

**SOUTHWEST CHAPTER**  
**AMERICAN COLLEGE OF SPORTS MEDICINE**  
**2017 ANNUAL MEETING**



October 20-21, 2017

Hilton Long Beach  
Long Beach, California

Jointly sponsored by the American College of Sports Medicine  
and the Southwest Chapter of the American College of Sports Medicine



# Second Floor

Hilton Long Beach

*Welcome to the*

37<sup>th</sup> Annual Meeting

of the

Southwest Regional Chapter

of the

**AMERICAN COLLEGE  
of SPORTS MEDICINE <sub>SM</sub>**

**October 20-21, 2017**

**Hilton Long Beach  
Long Beach, California**

**Jointly sponsored by the American College of Sports  
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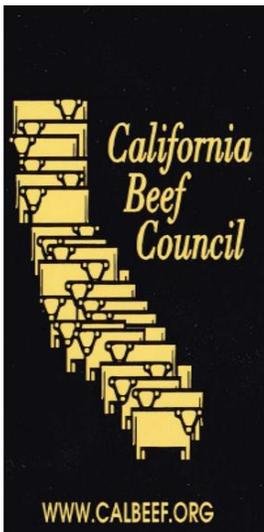
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**FRIDAY, 20 OCTOBER 2017, continued**

**Undergraduate Student Research 11:00 am-12:15 pm International I & II**

Moderator: Trevor Gillum, Ph.D., California Baptist University

**11:00 Acute Responses to the 7-Minute Workout**

Riegler M<sup>1</sup>, Stotz G, Fitzgerald K, Munoz CK, Lewis J, Ring S, Astorino TA  
Department of Kinesiology, CSU-San Marcos, San Marcos, California.

**11:15 Impact of Daily Exercise Compared to Exercise on Alternating Days on Post-Exercise Hypotension in Prehypertensive Men**

Dreos, Connor. Lentz, Rebecca. Palmani, Ezekial. Morse, Tabor. Votaw, Malachi. Durnil, Lydia. Horta, Dino. Zeigler, Zachary.  
College of Science, Engineering, and Technology, Grand Canyon University, Phoenix, AZ.

**11:30 Efficacy of Acute Caffeine Intake on Performance and Metabolic Responses during the 7-Minute Workout**

Holstrom, Patrick, Astorino, Todd Ph.D  
Department of Kinesiology, California State University San Marcos, CA

**11:45 Biomechanical Analyses of Hindlimb Suspended Rodent Caudal Discs**

Kristine T. Khieu<sup>1,2</sup>, Jeannie F. Bailey<sup>1</sup>, Devante A. Horne<sup>1</sup>, Ellen C. Liebenberg<sup>1</sup>, Alan R. Hargens<sup>2</sup>, Jeffrey C. Lotz<sup>1</sup>  
<sup>1</sup>University of California, San Francisco, CA, <sup>2</sup>University of California, San Diego, CA

**12:00 The Effect of Cold-Water Immersion on Running Mechanics**

DiBenedetto, Lucas M., Wiegand, Kristyne, Freedman Silvernail, Julia  
Department of Kinesiology and Nutrition Sciences, University of Nevada-Las Vegas

**FRIDAY, 20 OCTOBER 2017, continued**

**Concurrent Colloquia**

**11:00 am – 12:30 pm**

**For The Students**

**Pacific 1**

Mastering Presentations

Len Kravitz, Ph.D., University of New Mexico

Why Wrestle when You Can Dance: Integrating Motivational Interviewing  
Into Clinical Exercise Physiology

Robert Scales, Mayo Clinic, Scottsdale, Arizona

**Environmental Considerations for Performance**

**Pacific 2**

Palm Cooling and Performance: Why and How It Works

Young Sub Kwon, Ph.D., Humboldt State University

Cross-tolerance between Heat and Hypoxia – What’s the Deal?

Ailish Sheard, Ph.D., California State University, Los Angeles

Adaptations and Limits to Human Performance at High Altitude

Christine Mermier, Ph.D., University of New Mexico

**LUNCH**

**12:30 PM- 1:45 PM**

**Concurrent Colloquia**

**1:45 am – 3:15 pm**

**High Intensity Interval Training**

**Pacific 1**

HIIT in Cardiac Rehab

Cornelius Puiulet, M.S, University of New Mexico

HIIT: What Do We Know About Detraining?

Fabiano Amorim, Ph.D., University of New Mexico

Individual Responses to High Intensity Interval Training – does this MEAN matter?

Todd Astorino, Ph.D., California State University, San Marcos

**Running on Empty:**

**Pacific 2**

**Exercise Compulsion and Eating Disorders**

Kathryne Parker, M.S., RD

Jen Lombardi, MFT, CEDS

**FRIDAY, 20 OCTOBER 2017, continued**

**Graduate Student Research**

**1:45 pm – 3:15 pm**

**International I & II**

Moderator: Trevor Gillum, Ph.D., California Baptist University

- 1:45 **Quadriceps Impairment is Associated with Knee Mechanics during Gait in Obese Young Adults**  
Vakula, Michael N.<sup>1,2</sup>, Fisher, Koren L.<sup>1</sup>, Costa, Pablo B.<sup>1</sup>, Pamukoff, Derek N.<sup>1</sup>  
Department of Kinesiology, California State University, Fullerton, CA. <sup>2</sup>Department of Kinesiology, Utah State University, Logan, UT
- 2:00 **Aged Human Skeletal Muscle is Characterized by an Asynchronous and Aberrant Response to Damage**  
Sorensen, Jacob R., Skousen, Caitlin, Holland, Alex, Williams, Kyle, & Hyldahl, Robert D.  
Department of Exercise Sciences, Brigham Young University, Provo, Utah, USA
- 2:15 **Relationship between the initial drive block movement to measures of linear and change of direction speed in high school offensive lineman.**  
Kyle Collins and Robert G. Lockie  
Department of Kinesiology, California State University, Fullerton, Fullerton, CA, USA.
- 2:30 **Equity in the Outdoors: An Assessment of Local Recreation and Park Plans**  
Westbrook, Casey, Zieff, Susan, Bolter, Nicole, Lorenz, Kent  
Department of Kinesiology, San Francisco State University, San Francisco, CA
- 2:45 **Quantifying Compensations at the Whole Body Level during Gait in Individuals Post-ACL**  
Lin, Paige E., Neamat Allah, Neama H., Yano, Stephanie M., Alsalahat, Andrea L., Sigward, Susan M.  
Division of Biokinesiology and Physical Therapy, University of Southern California
- 3:00 **Implementation of a Nutrition Education Curriculum to Optimize Carbohydrate and Energy Intake among Male and Female Adolescent Distance Runners**  
Alaina Coffey, Virginia Gray, Nicole Alai, Michelle Barrack  
Department of Kinesiology, California State University, Long Beach

**FRIDAY, 20 OCTOBER 2017, continued**

**Concurrent Colloquia**

**3:30 pm – 5:00 pm**

**Technology Utilization for Health**

**Pacific 1**

Remote Monitoring, Wearables, and Telehealth Can Boost Health Outcomes  
Michelle Alencar, Ph.D., California State University, Long Beach

Haptic Robotics: Applications for Rehabilitation and Health Equity  
Charmayne Hughes, Ph.D., San Francisco State University

Older People Won't Use Mobile Technology? Think Again; the Future of Healthy Aging  
Nobuko (Kay) Hongu, Ph.D., University of Arizona

**Body Weight Training**

**Pacific 2**

A Systematic Approach to Effective Bodyweight Exercise Programming  
Chris Frankel, M.S., Head of Human Performance - TRX

From Push-ups to the Podium: Body Weight Training in Elite Paralympic Sport  
Sam Gardner, United States Olympic Center

Mechanism of the Repeated Bout Effect  
Rob Hyldahl, Ph.D., Brigham Young University

**Functional Capacity in Older Adults**

**International I & II**

Biomechanical Risk Factors Associated with Falls History in Older Adults  
David Keeley, Ph.D., New Mexico State University

Supplements and Programmed Resistance on Body Composition and Functional Capacity in Older Adults  
Sang-Rok Lee, Ph.D., New Mexico State University

Physical Functional Decline in Late Life and Implications for Physical Activity Interventions  
Robert Woods, Ph.D., New Mexico State University

Remote Sensing for the Collection of Functional Movement and CDC STEADI test data  
Eryn Murphy, Ph.D., New Mexico State University

**FRIDAY, 20 OCTOBER 2017, continued**

***SOCIAL EVENT***

**International III, IV, & V**

**5:00 - 7:30 PM**

**Poster Presentations**

**No Host Wine/Cheese Reception**

***SPECIAL EVENT***

**International I & II**

**7:00 - 8:00 PM**

***Student Jeopardy Bowl***



**SATURDAY, 21 OCTOBER 2017**

**Registration & Exhibits**

**Foyer**

**7:00 am – 9:30 am**

***Social Event***

**International III, IV, & V**

**7:30 -9:30 AM**

**Poster Presentations**

**Continental Breakfast**

**Concurrent Colloquia**

**9:00 am – 10:30 am**

**Vibration in the Human Body:**

**Pacific 1**

**Mechanics, Measurement, and Application**

Vibration Application and the Human Body

J. Brent Feland, MSPT, Ph.D., Brigham Young University

Mechanics of Vibration

Jonathon D. Blotter, Ph.D., Brigham Young University

Vibration Transmissibility and Measurement

Brian Burton, M.S. & Cameron Smallwood, M.S., Brigham Young University

**Become an Exercise is Medicine Ambassador**

**Pacific 2**

**EIM Training Workshop**

Chad Rethorst, Ph.D., University of Texas Southwestern



**SATURDAY, 21 OCTOBER 2017, continued**

**Colloquium**

**International I & II**

**Pulmonary System Limitations to Endurance Exercise**

**9:00 am – 9:45 am**

Markus Amann, Ph.D., University of Utah, School of Medicine

***Gatorade Sports Science Lecture***

**9:45 am – 10:30 am**

**International I & II**



**Nutrition for Pro Athletes**

Karen Freeman, M.S., RD, CSSD



**General Session**

**10:30 am – 12:00 pm**

**International I & II**

Moderator: Dale Wagner, Ph.D., President, SWACSM  
Utah State University

**Student Awards** – Trevor Gillum, Ph.D., California Baptist University

**Founders Lecture**

***Tracking Athletes: The Ethics of Biometric Technologies***

Katrina Karkazis, Ph.D., MPH  
Stanford University

**Recognition of Host School: University of New Mexico**

**Business Meeting**

## **SOUTHWEST ACSM RECOGNITION AWARD**

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| 1982 | D.B. Dill          |
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| 1990 | Lawrence Morehouse |
| 1991 | William Haskell    |
| 1992 | Ralph Paffenbarger |
| 1993 | Franklin Henry     |
| 1994 | George Brooks      |
| 1995 | James Skinner      |
| 1996 | Christine Wells    |
| 1997 | Lawrence Golding   |
| 1998 | Ken Baldwin        |
| 1999 | Robert Conlee      |
| 2000 | Gail Butterfield   |
| 2001 | R. James Barnard   |
| 2002 | Gene Adams         |
| 2003 | Vivian Heyward     |
| 2004 | Fred Roby          |
| 2005 | Marta Van Loan     |
| 2006 | Jack Wilmore       |
| 2007 | Larry Verity       |
| 2008 | Steven Loy         |
| 2009 | Lorraine Turcotte  |
| 2010 | William Beam       |
| 2011 | Priscilla MacRae   |
| 2012 | Barbara Ainsworth  |
| 2013 | J. Richard Coast   |
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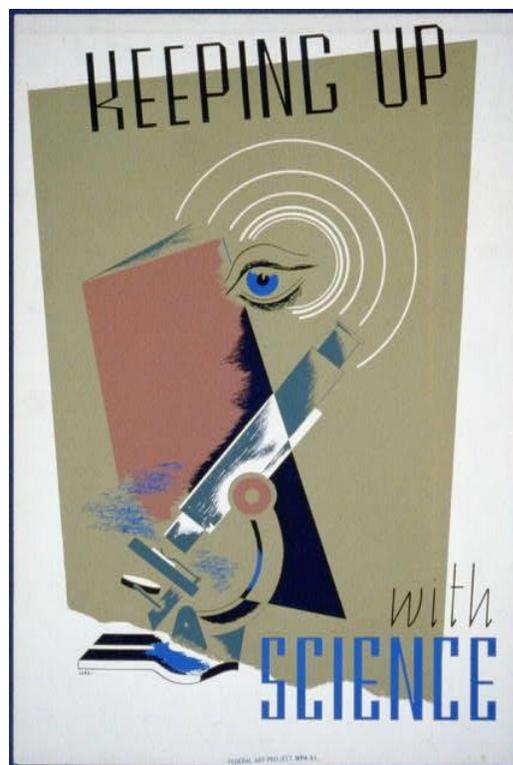
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**2017 SWACSM**

**Annual Meeting**

**ABSTRACTS**

**Student Research Award  
Poster Presentations**



# UNDERGRADUATE STUDENT RESEARCH AWARD

## 1. ACUTE RESPONSES TO THE 7-MINUTE WORKOUT

Riegler M<sup>1</sup>, Stotz G, Fitzgerald K, Munoz CK, Lewis J, Ring S, Astorino TA

Department of Kinesiology, CSU-San Marcos, San Marcos, California.

**Purpose:** A popular smartphone application called the 7-Minute Workout (7Min) claims to be scientifically proven to promote weight loss and improve cardiovascular function. The application has 10 million downloads and has been reviewed by 350,000 users. However, changes in metabolic and perceptual variables in response to 7Min are unknown. **AIM:** Our study compared acute responses between 7Min and a time-matched session of cycling-based high-intensity interval exercise (HIIE). **METHODS:** Fourteen active men and women (age and VO<sub>2</sub>max = 25.4 ± 8.3 years and 40.5 ± 6.4 ml·kg<sup>-1</sup>·min<sup>-1</sup>) initially underwent VO<sub>2</sub>max testing. During 2 subsequent sessions separated by ≥48 hours, they completed 7Min or HIIE. During exercise, oxygen uptake (VO<sub>2</sub>), heart rate (HR), blood lactate concentration (BLa), and rating of perceived exertion were measured. **RESULTS:** Peak VO<sub>2</sub> was higher ( $p < 0.001$ ) in HIIE vs. 7Min, and HIIE yielded greater ( $p < 0.001$ ) mean VO<sub>2</sub> (1.83 ± 0.41 L·min<sup>-1</sup> vs. 1.44 ± 0.32 L·min<sup>-1</sup>) and HR (159.0 ± 10.7 b·min<sup>-1</sup> vs. 140.7 ± 18.3 b·min<sup>-1</sup>,  $p < 0.001$ ) vs. 7Min. Blood lactate concentration increased ( $p < 0.001$ ) during exercise but was similar between bouts ( $p = 0.07$ ). Rating of perceived exertion was higher ( $p = 0.008$ ) in response to HIIE vs. 7Min. **DISCUSSION:** Although 7Min yields lower peak VO<sub>2</sub> and HR than HIIE, it is characterized by bursts approaching 90 %HRmax and causes significant BLa accumulation, representing vigorous exercise. Nevertheless, 7Min is on the low end of the intensity spectrum, which questions whether it represents true HIIE and will confer similar benefits if performed long term.

## 3. EFFICACY OF ACUTE CAFFEINE INTAKE ON PERFORMANCE AND METABOLIC RESPONSES DURING THE 7 MINUTE WORKOUT

Holstrom, Patrick<sup>1</sup>, Astorino, Todd Ph.D<sup>1</sup>

<sup>1</sup>Department of Kinesiology, California State University San Marcos, CA State University San Marcos, CA

**Introduction:** Caffeine (CAF) has been used as a performance booster for various exercise regimens and sports. Research has shown high intensity interval training to result in superior adaptations compared to moderate intensity continuous training. This study focused on determining the efficacy of CAF on high intensity circuit training performance. **Methods:** In this study, 10 active men and women were recruited. Initially subjects underwent a VO<sub>2</sub>max test on the cycle ergometer to establish fitness. On three subsequent days, they performed 2 bouts of the 7 Minute Exercise App, with a 2-min recovery in the middle after ingesting a caffeinated drink (Placebo, 2mg/kg bw, 5mg/kg bw). Each bout consisted of twelve 30 second exercises with a 10 second rest between exercises. Measurements for mean and peak VO<sub>2</sub>, BLa, upper and lower body repetitions were recorded. **Results:** Results showed significant difference in blood lactate ( $F=3.740$ ,  $p<0.05$ ) between doses of caffeine. Upper and lower body repetitions, mean and peak VO<sub>2</sub> were not significantly different with CAF caffeine. **Conclusion:** Our data show that CAF has little to no effect on improving performance of HIIT.

## 2. IMPACT OF DAILY EXERCISE COMPARED TO EXERCISE ON ALTERNATING DAYS ON POST-EXERCISE HYPOTENSION IN PREHYPERTENSIVE MEN

Dreos, Connor. Lentz, Rebecca. Palmani, Ezekial. Morse, Tabor. Votaw, Malachi. Durnil, Lydia. Horta, Dino. Zeigler, Zachary.

College of Science, Engineering, and Technology, Grand Canyon University, Phoenix, AZ.

**Purpose:** Acute exercise can result in post-exercise hypotension (PEH) lasting up to 24-h. Whether exercise performed on consecutive days would lead to an accumulating PEH effect has yet to be determined. The purpose of this study was to compare daily exercise (DE) to exercise performed on alternating days (AE) and a control (CON) on PEH. **Methods:** Sedentary, PHTN men 18-30yr participated in this three-arm randomized cross-over trial. The primary comparison was the magnitude of PEH between three groups (control (CON), alternating exercise (AE), and daily exercise (DE)) and within each group over time (day 1, 2, and 3). Both exercise groups were prescribed the same exercise intensity (70-75%HRmax), and total duration of exercise (90min) on a cycle ergometer. DE performed exercise on three consecutive days (three bouts of 30min). AE performed exercise on two alternating days (2 bouts of 45min). After exercise sessions subjects remained in the laboratory for 1-h while BP was taken every 5min. **Results:** 7 overweight (BMI=29±4kg/m<sup>2</sup>), young (22±2years), moderately fit (VO<sub>2</sub>peak=34±6ml.kg.min), PHTN (126±10/73±6mmHg) male subjects completed the study. There was a significant day by condition effect such that on day 3, MAP (DE 87 ± 7, AE 89 ± 9, CON 90 ± 8 mmHg), SBP (CON 123 ± 9, AE 123 ± 12, DE 119 ± 12 mmHg), and DBP (CON 73 ± 6, AE 72 ± 8, DE 71 ± 7 mmHg) were lowest during the post-exercise DE condition ( $P < 0.05$ ). **Conclusion:** In conclusion, the PEH effect appeared to accumulate during DE such that day 3 was the lowest of all conditions and days. It has been suggested that the current recommendation on training frequency should be changed from accumulating 30 min on most, preferably all days of the week, to *all days* of the week. Our preliminary findings support this notion.

## 4. BIOMECHANICAL ANALYSES OF HINDLIMB SUSPENDED RODENT CAUDAL DISCS

Kristine T. Khieu<sup>1,2</sup>, Jeannie F. Bailey<sup>1</sup>, Devante A. Horne<sup>1</sup>, Ellen C. Liebenberg<sup>1</sup>, Alan R. Hargens<sup>2</sup>, Jeffrey C. Lotz<sup>1</sup>

<sup>1</sup>University of California, San Francisco, CA, <sup>2</sup>University of California, San Diego, CA

**Purpose:** Hindlimb suspension has been accepted as a ground-based model of microgravity and prolonged bed rest/inactivity. This unloading model mimics the physiological changes associated, such as bone and muscle loss. The purpose of this study was to perform four-point bending tests on caudal discs to determine biomechanical parameters (max strength to failure, toe displacement, and stiffness) and histology to determine the failure mode. **Methods:** Spinal segments were obtained from 167 male and female Long-Evans rats at C11/C12 (aged 3 months – 9 months, loaded for 7 – 90 days, and recovered up to 90 days). A total of 79 test animals were subjected to hindlimb suspension with 88 controls. Each segment was loaded to failure using four-point bending (ElectroForce 3200; Bose, Eden Prairie, MN). Strength was defined as the force at failure, and stiffness as the slope of the linear region. Failed segments were fixed in formalin and stained with a trichrome Mallory-Heidenhain and hematoxylin and eosin stain to analyze location of failure. **Results:** On average, control animals had a normalized strength of 0.49 ± 0.16 N/mm<sup>2</sup> and unloaded had a value of 0.52 ± 0.16 N/mm<sup>2</sup> ( $p>0.05$ ). The stiffness and toe displacement of controls were 16.46 ± 6.87 N/mm and 0.67 ± 0.19 mm respectively, while the unloaded group had a stiffness of 17.73 ± 6.88 N/mm and toe displacement of 0.66 ± 0.19 mm ( $p>0.05$ ). Histological analyses showed consistent failure among all groups at the endplate junction, where the annulus fibers attach to the fibrocartilage of the bony endplate. **Conclusion:** There were no statistically significant differences in biomechanical values or failure mode between control and hindlimb suspended groups. This implies that hindlimb suspension may not be a useful model for detecting the effects of unloading on caudal motion segments or mimicking the effects of inactivity/bed rest on bone biomechanics.

## 5. THE EFFECT OF COLD-WATER IMMERSION ON RUNNING MECHANICS

DiBenedetto, Lucas M.<sup>1</sup>, Wiegand, Kristyne<sup>1</sup>, Freedman Silvernail, Julia<sup>1</sup>

<sup>1</sup>Department of Kinesiology and Nutrition Sciences, University of Nevada-Las Vegas, Las Vegas, NV

**Purpose:** Athletes commonly use cryotherapy as a treatment for acute, minor injuries to a joint or muscle. For example, athletes may choose to use cryotherapy as a treatment for an ankle strain or contusion to the lower leg to allow them to re-enter a game. The purpose of this study was to investigate the effects of cold water immersion on running mechanics. Variables of interest included preferred running velocity, peak ankle power, peak ankle angle, ankle angle at heel strike, and ankle angle at peak power. **Methods:** Fifteen healthy male and female participants (24.6±5.74 years) reported to the UNLV Sports Injury Research Center. Kinematic and kinetic data were collected using a 3D motion capture system while participants ran at a comfortable pace along a 10-m runway embedded with force platforms. Ten trials were completed before and after a 20-minute cold water immersion treatment. The water temperature was maintained at 10-12°C for the duration of the treatment. **Results:** Preferred velocity, peak ankle power, and ankle angle at heel strike decreased significantly (-0.13 m/s,  $p=0.004$ ; -53.69 Nm/s,  $p=0.011$ ; -2.17 degrees,  $p=0.045$ , respectively) after the cold-water immersion. Ankle angle at peak ankle power ( $p=0.762$ ) and peak ankle angle ( $p=0.273$ ) were not different between the two conditions. **Conclusion:** The cryotherapy treatment influenced preferred velocity, peak ankle power, and ankle angle at heel strike. Considering the potential changes to performance and injury risk from the treatment, these effects on running mechanics may influence the decision for athletes to utilize cryotherapy immediately before returning to play.

# GRADUATE STUDENT RESEARCH AWARD

## 1. QUADRICEPS IMPAIRMENT IS ASSOCIATED WITH KNEE MECHANICS DURING GAIT IN OBESE YOUNG ADULTS

Vakula, Michael N.<sup>1,2</sup>, Fisher, Koren L.<sup>1</sup>, Costa, Pablo B.<sup>1</sup>, Pamukoff, Derek N.<sup>1</sup>

<sup>1</sup>Department of Kinesiology, California State University, Fullerton, CA.

<sup>2</sup>Department of Kinesiology, Utah State University, Logan, UT

**Background:** Approximately 33% of the adult population in the United States is considered obese (28), which increases the risk of comorbidities such as osteoarthritis (OA) (34). The most notable feature of OA is the loss of articular cartilage within a joint, resulting in pain and physical disability (3). The association between obesity and OA is due to a combination of mechanical and metabolic factors (3). Greater weight from obesity adds stress to articular cartilage in weight-bearing joints, and contributes to cartilage breakdown (21). Previous studies have demonstrated an association between gait biomechanics and OA in older populations (15, 25), but data are lacking in young obese individuals without OA. Young obese compared to normal weight adults have lesser knee flexion excursion (KFE) (31), and greater vertical loading rates (vLR) during gait (30, 31). However, the source of aberrant gait mechanics in obese adults is unclear, and could be related to impaired shock attenuation from weakened musculature in the lower extremity. Obese young adults have deficits in quadriceps function after normalizing to fat-free mass, and walk slower compared to normal weight young adults. RTD was moderately associated with KEM at habitual gait speed, and KEM was also lesser in obese compared to normal weight adults. The lesser KEM in the obese group suggests that obese young adults walk with a quadriceps avoidance gait, which may contribute to knee OA development. Exercise interventions targeting RTD may be useful for improving walking mechanics in obese adults.

## 3. RELATIONSHIP BETWEEN THE INITIAL DRIVE BLOCK MOVEMENT TO MEASURES OF LINEAR AND CHANGE OF DIRECTION SPEED IN HIGH SCHOOL OFFENSIVE LINEMAN.

Collins, Kyle S.<sup>1</sup>, Lockie, Robert G.<sup>1</sup>

<sup>1</sup>Human Performance Laboratory, Department of Kinesiology, California State University, Fullerton

**Purpose:** Football requires high levels of strength, power, speed, and agility. The offensive line (OL) is a distinct position responsible for blocking, the most fundamental type being a drive block. Little research exists on the specific movements of the OL, and relationships to field performance tests in high school players. This study investigated relationships between the average velocity (avgV) and peak velocity (peakV) of the OL drive block test (DBT) to the 36.58-meter (m) sprint and pro-agility shuttle. **Methods:** Fifteen male OL football players from the same high school participated in this study. Participants were measured for the DBT with a horizontally-mounted linear position transducer, attached to a waist belt as the OL fired from a three-point stance into a blocking pad. 0-2.29, 0-4.57, 0-9.14, and 0-36.58 m intervals were recorded for linear speed. The first and second change of direction (COD), and total time were recorded for the pro-agility shuttle. COD deficit (difference between linear 0-9.14 m, and a COD of the pro-agility) was derived from both the first (COD deficit 1) and second COD (COD deficit 2) of the pro-agility shuttle. Pearson's correlations ( $p < 0.05$ ) investigated relationships between the avgV and peakV of the DBT and the speed tests. **Results:** The DBT avgV ( $r = -0.655$ ) and peakV ( $r = -0.575$ ) had significant relationships with the 2<sup>nd</sup> COD of the pro-agility shuttle. Similarly, avgV ( $r = -0.576$ ) and peakV ( $r = -0.533$ ) correlated with COD deficit 2. **Conclusion:** The traditional measures of performance in high school football players may not be the best indicators of OL drive block speed. Football coaches could attempt to measure pro-agility shuttle splits, and COD deficit derived from this test, to assess the movement qualities of OL, as they relate more to a movement-specific DBT designed specifically for the OL.

## 2. AGED HUMAN SKELETAL MUSCLE IS CHARACTERIZED BY AN ASYNCHRONOUS AND ABERRANT RESPONSE TO DAMAGE

Sorensen, Jacob R.<sup>1</sup>, Skousen, Caitlin.<sup>1</sup>, Holland, Alex.<sup>1</sup>, Williams, Kyle.<sup>1</sup> & Hyldahl, Robert D.<sup>1</sup>

<sup>1</sup> Department of Exercise Sciences, Brigham Young University, Provo, Utah, USA

**Purpose:** The remarkable capacity of skeletal muscle to adapt and repair following injury is attenuated with age. The purpose of this study was to uncover potential factors involved in the impaired regenerative response of aged human skeletal muscle. We comprehensively assessed the molecular stress response following muscle damage in old and young individuals. **Methods:** 10 young ( $22.7 \pm 2.25$  yrs) and 8 physically active old ( $70.9 \pm 7.5$  yrs) subjects completed a bout of 300 lengthening contractions (LC), and muscle biopsies were taken pre-exercise and at 3, 24, and 72h post-exercise. High throughput multiplexing bead assays were used to analyze biopsy samples for protein content. **Results:** After the bout of LC's, muscle damage was evident by increased soreness (young:  $41 \pm 22$  vs old:  $28 \pm 21$  mm) and losses in isokinetic force production (Young:  $52 \pm 20$  and Old:  $34 \pm 18\%$ ). Old muscle displayed a heightened and asynchronous inflammatory and MAPK response compared to young muscle, with higher expression of MCP-1 (group,  $p=0.019$ ) that appeared at the later 24 and 72 h time points, and a rapid increase in NF-kb activity (group x time,  $p=0.05$ ). In the old, p38 proteins increased  $1.70 \pm 0.47$  fold at the 3 h time point, before returning to pre-exercise levels (group x time,  $p=0.0043$ ). Additionally, by 3 h post-exercise total JNK protein levels peaked to  $2.4 \pm 1.3$  fold of the pre-exercise value and remained significantly elevated at  $2.07 \pm 0.92$  fold 24 h post-exercise (group x time,  $p=0.038$ ) before returning to pre-exercise levels. **Conclusion:** skeletal muscle of physically active older individuals is characterized by a dysregulated and asynchronous inflammatory and MAPK response, each of which may individually or collectively contribute to the deterioration of muscle repair mechanisms that accompanies aging.

## 4. EQUITY IN THE OUTDOORS: AN ASSESSMENT OF LOCAL RECREATION AND PARK PLANS

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**Background:** The majority of Americans do not meet the minimum recommendations for physical activity (PA), despite documented health benefits. Recreation and Park Departments (RPD) have the potential to increase PA levels; however, evidence shows that over half of people are sedentary in parks. Underserved populations are disproportionately less active in parks which is attributable to a number of factors. RPD plans can direct action that will impact population level behavior and health, and have been identified as a strategy to promote and increase PA equity. **Purpose:** Assess local-level RPD plans for inclusion of PA equity goals, and plan development and implementation components. **Methods:** Park plans were selected from 50 cities across the US using a stratified random sampling technique and analyzed using a policy analysis coding tool. Descriptive statistics were calculated for all variables. **Results:** Thirty-four plans met inclusion criteria for analysis. The majority of plans (62.9%) were recreation and park master plans and the remainder were city general plans with a recreation and park element (37.1%). Content related to PA was included in (51.4%) of plans analyzed. PA-related content included in plans focused on the built environment, programs, and promotions. Few RPD plans included content related to addressing PA in underserved populations (5.7%). **Discussion:** Despite parks potential to reduce physical inactivity among underserved populations, the majority of RPD plans have not developed goals related to increasing PA among underserved populations in parks. **Conclusion:** RPD plan developers have an opportunity to include PA equity goals to increase PA opportunities for underserved populations.

## 5. QUANTIFYING COMPENSATIONS AT THE WHOLE BODY LEVEL DURING GAIT IN INDIVIDUALS POST-ACLR

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**PURPOSE:** Decreases in vertical (vGRF) and posterior ground reaction forces (pGRF) occur during loading response 3 months following ACL reconstruction (ACLR). These alterations occur during double limb support (DLS) which may allow for interlimb compensations. The purpose of this study was to compare GRFs during DLS between individuals post-ACLR and controls. **METHODS:** 17 individuals (11F, 24.4±10.7yrs) 3 months (113.9±17.3days) post-ACLR and 10 controls (5F, 26.3±8.8yrs) performed 4 walking trials at a standardized velocity of 1.4 m/s. Stance phase was divided into initial DLS (iDLS) and terminal DLS (tDLS). Maximum vGRF and pGRF during iDLS and maximum GRF and anterior GRF (aGRF) during tDLS were identified for ACLr, non-surgical (NS) and control (CTRL) limbs. Between limb ratios for vertical and anteroposterior GRFs were calculated: (Reference limb GRF during iDLS)/(Contralateral limb GRF during tDLS). Variables of interest were compared between limbs using one-way ANOVAs;  $\alpha=0.05$ , post hoc: paired and independent t-tests. **RESULTS:** Vertical ( $p=0.007$ , ACLr:0.918±0.020, NS:1.004±0.018;  $p=0.034$ , CTRL:0.993±0.027) and anteroposterior GRF ratios ( $p<0.001$ , ACLr:0.834±0.027, NS:0.975±0.026;  $p=0.001$ , CTRL:1.005±0.0432) were reduced in ACLr compared to NS and CTRL limbs. Maximum vGRF ( $p=0.020$ , ACLr:1.010±0.013, NS:1.056±0.014BW;  $p=0.05$ , CTRL:1.057±0.021BW) and pGRF ( $p=0.001$ , ACLr:0.189±0.007, NS:0.218±0.007BW;  $p=0.014$ , CTRL:0.217±0.007BW) during iDLS were reduced in ACLr compared to NS and CTRL limbs. Maximum vGRF of the contralateral limb during tDLS was greater when the ACLr limb was in iDLS compared to the NS and CTRL limbs ( $p=0.006$ , ACLr:1.104±0.013, NS:1.054±0.010BW;  $p=0.108$ , ES: 0.67, CTRL:1.069±0.016BW). No differences between limbs in aGRF were observed ( $p=0.698$ , ACLr:0.227±0.006, NS:0.225±0.006, CTRL:0.219±0.009BW). **CONCLUSIONS:** Alterations in vertical GRF reflect a strategy of interlimb compensations post-ACLR and reduce loading in the surgical limb and shift loading to the non-surgical trailing limb. However, in the anteroposterior direction, no interlimb compensation was observed, suggesting other strategies may be utilized to reduce loading, such as altering kinematics, center of mass kinematics or center of pressure.

## 6. IMPLEMENTATION OF A NUTRITION EDUCATION CURRICULUM TO OPTIMIZE CARBOHYDRATE AND ENERGY INTAKE AMONG MALE AND FEMALE ADOLESCENT DISTANCE RUNNERS

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While adolescent distance runners are at risk for energy deficiency, limited prior studies have evaluated the effect of a nutrition education intervention. **PURPOSE:** We evaluated the effect of a four-week, nutrition education intervention on male and female high school cross-country runners' nutrition knowledge and self-efficacy in preparing and consuming nutrient-dense carbohydrate foods. **METHODS:** This study utilized a quasi-experimental, pretest-posttest design, among a sample of 27 ( $n=14$  female,  $n=13$  male) adolescent cross-country runners, age,  $15.6 \pm 1.1$ y. Runners attended four weekly 1-hour lessons, each with a pre-test, interactive lecture, post-test, lesson activity, and snack. Participants also completed a weekly application activity to translate what they learned to their eating. Body weight, body composition were measured at baseline using bioelectrical impedance analysis (BIA). Difference in nutrition knowledge and self-efficacy scores, before and after each lesson, were measured with paired samples t-tests. **RESULTS:** Mean nutrition knowledge scores significantly increased between the pre- and post-test for lessons 1 and 2 ( $2.5 \pm 0.8$  vs.  $3.8 \pm 0.9$ ,  $p<0.001$ ;  $2.8 \pm 0.8$  vs.  $4.4 \pm 1.0$ ,  $p<0.001$ , respectively). During lesson 1, runners were able to identify a higher number of nutrient-rich carbohydrate foods on the pre-test compared to post-test ( $9.6 \pm 0.6$  vs.  $13.4 \pm 0.4$ ,  $p<0.001$ ). Pre- and post-test nutrition knowledge scores did not significantly differ for lesson 3 and 4. Mean self-efficacy scores significantly increased, indicating improved self-efficacy, from pre- to post-test for all four lessons ( $p=.010$ ;  $p=.003$ ;  $p<.001$ ;  $p<.001$ ). After lesson 4, 45.8% ( $n=11$ ) of runners reported increasing intake of nutrient-dense carbohydrate foods; 16.6% ( $n=4$ ) reported eating more; 16.6% ( $n=4$ ) became more aware of their food choices, 6.5% ( $n=2$ ) reported improvement in energy. **CONCLUSIONS:** These findings suggest a benefit of the nutrition education curriculum to increase nutrition knowledge and self-efficacy to optimize intake of nutrient-dense carbohydrate foods among adolescent endurance runners.

# FRIDAY POSTER PRESENTATIONS

## 1. INVESTIGATING THE RELATIONSHIP BETWEEN BALANCE ABILITY/LEG DISCREPANCY AND EXERCISE TYPE

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Balance ability is a fundamental aspect of daily and competitive life. Superior proprioception has been linked to improved sports performance and reduced injury risk [1,2,4] while weight imbalances have shown to negatively affect performance and increase incidence of injury [3,4]. Particularly in athletes, postural performance is improved through balance and strength training [4]. Postural balance is characterized by the ability to achieve and maintain equilibrium without falling [2,4]. However, minimal clinical research has been done investigating the differences in balance ability and leg discrepancy between varying sports and exercise. **Purpose:** Compare exercise type with balance ability and examine leg discrepancy. **Methods:** A total of 39 college students (21 males, 18 females, 20.5 ± 1.19 years) participated in this study. Data was collected on one day. Balance and weight distribution was assessed using the Stability Evaluation Test and Weight Distribution/Squat Test on the NeuroCom<sup>®</sup> Balance Manager. Weight distribution was measured at 0°, 30°, 60°, and 90° of knee flexion. **Results:** Analysis revealed significant differences ( $p < 0.05$ ) in weight distribution between dominant and nondominant legs at 0°, 30°, 60°, 90° ( $p = 0.007$ ,  $p = 0.001$ ,  $p = 0.000$ ,  $p = 0.000$ ). A significant difference exists between those who play sports and those who do not during the single leg balance test on foam ( $p = 0.025$ ). A difference was found between dominant and nondominant legs at 60°, 90° of knee flexion between running and stair activity ( $p = 0.002$ ,  $p = 0.047$ ). A difference between cycling and running during tandem stance on firm ( $p = 0.028$ ) and between exercise and no exercise during the single leg balance test on foam ( $p = 0.014$ ). **Conclusion:** Although more research is needed, this study found that weight distribution is not symmetrical and type of sport or activity has an impact on balance ability. These findings can provide insight into training programs to combat this difference to reduce injury risk or increase performance.

## 3. AN EXAMINATION OF LEG FORCE PRODUCTION IN YOUTH SOCCER ATHLETES

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**Purpose:** Previous research has indicated a possible link between bilateral asymmetry in leg force production and knee injuries in athletes involved in sports with jumping and cutting activities. The purpose of this study was to examine the leg force production in youth soccer athletes age 8 to 18 years utilizing force plate technology. **Methods:** Eighty-seven girl and 79 boy youth soccer athletes volunteered for this study. Athletes were divided into five age groups. Following 5 minutes of the usual team warm up, the athletes performed five countermovement jumps with one leg on each force plate. Athletes were given a one-minute rest between jumps. The three highest force readings for each leg were used to calculate the percent difference in leg force production. **Results:** Within groups, there were significant differences ( $p < 0.001$ ) between right and left leg force production for each sex, except Group 1 boys ( $p = 0.08$ ) and Group 2 girls ( $p = 0.193$ ). When examining force production between groups, no differences were found between Groups 1 and 2 when comparing mean right and left leg force production (right  $p = 0.448$  and left  $p = 0.787$ ). All other groups had significant differences ( $p < 0.002$ ). The range of percent difference between right and left leg for the boys was 5.4% (Group 1) to 18.2% (Group 2) and 9.4% (Group 1) to 20.3% (Group 5) for girls. **Discussion:** The results of this study show asymmetric force production in most age groups in this sample of youth soccer athletes. The older age groups had a percent difference ranging from 16.0% (Group 5 boys) to 20.3% (Group 5 girls). Future investigations are needed to observe the correlation between asymmetric leg force production and occurrence of leg injury.

## 2. HEALTH-RELATED COMPONENTS OF FITNESS OF SPECIAL WEAPONS AND TACTICS TEAM MEMBERS

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**Purpose:** Some tactical occupations involve high intensity efforts that—when combined with low-level fitness—elevates the individual's risk of experiencing a bodily injury or cardiovascular complication. The job demands of members in Special Weapons and Tactics (SWAT) teams of law enforcement agencies also involve heavy exertion, yet it remains uncertain whether they have adequate fitness levels to sustain high intensity efforts. The purpose of this investigation was to examine all five health-related fitness components of SWAT members. **Methods:** Fourteen healthy men (mean ± SD; age = 33.1 ± 5.7 y, height = 180.7 ± 5.4 cm, mass = 90.6 ± 10.0 kg) from SWAT teams of local law enforcement agencies completed five health-related fitness assessments. These included 1) calculation of body mass index (BMI) using height and weight measurements, 2) a one-repetition maximum (1RM) test of upper body strength on a bench press, 3) a graded exercise test on a treadmill to measure maximum oxygen uptake ( $\dot{V}O_{2max}$ ), 4) a YMCA submaximal bench press test, and 5) a Canadian forward flexion test. Descriptive statistics were calculated for all dependent variables. **Results:** Participants had a BMI of 27.7 ± 2.4 kg·m<sup>-2</sup>. Absolute and relative 1RM on the bench press were 120.9 ± 14.5 kg and 1.35 ± 0.22 kg·kg<sup>-1</sup>, respectively.  $\dot{V}O_{2max}$  was 47.9 ± 5.5 ml·kg<sup>-1</sup>·min<sup>-1</sup>. Participants completed 52 ± 15 repetitions on the YMCA submaximal bench press test. Distance reached on the Canadian forward flexion test was 30.7 ± 5.7 cm. **Conclusion:** According to ACSM normative data, participants' BMI classified as overweight. Additionally, participants demonstrated very good to excellent levels of cardiorespiratory fitness, muscular strength, muscular endurance, and flexibility, suggesting their fitness levels are appropriate for the vigorous exertions involved in this occupation. This information is beneficial for fitness professionals who train the tactical population.

## 4. LEG FORCE PRODUCTION AND RATE OF FORCE DEVELOPMENT IN DIVISION I SOCCER WOMEN

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**Purpose.** Scientific evidence has demonstrated that bilateral asymmetries in leg force production can lead to an increased risk of anterior cruciate ligament (ACL) injuries, especially in women athletes. The purpose of the investigation was to examine the differences in leg force production and rate of force development (RFD) between the right and left legs of Division I women soccer athletes. **Methods.** Participants reported to the Applied Physiology Laboratory for one testing session. Participants warmed-up on a cycle ergometer for five minutes followed by five minutes of self-paced stretching. Participants performed a total of five countermovement jumps (CMJ) with their hands on hips. They were encouraged to give maximum effort in all jumps and were given one minute rest between jumps. Paired t-tests were used to determine differences in force production between dominant (DOM) and non-dominant (NDOM) legs. Jump data was also analyzed for average and peak RFD during the propulsion phases. Peak RFD was determined with the propulsion phase broken into 5 equal segments. **Results.** Thirteen women (Wt: 66.54 ± 6.36 kg; Ht: 167.15 ± 6.19cm) volunteered for the investigation. Analysis revealed a significant difference ( $p = 0.018$ ) between right (626.1 ± 124.6N) and left leg (683.6 ± 67.6N) force production. Nine of the 13 women had greater than a 10% difference in force production between right and left leg, and 5 had greater than 15% difference. There was no difference in average or peak RFD between the legs. **Conclusion.** In this group of collegiate soccer women, there was a significant difference in leg force production during a CMJ. Future testing should be utilized to determine whether seasonal changes affect the leg force production of collegiate soccer women and if a bilateral difference in force production increases the risk of leg injuries.

## 5. DIETARY HABITS OF A DIVISION I CROSS-COUNTRY TEAM

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**Purpose:** Scientific evidence has demonstrated that proper intake of both macronutrients and micronutrients is vital in the performance and overall health of competitive athletes. The purpose of this investigation was to examine the dietary habits of a Division I cross-country team.

**Methods:** Dietary intake of 26 cross country runners (16 men and 10 women; mean age=19.5±1.1yrs) was assessed using the Block 2014 Food Frequency Questionnaire. **Results:** Total reported caloric intake for the men was 3,320kcal and the women 2,170kcal. For men, mean carbohydrate (CHO) intake was 6.1±1.18g/kgBW/day, mean protein (PRO) intake was 2.0±0.5g/kgBW/day. For women, mean CHO intake was 5.2±1.3g/kgBW/day and for PRO was 1.5±0.3g/kgBW/day. Mean team calcium, vitamin D, and potassium, intake was 1,565.2±500.5mg, 311.5±127.3IU, and 3,759.8±1,145.2mg respectively. Mean iron intake for the women was 45.0±31.5mg. **Conclusion:** In this group of Division I cross-country runners, the men were within the recommended range for athletes for carbohydrate and protein intake, the women only met the recommendation in protein intake. Eight women did not meet the athlete recommendation for CHO intake. For calcium, potassium, and iron, the team mean values were within the suggested ranges; however there was a wide range of intake values amongst the athletes. None of the athletes met the RDA (600IU) for dietary vitamin D intake; however, this group of athletes train outside in the afternoon, so vitamin D via sun exposure may provide adequate vitamin D. Monitoring of an athlete's dietary habits, augmented with blood testing, may provide a more thorough picture of potential problem areas, especially in endurance athletes. Proper nutrient intake is vital for the development, function, and repair of the muscular, skeletal, and nervous systems, especially in athletes striving to attain maximal performance and health.

## 7. STANCE WIDTH AND VERTICAL JUMP HEIGHT: DO ANTHROPOMETRIC CONSTRAINTS INFLUENCE PERFORMANCE

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**Purpose:** Optimal stance width in sports has been traditionally seen as shoulder width apart. However, little is known about optimal stance widths that are altered to accommodate the individual. The Wright Balance System<sup>®</sup> is a method that personalizes one's stance width to enable maximal performance. The system divides the core into 3 main regions, upper, middle, and lower core. Based on Wright's system, one's dominant core region determines stance width. This study sought to investigate the Wright Balance<sup>®</sup> stance width and its effect on vertical jump height when performing a vertical jump test. It was hypothesized that the Wright Balance<sup>®</sup> stance width would outperform one's preferred stance width. **Methods:** Twenty six participants (age (21 ± 2): y/o, 13 males and 13 females) volunteered to participate in the study. Participants completed 3 trials of a vertical jump test with their preferred stance width and 3 trials using their determined Wright Balance<sup>®</sup> stance width. Between each trial was a 2 minute rest. Stance width order was counterbalanced across participants. Of the 3 trials, the max jump height was recorded. **Results:** The mean max jump height for preferred and Wright Balance<sup>®</sup> conditions were 20.08 ± 5.87 inches and 20.29 ± 5.80 inches, respectively. A paired samples t-test was used to compare the maximum vertical jump height for both conditions and revealed no significant differences,  $t(25) = 1.22, p = .234$ . **Conclusion:** There were no significant differences in jump height when comparing the results of a participant's preferred stance width and their Wright Balance<sup>®</sup> stance width. While there were no differences, there was a trend that favored higher vertical jump distances for the Wright Balance<sup>®</sup> condition. Additional research is needed to investigate potential performance differences associated with specified stance widths that are based on the constraints of one's anthropometrics.

## 6. EFFECTS OF WEARING THE ELEVATION TRAINING MASK™ ON ENDURANCE PERFORMANCE COMPARED WITH CHANGES FROM TRAINING AT INCREASED ENVIRONMENTAL ALTITUDE – PRELIMINARY RESULTS

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**Purpose:** To determine whether six weeks of high intensity interval training (HIIT) while wearing the Elevation Training Mask™ would improve endurance performance compared with a control. **Methods:** Eighteen participants completed the study who were randomized into a mask (n = 9) or control (n = 9) group. Pre- and post-testing included a VO<sub>2</sub>max cycle ergometer ramp protocol with economy measures at submaximal power outputs (PO). Participants trained on a cycle ergometer twice a week for 30 min each session for six weeks. Sessions included a 5-min warm-up and cool-down with 20 minutes of HIIT (30s exercise at 100% peak power output (PPO), 90s active recovery, 10 bouts). Independent t-tests and repeated measures ANOVA determined statistical significance (p < 0.05). **Results:** Prior to starting and after training, the mask group had a significantly higher (p < 0.05) VO<sub>2</sub> at ventilatory threshold (VT), at 100W, 125W, and 150W (before: 36.5, 25.2, 27.6, & 31.4 mL·kg<sup>-1</sup>·min<sup>-1</sup>, respectively; after: 37.2, 23.6, 26.3, & 30.1 mL·kg<sup>-1</sup>·min<sup>-1</sup> respectively) compared to the control (before: 28.8, 19.8, 22.9, & 24.5 mL·kg<sup>-1</sup>·min<sup>-1</sup>, respectively; after: 27.9, 18.5, 20.6, & 23.3 mL·kg<sup>-1</sup>·min<sup>-1</sup>, respectively). VO<sub>2</sub>max was not significantly different (p < 0.05) between groups (control: 31.75 & 32.48 mL·kg<sup>-1</sup>·min<sup>-1</sup>, mask: 40.59 & 41.39 mL·kg<sup>-1</sup>·min<sup>-1</sup> respectively). There were significant improvements from pre- to post-training in PPO for the control (7.1%) and PPO and PO at VT in the mask group (10.6% and 8.9%, respectively). **Conclusion:** The mask group was less economical before and after training; however, no changes occurred from training. Only the mask group demonstrated a pre- to post-training increase in PO at VT; however, post-training values were not significantly different from the control. Both groups demonstrated similar training adaptations and further investigation is required to compare the present findings to increased altitude.

## 8. POTENTIAL EFFECTS OF EXERCISE-INDUCED CORTISOL RELEASE ON EXECUTIVE FUNCTIONING IN PREADOLESCENTS

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**Purpose:** Moderate-intensity aerobic exercise (MAE) has been shown to elicit improvements in cognition and subsequent academic performance among preadolescents. Aerobic exercise has also shown to increase cortisol release in response to increasing exercise intensity. However, it is unknown if increased cortisol levels following exercise are related to acute improvements in executive function following a bout of MAE in preadolescents. The purpose of this study was to examine the potential effects of increased cortisol release after acute MAE on attention and working memory among preadolescents. **Methods:** Eleven preadolescents [6 males, 5 females] volunteered to participate in this study (age=9.45±1.03). Participants were randomized in a counterbalanced fashion to 30 minutes of rest or 30 minutes of treadmill MAE (60-70% HR max). Immediately pre-post each condition, participants completed a cognitive battery consisting of tests of attention (Flanker Test) and working memory (Sorting Working Memory Test), as well as salivary samples for the analysis of cortisol. Mixed-linear models with Tukey's HSD post-hoc tests for multiple comparisons were used to assess the effect of condition on working memory, attention, and salivary cortisol. **Results:** There was a significant effect of condition on working memory (F=3.16, p=0.04), with no change from pre-post rest (p=0.93) and improving from pre-post exercise (p=0.03). There was no effect of condition on attention or salivary cortisol, most likely due to a small sample size. **Conclusion:** Exercise had a positive effect on working memory, however, we were unable to relate this improvement to changes in salivary cortisol due to a lack of statistical power. This study could provide insight into the physiological effects of increased cortisol release on cognition, specifically in regard to working memory. However, more data are needed to achieve sufficient statistical power to detect these relationships.

## 9. ACUTE EFFECTS OF HIGH-INTENSITY INTERVAL EXERCISE ON AMBULATORY BLOOD PRESSURE

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**Purpose:** High-intensity interval exercise (HIIE) reduces blood pressure (BP) to a greater extent than continuous exercise at least 3 hours after completing exercise in young healthy adults. However, it is unknown whether the reduction in BP after HIIE could last up to 24h. The purpose of this study was to examine the acute effects of HIIE on 24h ambulatory BP in physically inactive, prehypertensive adults. **Methods:** Seven participants (age: 24 ± 3yr, height: 166.9 ± 7.6cm; weight: 65.2 ± 6.1kg; VO<sub>2max</sub>: 76 ± 12%predicted; resting BP: 124/77 ± 6/5mmHg) underwent 24h ambulatory BP monitoring after three trials performed in a random order: (a) HIIE: 10x1min intervals above 90% of maximal heart rate (HR<sub>max</sub>) separated by 1min active recovery, (b) SSE: 30min of steady state exercise, and (c) control. **Results:** There were no significant differences in energy expenditure between HIIE and SSE (P=0.155). There were no baseline differences in systolic, diastolic or mean BP (P>0.05) between the three trials. 24h systolic, diastolic, and mean BP were ≈2mmHg lower after SSE when compared with HIIE and control (P < 0.05; linear mixed model with Bonferroni posthoc correction). 24h HR was significantly higher after HIIE (76 ± 13bpm) compared with SSE (73 ± 13bpm; P<0.001) and control (72 ± 14bpm; P<0.001), suggesting that sympathetic tone was higher after HIIE. When HR was included as a covariate in the statistical model, both HIIE and SSE significantly reduced systolic, diastolic, and mean BP when compared with control (P<0.05), with no differences between HIIE and SSE (P=1.000 for systolic, 0.813 for diastolic, and 1.000 for mean BP). **Conclusion:** HIIE significantly increases HR for up to 24h, which influences the acute post-exercise hypotensive effect of HIIE on 24h ambulatory BP.

## 11. THE ROLE OF AEROBIC FITNESS IN THE STRESS RESPONSE OF HUMAN PERIPHERAL BLOOD MONONUCLEAR CELLS

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**Purpose:** Heat shock proteins (HSPs) are intracellular chaperones that repair misfolded proteins in response to cellular stress and have been shown to have immunoregulatory properties. Dysfunctional HSP70 control has been shown in disease states associated with low cardiovascular fitness (CVF) and obesity. It is unknown if these factors impact HSP70 expression in response to stress. The purpose of this study is to determine if HSP70 control in PBMCs is altered among overweight humans with low CVF. **Methods:** Human PBMCs were isolated from aerobically trained and untrained human subjects after an overnight fast. PBMCs were plated at 2x10<sup>6</sup> cells/ml and incubated overnight at 37°C. The following day, plates were separated into the three groups: control (37°C), heat (42°C, 90 minutes), and heat + 200 mM of N-acetyl cysteine (42°C + A, 90 minutes). Protein expression was measured by Western blot analysis. Protein included p38 MAPK total, phospho-p38 MAPK, Akt total, phospho-Akt, HSP70, and MnSOD. A multiplex bead assay was used to measure levels of TNF-α, IL-6, IL-1β, and IL-10. **Results:** There was no difference in HSP70 levels at 37°C between fit and unfit groups (0.557 ± 0.25 vs. 0.647 ± 0.37, p>0.05). Fit individuals showed a significantly greater upregulation of HSP70 after 41°C and 37H (1.95 ± 0.83 vs. 0.95 ± 0.45; and 1.80 ± 0.79 vs. 0.79 ± 0.43, respectively, p<0.05). TNF-α levels significantly increased in unfit PBMCs after heat stress (41) compared to 37C (5.85 ± 3.33 vs. 3.18 ± 2.11 pg/ml, p<0.05). **Conclusion:** No significant difference in resting levels of HSP70 was observed between fit and unfit individuals with excessive body fat. The HSP response was greater in fit individuals after exposure to both stressors. These results suggest that obese, unfit individuals are under chronic, low level stress resulting in a blunted response to additional stressors.

## 10. DOES FALSE FEEDBACK ALTER PERFORMANCE IN AN ANAEROBIC MAXIMAL TEST AMONG HEALTHY YOUNG ADULTS?

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**Introduction:** It has been observed that extrinsic factors, such as music or verbal encouragement, can influence performance while exercising. It has yet to be determined if this effect is present in supra-maximal efforts. The **purpose** of this investigation was to determine whether positive feedback (PF) or negative feedback (NF) prior to a maximal anaerobic exercise test improves or degrades performance. **Methods:** 23 college aged adults were recruited for a two-day exercise protocol and were randomly divided into a PF or NF group. Day one: participants were oriented with the Wattbike Pro cycle ergometer and underwent a 30-second anaerobic test of power (in line with a Wingate test of power). Day two: Participants had a 24 hour–2 week window in which they could perform the second trial. Prior to the second trial participants were informed they performed better (PF) or worse (NF) than a hypothetical average prior to their second 30-second anaerobic test of power. **Results:** Both PF and NF groups observed a significant improvement in peak power (p=0.03, p=0.02 respectively), and average power (p=0.042, p=0.035 respectively). Additionally, there was a significant improvement in power/mass ratio among the NF group (p=0.026). There was no difference in peak or average power between groups among the day 2 trial (p=0.95, p=0.18, respectively). **Conclusion:** PF or NF prior to a maximal anaerobic test of power improved peak and average power. It is theorized that the improvement among the PF group corresponded to an increase in self-efficacy; while the improvement among the NF group was related to a desire to perform at or above the fabricated average.

## 12. GAMES FOR GAINS: THE EFFECTS OF VIDEO GAMES ON MOTOR LEARNING SKILLS

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**Purpose:** As video games increase in popularity, there has been a debate among scientists to determine the effects, if any, gaming has on a variety of skills. This study specifically focused on the effects of a video game regimen on reaction time (RT) and hand-eye coordination (HEC). **Methods:** Fifteen college students (5 female and 10 male) participated in this study with a mean age of 20.5 ± 0.64 years. Subjects underwent three tests: RT, the star tracer (ST) at their own pace, then a timed ST. Each test consisted of three trials. Before completing their pre-tests, the subjects were randomly divided into an experimental gaming group (n=8) or control group (n=7), independent of their previous gaming experience. The experimental gaming group played 5 matches of League of Legends a week for five weeks, while the control group abstained from League of Legends for the five weeks. Upon completion of the five week intervention, subjects returned to lab to complete the three tests again. **Results:** The experimental gaming group's post-test RT mean of 0.31 ± 0.02 seconds was significantly lower (with p < 0.05) than their pre-test RT mean of 0.33 ± 0.02 seconds. There was no statistical difference (p > 0.05) between the control group's post-test RT mean of 0.36 ± 0.08 seconds when compared to their pre-test RT mean of 0.32 ± 0.02 seconds. Statistical comparison of the two groups, however, yielded no significant difference. The remaining ST tests had significant differences within the group's post- to pre-tests, but held no statistical difference when comparing the two groups. **Conclusion:** Differing variance in the experimental and control group's RT suggest there is a connection unidentifiable by this study design. The results of the study did not find any causal evidence of video games, but raised questions for further research.

### 13. PARENTS PERCEPTIONS ON THE IMPLEMENTATION OF A GAME-BASED PHYSICAL ACTIVITY CURRICULUM AT-HOME FOR CHILDREN AGES 4-7 YEARS OLD WITH AND WITHOUT PRADER-WILLI SYNDROME

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**Purpose:** A 12-week game physical activity (PA) curriculum was designed for children aged 4-7 years old with and without Prader-Willi Syndrome (PWS), a rare genetic neurodevelopmental disorder leading to obesity and motor, communication and behavior challenges. In this home-based intervention, parents were the leaders in implementing the PA curriculum targeting motor skills development. This multiple-case study evaluated parent perceptions in leading this PA program with their child at home. **Methods:** Participants were parents (N=15) of children with (n=5) or without PWS (n=10) participated in the Home-based Active Play for Parents and Youth (HAPPY) Early Discoveries intervention. After the 12 week program, parents participated in a semi-structured interview reflecting on their experiences with implementing the program and any changes perceived in their child. Each interview was transcribed and analyzed for common themes using hierarchical content analysis. **Results:** The frequent challenges of implementation included: difficulty with time management (e.g., scheduling), lack of motivation by the parent and the child not wanting to do the program (e.g., lazy, sick). Facilitators of the program included: incorporating the program into their lives (e.g., making it a routine and scheduling it), making a commitment, fostering their child's motivation (e.g., children making choices, tailoring to their child's interests and social support from others) and the equipment and curriculum (e.g., easy to use and child-friendly). Perceived outcomes from parents included: improvement in child's motor skills, confidence, and motivation, improvement in parents' teaching motor skills as well as enjoyment and quality time together with their child. **Conclusion:** An at home PA program may pose challenges for parents but strategies such as scheduling, building it into a routine and engaging their child may help to address these challenges. From the parents' perspective, performing this flexible and fun program may contribute to building motor skills and confidence in their children.

### 15. SENSORLESS VIDEO-BASED MOTION CAPTURE SYSTEM FOR SPORT AND CLINICAL PURPOSES

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**Purpose:** Motion capture systems have been essential tools in the field of biomechanics. However, motion capture systems used in laboratories require significant amount of time and knowledge, as well as being difficult to use outside of a laboratory setting. Frequency Divergence Image (FDI) is an advanced algorithm with the ability to detect micro-motion from each pixel of a video footage. A motion capture system based on FDI is potentially more accessible when collecting data outside of the laboratory. The purpose of the project was to investigate the utility of a unique experimental algorithm to accurately distinguish between amateur and collegiate level golfers. **Methods:** Participants consisted of two groups based on skill level; 1) amateur university age students and 2) collegiate NCAA Division I golfers. Each participant's golf swings were recorded (Canon SL 1, 35mm prime lens, resolution of 1280x720 pixels at 60fps), data was then processed using the experimental algorithm (MATLAB 2016A). Analysis of the data consisted of a comparison of the experimental algorithm with other motion detection algorithms to distinguish the two groups of golfers. **Results:** The proposed algorithm was found to be the most effective method to distinguish the two golfing groups compared to nine other video-based motion capture algorithms. Based on the functions and collection methods of the systems on the current golf market, the proposed video-based motion capture algorithm can be considered as a brand-new category. **Conclusion:** The proposed motion capture algorithms has displayed its ability to distinguish motions such as the golf swing, and quantitative comparison has shown that it could be an unique system in golf. With the superior properties of FDI, there is potential to develop customized motion capture systems for different technique oriented sports and clinical purposes such as gait capture and analysis associated with orthopedic pathology.

### 14. COMPARISON OF HANDHELD AND HUMAC NORM DYNAMOMETRY FOR LOWER EXTREMITY MUSCLE STRENGTH MEASUREMENTS

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**Purpose:** The use of hand held dynamometry is commonplace in research and clinical practice when an isokinetic unit is not available for muscle strength testing. However, the use of a hand-held dynamometer alone or in conjunction with a patient stabilization strap has not been thoroughly examined and compared to the isokinetic machine. **Methods:** Nine healthy convenience sample volunteers (2 males, 7 females; age: 24.40(5.78) years; height: 67.0(4.0) inches; mass: 72.30(17.25) kg) participated in the study. The participants randomly completed isometric strength tests of knee flexion and extension with the handheld dynamometer (HD), handheld dynamometer with patient stabilization strap (SHD), and HUMAC NORM Dynamometer (HN; CSMi, Stoughton, MA). The average of three trials was normalized by body weight and the ratio between knee flexion and extension strength was recorded for analysis. **Results:** A repeated measures ANOVA was performed to determine significant differences ( $P < .05$  a priori) between variables;  $F(2) = 19.352$   $p < .01$ . Post hoc comparison showed SHD (mean =  $2.707 \pm .245$ ) was significantly greater than HD ( $1.396 \pm .065$ ) and HDS was significantly greater than HN (mean =  $1.649 \pm .164$ ). HD and HN produced similar results. **Conclusion:** Results indicated that using a hand-held dynamometer without the use of a patient stabilization strap produced similar measurements to the HUMAC NORM dynamometer. Using the patient stabilization strap overestimated the patients' strength. Using a handheld dynamometer for these measurements may be used to produce similar results without the time obligation and expense of using a Humac Norm dynamometer unit.

### 16. CHANGES WITH AGE IN CARDIORESPIRATORY FITNESS IN MALE FIREFIGHTERS: MODIFICATION BY BMI AND BODY FAT

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**Purpose:** Firefighters (FF) require a high level of physical fitness to meet the demands of a strenuous and hazardous occupation. Cross-sectional studies report age-group mean cardiorespiratory fitness (CRF) values below the National Fire Protection Association (NFPA) threshold of 42 ml/kg/min in male FF older than 40 years. The primary aim of the present study was to determine the rate and pattern of decline in CRF with increasing age in a large sample of FF with data collected across eleven years, and to determine if this decline could be attenuated by maintaining a healthy BMI and body fat percentage (BF). **Methods:** Participants were 1169 FF in Southern California who underwent voluntary annual medical and performance evaluations between 2005 and 2015. Variables of interest included BMI, BF estimated from skinfold sites, and CRF assessed by a maximal graded exercise test. Descriptive statistics were computed for these variables by age groups with 5-year increments. Analysis of variance (ANOVA) was used to compare CRF between age groups, and multivariable linear regression to predict CRF by age group, BMI and BF. **Results:** ANOVA revealed significant differences among the mean values for all variables ( $p < 0.05$ ). The percent of firefighters meeting the 42 ml/kg/min requirement decreased from 97.04 to 49.82% in the < 30 to the 55+ age group, respectively. The average decline in relative  $\dot{V}O_{2max}$  across each age group was 2.14 ml/kg/min before, and 1.25 ml/kg/min after adjustment for BMI and BF. **Conclusion:** CRF significantly declined with increasing age. Although this decline may be attenuated by maintaining a healthy BMI and BF, more than 40% of FF greater than 50 years of age failed to meet the NFPA standard for CRF. Fire departments should recognize this health and safety risk and take steps to promote physical fitness among all FF.

## 17. HEART RATE RESPONSES OF A CUSTODY ASSISTANT CLASS TO A FORMATION RUN DURING ACADEMY TRAINING

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**Purpose:** Formation running (FR) is commonly used for physical training (PT) in law enforcement academies. The study purpose was to analyze the heart rate response during a FR to determine the potential efficacy of this training method. **Methods:** A retrospective analysis was performed on data gathered from 26 recruits from a single custody assistant (CA) class, comprising 12 men and 14 women. Prior to academy training, a YMCA step test was administered, and on the basis of recovery heart rate, CAs were divided into three groups: the top 25% were High Fit (HF); bottom 25% were Low Fit (LF); and the remaining participants were Moderate Fit (MF). Heart rate monitors were worn by CAs during on FR completed at an approximate 11-minute mile pace, and heart rate zones were defined as: very light (<57% of age-predicted maximum heart-rate), light (57%-63%), moderate (64%-76%), vigorous (77%-95%), and very vigorous (>95%). A one-way ANOVA ( $p < 0.05$ ), with Bonferroni post hoc, calculated any between-group differences in time spent, and percentage of total time spent, in the different heart rate zones during the FR. **Results:** No significant between-group differences were found in heart rate responses. However, the results indicated that none of the groups spent enough time (~20-30 minutes) above the ACSM-recommended cardiovascular adaptation threshold (~63% maximum heart-rate). **Conclusion:** Although cardiovascular adaptation may be achieved through FR, when the duration of the run is taken into account with the time limitations placed on academy populations, the use of a slower FR may not be the most time efficient approach. Although there were no between-group differences in time spent in different training zones, none spent enough time above the suggested ACSM threshold for cardiovascular adaptations. If the goal of a PT session is cardiovascular development, other training methods (e.g. ability-based running) may be more appropriate.

## 19. INFLUENCE OF LOAD ON FRONTAL PLANE KINETICS DURING THE BACK SQUAT

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**PURPOSE:** Individuals who perform the back squat (BS) improve lower extremity strength and sports performance. Lifting higher loads during the BS may increase the likelihood of knee injury. A common mechanism of knee injury is excessive knee abduction. The purpose of this study was to examine the influence of 2 different loads on frontal plane kinetics during the back squat. **METHODS:** 28 healthy individuals (17 males/11 females, 23.42±3.34 yrs., 1.72±0.09 m, 73.20±11.41 kg) who consistently performed the BS were recruited for this study. Two visits were required for this study, with the first being 1-repetition-maximum (1RM) testing and the second consisting of a 3-dimensional assessment of squatting mechanics. During the second visit, participants performed 2 sets of 3 repetitions of the BS at both 70% and 85% 1RM in a random order. A metronome set to 55 beats per minute was utilized to ensure all lifts were of the same velocity. Peak values were taken from the second repetition of each set, and the average was used for analysis. Paired samples T-tests were used to compare peak external knee abduction moments at 70% at 85% 1RM. **RESULTS:** No difference was found in peak external knee abduction moment between loading conditions (70%1RM=0.12±0.05 Nm/BW\*ht vs. 85%1RM=0.13±0.07 Nm/BW\*ht,  $p=0.12$ ). **CONCLUSION:** The results of this investigation suggest that frontal plane knee loading does not differ between 70 and 85% 1RM. Therefore, individuals may freely choose between 70% and 85% 1RM without worrying about increased frontal plane knee joint loading. However, loads used in this study were relatively similar, and there may be greater differences in knee abduction moments at >85% or <70% 1RM. Furthermore, there are other mechanisms of injury besides excessive knee abduction that may differ by increasing load.

## 18. INDIVIDUALS FOLLOWING ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION ADJUST CENTER OF PRESSURE LOCATION TO REDISTRIBUTE EXTENSOR LOADING

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**Purpose:** To determine the relationships between CoP position and sagittal plane moments distributions both within- and between-limbs. **Methods:** Twenty-five individuals 5 months following ACLr were enrolled. Peak knee extensor moment (kEXT) was identified during the deceleration phase (0° to maximum knee flexion angle) of bilateral bodyweight squats; hip extensor moment (hEXT), and CoP position at kEXT were then determined. CoP position (CoP<sub>pos</sub>) was calculated as distance away from the heel anteriorly. To reflect the relative hip to knee extensor moment distribution within the limb, a hip to knee ratio (hEXT/kEXT) was calculated for each limb. Between-limb ratios (surgical limb / non-surgical limb) were calculated for COP<sub>pos</sub> and (hEXT/kEXT) to reflect the relative differences between limbs. Separate univariate linear regressions were used to determine if the CoP<sub>pos</sub> was predictive of the extensor moment distribution for each limb and if the relative difference between limbs in CoP<sub>pos</sub> was predictive of the relative difference between limbs in extensor moment distribution ( $\alpha=0.05$ ). **Results:** CoPpos was a significant predictor of the hEXT/kEXT in each limb (surgical:  $R^2 = .62$ ,  $p = .004$ ; non-surgical:  $R^2 = .38$ ,  $p = .042$ ). The between-limb CoPpos ratio was a significant predictor of the between-limb hEXT/kEXT ratio ( $R^2 = .49$ ,  $p = .017$ ). **Conclusion:** A more anterior COPpos was related to a more hip dominant strategy in both surgical and non-surgical limbs. As the CoPpos was positioned more anteriorly, the extensor demand at the knee decreased while the demand at the hip increased. When considering between-limb, those who exhibited a more hip dominant strategy in their surgical limb compared to non-surgical limb also positioned their COP more anteriorly in the surgical limb. This suggests that individuals following ACLr may adopt a strategy that positions the CoP more anteriorly to reduce the demands on the knee extensors in the surgical limb.

## 20. THE RELATIONSHIP BETWEEN AGILITY AND ANAEROBIC POWER IN SPECIAL WEAPONS AND TACTICS TEAM MEMBERS

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**Purpose:** The purpose of this investigation was to examine the relationship between agility and anaerobic power in Special Weapons and Tactical (SWAT) team members. **Methods:** Fourteen healthy males and one healthy female (age, 32.67 ± 5.74 y; height, 179.63 ± 6.68 cm; mass, 89.6 ± 10.39 kg) volunteered to participate in a combined familiarization and testing session. During familiarization, participants filled out a health history questionnaire, PAR-Q, and signed informed consent. Participants then performed a 5min warm-up on the treadmill followed by a familiarization of all tests. Participants performed three warm-up trials with 1min rest between each trial for the agility T-test. Each participant was given rest as needed and then performed three testing trials with 2min rest between each trial. Timing gates were used to record the times of the agility T-test to ensure accurate readings and eliminate human error. The best time of completion was recorded and used for analysis. After a sufficient amount of rest, participants completed three acceleration phases and performed a 30s anaerobic Wingate Test with a resistance of 9% of body mass. Peak power (PP), relative peak power (RPP), and relative average power (RAP) were recorded and used for analysis. Pearson's r correlations were conducted to analyze the relationship between all outcome variables. **Results:** There was a significant ( $p<0.05$ ), negative correlation between the agility T-test time and PP ( $p= 0.038$ ;  $r= -.539$ ), RPP ( $p= 0.002$ ;  $r= -.742$ ), and RAP ( $p= 0.002$ ;  $r= -.734$ ). **Conclusion:** There is an overall significant relationship between the agility T-test time and anaerobic power. Lower leg muscle power and speed while changing direction may correlate to similar push-off actions. The results of this study suggest that anaerobic power is related to agility, and research on this connection might further elucidate whether anaerobic power training can also enhance agility in tactical training.

## 21. THE EFFECT OF WETSUIT THICKNESS ON PADDLING EFFICIENCY IN PROFICIENT SURFERS

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**Purpose:** Given the limited amount of literature describing the impact that wetsuit thickness has on surf performance, the purpose of this study was to test the hypothesis that increasing wetsuit jacket thickness would increase the energy expenditure required while paddling. **Methods:** Thirty-three proficient male surfers paddled at a speed of 1.1 m/s for three minutes in a swim flume after three minutes of seated baseline. No wetsuit, as well as a Hurley rash-guard, 0.5, 1.0 and 2.0mm wetsuit jackets, were investigated in this study. Heart rate, oxygen consumption, skin temperature, and wetsuit preference were measured for each trial. A one-way RMANOVA was run on data obtained during the final minute of paddling. **Results:** There were no significant differences in VO<sub>2</sub> between conditions (control: 22.45 ± 2.79, rash-guard: 22.55 ± 2.32, 0.5mm: 22.87 ± 2.49, 1.0mm: 22.90 ± 2.02, 2.0mm: 22.81 ± 2.10ml/kg/min). Heart rate was significantly lower while paddling without a wetsuit (129.77 ± 20.34bpm) compared with the 1.0 (133.72 ± 20.16bpm) and 2.0mm (135.09 ± 21.96bpm) wetsuit jackets. Heart rate was also significantly lower paddling in a rash-guard (130.55 ± 21.59bpm) compared to the 2.0mm (135.09 ± 21.96bpm) wetsuit jacket. The paddling skin temperature without a wetsuit was significantly decreased compared to the 0.5 (32.00 ± 1.88°C) and 2.0mm (33.22 ± 1.25°C) wetsuit jackets. The 0.5, 1.0 (32.03 ± 1.34°C), and 2.0mm wetsuit jackets had significantly higher paddling skin temperatures than the rash-guard (29.80 ± 1.83°C). The 2.0mm wetsuit jacket also had a significantly higher paddling skin temperature than both the 0.5 and 1.0mm wetsuit jackets. **Conclusion:** The data suggests that the wetsuit jacket thickness does not significantly affect energy expenditure while paddling. Skin temperature data for the current investigation suggest that these findings are likely a result of an increase in thermoregulation requirements while wearing a thinner wetsuits jacket.

## 23. WINGATE ANAEROBIC TEST RELIABILITY ON THE VELOTRON WITH ICE HOCKEY PLAYERS

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**Purpose:** This study evaluated the test-retest reliability of the Wingate Anaerobic Test (WAnT) performed on a Velotron electromagnetically-braked cycle ergometer (EE) for power-trained athletes and assessed whether a familiarization trial was necessary to achieve high test-retest reliability. **Methods:** Twenty-one male ice hockey players (age 23.5 ± 4.7 yrs, mass 86.3 ± 16.6 kg, height 180.9 ± 7.4 cm) from a collegiate club team (Club = 10) and a recreational league (Rec = 11) performed three, 30-sec WAnTs within 2 weeks, and with at least 24 hours between visits. Mean power (MP), anaerobic capacity, peak power (PP), anaerobic power, maximum RPM, and fatigue index were assessed. Resistance was 8.5% of the participant's body weight. **Results:** The effect of time on power output was moderated ( $p < .001$ ,  $\eta_p^2 = .24$ ) such that a significant increase was observed after a practice trial, but not between subsequent trials for the Club players; no practice effect was observed among Rec players. Extremely high reliability ( $ICC_{1,1}$ ) was found between trials after excluding the practice trial (MP = .973, anaerobic capacity = .975, PP = .957, anaerobic power = .890). Club players achieved higher outputs despite no significant differences in body size or age compared to Rec players. **Conclusions:** Ice hockey players performing the 30-sec WAnT on the Velotron EE had highly reliable data, and using a familiarization trial is recommended to increase reliability and achieve higher power outputs. Lastly, because WAnT results from EE and mechanically-braked ergometers cannot be compared, normative tables for EE results need to be created.

## 22. BIOMECHANICAL AND PHYSIOLOGICAL RESPONSES TO WEARING COMPRESSION SOCKS IN RECREATIONAL RUNNERS

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**Purpose:** Compression clothing is commonly worn by athletes and anecdotally believed to elicit beneficial responses both physiologically and biomechanically during a performance. The purpose of the study was to compare muscle activity, heart rate, and rating of perceived exertion while wearing graduated compression socks, regular socks, and a placebo sock. We hypothesized that compressions socks have no effect on biomechanical or physiological factors measured. **Methods:** Recreational runners (n=5; 1.65 ± .07m; 67.48 ± 8.9kg; 21.8 ± 3.25yr) completed three running conditions: wearing graduated compression socks (CS), regular socks (RS), and placebo socks (PS). Each run was 10 minutes at a self-selected pace with speed controlled between conditions. CS were knee-high socks (Copperfit Energy Compression) that had graduated compression moving proximally up the leg. Sock size used was based on shoe size as per manufacture instructions. RS were determined by the type of sock each subject was wearing on the day of testing. PS were regular soccer socks in which we fitted all subjects with L/XL to minimize any compression and instructed each subject they were a different brand of compression socks. Heart Rate (HR) was measured at the end of all trials telemetrically (Polar, Lake Success, NY). Muscle activity of the lower extremity was measured through electromyography (EMG; Delsys, Natick, MA). Rating of perceived exertion (RPE) was recorded at 3 minute intervals. EMG data were processed by removing any zero offset, rectifying, and averaging over 30 seconds of minutes 4, 7, and 10 of each trial. Dependent variables (EMG, HR, RPE) were each compared between conditions using repeated measure ANOVAs ( $\alpha=0.05$ ). **Results:** Muscle activity for any muscle tested, HR, nor RPE were different between conditions ( $p>.05$ ). **Conclusion:** Neither the compression sock nor placebo sock influenced muscle activity, HR, nor RPE when running speed was controlled.

## 24. THE EFFECTS OF LOW VOLUME HIGH INTENSITY INTERVAL TRAINING (HIIT) VS. PERIODIZED HIIT ON BODY COMPOSITION AND MUSCLE STRENGTH IN SEDENTARY, OBESE WOMEN

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**Introduction:** Obesity rates are increasing, with the incidence of obese U.S. adults increasing from 30.5% in 2000 to 37.0% in 2014 (Ogden et al., 2015). Additionally, women suffer from obesity or extreme obesity compared to men (Ogden and Carroll, 2010). Correspondingly, a consequence of sedentary lifestyles is poor muscular strength, which is a risk factor for diseases such as diabetes and cardiovascular disease (Shiroma et al., 2017), as well as all cause mortality (Rantanen et al., 2000). High intensity interval training (HIIT) is a time efficient and more enjoyable mode of exercise among sedentary obese persons and elicits similar adaptations versus moderate intensity continuous training (MICT) (Kong et al., 2016).

**Aim:** The purpose of this study was to investigate the effects of two different types of HIIT on body composition and muscular strength in sedentary, obese women.

**Methods:** 17 obese sedentary women (age = 37.51±10.53 yr) participated in a six-week exercise intervention, three training sessions per week. They were randomized into low volume HIIT (LO) (n=9, BMI=37.22±3.34 kg/m<sup>2</sup>) or periodized HIIT (PER) (n=8, BMI=41.00±5.33 kg/m<sup>2</sup>). Body composition and muscle strength were measured pre- and post-training. Fat mass and fat free mass were measured using air displacement plethysmography via a BodPod (COSMED, USA Inc., Chicago, IL). Peak knee extension and flexion torque at 60 deg/s was assessed using an isokinetic dynamometer (Biodex System 3, Shirley, NY).

**Results:** FFM was increased in LO (52.07±5.09 kg vs. 53.93±4.69 kg) and PER (55.40±6.604 vs 56.10±6.57 kg), ( $p<0.05$ ,  $p=0.03$ ), yet there was no interaction ( $p=0.326$ ). There was no significant changes in body mass ( $p=0.075$ ), fat mass ( $p=0.19$ ), or peak extension ( $p=0.36$ ) or flexion torque ( $p=0.75$ ).

**Conclusion:** Regardless of protocol, HIIT can elicit body composition improvements including an increase in fat free mass, but has no effect on muscular strength in sedentary, obese women.

## 25. A 15-MONTH EXAMINATION OF RUNNING AND ELECTROMYOGRAPHIC ECONOMY IN DIVISION 1 CROSS-COUNTRY RUNNERS-A PILOT STUDY

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**Introduction:** Running economy (RE) has previously been used to assess the cardiorespiratory efficiency of endurance athletes. Electromyography (EMG) has been used to measure action potential activity in human muscle and can also be used to compute an efficiency measure. The purpose of this investigation was to analyze the changes in RE as collegiate endurance athletes age and train. **Methods:** Nine endurance-trained Division I runners (male=7; female=2) volunteered to participate in the study. RE was measured at 9.66, 11.27, and 12.87km•hr<sup>-1</sup> for all participants and at an additionally at 14.48 and 16.09km•hr<sup>-1</sup> for the men. The participants ran five-min stages in a continuous manner on a treadmill with expired gases analyzed. Following a 10-min rest, VO<sub>2</sub>max testing consisted of 1 min stages of increasing speed until the participant could no longer continue. EMG activity was measured in the vastus lateralis (VL) and rectus femoris (RF) by surface electrodes. The participant's maximal muscular activity was measured during a maximal isometric contraction utilizing an isokinetic device. **Results:** RE (ml kg<sup>-1</sup> min<sup>-1</sup>) measures did not change (p≥0.05) between tests (463±82 Days). The EMG signal (μV) showed no significant differences (p≥0.05) between tests as well. **Discussion:** Although there was no significant difference in RE or EMG economy, the RE improved by 2.34%, which could potentially equate to a 42 second time improvement in a 10K race. This slight improvement could be the difference between sixteenth and first place. Data will continue to be collected on this group and other runners in years to come in order to enhance the statistical power.

## 27. THE EFFECTS OF MOTORIZED VS. NON-MOTORIZED TREADMILLS IN COLLIGATE CROSS-COUNTRY FEMALE ATHLETES ON SUBSTRATE UTILIZATION

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**Purpose:** The purpose of our study was to determine the effect of motorized (MT) vs. non-motorized (NMT) treadmills on substrate utilization. **Methods:** Eleven female Division II cross-country athletes volunteered on three testing days. Before testing started, participants completed an IRB-approved informed consent and PAR-Q. On familiarization day participants performed a treadmill protocol that consisted of five-minutes of each a warm-up walk, a walk, a run, and a cool-down walk on the Woodway Curve 3.0 NMT. Day two and three were randomized between the two types of treadmill for each participant and metabolic data was collected using the Cosmed K4b2 metabolic measurement system. RER, percentage of fat (%FAT) utilization, and percentage of carbohydrates (%CHO) utilization was used for analysis. Dependent t-tests were used to compare NMT and MT for each outcome variables. **Results:** During walking, there were significant (p<0.05) differences between MT and NMT in RER (MT=0.92 ± 0.07, NMT=0.98 ± 0.04), %FAT (MT=28.1 ± 22.7%, NMT=9.7 ± 9.6%), and %CHO (MT=72.4 ± 22.6%, NMT=90.7 ± 9.4%). During running, there were significant (p<0.05) differences between MT and NMT in RER (MT=0.96 ± 0.03, NMT=1.11 ± 0.09), %FAT (MT= 12.8 ± 12.4, NMT=1.3 ± 3.8), and %CHO (MT=87.7 ± 12.3, NMT=98.7 ± 3.6). **Conclusion:** Our findings suggest that activity on the NMT results in more utilization of carbohydrate than fat. The unique curved, self-propelled surface of the NMT resulted in activity performed at a higher RER compared to the MT, despite the same exercise intensity. When limited glycogen supply is an issue—as is with aerobic endurance athletes—an MT is important to enhance fatty acid oxidation and spare glycogen. An MT might also be more appropriate for training specificity as it more closely mimics surface level running compared to the curve of an NMT.

## 26. A-MODE AND B-MODE ULTRASOUND MEASUREMENT OF FAT THICKNESS: A CADAVER VALIDATION STUDY

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**Background:** With technological advances, there has been a resurgence in the use of ultrasound as a method to measure subcutaneous fat thickness. Despite the increased interest in this methodology, research comparing A-mode and B-mode ultrasound devices is lacking. **Purpose:** Subcutaneous fat thickness measured by a low resolution (2.5 MHz) A-mode ultrasound and a high resolution (12 MHz) B-mode ultrasound were compared to the actual fat thickness in dissected cadavers. **Methods:** Subcutaneous fat thickness of six cadavers (3 male, 3 female) was measured at six sites (chest, abdomen, thigh, triceps, suprailiac, calf) with both ultrasound devices before the cadavers were dissected and site-specific thickness was measured. **Results:** Correlations between both ultrasounds and the dissected measurement exceeded 0.90 at all sites with a few exceptions. At the abdomen, the relationship between the two devices was 0.76, and the B-mode and dissected measurement was also 0.76. The correlation between dissection and A-mode was 0.75 for the suprailiac site, but it was not possible to discern the separation of tissue at this site when using the B-mode device. There were no significant differences (P > 0.05) between the devices and the dissected measurement at any of the six sites. The mean difference in fat thickness between A-mode and B-mode was < 0.7 mm at all sites except the calf (1.2 mm). **Conclusion:** With the exception of the suprailiac site, both A-mode and B-mode ultrasound are equally capable of providing measurements of subcutaneous fat thickness with an accuracy of < 1 mm at most sites.

## 28. COMPARING CUSTOM FOOT DOMING STRENGTH DEVICES

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**Introduction:** Intrinsic foot muscle weakness has been hypothesized as a possible factor in many foot deformities and diseases. However, there is no gold standard when it comes to isolating and measuring intrinsic foot muscle strength. **Purpose:** The aim of this study was to compare two custom devices designed to isolate the intrinsic foot muscles and measure their strength. **Methods:** 53(21M,24F) healthy subjects [Ht = 171.5cm ± 10.1Wt = 71.0kg ± 13.1Age = 25.2±6.4] were recruited for two separate testing sessions two weeks apart. Only the first session was used for this analysis. Subjects were fitted into each of the testing devices in which they would perform a metatarsal doming motion, also known as the short-foot exercise. Force data was collected by either pushing or pulling against a force transducer. Subjects performed three trials on each device. Repeatability was assessed using interclass correlation coefficients (ICC) across the three trials. The two devices were then correlated with a Pearson correlation coefficient (r) using the averages of the three trials. **Results:** Within-session repeatability was excellent and comparable for both devices (ICCpull= .965, ICCpush= .953). The push and pull methods were moderately strongly correlated with each other (r =0.8). **Conclusion:** Both methods were repeatable and measured similar aspects of the intrinsic foot muscles. Our results suggest that only one of the devices is needed. Further studies are required to determine whether one method better isolates the intrinsic foot muscles. Other considerations include subject comfort and ease of use.

## 29. PHYSICAL ACTIVITY AND INSULIN RESISTANCE IN 6,589 NON-DIABETIC ADULTS: AN NHANES INVESTIGATION

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**Purpose:** This cross-sectional study was designed to determine the extent to which insulin resistance differs across levels of physical activity (PA) in non-diabetic adults. **Methods:** Because the 6,589 participants were randomly selected as part of the National Health and Nutrition Examination Survey (NHANES), results are generalizable to all non-institutionalized U.S. adults. MET-minutes were used to quantify total PA. Participants self-reported the duration, frequency, and intensity they engaged in 62 activities, and were divided into four categories based on their weekly sex-specific MET-minutes of activity. Approximately 34% reported no regular PA (< 10 minutes per week). They were labeled Sedentary. The remaining non-sedentary adults were divided into sex-specific tertiles, with 22% in each category. These groups were labeled Low, Moderate, and High PA. Insulin resistance was indexed using HOMA-IR. Along with age, sex, and race, cigarette smoking (pack-years) and BMI were used as covariates. HOMA-IR values were log-transformed. **Results:** Mean ( $\pm$ SE) age was 44.2 $\pm$ 0.4. With age, sex, and race controlled, HOMA-IR differed significantly across the PA categories ( $F=13.6$ ,  $P<0.0001$ ). Specifically, the Sedentary (2.6 $\pm$ 0.07) and Low PA groups (2.6 $\pm$ 0.09) did not differ, but the Moderate (2.2 $\pm$ 0.10) and High PA groups (2.0 $\pm$ 0.07) differed significantly from the other PA groups and each other. Adding pack-years to the model strengthened the relationship ( $F=14.4$ ,  $P<0.0001$ ), with the same differences remaining significant. Adding BMI to the full model weakened the relationship ( $F=8.2$ ,  $P<0.0001$ ), but it remained significant. The Moderate and High PA groups differed from the other groups, but not each other. **Conclusion:** In a sample representing all U.S. adults, Moderate and High levels of PA were related significantly with reduced insulin resistance. Part of the association was a function of differences in BMI, but the findings indicate that PA and insulin resistance are related significantly, even if all adults were to have the same BMI.

## 31. NEUROTRACKER COGNITIVE TRACKING FUNCTION AND ITS RELATIONSHIP TO GRADE POINT AVERAGE IN COLLEGE STUDENTS

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**Purpose:** The NeuroTracker system is a training tool used to enhance one's cognitive abilities. It has been previously tested to improve athletic performance and core cognitive abilities in a variety of populations, but it has yet to be used as a cognitive test to examine its ability to distinguish academic ability in college students. The purpose of this study was to examine the relationships between a student's grade point average (GPA), major, minutes exercised, and visual tracking speed utilizing the NeuroTracker System. **Methods:** Forty-five students volunteered for the study (20 male and 25 female, 20.2 $\pm$ 1.09years, ht=170.44 $\pm$ 9.48cm, wt=70.98 $\pm$ 15.66kg) and were tested with the NeuroTracker system to obtain a baseline visual tracking speed. Each participant performed 1 session of 20, 6-second trials where they had to track 4 of 8 balls in a 3-dimensional queue. If they succeeded, the speed would increase, and if they failed, the speed would decrease. Their final score was calculated by averaging variable trial successes and failures dependent on performance throughout the session. **Results:** There was no correlation found between tracking speed and GPA, major, and minutes exercised. Moderate correlations were found between age and tracking speed ( $r=0.378$ ;  $p=0.011$ ), sex and tracking speed ( $r=-0.448$ ;  $p=0.002$ ). **Conclusion:** The results suggests that there was no correlation between GPA, college major, minutes exercised, and cognitive tracking speed, but older students did better and men had faster tracking scores. Additional testing is warranted to determine if cognitive tracking speed is related to athletic ability and academic success.

## 30. RETURN TIME TO PLAY AFTER PLATELET-RICH PLASMA INJECTION (PRP) FOR HAMSTRING TEARS

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Platelet rich plasma (PRP) become popular biological method used to accelerate healing in sports medicine and orthopedic surgery field. PRP is concentrate the human platelets to supra-physiologic levels. It is an autologous producing high level of the platelets concentration centrifuged from the peripheral vein. Then it reinjected under the ultrasound guidance during surgery or at a site of injury. **PURPOSE:** to elucidate the effects of single platelet-rich plasma (PRP) injection combined with rehabilitation exercises on time to return to activity following hamstring tear injury. **METHODS:** Seventeen physically active male athletes (22.3 years; 1.80 m; 74.7 kg; 24.9 kg/m<sup>2</sup>) with a 2nd-grade acute hamstring tear were randomized to a treatment group ( $n = 8$ ) or control group ( $n = 9$ ). Both groups received the same physical rehabilitation program for eight weeks; however, only the treatment group received an autologous single PRP injection. Hamstring force (HF), knee flexion range of motion (KFROM), and Return time to play (RTP) were collected at baseline, 4 weeks, and 8 weeks. **RESULTS:** the PRP group demonstrated earlier full recovery than the control group. The mean time to return to play for the PRP group was 27.2  $\pm$  4.3 days and 48.1  $\pm$  2.7 days for the control ( $t= 3.921$ ,  $P = 0.002$ ). However, neither HF nor KFROM showed any significant differences between groups at any time ( $p > 0.05$ ). **CONCLUSION:** PRP injection combined with physical rehabilitation for hamstring tear was more effective in return time to play than the physical rehabilitation alone.

## 32. THE FUNCTIONS OF OBSERVATIONAL LEARNING WITH DISABILITY SPORT PARTICIPANTS

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**Purpose:** Observation is a well-known instructional technique to convey information when teaching motor skills. Cumming and colleagues (2005) developed the Functions of Observational Learning Questionnaire (FOLQ) identifying three reasons in which athletes use observation: (a) skill, (b) strategy, and (c) performance. Despite the abundance of research with able-bodied athletes, little is known about the use of observation of athletes with physical disabilities. The purpose of this study is to examine the functions of observation of those with physical disabilities while also examining possible sex differences. **Methods:** Forty-four participants ( $Mage=33.55$  years) completed the 17-item FOLQ and responded to two additional questions relating to situational uses of observation. Participants were also required to complete a demographic form. **Results:** Preliminary results trend towards a difference between the functions of observational learning; specifically, the skill function was used most often followed by the strategy and performance functions. There are no trending differences between males and females and their use of observation. Preliminary results indicate many variations between situations and the amount of time observation is used by participants with disabilities. **Conclusion:** These preliminary results indicate that athletes with disabilities use observation in a similar manner as able-bodied athletes however, there does not appear to be a difference between sexes. Discussion will be tailored to practical applications, limitations and future research.

### 33. PROMOTING ACTIVITY IN THE PARKS: KINESIOLOGY STUDENTS SERVING AS PHYSICAL ACTIVITY COACHES

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**Purpose:** Adding outdoor gym equipment to a park has the potential to influence the physical activity of park users (Cranney et al., 2016). This study piloted the feasibility of utilizing kinesiology students as physical activity coaches at outdoor exercise equipment in public parks.

**Methods:** Pairs of students were placed in 10 parks in four cities to coach park users with a total of 12 sessions held per week for a period of 11 weeks. Students were trained on motivational interviewing techniques and behavior change skills as part of their course work and incorporated these into their interactions with the park users. Students recorded attendance at their sessions including use of exercise equipment and coaching provided. If a resident was 'coached', the student at very least introduced themselves to the resident, but may have also discussed physical activity perceptions, goals, barriers, and regulatory skills. If a resident was tracked as 'used equipment', they were exercising on the exercise equipment. Also, the System for Observing Play and Recreation in Communities (SOPARC; McKenzie et al., 2006) was used to track park use and equipment use, both before (November) and after (May) the pilot took place. Dependent t-tests were used to compare differences in park use, equipment use and percent vigorously active between the two assessments.

**Results:** Over the 11 weeks, students coached 214 residents and tracked 386 residents using the exercise equipment. There were no differences in overall park use ( $p=.066$ ) or intensity of activity ( $p=.470$ ). For exercise equipment use, there was a decrease that approached significance (November:  $M=7.3, SD=4.5$ ; May:  $M=3.8, SD=3.0$ ;  $p=.058$ ); however, the percent vigorously active remained constant (37.9% vs 36.3%,  $p=.91$ ).

**Conclusion:** Although seasonal variations may partly contribute to the trend towards lower activity, many park users interacted with the student coaches supporting the feasibility of such a program.

### 34. IMPROVEMENTS IN BONE MINERAL DENSITY FOR FEMALE CANCER SURVIVORS AFTER COMBINED AEROBIC AND RESISTANCE TRAINING

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**Background:** Due to recent advances in cancer treatment and technology, there are higher rates of cancer survivors. However, treatments are harsh on bone and can negatively affect a person's bone mineral density (BMD). In general, exercise positively influences recovery in cancer survivors, which can potentially help bone health in women with and at risk for osteoporosis. **Aim:** This study aims to assess changes in bone health due to exercise in women after cancer treatment. **Methods:** 17 female cancer survivors, between the ages of 40 to 80, participated in a 26-week combined aerobic and resistant training program for one hour, three times per week. The Block 2005 Food Frequency Questionnaire was given to the participants to measure dietary intake. Dual-energy x-ray absorptiometry (DXA, Hologic Discovery A) was used to measure BMD at the spine, hip, and whole body before and after the exercise program. **Results:** Participants were an average age of  $63\pm 10.3$  years and were  $6.2\pm 10.6$  years since completing cancer treatment. Questionnaire values reported calcium intake was  $1179\pm 600$  mg/day, vitamin D consumption was  $621\pm 268$  IU/day, and protein intake was  $0.75\pm 0.31$  g/kg of body weight. Compared to baseline, participants had a significant increase in BMD at the spine, hip, and whole body after 26 weeks. The spine increased from  $0.971\pm 0.22$  g/cm<sup>2</sup> to  $0.995\pm 0.22$  g/cm<sup>2</sup> ( $p<0.01$ ), the hip increased from  $0.860\pm 0.18$  g/cm<sup>2</sup> to  $0.875\pm 0.19$  g/cm<sup>2</sup> ( $p<0.05$ ), and the whole body increased from  $1.00\pm 0.15$  g/cm<sup>2</sup> to  $1.02\pm 0.16$  g/cm<sup>2</sup> ( $p<0.01$ ). **Conclusion:** Results suggests that a whole body workout, consisting of both aerobic and resistant training, may improve bone health in female cancer survivors.

### 35. BILATERAL IMPAIRMENT IN QUADRICEPS FUNCTION FOLLOWING ACL RECONSTRUCTION

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**Purpose:** Following ACL reconstruction (ACLR), typical return to sport (RTS) criteria includes achieving  $\geq 90\%$  quadriceps strength of the uninvolved limb. However, bilateral strength impairment due to disuse during rehabilitation may limit the reference value of the uninvolved limb. The purpose of this study was to (1) compare quadriceps strength symmetry between individuals with and without ACLR, and (2) compare quadriceps function between the involved, uninvolved, and control limbs.

**Methods:** Isometric (peak torque (PT) and rate of torque development (RTD)) and isokinetic (180°/sec) quadriceps function were assessed in 46 individuals with ACLR (74% female; age= $22.1\pm 2.8$  years; height= $1.70\pm 0.09$ m; mass= $71.6\pm 15.7$ kg) and 38 control participants (74% female; age= $21.9\pm 1.2$  years; height= $1.69\pm 0.09$ m; mass= $66.2\pm 11.7$ kg). Limb symmetry indices (LSI) were calculated as a percentage of the involved to uninvolved limb in the ACLR group, and between the non-dominant and dominant limb in the control group. Dependent variables were compared between involved and uninvolved limbs using paired t-tests, and involved and uninvolved limbs were compared to control limbs using independent t-tests (adjusted  $\alpha=0.017$ ). **Results:** Involved limbs produced lower PT ( $2.27\pm 0.55$  vs.  $2.57\pm 0.73$  Nm $\dot{Y}$ kg<sup>-1</sup>,  $p=0.016$ ), RTD ( $11.69\pm 5.98$  vs.  $15.27\pm 6.92$  Nm $\dot{Y}$ kg<sup>-1</sup>sec<sup>-1</sup>,  $p<0.01$ ) and PT at 180°/s ( $1.72\pm 0.48$  vs.  $1.91\pm 0.47$  Nm $\dot{Y}$ kg<sup>-1</sup>,  $p<0.01$ ) compared to control limbs. Uninvolved limbs produced lower PT ( $2.29\pm 0.53$  vs.  $2.57\pm 0.73$  Nm $\dot{Y}$ kg<sup>-1</sup>,  $p=0.019$ ), RTD ( $10.66\pm 5.06$  vs.  $15.27\pm 6.92$  Nm $\dot{Y}$ kg<sup>-1</sup>sec<sup>-1</sup>,  $p<0.001$ ) and PT at 180°/s ( $1.66\pm 0.41$  vs.  $1.91\pm 0.47$  Nm $\dot{Y}$ kg<sup>-1</sup>,  $p<0.01$ ) compared to control limbs. No differences were found between involved and uninvolved limbs in PT ( $p=0.43$ ), RTD ( $p=0.07$ ), or PT at 180°/sec ( $p=0.16$ ). No differences in LSI were found between groups in PT ( $p=0.28$ ) or in PT at 180°/s ( $p=0.07$ ). **Conclusion:** LSI indices were similar between groups, but the involved and uninvolved limbs were weaker compared to controls. Caution is recommended when using LSI criteria for RTS, and comparison to a control limb may provide a better reference of quadriceps function.

### 36. ACUTE HEMODYNAMIC AND CARDIORESPIRATORY RESPONSES TO HIGH INTENSITY INTERVAL TRAINING REGIMENS IN MEN WITH SPINAL CORD INJURY: A CASE SERIES

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High intensity interval training (HIIT) has been shown to elicit higher peak oxygen consumption (VO<sub>2</sub>), heart rate (HR), and enjoyment compared to moderate intensity continuous training (MICT) in men with spinal cord injury (SCI) (Astorino and Thum 2017). However, it remains unclear whether persons with SCI would demonstrate similar increases in hemodynamic variables in response to HIIT that have been observed in healthy populations. **Purpose:** The purpose of the study was to determine acute hemodynamic and cardiorespiratory responses to different modes of interval training in men with spinal cord injury. **Methods:** Four habitually active men (mean age, height, and mass =  $46.25 \pm 13.81$  yr.,  $182.30 \pm 7.90$  cm, and  $72.02 \pm 7.84$  kg), completed five exercise sessions separated by at least 48 h. VO<sub>2peak</sub> was assessed using a wall mounted arm ergometer to determine individual peak power output (PPO). The subsequent 4 visits were randomized to either moderate intensity continuous exercise (MICT) at 35% PPO, high intensity interval training (HIIT) at 85% PPO, sprint interval training (SIT) at 115% PPO or a no exercise control (CON). Cardiac output (CO), stroke volume (SV), and heart rate (HR) were monitored via thoracic impedance and gas exchange data (VO<sub>2</sub>) was continuously collected. Each exercise bout was calorically matched ( $100 \pm 10$  kcal). **Results:** Mean VO<sub>2</sub>, significantly increased across time ( $p<0.05$ ). Mean SV, and CO significantly increased across time, in which there was also a time $\times$ trial interaction ( $p<0.05$ ). Additionally, there was a main effect across trials for HR ( $p=0.010$ ) as well as a time $\times$ trial interaction ( $p<0.05$ ). **Conclusion:** The results may reveal that the incorporation of HIIT could be a viable option for exercise programming in the spinal cord injured population. Further research is warranted to examine the long-term effects of interval training on overall cardiovascular health.

### 37. UTILIZING VIBROMYOGRAPHY TO ANALYZE MUSCULAR ACTIVITY DURING A CYCLE ERGOMETER TEST: A PILOT STUDY

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**Purpose:** Vibromyography (VMG) is used to measure the lateral oscillations of myofibrils at the initiation of contraction, as well as vibrations caused by pressure changes of the muscle fiber as a whole as it changes shape. VMG signal amplitude is influenced by the recruitment of motor units, while VMG mean power frequency (MPF) decreases as fatigue threshold is reached. The purpose of this study was to examine the amplitude and frequency responses to increased workloads during a cycle ergometer test. **Methods:** Fifteen college-aged students volunteered for this study (20.14±1.562 yrs; 174.51±10.25 cm; 72.35±11.62 kg). Cohesive bandage was used to attach a VMG sensor to the skin above the right vastus lateralis (VL). The maximal VMG signal of the subject's VL was determined during an isometric contraction utilizing an isokinetic dynamometer. Participants performed an incremental, continuous cycle ergometer test, with resistance increasing every two minutes. **Results:** Analysis revealed a significant, positive correlation between VMG signal amplitude and cycle resistance ( $p<0.001$ ,  $r=0.994$ ). There was also a significant, positive relationship between VMG economy and resistance ( $p<0.001$ ,  $r=0.952$ ). There was no relationship between normalized torque (peak torque/weight) and economy ( $p>0.05$ ). Six of the 15 subjects showed a VMG MPF fatigue threshold (VMG MPF<sub>fit</sub>). The mean VMG MPF<sub>fit</sub> occurred at 179.17±64.6 watts. **Discussion:** Our results confirmed that there is a consistent increase in the VMG signal amplitude with increased cycle resistance. Signal MPF also increased with increasing resistance. In six subjects there was a significant decrease in MPF with increasing intensity, indicating a VMG MPF<sub>fit</sub>. The VMG MPF<sub>fit</sub> occurred at a mean Rating of Perceived Exertion of 13.34±2.7 on the Borg Scale. This is in accordance with previous research that shows fatigue thresholds occur at an RPE around 13 or 14 on the Borg scale.

### 39. STEP-WIDTH SYMMETRY DIFFERENTIATES INDIVIDUALS WITH AND WITHOUT A HISTORY OF FALLS

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**Purpose:** Increased risk of falling can be identified by gait. However, no known investigations have studied the contribution of step-width symmetry to falls risk. The purpose of this study was to identify differences in step-width symmetry across fallers and non-fallers. **Methods:** 351 subjects over 60 years were recruited from testing sites across the Southwest United States by the Electronic Caregiver® Mobile Falls Risk Assessment Laboratory. Participants self-reported history of falls in the last three years. Gait data were collected via the Walkway™ gait analysis system. Independent sample t-test was conducted to quantify step-width symmetry differences across fallers and non-fallers. Fall history was the dependent variable and step-width symmetry was the independent variable. **Results:** Central tendency measures revealed that for non-fallers, step-width symmetry data approximated the normal distribution and an average step-width difference of 0.94 cm was observed. For fallers, step-width symmetry data were observed to be leptokurtic and did not approximate the normal distribution with an average step-width difference of 0.68 cm. Though the t-test is moderately robust against model assumption violations, it is understood that higher levels of kurtosis can impact Type I error. Thus, a decision was made to reduce the overall alpha associated with the hypothesis testing ( $\alpha = 0.01$ ). Results of the means difference test revealed a significant difference in step-width symmetry between fallers and non-fallers ( $t_{349} = 3.106$ ,  $p = 0.002$ ). **Conclusion:** Fallers demonstrated more symmetrical step-width than non-fallers. Additional analysis revealed fallers also demonstrated a wider walking base than non-fallers. As previous work has demonstrated lower magnitudes of center of mass (COM) excursion in fallers, the finding of increased step-width symmetry in fallers is thought to be an attempt to control COM excursion during locomotion by widening the walking base. This increase in walking base is thought to ultimately increase step-width symmetry in fallers.

### 38. METABOLIC COST, EXERCISE INTENSITY, AND PERCEIVED EXERTION DURING ACTIVE VIRTUAL REALITY GAMING

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**Purpose:** This is the first study to examine active virtual reality games (AVRG) as a new avenue of exercise by assessing the intensity of three HTC VIVE® games by measuring oxygen consumption (VO<sub>2</sub>) and rating of perceived exertion (RPE) during the gaming sessions. A secondary purpose was to compare the exercise intensities of the three games to current ACSM exercise guidelines. **Methods:** Forty-one healthy volunteers [male ( $n=21$ ), female ( $n=20$ ); mean±SD, age: 25.2±4.4y] made two-visits to the laboratory separated by >48hrs. During visit one, participants were assessed for body composition, completed a graded exercise test to determine maximal VO<sub>2</sub>, and a familiarization period of the following AVRGs: Thrill of the Fight [TOF], Audioshield [AS], and Holopoint [HP]. During visit two, VO<sub>2</sub> and RPE were measured during 10-minutes of supine rest and 10-minute sessions of the games. Game intensity was further quantified as a percentage of VO<sub>2</sub> reserve (%VO<sub>2</sub>R) and metabolic equivalents (METs). Between game differences in measures were compared via an ANOVA ( $p\leq 0.05$ ). **Results:** Compared to resting values, VO<sub>2</sub> was higher during TOF, AS, and HP ( $p\leq 0.05$ ). Using %VO<sub>2</sub>R, TOF was classified as vigorous, HP was moderate, and AS ranged from light to moderate intensity depending on gaming experience. Using METs, TOF was classified as vigorous, HP ranged from moderate to vigorous, and AS was moderate intensity. Using RPE, TOF to be light to moderate exertion, whereas HP and AS were light intensity. **Conclusion:** Our data suggests the three AVRGs examined can elicit least a moderate exercise intensity based on ACSM guidelines. Participants perceived the physical exertion to be lower during the games than their measured exertion, which might allow participants to continue playing AVRGs for longer durations before feeling fatigued. Data on metabolic cost for movement specific games may aid consumers and health/fitness specialists in developing exercise programs with AVRGs.

### 40. THE EFFECT OF MOTORIZED AND NON-MOTORIZED TREADMILL ON THE LOWER-BODY PERCENT OF MUSCLE ACTIVATION IN DIVISION II FEMALE CROSS COUNTRY ATHLETES

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**Purpose:** The purpose of this study was to compare the percent of muscle activation (%ACT) in the lower body in female cross-country athletes when using a non-motorized (NMT) and motorized treadmill (MT). **Methods:** Ten female Division II cross-country athletes that volunteered to participate in three testing days. Before testing the athletes, they completed an IRB approve inform consent and PAR-Q. Electromyography (EMG) sensors were used to collect muscle activity during maximal voluntary isometric contractions (MVIC) and dynamic trials. EMG sensors were placed on the following muscles of the right leg: medial hamstring (MH), vastus lateralis (VL), medial gastrocnemius (MG), and tibialis anterior (TA). The treadmill protocol consisted of a five-minute warm-up walk, walk, runn and cool-down walk. On familiarization day, the participants performed the treadmill protocol on the Woodway Curve 3.0 NMT. On the second and third testing day the participant performed MVIC's and treadmill protocols with EMG. Percent of MVIC's during walking and running trials for each muscle were calculated and used for analysis. Paired sample t-test was used to analyze differences between MT and NMT conditions for each muscle. **Results:** There were significant ( $p<0.05$ ) differences between MT (77.79 ± 6.55%) and NMT (87.36 ± 7%) in %ACT in VL during the walking trial. There were no significant ( $p>0.05$ ) differences between MT and NMT in %ACT in VL during the running trial. There were no significant ( $p>0.05$ ) differences between MT and NMT in %ACT in other muscles during walking and running trials. **Conclusion:** The results show there is greater differences in %ACT on the NMT compared to the MT only in the VL during walking trials. This may be due to differences in the curvature of the NMT, which could have prevented participants to use heel strike phase while walking resulting in higher %ACT in the VL.

#### 41. INFLUENCE OF QUADRICEPS STRENGTH SYMMETRY ON LANDING SYMMETRY FOLLOWING ACL RECONSTRUCTION

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**Purpose:** Individuals with anterior cruciate ligament reconstruction (ACLR) aim to achieve  $\geq 90\%$  quadriceps strength of the uninvolved limb prior to return to sport. Quadriceps strength asymmetry may contribute to asymmetric landing mechanics. The purpose of this study was to investigate the relationship between quadriceps function symmetry and landing symmetry. **Methods:** 48 individuals with primary unilateral ACL reconstruction participated in this study (34 females, age=22.0 $\pm$ 2.8 years, height=1.70 $\pm$ 0.09m, mass=71.9 $\pm$ 16.1kg, IKDC=86.1 $\pm$ 9.3). Participants completed three drop jump landings from a 30cm height located at a distance of 50% of their height onto 2 force plates. Quadriceps strength was assessed via isometric (peak and rate of torque development (RTD)) and isokinetic knee extension at 60°, 180°, and 240° per second. Limb symmetry index (LSI) was calculated as the ratio of the involved divided by the uninvolved limb for strength measures and landing biomechanics (knee flexion angle (peak, at ground contact, and excursion), peak external knee flexion moment (KFM), and vertical ground reaction force (GRF)). Pearson correlation was used to assess the relationship between quadriceps LSIs and KFM and GRF LSIs. Spearman rho was used to determine the relationship between quadriceps LSIs and knee flexion angle LSIs. **Results:** Isometric strength LSI ( $r=0.30$ ,  $p=0.05$ ) and RTD LSI ( $r=0.37$ ,  $p=0.01$ ) were associated with KFM LSI. Isometric strength LSI ( $\rho=0.34$ ,  $p=0.02$ ) and isokinetic strength LSI at 60° ( $\rho=0.40$ ,  $p=0.01$ ) and 180° ( $\rho=0.31$ ,  $p=0.05$ ) were associated with knee flexion excursion LSI. Isokinetic strength at 180° ( $r=0.39$ ,  $p=0.01$ ) was associated with GRF LSI. **Conclusion:** Quadriceps LSI is associated with knee mechanics during landing, and improving symmetry may be useful for restoring landing symmetry after ACLR. Taking quadriceps symmetry into account may help when determining return to sport criteria. However, relationships were weak, and other factors such as impaired neuromuscular control may also contribute to asymmetry during landing.

#### 43. THE EFFECT OF ACADEMY TRAINING ON THE PHYSICAL FITNESS OF CUSTODY ASSISTANT RECRUITS ACROSS THREE CLASSES

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**Purpose:** The primary occupational tasks for custody assistants (CAs) is to ensure the safety and security of inmates in detention facilities. The eight-week academy training period aims to develop the physical characteristics important for the occupation. However, as there is generally no physical testing prior to getting hired, fitness levels for CA recruits can vary greatly. This could influence the fitness adaptations experienced across different CA classes. The study purpose was to determine the effects of academy training on male and female recruits from three classes. **Methods:** A retrospective analysis of three CA classes (Class 1: M=29, F=11; Class 2: M=22, F=15; Class 3: M=18, F=12) was conducted. The tests the recruits performed pre- and post-academy training included: number of push-ups and sit-ups in 60 s; maximum number pull-ups; 201-m (220 yard) sprint; and 2.4-km (1.5-mile) run. The training sessions were designed by the CA training instructors. Factorial ANOVAs ( $p<0.05$ ) with Bonferroni post hoc were calculated for each test to determine any within- and between-group differences as a result of academy training for the recruits. **Results:** All CA classes significantly improved pull-ups, push-ups, sit-ups, and 2.4-km run time with no differences between the classes. For the 201-m sprint, classes 2 (pre=38.13 s, post=35.14 s) and 3 (pre=34.33 s, post=33.35 s) improved after academy training. However, class 1 did not (pre=35.48 s, post=36.54 s). **Discussion:** The current format of academy training can improve maximum strength (pull-ups), strength endurance (push-ups and sit-ups), and aerobic capacity (2.4-km run) in CAs. However, training instructors should be aware that certain characteristics (anaerobic endurance as measured by the 201-m sprint) did not improve across all classes. As anaerobic power is important for CAs as it relates to occupational tasks (e.g. responding to emergency situations), training instructors should ensure development in this capacity for all CA classes.

#### 42. COMPARISON OF MOTOR PROFICIENCY IN CHILDREN WITH PRADER-WILLI SYNDROME VERSUS TYPICALLY DEVELOPED CHILDREN

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**Purpose:** Prader-Willi syndrome (PWS) is a genetic disorder that can result in developmental delays in motor skills. Children with PWS are less likely to participate in physical activity due to hypotonia, muscle weakness, and movement dysfunction. This study aimed to characterize and compare motor proficiency (MP) in children with PWS to typically-developing children (TDC). **Methods:** Six children with PWS (age=5.0 [4.0-6.0] y; height=108.6 [99.1-119.4] cm; body mass=21.9 [15.0-33.5] kg) and 17 TDC (age=5.0 [4.0-7.0] y; height=114.3 [99.1-132.7] cm; body mass=22.5 [16.4-43.5] kg) participated. Cognitive function was assessed using the abbreviated Stanford Binet Intelligence test Fifth Edition in PWS ( $n=3$ , moderately impaired;  $n=2$ , borderline impaired;  $n=1$ , average). Parents reported age of child's developmental milestone achievement: stood alone (SA), walked alone (WA), ran alone (RA), and manipulated object purposefully (MOP). MP was measured using the Bruininks-Oseretsky Test of Motor Proficiency-Second Edition-Short Form, a norm-referenced test assessing fine and gross motor skills. Standard scores were calculated and used to compare groups MP. Group comparisons were done using Mann-Whitney U tests. Descriptive categories described participant MP compared to the normative sample. **Results:** PWS achieved SA, WA, RA, and MOP at a later age than controls ( $p \leq 0.01$ ). PWS had a lower standard score for MP (PWS=25 [21-30]; TDC=53 [30-67]) than controls ( $p \leq 0.001$ ). All PWS scored well-below average, while controls scored in the well-below average ( $n=1$ , 5.9%), average ( $n=13$ , 76.5%), and above-average ( $n=3$ , 17.6%) categories. **Conclusion:** Young children with PWS displayed delayed motor development and lower MP than TDC. Delayed developmental milestone achievement may explain the poor MP observed in this young PWS group. However, since MP in PWS continues to be poor later in life (Lam et al. 2016), reduced lean mass, and movement and sensorimotor integration dysfunction should also be considered.

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#### 44. AFFECT AND ENJOYMENT RESPONSES TO IMPOSED AND SELF-PACED HIGH INTENSITY INTERVAL TRAINING

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**Background:** Like moderate intensity continuous training (MICT), high intensity interval training (HIIT) provides similar fitness and health related benefits and may reduce the risk of chronic diseases. Typically, HIIT is performed in a lab setting supervised by experienced personnel. Whether this imposed exercise exerts a deleterious effect upon perceptual responses to HIIT is unknown. **Purpose:** The purpose of this study was to examine differences in enjoyment and affect between self-paced and imposed HIIT. **Methods:** Ten physically active men and women performed a baseline  $VO_{2max}$  to determine their peak power output (PPO) on the cycle ergometer. Subsequently, they performed imposed or self-paced HIIT whose order was randomized. Imposed HIIT consisted of eight 60 second bouts at 80% of PPO with a 60 second recovery between bouts. Self-paced HIIT followed the identical number and duration of each bout as imposed, but subjects were required to freely modify power output of the cycle ergometer during each bout to elicit an RPE greater than or equal to 7. Oxygen uptake ( $VO_2$ ), blood lactate concentration (BLA), heart rate (HR), affect, and Physical Activity Enjoyment (PACES) were measured. **Results:** Data showed a significant difference in BLA ( $p=0.007$ ) and PACES between bouts, as BLA was higher in self-paced versus imposed, and PACES was lower in self-paced (81.5 $\pm$ 13.06) versus imposed (92.3 $\pm$ 11.96). Yet, there was no difference in affect ( $p=0.084$ ) or HR ( $p=0.115$ ). Self-paced led to higher  $VO_2$  ( $p=0.000$ ), RPE ( $p=0.003$ ), and power output ( $p=0.000$ ) versus imposed. **Conclusion:** Due to attainment of a higher physiological and perceptual intensity, self-paced HIIT likely led to lower enjoyment scores, although affect was similar. Whether long-term completion of self-paced HIIT is superior to imposed HIIT to elicit various health related adaptations remains to be determined.

#### 45. FUELING FOR OPTIMAL HEALTH AND PERFORMANCE: A NUTRITION CURRICULUM FOR PARENTS OF ADOLESCENT FIGURE SKATERS

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**Purpose:** Adolescent figure skaters face the challenge of maintaining their appearance while consuming enough energy and nutrients to meet the high demands of training and performance. The pressure to stay lean and improve performance at the same time puts these athletes at an increased risk for exercising calorie restrictions and disordered eating. With parents being the primary providers of nutrition for their children, the purpose of this project was to create an evidence-based nutrition education curriculum for parents with at least one adolescent child attending an elite training school for figure skating. The goal of the program is to enhance parental knowledge, skills, and awareness surrounding the nutrition needs of adolescent figure skaters to meet the high demands of training and performance. **Methods:** The specific components of the Fueling Your Adolescent Figure Skating Athlete curriculum were developed based on current evidence of literature. The curriculum integrated constructs from the Social Cognitive Theory to enhance parent's intrinsic motivation and behavioral skills surrounding the nutrition needs of their adolescent figure skating athlete. Formative evaluation of the accuracy and appropriateness of the program was completed by two registered dietitians experienced in sports nutrition. **Results:** The Fueling Your Adolescent Figure Skating Athlete curriculum consists of six 40-minute PowerPoint presentations with corresponding activities, lesson plans, and handouts. The curriculum guides parents in the following areas: nutrition needs during adolescence, macronutrients, micronutrients of concern, proper hydration, nutrition throughout the training year, and example nutrition packed meals and snacks. **Conclusion:** It is hoped that this nutrition curriculum will provide parents with enhanced nutrition knowledge and skills to promote healthy eating patterns of their adolescent figure skating athlete for optimal health, performance, and prevention of injury. The implementation of the program is being planned.

#### 47. ACUTE EXERCISE AND COGNITION IN YOUNG ADULTS: DOES INTENSITY AND SKILL MATTER?

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**Purpose:** Past research has found positive effects of acute, aerobic exercise on cognition. However, motor skill complexity and exercise intensity need further study. The purpose of this study was to examine the effects of motor skill complexity and exercise intensity on short term memory (STM) and executive function in young adults. **Methods:** 30 participants, 19 women and 11 men with a mean age of 20.4, completed a control condition (20 minute rest while listening to music) and exercise condition (20 minute exercise to music) in a 2 (within participants: control, experimental) X 4 (between participants: Exercise Type) counter-balanced design. The four exercise conditions were Modern Dance (low aerobic, high skill), Stationary Cycling (high aerobic, low skill), Strength Training (low aerobic, low skill), and Boot Camp (high aerobic, high skill). Cognitive performance, assessed by computerized tests of STM (word recall) and executive function (Stroop), were completed before and after the control and exercise conditions. **Results:** Using repeated measures ANOVA, Exercise Type significantly affected reaction time (RT) in Stroop,  $F(3, 18) = 3.78, p = .03, \eta^2_p = .39$  such that RT in Stationary Cycling ( $M = 1.9, SE = .21$ ) was significantly slower than Modern Dance ( $M = 1.22, SE = .13, p = .01$ ), Boot Camp ( $M = 1.2, SE = .15, p = .01$ ) and Strength Training ( $M = 1.05, SE = .16, p < .01$ ). Condition did not affect RT, but did show a marginal effect on accuracy, such that performance in the Exercise condition ( $M = .979, SE = .01$ ) was less accurate than in the Control condition ( $M = .99, SE = .004, F(1, 18) = 3.62, p = .07, \eta^2_p = .17$ ). STM effects were not significant, but showed similar trends. **Conclusion:** These results tentatively suggest that higher exercise intensity may negatively impact cognitive function.

#### 46. CONCURRENT VALIDITY AND RELIABILITY OF THE ASSESS2PERFORM BARSENSEI IN BARBELL BACK SQUATS

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**Purpose:** The purpose of this study is to determine the reliability of the Assess2Perform BarSensei and establish concurrent validity using the previously tested GymAware PowerTool in assessing resistance training kinematics. **Methods:** 9 Participants were recruited who had at least 6 months of regular squat training (>1x per week), had no injuries in the previous 6 weeks, and had rested for 72 hours prior to each session. This study was approved by the California State University Monterey Bay Committee for the Protection of Human Subjects. All subjects gave informed consent prior to participation. On Day 1, subjects were familiarized to the protocol and tested their 1 repetition maximum (1RM). On Days 2 and 3, after a standardized warm-up, subjects performed a standardized squat protocol of 2 sets of 3 repetitions each at 45% 1RM, 60% 1RM, and 75% 1RM. From each repetition on Days 2 and 3, mean concentric velocity (MCV) and peak concentric velocity (PCV) was collected and compared between the devices. Pearson correlations were used to assess the concurrent validity of velocity values obtained from both devices. Intra-set reliability was also quantified using intraclass correlations. **Results:** MCV from both devices had a large relationship  $r = 0.66$ . PCV from both devices had a very large relationship  $r = 0.75$ . Within-set reliability of the BarSensei and GymAware MCV was  $ICC = 0.77, ICC = 0.98$ , respectively. Within-set reliability of the BarSensei and GymAware PCV was  $ICC = 0.81, ICC = 0.95$ , respectively. **Conclusion:** There is a large relationship between both devices, so the BarSensei is somewhat concurrently valid. However, the BarSensei is not as reliable within a single set as the GymAware Powertool Device.

#### 48. EXPLORING SELF-REPORTED ANTICIPATED OUTCOMES OF AN EIGHT WEEK EXERCISE PROGRAM ON QUALITY OF LIFE FOR INDIVIDUALS WITH SPINAL CORD INJURY

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**Purpose:** When a spinal cord injury (SCI) occurs, the severity of the loss of strength, sensation, and function depends on the type and level of injury. Individuals with SCI experience barriers to exercise, which arise from not having accessible facilities, transportation issues, traveling long distances to exercise and getting fatigued easily. Phenomenology utilizes qualitative data to explore the lived experiences of research participants – in this case, individuals with SCI beginning an eight-week exercise program. The purpose of this project was to use a qualitative phenomenological approach to explore the anticipated physical and psychological effects of engaging in an eight-week exercise program on quality of life for individuals with SCI.

**Methods:** This preliminary study used a qualitative approach in which we conducted ten individual interviews with participants with SCI before they take part in an eight-week exercise training session only open to individuals with SCI. Interviews ranged from 23 to 47 minutes. Interviews were transcribed and compared using a phenomenological approach.

**Results:** Results revealed distinct themes across transcripts. Participants discussed exercise as a means of mobility and increasing autonomy. Participants reported that exercise increases strength thereby increasing ability to travel long distances in a wheelchair. In addition, improved strength positively affects ability to transfer (from bed to wheelchair, from wheelchair to car, etc.). Other anticipated outcomes included further opportunities for social engagement. Participants also reported on the importance of mentoring others with disabilities as a means of providing further meaning in their lives.

**Conclusion:** The results of this project indicate a level of excitement as individuals embark on an eight-week training regimen developed specifically for individuals with SCI. Participants report anticipated outcomes of increased autonomy, opportunities for social engagement, and opportunities for mentorship as a result of completing a group exercise program.

#### 49. CHARACTERIZATION OF PLANTAR CONTACT AREA ERROR FROM PRESSURE-MEASURING INSOLES IS REDUCED USING AN ADAPTIVE SENSOR THRESHOLD METHOD

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**Purpose:** Pressure-measuring insoles have the potential to quantify plantar contact area (PCA) during locomotion. However, lack of full understanding of these insoles can lead to inaccurate estimation of the PCA they produce. The purpose of this study was to present a novel approach to reduce PCA error of pressure-measuring insoles using an adaptive-threshold method. **Methods:** A sample of 6 healthy, ambulatory, young adults (age = 27±5.7 years, mass = 87.0±11.6 kg, height = 1.73±0.1 m) participated in the study. All participants wore size 43 (Euro) insoles, which best fitted their feet. Each participant performed ten walking trials on a custom-built elevated walkway. Participants wore a pressure-measuring insole on the left foot. High resolution reference footprints from the right bare foot were imaged using a custom-built podoscope device. Optical pedography combined with digital image processing algorithms were used to measure the PCA of the reference footprints over the entire stance phase of walking. PCA error of pressure-measuring insoles, with respect to the optical pedography method, were calculated using two threshold criteria: 1) a fixed threshold (5 kPa), and 2) an adaptive threshold that used a small percentage (0.2%) of the maximum load on the insole. Error ratios (ER) between each threshold method and the reference footprints were calculated. **Results:** The adaptive threshold of 0.2% of the maximum load placed on the insole yielded (ER = 0.91±0.13) while the fixed threshold overestimated the PCA by over 30% (ER = 1.33±0.20). **Conclusion:** The proposed adaptive threshold method proved to be more effective at reducing PCA error than the fixed threshold method. To the authors' knowledge, this is the first study to examine the use of a load-based adaptive threshold method in measuring PCA in a dynamic state. Future studies will examine the robustness of adaptive-threshold algorithms for wider population.

#### 51. MUSCLE GROWTH AND STRENGTH DEVELOPMENT FOLLOWING A 12-WEEK RESISTANCE TRAINING PROGRAM ARE SIMILAR BETWEEN YOUNG MEN AND WOMEN CONSUMING SOY OR WHEY PROTEIN SUPPLEMENTS MATCHED FOR LEUCINE CONTENT

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**Purpose:** There have been conflicting reports in the literature about the efficacy of plant-based compared to animal-based protein supplementation to comparably support muscle growth and strength development in conjunction with resistance training. This may be due to varying amounts of protein (and therefore varying amounts of specific amino acids) provided in supplements and to habitual dietary intake of participants. The purpose of this study was to determine whether matching protein supplements for leucine content, instead of total protein content, would contribute to similar strength increases and muscle growth in response to a 12-week resistance training program among healthy, untrained young men and women. **Methods:** This prospective, parallel-arm, double-blind, randomized trial involved 12-weeks of a resistance training program and daily protein supplementation with either 19 grams of whey protein isolate or 26 grams of soy protein isolate, both containing 2 grams of leucine. Participants underwent a DXA scan, ultrasound of their dominant leg's thigh muscles, and had their strength tested through isokinetic dynamometry on three occasions (baseline, mid-study, and post-intervention). Data were analyzed through multilevel modeling. **Results:** Both groups significantly increased strength, total body mass, and lean body mass and significantly decreased total fat mass, body fat percent, and subcutaneous adipose tissue with no differences between groups over time. **Conclusion:** Among healthy, young, untrained men and women in the present study, there were no significant group differences for anthropometric or strength changes in response to resistance training and protein supplementation matched for leucine content. This highlights the potential of plant-based protein to comparably support strength and body composition changes and may serve as a foundation upon which to base future work investigating other types of plant protein and plant-protein supplementation in other populations such as the elderly or malnourished.

#### 50. THE EFFECT OF STRIDE FREQUENCY VARIATIONS ON RUNNING PERFORMANCE OF TIME TO EXHAUSTION AT THE VELOCITY OF VO<sub>2</sub>MAX

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**Purpose:** Running economy(RE) considered to be a critical factor to improve running performance. Stride frequency(SF) is an important variable for determining RE. However, no previous research has investigated the interaction between running performance at the velocity of VO<sub>2</sub>max and SF. The purpose of this study was to investigate running performance effects by five different SF at the velocity of VO<sub>2</sub>max. **Methods :** Nine male recreational runners (mean ± SD, Age=25 ± 4.8yr, Height=1.73 ± 0.6m, Body Mass=73.3 ± 7.9kg) measured VO<sub>2</sub>max (52.7 ± 5.8 ml/kg/min) and preferred stride frequency (PSF; 89.5 ± 4.6 / min) through a graded exercise test (GXT) and a running session, respectively. Running speed was determined based on each individual's GXT results, and participants ran at this constant speed with different SF (PSF, ±5%, ±10%) until time to exhaustion or failure to maintain a given SF. During experimental sessions, heart rate, energy expenditure(EE; kcals), SF measured. **Results:** The total running distance and kilocalories were statistically significant among SF variations (p<0.05). Specifically, the 105% of SF condition was significantly (p<0.05) different at three SF conditions; 90%, 95%, and 110% except 100% of SF (p=0.23).

**Table 1.** The relationship between SF and distance, energy expenditure(kcals)

| SF variations  | 90%                  | 95%           | 100%          | 105%         | 110%          |
|----------------|----------------------|---------------|---------------|--------------|---------------|
| Distance(mile) | 1.00 ± 0.5 * $\Psi$  | 1.04 ± 0.5 *  | 1.37 ± 0.6    | 1.64 ± 0.7   | 1.15 ± 0.7 *  |
| EE(kcals)      | 53.2 ± 21.5 * $\Psi$ | 67.4 ± 31.4 * | 86.1 ± 33.0 * | 114.1 ± 39.5 | 74.0 ± 40.2 * |

Note. Results reported in mean ± SD.

\* p < 0.05, value significantly different from 105% SF conditions.

$\Psi$  p < 0.05, value significantly different from 100%; PSF conditions.

**Conclusion:** The SF variations have a significant influence on running performance. Specifically, this research suggests that recreational runners could use a 105% of SF to improve performance with the better RE.

#### 52. TRPV1 RECEPTOR ANTAGONIST BLUNTS CHOLINERGIC-MEDIATED SWEATING

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**Purpose:** Cholinergic-mediated primary sweat production requires an increase in Ca<sup>++</sup> influx across the epithelial cell membrane of the sweat gland. Several Ca<sup>++</sup> channels have been proposed to contribute to the increase in Ca<sup>++</sup> influx. We tested the hypothesis that the nonspecific cation channel associated with the TRPV1 receptor, which are located on sweat gland epithelial cells, contributes to the Ca<sup>++</sup> influx and thereby local sweat production. **Methods:** We measured local sweat rate (SR) with a 0.7 cm<sup>2</sup> capsule containing a humidity sensor and a thermocouple and flushed with dry gas was placed on the skin overlaying an intradermal microdialysis probe used to deliver 20 mM capsazepine, a TRPV1 receptor antagonist, to the skin. Two small stainless steel needles were placed into the skin (7 mm apart, 2 mm deep) and stimulated at a constant current intensity of 2.5 mA for 30 s at frequencies of 0.2, 1, 2, 4, 8, 16, 32, and 64 Hz to generate stimulus-response curves of the area under the SR-time curve versus log stimulus frequency before (vehicle control) and following 60 min of 20 mM capsazepine perfusion. **Results:** The EC<sub>50</sub> was similar for both trials averaging 10.8 ± 1.2 and 11.4 ± 1.2 Hz, respectively. Peak SR response occurred at 64 Hz and the plateau of the area under the SR-time curve was 40% higher during control (0.247 ± 0.024 mg·cm<sup>-2</sup>) than during capsazepine treatment (0.158 ± 0.015 mg·cm<sup>-2</sup>, p =0.003). **Conclusion:** The marked reduction in the plateau local sweat rate response indicates that TRPV1 receptor cation channels likely contribute to Ca<sup>++</sup> influx during cholinergic-mediated sweating.

### 53. EFFECTS OF FOAM ROLLING ON ISOKINETIC PEAK TORQUE AND MUSCLE ACTIVATION

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Foam rolling (FR) is a common method of increasing range of motion; however, its effects on peak torque (PT) and muscle activation are relatively unknown. **Purpose:** To examine the effects of FR on isokinetic PT and electromyography (EMG). **Methods:** Twenty-two recreationally active women (mean age  $\pm$  SD = 21.55  $\pm$  1.82 years, height = 161.91  $\pm$  6.58 cm, body mass = 61.47  $\pm$  10.54 kg, body mass index (BMI) = 23.32  $\pm$  2.82 kg/m<sup>2</sup>) volunteered for this study. Participants performed a pre- and post-test analyzing hamstrings and quadriceps PT and EMG of their dominant limb while completing maximal knee extension and flexion at three different velocities. Protocols were randomized and consisted of three maximal kicks in the concentric phase at 60°·s<sup>-1</sup>, 180°·s<sup>-1</sup>, and 300°·s<sup>-1</sup> for hamstrings and quadriceps, and 60°·s<sup>-1</sup> and 180°·s<sup>-1</sup> in the eccentric phase for the hamstrings. Participants foam rolled the hamstrings muscles, or sat quietly during a similar duration control condition, between the pre- and post-tests. **Results:** Concentric hamstrings PT decreased 6.17%, 3.74%, 3.42% from pre- to post-test at 60°·s<sup>-1</sup>, 180°·s<sup>-1</sup>, and 300°·s<sup>-1</sup>, respectively, for the FR condition, and decreased 5.87%, 8.67%, 6.46% at 60°·s<sup>-1</sup>, 180°·s<sup>-1</sup>, and 300°·s<sup>-1</sup>, respectively, for the control condition ( $p = 0.022$ ). Concentric biceps femoris EMG decreased 5.14% collapsed across condition and velocity ( $p = 0.028$ ). There were no significant changes in concentric quadriceps and eccentric hamstrings PT ( $p > 0.05$ ), or concentric quadriceps and eccentric biceps femoris EMG Activity ( $p > 0.05$ ). **Conclusion:** Following a foam rolling protocol, there was no major deficit in PT or muscle activation, when compared to a control condition. These findings indicate FR might not decrease strength performance beyond those of a similar duration control condition.

### 55. THE RELATIONSHIP BETWEEN METABOLIC SYNDROME MARKERS, CYTOKINES, AND PHYSICAL ACTIVITY IN OBESE YOUTH WITH AND WITHOUT PRADER-WILLI SYNDROME

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**Purpose:** The purpose of this study is to identify a relationship between metabolic syndrome (MetS), pro-inflammatory cytokines, and moderate-to-vigorous physical activity (MVPA) in youth with Prader-Willi Syndrome (PWS) and non-syndromic obesity (OB). **Methods:** Twenty-one youth with PWS (ages 10.7  $\pm$  2.6) and 34 youth with OB (ages 9.6  $\pm$  1.0) participated. Body composition measures and blood pressure were obtained. Blood sampling measured cholesterol, CRP, IL-6, and TNF- $\alpha$  concentrations. Accelerometry measured MVPA for eight consecutive days. Chi-square analyses and t-tests compared the frequency of meeting the MetS criteria and differences in MetS markers and cytokines between PWS and OB youth. Group specific median-splits separated participants into high and low PA level. ANOVAs analyzed differences in MetS severity and cytokines between youth groups and levels of PA. **Results:** The frequency of presenting BMI z-score as a MetS marker was lower in youth with PWS than OB (PWS = 61.9%, OB = 91.2%,  $\chi^2 = 6.952$ ,  $p < 0.01$ ). The frequency of presenting fasting glucose as a MetS marker was lower in youth with PWS than OB (PWS = 14.3%, OB = 44.1%,  $\chi^2 = 5.247$ ,  $p < 0.05$ ). In OB, MVPA was associated with MetS severity ( $r = -0.35$ ,  $p = 0.07$ ) and CRP ( $r = -0.39$ ,  $p = 0.05$ ). In PWS, those with low PA had higher TNF- $\alpha$  concentrations than those with high PA (PWS low PA = 1.80  $\pm$  0.45 pg/mL, PWS high PA = 1.39  $\pm$  0.26 pg/mL,  $p = 0.04$ ). **Conclusion:** Youth with PWS appear to present a better cardiometabolic profile than OB. Our data suggests that PA could possibly influence MetS and systemic inflammation in youth with and without PWS. Future research should consider longitudinal designs to investigate the influence of PA in individuals with PWS to aid in the prevention of MetS.

### 54. EFFECTIVENESS OF COLLEGE PHYSICAL EDUCATION COURSES AT IMPROVING EXERCISE MOTIVATION

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**Purpose:** Recent research suggests that 56% of undergraduate students do not meet the physical activity guidelines (PAG), and 80% of college graduates continue being inactive throughout adulthood. Participating in a physical education course (PED) may increase the number of students who meet the PAG. However, only 40% of 4-year colleges still require students to complete a PED. Reasons for decreases in PED requirements and offerings are competition for time, space, and budget resources. Thus, it becomes incumbent for PED programs to provide evidence that their courses provide benefits to students' physical activity (PA). A key determinant of long-term PA participation is exercise motivation. Self-Determination Theory describes how people who are more autonomously motivated to exercise are more likely to engage in this health-promoting behavior long term. The purpose of this study was to determine if college PED benefit students' exercise motivation, specifically by increasing autonomous exercise motivation. **Methods:** Two hundred nineteen students who were enrolled in a Spring semester PED completed the Behavioral Regulations in Exercise version 2 questionnaire at the beginning and end of the semester. Baseline scores were used to dichotomize students into low or high motivated groups. Changes in exercise motivation were compared between groups using a repeated measures MANOVA. **Results:** While high motivated students maintained their exercise motivation, low-motivated students significantly improved on introjected regulation ( $p = 0.014$ ;  $\eta^2 = 0.028$ , small effect size), identified regulation ( $p < 0.001$ ;  $\eta^2 = 0.174$ , large effect size), intrinsic regulation ( $p < 0.001$ ;  $\eta^2 = 0.090$ , medium effect size), and relative autonomy index ( $p < 0.001$ ;  $\eta^2 = 0.074$ , medium effect size). **Conclusion:** College PED may improve autonomous exercise motivation among students who began with low exercise motivation levels. These results indicate that college PED may provide meaningful health benefit to students, indicating their value in health education.

### 56. A PRELIMINARY INVESTIGATION INTO THE EFFECTS OF HYPERMOBILITY ON LOWER-BODY DYNAMIC STABILITY, POWER, AND STRENGTH IN APPARENTLY HEALTHY MEN AND WOMEN

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**Purpose:** Hypermobility is defined as an inherent laxity of ligaments, and it may be present in approximately 10% of the Western population. Great joint mobility may be necessary in certain populations, such as dancers and gymnasts. Whether hypermobility can influence other physical characteristics (e.g. dynamic stability, power, and strength) has not been investigated. The purpose of this study was to determine the impacts of hypermobility on unilateral and bilateral lower-body dynamic stability, power, and strength in otherwise healthy men and women. **Methods:** Twenty-four college-aged individuals (9 males, 15 females) were tested for hypermobility, determined using the Beighton method. Dynamic stability was measured using the modified Star Excursion Balance test (SEBT), and calculated by reach distance as a percentage of leg length. Power was measured via vertical, standing broad (both bilateral and unilateral), and lateral (unilateral) jumps. Lower-body strength was assessed by bilateral and unilateral peak force and time to peak force in the isometric mid-thigh pull. Participants were grouped into those with or without hypermobility (males and females were analyzed separately), and independent samples t-tests ( $p < 0.05$ ) were used to calculate any between-group differences in the performance tests. **Results:** Three males and 7 females presented with hypermobility. No significant differences were found between the hypermobile and non-hypermobile participants in the strength or power tests. However, hypermobile males performed significantly better in the SEBT left-leg medial reach ( $p = 0.033$ ; 78.77 $\pm$ 9.51% vs. 61.90 $\pm$ 8.80%). Hypermobile females performed better in the right-leg medial reach ( $p = 0.047$ ; 83.24 $\pm$ 8.71% vs. 72.36 $\pm$ 10.30%). **Conclusion:** The results from this preliminary investigation show that the presence of hypermobility in apparently healthy individuals does not appear to impact bilateral or unilateral lower-body power or strength. However, hypermobility may provide some benefit to dynamic stability, which has implications for individuals who require both of these characteristics (i.e. dancers, gymnasts).

## 57. CLINICAL OUTCOMES OF CERVICAL AND LUMBAR SPINE MRIS IN PATIENTS WITH NON-CONDITIONAL PACEMAKERS AND DEFIBRILLATORS

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**Purpose:** Safety and image quality of MRIs in patients with non-conditional implanted cardiac devices has recently been demonstrated. The effects of MRI on devices seems to be negligible with proper setup and surveillance by electrophysiologists and cardiac device experts. The benefit of these MRIs and their use instead of other less costly imaging methods has not been explored. The aim of this project is to assess patient clinical outcomes and utility of MRI scanning over CT or X-Ray for non-conditional devices. **Methods:** Consent was obtained. Patients were sorted into those with permanent pacemaker versus implantable cardioverter-defibrillator carriers and organized into lumbar or cervical MRI scan categories based on their anatomical symptoms. Patients were observed by the electrophysiology and cardiac device team during MRI. Their electronic medical records were examined for myriad considerations for a period of years. These outcomes were analyzed and interpreted. **Results:** Scans show spinal stenosis, facet joint arthropathy, degenerative disk disease, and bulges as the most common findings. 30.8% of patients were able to have a diagnosis ruled out. 63.5% of patients did not require additional scans pertaining to the same complaint at presentation throughout the course of their care after the initial scan. Treatments consisted mostly of physical therapy referrals, changes to medication, pain injections, and orthotics. MRI led to 44.23% of patients with their issues completely resolved and 46.15% that improved but have not experienced full resolution of problems yet. The most meaningful findings were cancer metastasis, ankylosing spondylitis, and fracture; all of these were not discovered with X-Ray or CT and were only exhibited upon MRI.

## 59. THE EFFECTS OF FOAM ROLLING ON MAXIMAL SPRINT PERFORMANCE AND RANGE OF MOTION

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**Purpose:** The purpose of the present study was to examine the effects of foam rolling on sprint performance and range of motion in recreational athletes. **Methods:** Eleven men (mean  $\pm$  SD age = 22.16  $\pm$  3.2 years, body mass = 81.6  $\pm$  7.97 kg, height = 175.2  $\pm$  5.4 cm) and eleven women (21.7  $\pm$  1.8 years, 64.5  $\pm$  8.8 kg, 162.8  $\pm$  4.4 cm) volunteered for this study. Participants visited the laboratory and outdoor field on three occasions. The first visit was an orientation and familiarization session, the second and third days involved measuring the participant's baseline range of motion during dorsiflexion, hip flexion, and knee flexion, in addition to baseline 20-m sprints with 2 minutes of rest in between. Next, they took part in either a foam rolling intervention or a control condition. Then, the participant's range of motion and sprint times were measured again. **Results:** Range of motion increased 3% for dorsiflexion and knee flexion, and 5% for hip flexion, for both men and women after the foam rolling intervention ( $p \leq 0.05$ ). No significant changes were seen in range of motion for the control condition ( $p > 0.05$ ). Sprint times did not significantly change from the control or foam rolling interventions for men or women ( $p > 0.05$ ). **Conclusion:** While no significant decreases in sprint times were found, foam rolling in individuals who need acute improvements in range of motion without subsequent decreases in performance may be advantageous.

## 58. VERIFICATION OF MAXIMAL OXYGEN UPTAKE USING SUPRAMAXIMAL TESTING DURING ARM ERGOMETRY IN PERSONS WITH SCI

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**Background:** Maximal oxygen uptake ( $VO_{2max}$ ) is the preferred method for measuring cardiorespiratory fitness as well as a good indicator for long term morbidity and mortality. There are several indicators of  $VO_{2max}$ , but none of them are consistent across all populations. For this reason, verification testing (VER) of an incremental test has been studied as a means of attaining 'true'  $VO_{2max}$ . It is known that people with spinal cord injury (SCI) have a lower cardiorespiratory fitness than an able-bodied (AB) person. SCI individuals can use an arm ergometer to attain  $VO_{2max}$  and increase their overall health. **Aim:** Verification testing was used to assess the validity and reliability of initial maximal oxygen uptake testing in SCI individuals. **Methods:** Participants (SCI, N=10, AB, N=10) were healthy men and women (SCI (age and injury duration, 33.3  $\pm$  10.5 yr and 6.8  $\pm$  6.2 yr, AB, 24.1  $\pm$  7.4 yr). Participants warmed up on an arm ergometer for 5 minutes at 7 Watts (W) followed by an increasing workload at 3 W/min for tetraplegics, 13 W/min for paraplegics and 8-20W/min for AB until fatigue. This allowed for a measurement of  $VO_{2max}$  (L/min) at  $HR_{max}$  and Peak Power Output (PPO), followed by a verification test at 105% PPO. **Results:** AB results (1.63  $\pm$  0.40 L/min vs. 1.76  $\pm$  0.40 L/min) were higher than SCI (1.30  $\pm$  0.45 L/min vs. 1.31  $\pm$  0.43 L/min). During  $VO_{2peak}$  for the incremental test, SCI had a result of 17.4  $\pm$  4.7 mL/kg/min and AB was 24.0  $\pm$  4.7 mL/kg/min. During the verification test, SCI's  $VO_{2peak}$  was 17.6  $\pm$  4.5 mL/kg/min and AB was 26.0  $\pm$  4.3 mL/kg/min. **Conclusion:** Verification tests following an incremental protocol provide true and reliable means of  $VO_{2max}$  measurement in SCI population. However, for AB population, the verification test may be required to verify true  $VO_{2max}$ .

## 60. MAXIMAL SQUAT STRENGTH IS ASSOCIATED WITH FOOT STRIKE PATTERN IN COMPETITIVE DISTANCE RUNNERS

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**Purpose:** Foot strike pattern during running can contribute to lower extremity overuse injuries such as stress fracture, potentially due to high loading rates (LR). However, adopting a forefoot strike (FF) may require additional lower extremity strength due to the greater demand placed on the gluteal muscles compared to a rearfoot strike. The purpose of this study was to determine the association between hip extensor strength, foot strike pattern, and LR. It was hypothesized that greater hip extensor strength would be associated with a FF pattern, and a lower LR. **Methods:** 23 uninjured, collegiate distance runners (91% male, age=21.9 $\pm$ 2.5 years, height=1.77 $\pm$ 0.06 m, mass=64.15 $\pm$ 6.6 kg, running volume=82.55 $\pm$ 17.45 km/week) who were resistance trained were recruited for this study. Hip extensor strength was assessed via maximal voluntary isometric contractions (MVIC) on an isokinetic dynamometer and 1-repetition maximum back squat (1RM BS). LR and foot strike index (FSI) were assessed during 5 overground running trials at the participant's preferred training pace. FSI was calculated as the distance (m) between the center of pressure and location of the calcaneal marker at initial contact relative to the participant's foot length (m). The highest MVIC peak torque (PT; N/kg) and 1RM BS, median FSI, and average LR (body weight/second) of the 5 trials were used for analysis. Spearman Rho and partial correlations were used to determine relationships between dependent variables. **Results:** Greater 1RM BS was associated with a larger FSI ( $\rho=0.499$ ,  $p=0.018$ ). Greater FSI was associated with lesser LR ( $\rho=-0.494$ ,  $p=0.017$ ). Greater 1RM BS and lesser LR were not significantly associated ( $r=-0.394$ ,  $p=0.077$ ). PT was not associated with FSI or LR. **Discussion:** Runners with greater 1RM BS land in a more FF position and with lower LR. These findings emphasize the contribution of hip extensor strength to running mechanics, and justify the selection of the BS for runners.

## 61. HEART RATE RESPONSE OF A CUSTODY ASSISTANT CLASS TO CIRCUIT TRAINING DURING THE ACADEMY PERIOD

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**Purpose:** Circuit training (CT) is a commonly used form of physical training in law enforcement to train large groups of recruits. The physiological effects of CT in a custody assistant (CA) population has received no analysis. The study purpose was to use heart rate data to determine the physiological response of CAs to two CT sessions. **Methods:** Twenty-eight CA recruits were analyzed, which included 14 males and 14 females. A YMCA step test was used to split recruits into three groups: High Fit (HF), Moderate Fit (MF), and Low Fit (LF). Heart rate monitors were worn by the recruits during two CT sessions. CT sessions were designed by the training officers and the investigators did not intervene. Heart rate zones were defined as: very light (<57% of age-predicted maximum heart-rate), light (57%-63%), moderate (64%-76%), vigorous (77%-95%), and very vigorous (>95%). A one-way analysis of variance ( $p < 0.05$ ), with Bonferroni post-hoc, was calculated any significant between-group differences in time spent and percentage of total training time in the different heart rate zones. **Results:** The HF group spent a significantly longer duration in the very light (session 1: time only), light (session 1: time and percentage of time; session 2: time) and moderate (session 2: time and percentage of time) zones compared to the LF group. The MF group spent a longer duration in the light (session 1 and 2: time and percentage of time) and moderate (session 2: time and percentage of time) zones compared to the LF group. The LF group spent a longer duration in the very vigorous zone when compared to the HF (session 1 and 2) and MF group (session 2). **Conclusion:** The CT sessions resulted in relatively different workloads among recruits. Training officers should attempt to adjust CT to cater to different CA ability levels.

## 63. A STUDY OF FORCE PRODUCTION AND MUSCLE QUALITY IN THE PUSH AND NON-PUSH LEGS OF COLLEGIATE SKATEBOARDERS

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**Purpose:** Very little scientific research has been conducted examining force production, rate of force development (RFD), and muscle morphology of the push and non-push legs of skateboarders. Ultrasound has been used to measure muscle morphology in a wide variety of athletes while force plates have been a useful tool in discovering the force production and RFD of various athletic populations. Therefore the purpose of this study was to examine force production, RFD, and the muscle morphology of skateboarders through the use of ultrasound and force plates. **Methods:** Participants reported to the Applied Physiology Lab for one testing session in which ultrasound measurements of the Vastus Lateralis and Rectus Femoris were taken of the push and non-push legs. This was followed by a five minute warm-up on a cycle ergometer. Participants then performed five maximal effort countermovement jumps with their hands on their hips. They were given one minute of rest between each jump. A paired t-test was used to determine any difference in maximum force production (MFP), RFD, and muscle thickness between push and non-push legs. **Results:** Twenty-one men (Wt:  $72.03 \pm 11.38$ kg; Ht:  $174.60 \pm 9.48$ cm) volunteered for the study. Analysis revealed no difference ( $p=0.630$ ) in MFP between push and non-push legs (push:  $823.96 \pm 152.03$ N; non-push:  $837.15 \pm 148.20$ N), no difference ( $p=.694$ ) in RFD between push and non-push legs (push:  $2142.51 \pm 1158.69$ N/s; non-push:  $2214.24 \pm 1041.39$ N/s), no difference ( $p=.193$ ) in Vastus Lateralis thickness between push and non-push legs (push:  $1.98 \pm .66$ cm; non-push:  $1.90 \pm .52$ cm). There was a significant difference ( $p=.005$ ) in Rectus Femoris thickness between push and non-push (push:  $1.67 \pm .31$ cm; non-push:  $1.76 \pm .34$ cm). **Conclusion:** This group of collegiate skateboarders had a significant difference in only the thickness of their Rectus Femoris. Future studies should examine the mechanisms behind this difference as well as examine the dose response of higher volumes of skateboarding.

## 62. THE EFFECT OF ACUTE GLUTAMINE SUPPLEMENTATION ON MARKERS OF THE HEAT SHOCK PROTEIN RESPONSE AFTER REPEATED FIREFIGHTING SIMULATIONS

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**Purpose:** Wildland firefighters (WLFs) perform physically demanding work in extreme environmental conditions (heat and pollution), which puts them at an increased risk for heat and fatigue related injuries. Further, WLFs typically have long work shifts (12h), which are repeated on consecutive days until fire suppression is complete. Glutamine is a non-essential amino acid that has been shown to activate the heat shock protein (HSP) stress system in immune cells when orally ingested before exercise. The purpose of this study was to determine if acute glutamine supplementation activates the HSP system and enhances recovery during repeated bouts of simulated firefighting. **Methods:** Eight healthy, physically active subjects (5 male, 3 female) performed baseline testing followed by glutamine (Gln) and placebo (Pla) supplementation trials. Subjects ingested glutamine (0.15g/kg) or placebo before and after repeated bouts (separated by 24h) of firefighting simulations, in a heated environmental chamber (35°C). Markers of thermal stress, biological stress, and fatigue were measured at baseline, pre, post and 4h post-exercise in each trial. **Results:** Glutamine levels were increased prior to exercise on both days for Gln vs. Pla trials ( $p<0.05$ ). HSP70 and HSP90 were both elevated at 4h post-exercise on both days in Gln trial ( $p<0.05$ ), which correlated with improved fatigue. HSP60 increased in the Pla trial at the 4h time point ( $p<0.05$ ). **Conclusion:** The ingestion of an acute glutamine supplement prior to repeat firefighting simulations appears to upregulate the HSP system at the post-simulation time points, which may support recovery, and improve work performance.

## 64. PERFORMANCE FACTORS RELATED TO THROWING DISTANCE IN COLLEGIATE TRACK ATHLETES

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**Purpose:** The purpose of this study was to identify potential correlations between upper and lower body power, balance, flexibility, and body composition in relation to actual throwing performance in collegiate throwers. **Methodology:** 12 collegiate throwers (8 male, 4 female; minimum of 4 years of experience) performed a series of functional tests and a competition level throw. Participants performed a brief warm up prior to each test. Upper body power was determined using a seated medicine ball throw (9kg male, 6kg female) performed laying on a bench at a 45° incline. Lower body power and reaction time were measured using a vertical jump mat (Probotics Inc, Hunstville, AL) which provided jump height, ground reaction time, and an overall power factor (OPF). Balance was assessed during single leg trials for each leg on a Biodex balance system (Biodex Medical Systems Inc., Shirley, NY). Flexibility was assessed by sit and reach. Body composition was measured by means of air displacement plethysmography (Bod Pod; Cosmed USA Inc, Concord, CA). Functional testing results were compared to actual competition throws, which took place at a sanctioned meet within 3 days of testing. Comparisons between functional tests and competition throws were made using Pearson's R (linear) and Spearman's Rho (nonlinear) tests to identify correlations. **Results:** Nonlinear correlations were found between throwing distance and body fat percentage ( $\rho=-0.699$ ;  $p=0.011$ ), and OPF ( $\rho=0.609$ ;  $p=0.047$ ). Linear correlations were found between throwing distance and overall lead leg stability ( $r=0.701$ ;  $p=0.011$ ), and lead leg medial/lateral stability ( $r=0.688$ ;  $p=0.013$ ). **Conclusion:** These data suggest that body fat percentage, lower body power, and lead leg stability are each correlated with throwing distance. Improvements in these areas could lead to improvements in overall throwing distances in collegiate throwers.

## 65. A CROSS-SECTIONAL ANALYSIS ON THE EFFECT OF SEX AND AGE ON UPPER- AND LOWER- BODY POWER FOR LAW ENFORCEMENT AGENCY CANDIDATES PRIOR TO ACADEMY TRAINING

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**Purpose:** Power, which is the rate of doing work, is an important characteristic for tactical populations. For law enforcement officers, tasks such as carrying or dragging a civilian to safety, and suspect restraint and pursuit, require upper- and lower-body power in order to be effective. However, certain recruits may be lacking in these qualities even if they have been accepted to a law enforcement agency (LEA). The study purpose was to investigate upper- and lower-body power in male and female LEA recruits, and recruits of different ages, prior to academy training. **Methods:** Retrospective analysis of data from recruits (males:  $n = 68$ , age:  $27.06 \pm 5.42$  yrs; females:  $n = 19$ , age:  $27.11 \pm 5.40$  yrs) was conducted. The measurements taken were: vertical jump height (VJ); peak anaerobic power measured in watts calculated by the Sayers equation (PAPw); power-to-body mass ratio (P:BM); and distance from the seated medicine ball toss (MBT). Independent sample t-tests were used to compare the sexes. A one-way analysis of variance with Bonferroni post hoc were used to compare pooled data for the recruits across different age groups (20–24; 25–29; 30–34; 35+ yrs). **Results:** The male recruits demonstrated superior performance measured by the VJ, PAPw, P:BM, and MBT compared to the females ( $p < 0.001$ ). With regards to age, there was a significant difference between the 20-24 and 35+ yr groups in P:BM ( $p = 0.009$ ). **Conclusion:** Upper- and lower-body power is important for law enforcement officers as it will aid performance in certain occupational tasks. The results showed that despite being accepted to a LEA, female recruits scored below males in all power tests prior to academy, while older recruits had a lower P:BM. Female and older recruits should participate in power training prior to academy training to minimize any potential deficiencies.

## 67. PHYSIOLOGICAL CHARACTERISTICS OF CUSTODY ASSISTANT CLASSES PRIOR TO ACADEMY TRAINING

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**Purpose:** Within a law enforcement agency, Custody Assistants (CAs) are primarily responsible for upholding proper safety and security inside correctional facilities. Uniquely, unlike other law enforcement positions, CAs may not be subjected to physical examinations prior to matriculation. This exemption could become pivotal because the differences in physical characteristics could become an issue across different classes prior to academy training. The purpose of this study was to investigate the physiological characteristics of CAs across three academy classes. **Methods:** A retrospective examination of performance data was conducted on 108 CAs from three separate classes (Class 1: 29 males, 11 females; Class 2: 22 males, 16 females; Class 3: 18 males, 12 females). The tests encompassed: hand grip strength; maximum number of sit-ups and push-ups in 60 s; 201-m (220-yard) run, and 2.4-km (1.5 mile) run time. To compare any differences between males and females within the three classes (the sexes were analyzed separately), a one-way analysis of variance with Bonferroni post hoc was utilized, with significance set at  $p < 0.05$ . **Results:** Within the males CAs, there were two significant differences between classes; class 1 executed more sit-ups ( $p = 0.042$ ), but were much slower in the 201-m run ( $p = 0.011$ ) in comparison to class 3. For the females, there were no significant differences between the three classes. **Conclusion:** Even without physical testing prior to academy training, the CA classes from this law enforcement agency seemed to be relatively similar in their physiological characteristics. However, physical training instructors should acknowledge that there may be select variances between certain classes (e.g. abdominal strength measured by sit-up repetitions; anaerobic endurance measured by 201-m run time). Physical training instructors should utilize fitness assessments to characterize strength and weaknesses for individuals within their classes, and tailor training to improve any deficiencies in their CAs.

## 66. EFFECTS OF SHORTWAVE DIATHERMY ON THE GASTROCNEMIUS COMPLEX ON ANKLE DORSIFLEXION, BALANCE, AND AGILITY: A DOUBLE-BLINDED, RANDOMIZED CONTROL TRIAL

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**Purpose:** Shortwave diathermy (SWD) is a deep heating therapeutic modality that may be available to sports medicine professionals. SWD's ability to penetrate and heat deep tissues has proven useful for increasing muscle flexibility and decreasing synovial inflammation. However, clinical research on this modality and its effects on human performance is limited. The purpose of this study is to examine the acute effects of shortwave diathermy on each participant's ankle dorsiflexion range of motion, balance, and agility. **Methods:** A total of 32 college students (13 males, 19 females,  $20.7 \pm 0.68$  years) participated in this study. Data was collected on 3 separate days, with baseline measurements taken on day one. It was randomly assigned on which days participants received diathermy or sham treatment. Balance was assessed using the Stability Evaluation Test (SET) and Limits of Stability (LOS) test on the NeuroCom® Balance Manager force plate system. Maximal degrees of ankle dorsiflexion were measured with a goniometer. Agility was measured with a Pro-Agility change of direction test. Critical dependent variables included degrees of sway during the SET test, maximal excursion (MXE) and directional control (DCL) for the LOS test, degrees of ankle dorsiflexion, and time for the Pro-Agility test. **Results:** Repeated measures ANOVA tests revealed statistically significant differences ( $p < 0.05$ ) between baseline and treatment groups in SET balance testing ( $p = 0.004$ ), agility ( $p = 0.030$ ), and both dominant ankle dorsiflexion ( $p = 0.001$ ) and non-dominant ankle dorsiflexion ( $p = 0.001$ ) groups. No statistical significance was observed in MXE and DCL groups of the LOS balance test ( $p = 0.261$ ,  $p = 0.113$ ). **Conclusion:** Although more research on diathermy is needed, our study concludes that the application of shortwave diathermy has benefits on ankle joint range of motion.

## 68. ENERGY COMPENSATION AFTER SPRINT- AND HIGH-INTENSITY INTERVAL TRAINING

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**Background:** Many individuals lose less weight than expected in response to exercise interventions when considering the increased energy expenditure of exercise (ExEE). This is due to energy compensation in response to ExEE, which may include increases in energy intake (EI) and decreases in non-exercise physical activity (NEPA). We examined the degree of energy compensation in healthy young men and women in response to interval training. **Methods:** Data were examined from a prior study in which 24 participants completed either 4 weeks of sprint interval training or high-intensity interval training. Energy compensation was calculated from changes in body composition (air displacement plethysmography) and exercise energy expenditure was calculated from mean heart rate based on the heart rate-VO<sub>2</sub> relationship. Differences between high ( $\geq 100\%$ ) and low ( $< 100\%$ ) levels of energy compensation were assessed. Linear regressions were utilized to determine associations between energy compensation and  $\Delta\text{VO}_{2\text{max}}$ ,  $\Delta\text{EI}$ ,  $\Delta\text{NEPA}$ , and  $\Delta\text{resting metabolic rate}$ . **Results:** Very large individual differences in energy compensation were noted. In comparison to individuals with low levels of compensation, individuals with high levels of energy compensation gained fat mass, lost fat-free mass, and had lower change scores for VO<sub>2max</sub> and NEPA. Linear regression results indicated that lower levels of energy compensation were associated with increases in  $\Delta\text{VO}_{2\text{max}}$  ( $p < 0.001$ ) and  $\Delta\text{NEPA}$  ( $p < 0.001$ ). **Conclusions:** Considerable variation exists in response to short-term, low dose interval training. In agreement with prior work, increases in  $\Delta\text{VO}_{2\text{max}}$  and  $\Delta\text{NEPA}$  were associated with lower energy compensation. Future studies should focus on identifying if a dose-response relationship for energy compensation exists in response to interval training, and what underlying mechanisms and participant traits contribute to the large variation between individuals.

## 69. MARITAL STATUS AND LINEAR GAIT VELOCITY AS A RISK FACTOR FOR FALLING IN OLDER ADULTS

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**Purpose:** Marital status and health has often been a topic of interest. Studies have previously suggested that married older adults are generally healthier than their unmarried counterparts. Additionally, research suggests that a slower gait velocity is associated with a higher falls risk indoors. This study is aimed at determining if the risk of falling in older adults, specifically in accordance with linear gait velocity, is dependent on marital status. **Methods:** The sample was compromised of 350 people over the age of 60 years, regardless of gender. Participants were recruited from various testing sites across the Southwest United States. Participants were separated into four groups based on marital status; divorced (0), widowed (1), married (2), and single (3). A one-way ANOVA was conducted to test for a difference in gait velocity across marital status in older adults. For the means difference test, marital status was the independent variable and gait velocity was the dependent variable with alpha set at  $\alpha = 0.05$ . Follow-up analysis for a significant result was conducted utilizing Tukey's HSD analysis with alpha also set at  $\alpha = 0.05$ . **Results:** Overall ANOVA results indicated a difference in linear gait velocity across the various groups ( $F_{3,346} = 11.935$ ,  $p < 0.001$ ,  $1-\beta > 0.80$ ). Tukey HSD post hoc analysis revealed that widowed individuals walked at a significantly lower gait velocity than did both their divorced counterparts ( $\bar{X}_D = -9.6644\text{cm/s}$ ,  $p = 0.016$ ) and their married counterparts ( $\bar{X}_D = -15.4839\text{cm/s}$ ,  $p < 0.001$ ). **Conclusion:** Unmarried older adults have a slower gait velocity than their married counterparts. This suggests that they're at higher risk of falling in their homes. Older adults who are widowed should be considered candidates for fall prevention strategies. Additional research may be conducted to assess the relationship between gait velocity and gender in regards to marital status.

## 71. EFFECTS OF A COMBINED AEROBIC AND COGNITIVE TRAINING INTERVENTION ON COGNITIVE FUNCTION IN CANCER SURVIVORS

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**Introduction:** Cancer-related cognitive impairment (CRCI) has been reported to negatively affect upwards of 75% of cancer patients undergoing treatment. Treatment and management of CRCI has proven to be a difficult task due to the fact that it has yet to be fully characterized. Some studies have shown that cognitive training or aerobic exercise may mitigate aspects of CRCI. Yet, it is unclear whether simultaneously combining these two interventions could provide additive or synergistic benefits on cognitive function in cancer survivors. **Purpose:** To determine the effects of a quasi-randomized, controlled aerobic and cognitive training intervention on cognitive function in cancer survivors ( $N = 28$ ). **Methods:** Pre and post physical and cognitive assessments were administered. A 36-session computer-based cognitive, aerobic, and flexibility training intervention was completed. Participants were assigned to one of the following groups: aerobic exercise only (AER), cognitive training only (COG), simultaneous aerobic exercise plus cognitive training (AER+COG), or a control flexibility only group (CON). **Results:** No significant ( $p > 0.05$ ) main effects between groups and variables were observed. Within groups measures revealed that the AER logical memory scaled scores (+33%), delayed recall scaled scores (+27%), block design scaled scores (+19%), and letter-number sequencing scaled scores (+12%) significantly increased ( $p < 0.05$ , respectively) pre-to-post. The CON group significantly ( $p < 0.05$ ) increased from pre-to-post in controlled oral word association gender, age, and education verbal fluidity subtests (Z-scores). All cognitive scores (AER+COG and COG groups) failed to significantly ( $p > 0.05$ ) increase pre-to-post. **Conclusions:** Aerobic training alone had the greatest impact on cognitive function. Individually, these methods may be appropriate for addressing CRCI in this population, but combined training of this nature may be too demanding for cancer survivors suffering from CRCI.

## 70. COMPARISON OF CALORIC EXPENDITURE IN AN APPLE WATCH AND PORTABLE METABOLIC CART

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**Purpose:** To validate the Apple Watch (AW) for wheelchair users by comparing caloric energy expenditure (EE) against expired gas analysis. Valid activity tracking will be helpful for clinicians, patients and consumers and may help increase physical activity levels among wheelchair users. **Methods:** Five wheelchair users (age=50.0(5.6)) and three able-bodied (age=25.3(3.2)) participants completed a series of exercises including wheelchair treadmill propulsion at 30, 45, and 60 strokes per minute (spm) and arm cycle ergometry at 45, 60, and 80rpm. They were equipped with an AW on their dominant hand, heart rate monitor, and a portable metabolic tracking cart. The Apple Workout app was used for each task. Caloric expenditure data was extracted from both devices and compared by Bland-Altman analysis. **Results:** For treadmill tasks, the AW reported the average EE at 30, 45, and 60spm frequencies were 7(2.0), 8(2.3) and 9(2.0) kcals, respectively. At the same frequencies, the metabolic cart expenditures read 10(3.9), 12(5.3), and 15(6.7). Bland-Altman analysis showed relatively poor agreement between the cart and watch at 30spm (mean difference 3 with limits of agreement (LoA) -4-9). Mean absolute percent error (MAPE) was 21.56%. Agreement worsened at higher stroke frequencies, 45spm (4(-4-12)) and 60spm (6(-4-10)). MAPE was 29.11% and 35.88%, respectively. For arm ergometry, the average EE reported by the watch at 45, 60, and 80rpm were 7(1.0), 9(1.5), and 11(1.4). Metabolic cart expenditures were 6(3.0), 7(2.4), and 8(2.8) at the same frequencies. Bland-Altman analysis showed good agreement at 45rpm (-0.4(-6-5)) with a MAPE of 32.69%. Agreement worsened at higher frequencies, 60rpm (-3(-6-1)) and 80rpm (-2(-7-2)). MAPE was 58.57% and 48.54%, respectively. **Conclusion:** While performing a treadmill task, the AW underestimated caloric expenditure, but overestimated for arm ergometry. The activity tracker records EE with good validity only at lower frequency tasks.

## 72. SIMILAR STRENGTHS BETWEEN DOMINANT AND NON-DOMINANT FEET IN PERFORMING THE DOMING PULL STRENGTH TEST

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**Purpose:** To observe differences in strength of the muscles that dome or lift the medial longitudinal arch (MLA) between the dominant and non-dominant foot, in the "Doming Pull" strength test. In addition, we determined the repeatability of the test for each foot within the same testing day. **Method:** Fourteen healthy individuals, average age=24 y, height=168.7 cm, weight 69.9 kg, participated in the study and their dominant foot was determined. We assessed their strength in performing doming of the MLA with their dominant and non-dominant foot. The subject stood on a platform with their foot secured in a customized strength-testing device. The subjects performed the doming pull test by pulling the metatarsal heads back toward the heel, shortening the arch of the foot without curling the toes or lifting them from the platform. The subject lifted up into pad attached to small cables that extend below the platform to a force transducer. They held the doming position for 3 seconds and repeated for 3 trials with a 30 second rest between each. We performed a paired t-test to determine if there was a difference between dominant and non-dominant foot strength. Next, we compared the reliability of our strength test for the dominant and non-dominant foot separately via an Intraclass Correlation Coefficient (ICC). **Results:** There was no significant difference in foot strength between dominant and non-dominant feet ( $p=0.263$ ). The average strength of the dominant foot was  $13.0\pm 8.0$  kg and  $11.4\pm 6.8$  kg for the non-dominant foot. The ICC<sub>3,k</sub>=0.929 for the dominant foot and the ICC<sub>3,k</sub>=0.926 for the non-dominant foot. **Discussion:** There is no significant difference in muscle strength between the dominant and non-dominant foot in performing doming action of the MLA. There was excellent repeatability of testing of both the dominant and the non-dominant foot with the Doming Pull strength test.

### 73. THE 75-YARD PURSUIT RUN FOR LAW ENFORCEMENT OFFICERS: RELATIONSHIPS TO STRENGTH, POWER AND SPEED TESTS AND PREDICTORS OF PERFORMANCE

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**Purpose:** The 75-yard pursuit run (75PR) was designed by law enforcement agencies (LEAs) to simulate a foot pursuit for law enforcement officers (LEOs). There has been no analysis of the contributing physiological factors to performance in this test. The study purpose was to determine relationships and predictive capabilities between the 75PR and tests of linear speed, change-of-direction (COD) speed, and lower-body power and strength. **Methods:** Twenty-seven college-aged participants (17 male, 10 female) completed two days of testing separated by ~48 hours. Day one assessed the 75PR, and tests of linear speed (0-5, 0-10, and 0-20 m sprint intervals) and lower-body power (standing broad jump [SBJ] and lateral jump [LJ] from both legs). Day two assessed COD speed (Illinois Agility Test [IAT] and 505), and lower-body power (vertical jump [VJ]) and strength (isometric midthigh pull). Male and female data was analyzed separately, and Pearson's correlations ( $p < 0.05$ ) determined relationships between the 75PR and the performance tests. Stepwise multiple regressions ( $p < 0.05$ ) illustrated whether any performance test predicted 75PR time in either sex. **Results:** Male participants saw large correlations between the 75PR and 0-10 and 0-20 m intervals IAT, and 505 ( $r = 0.50-0.86$ ), and LJ on both legs ( $r = -0.56--0.75$ ). Females demonstrated relationships between the 75PR and the 0-10 and 0-20 m intervals, IAT, 505 ( $r = 0.73-0.94$ ), VJ, SBJ, and LJ on both legs ( $r = -0.77--0.85$ ). The best predictors of 75PR performance were the right-leg 505, and LJ for males ( $R^2=0.89$ ), and IAT and right-leg LJ ( $r^2=0.95$ ) for females. **Conclusion:** This study showed that linear speed over 10-20 m, COD speed, and lower-body power measure by jump tests related to 75PR performance in males and females. Individuals training to become LEOs should enhance linear and COD speed and lower-body power to improve foot pursuit ability.

### 75. HEART RATE RESPONSE OF CUSTODY ASSISTANT RECRUITS TO PSYCHOLOGICAL STRESS TRAINING DURING THE FIRST DAY OF ACADEMY

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**Purpose:** Custody assistants (CA) are responsible for maintaining security in detention facilities for law enforcement agencies. Psychological stress training (PST) is an important component of the academy period for CAs due to high levels of work-related stress. The physiological response to PST has received little analysis. The study purpose was to measure the heart rate (HR) response to PST in CAs. **Method:** Retrospective analysis of HR data recorded during the first PST session of academy was analyzed from 28 recruits (14 males, 14 females). CA recruits were split into groups using HR recovery from the YMCA step test performed prior to academy: High Fit (HF; top 25%), Moderate Fit (MF; 26-74%), and Low Fit (LF; bottom 25%). The responses to PST were defined using ACSM guidelines for aerobic training: very light (<57% of age-predicted maximum heart-rate), light (57-63%), moderate (64-76%), vigorous (77-95%), and very vigorous (>95%). A one-way ANOVA ( $p < 0.05$ ), with Bonferroni post-hoc, calculated any significant between-group differences in time spent and percentage of total training time in the different HR zones. **Results:** The LF group spent significantly less time (~7 min) in the 64-75% zone compared to the MF and HF groups (~33-34 min), but more time in the 76-95% zone (~63 min vs. ~45-47 min). Regarding percentage of training time, the LF group spent significantly less time in the 64-76% zone (~7% vs. ~32-37%), and more time in the 77-95% zone (~66% vs. ~44-49%) compared to the MF and HF groups. The LF group (~25%) spent more time in the >95% zone compared to the HF group (~5%). **Conclusion:** LF CAs spent more time in vigorous-to-very vigorous training zones during PST, while the HF CAs spent less time in these zones. Greater aerobic fitness may be beneficial for reducing HR responses to stressful situations in CAs.

### 74. DIFFERENCES BETWEEN DIVISION II FEMALE CROSS-COUNTRY AND SOCCER ATHLETES FORCE PRODUCTION DURING WALKING AND RUNNING: A PRELIMINARY STUDY

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**Purpose:** The purpose of the investigation was to examine and compare the force production between female soccer and cross-country athletes when running and walking. **Methods:** Eight female Division II athletes in cross-country ( $n=4$ ) and soccer ( $n=4$ ) volunteered in 2 testing days. Before testing started, participants completed a PAR-Q and IRB approved informed consent. Day one (familiarization) participants performed the treadmill protocol which consisted of a five-minute warm-up walk, a five-minute walk, a five-minute run and a five-minute cool-down walk on the Woodway Curve 3.0 Non-motorized Treadmill (NMT). Force data was collected through the embedded force sensors in the NMT and analyzed participant's horizontal (hforce) and vertical force (vforce), power, and velocity. All values were averaged for each condition over the 5-minute time period of walking and running. Independent t-test were used to compare athletes for each dependent variable. **Results:** No significant ( $p > 0.05$ ) differences were found between groups for hforce ( $CC= 28.74 \pm 0.07$ ;  $SO= 28.59 \pm 0.28$ ), vforce ( $CC= 646.17 \pm 82.53$ ;  $SO= 649.13 \pm 96.80$ ), power ( $CC= 57.32 \pm 5.41$ ;  $SO= 51.04 \pm 11.84$ ), and velocity ( $CC= 3.66 \pm 0.34$ ;  $SO= 2.90 \pm 1.31$ ) in walking trials. : No significant ( $p > 0.05$ ) differences were found between groups for hforce ( $CC= 34.87 \pm 0.05$ ;  $SO= 34.92 \pm 0.06$ ), vforce ( $CC= 647.24 \pm 82.66$ ;  $SO= 650.97 \pm 95.45$ ), power ( $CC= 81.13 \pm 10.90$ ;  $SO= 77.27 \pm 11.87$ ), and velocity ( $CC= 5.20 \pm 0.71$ ;  $SO= 4.29 \pm 1.62$ ) in running trials. **Discussion:** Soccer and cross-country athletes are both high endurance sports, where cross-country runners run miles for their sport and soccer players run miles on the field. Considering they can create the same amount of force for any type of aerobic activity, whether it be walking or running this may contribute to no group differences shown in the current investigation.

### 76. EFFECTS OF ASEA REDOX SUPPLEMENT ON AEROBIC CAPACITY AND VENTILATORY THRESHOLD: A DOUBLE-BLIND, PLACEBO-CONTROLLED STUDY

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ASEA is a commercially available supplement described by the manufacturer as a perfect balance of "Redox Signaling molecules suspended in pristine saline solution." Despite numerous anecdotal endorsements by athletes and in-house research reports claiming this supplement can enhance aerobic performance, there is a lack of peer-reviewed research on the ergogenic benefits of ASEA. **Purpose:** This study aimed to determine if ASEA could improve aerobic capacity ( $VO_2max$ ) and/or ventilatory threshold (VT) of physically active participants. **Methods:** Eleven (6 female, 5 male) young adults ( $21.9 \pm 3.9$  y) performed 3  $VO_2max$  tests: baseline, after 2 weeks of supplementing with ASEA, and after 2 weeks of taking a placebo in a cross-over design. Treatment order was randomized and double-blinded. There was a 1-week washout period between treatments. Participants consumed 4 oz./day of the treatment according to the manufacturer's recommendations. **Results:**  $VO_2max$  at baseline ( $55.0 \pm 8.6$  ml·kg<sup>-1</sup>·min<sup>-1</sup>), placebo ( $53.6 \pm 9.1$  ml·kg<sup>-1</sup>·min<sup>-1</sup>), and ASEA ( $53.7 \pm 10.1$  ml·kg<sup>-1</sup>·min<sup>-1</sup>) was not significantly different ( $P = 0.172$ ). Similarly, absolute  $VO_2max$  ( $P = 0.436$ ), time to reach  $VO_2max$  ( $P = 0.955$ ), and maximal heart rate ( $P = 0.410$ ) were not significantly different between trials. Additionally, the difference in VT as a percentage of  $VO_2max$  was not significantly different from one trial to another ( $P = 0.678$ ). **Conclusions:** Contrary to the manufacturer's claims, ASEA did not improve the aerobic performance of young, fit adults who supplemented with the product daily for 2 weeks.

## 77. THE EFFECTS OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION STRETCHING ON PEAK FORCE PERFORMANCE AND BALANCE: A PILOT STUDY

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**Purpose:** Pre-exercise stretching is often considered beneficial. However, current scientific research does not strongly support this practice (Weerapong, et al., 2004). Still, proprioceptive neuromuscular facilitation (PNF) stretching is a different technique, and has not been examined in depth for its pre-exercise effects. The purpose of this pilot study is to determine whether passive stretching, static stretching or hold-relax PNF stretching will affect the athletic performance of college-age students (18-25 years old) in terms of their flexibility, balance, and maximal force output in the hamstrings. **Methods:** Ten participants were tested in three sessions: once as a baseline, another using static stretching, and another using PNF stretching, the latter two randomized. All sessions prefaced the stretching with a heating pad application to the hamstrings for 5 minutes. The static stretching session involved three 10-second rounds of stretch for each leg. The PNF stretching session involved three 10-seconds rounds of stretch, a 5-second isometric hold, and a 3-second stretch, also for each leg. After stretching, participants then performed a sit-and-reach test, evaluated their stability on the Neurocom device, and then tested hamstring isometric flexion on a HUMAC. **Results:** Flexibility significantly increased after both static ( $p=0.007$ ) and PNF ( $p=0.003$ ) stretching. There were no significant differences in force between the two types of stretching ( $p=0.119$ ). Additionally, there was a significant difference in balance between the baseline and the other two sessions, but there was not a significant difference in force between the two techniques of stretching. **Conclusion:** The relatively low p-value, while insignificant, demonstrates the need to replicate this study with a larger population. Stretching, using either technique, is beneficial for increasing flexibility. Both stretching techniques will be most beneficial when acute, short-term flexibility and balance are necessary for maximal performance.

## 79. VASTUS LATERALIS FIBER TYPE PROFILE OF AN ULTRAMARATHON RUNNER

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**Purpose:** Ultramarathons are races longer than the typical marathon running distance (26.2 miles). This requires extensive oxidative metabolism and a presumably high amount of slow-twitch fibers. While extensive research has been done on marathon runners, much less is known about the fiber type composition of ultramarathon athletes. The purpose of this study was to identify the fiber type profile of a competitive ultramarathon runner. The hypothesis is that the ultramarathon runner will have a higher concentration of slow twitch muscle fibers. **Methods:** A resting biopsy was obtained from the *vastus lateralis* of a 32-year-old male who has completed 30 ultramarathons and 11 marathons (with several top 10 finishers). After incubating the muscle in skinning solution, single muscle fibers were mechanically isolated and analyzed ( $n=71$ ) for myosin heavy chain (MHC) via SDS-PAGE. **Results:** The ultramarathon athlete's muscle fiber composition was 63.5% MHC I (slow), 12.2% MHC I/IIa (hybrid), and 24.3% MHC IIa (fast). No MHC IIa/IIx, MHC IIx, or MHC I/IIa/IIx were identified. **Conclusions:** The predominance of MHC I matched the hypothesis and may partially explain his success in extremely long bouts of aerobic exercise. This case study provides novel insight into fiber type profile of a competitive extreme endurance trained individual. Further research needs to be done on athletes of all sports and the like to elucidate specific phenotypes of athletes for performance optimization in a highly specific manner.

## 78. WAIST-TO-HIP RATIO IN LAW ENFORCEMENT AGENCY RECRUITS: RELATIONSHIP TO PERFORMANCE IN PHYSICAL FITNESS TESTS

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**Purpose:** Occupational readiness of law enforcement agency recruits are typically assessed via physical fitness tests. Body composition is a potential influence on test performance, which is difficult to measure during recruit testing due to time constraints. The study purpose was to examine whether waist-to-hip ratio (WHR), which is a practical measure of body composition, is related to recruit performance in fitness tests. **Methods:** Retrospective analysis of 87 recruits was executed, with data stratified into males ( $n=68$ ) and females ( $n=19$ ). WHR was measured, and the fitness tests included: grip strength; push-ups and sit-ups in 60 s; vertical jump (VJ); medicine ball throw (MBT); 75-yard pursuit run; arm ergometer revolutions in 60 s; and multi-stage fitness test shuttles. Pearson's correlations ( $p<0.05$ ) calculated relationships between WHR and the fitness tests, with males and females analyzed separately. Males and females were stratified in low (top 25% of the sample), moderate (middle 26-74%), and high (bottom 25%) WHR groups. A one-way ANOVA ( $p<0.05$ ) with Bonferroni post hoc compared between-group test performance. **Results:** There were significant relationships between WHR, push-ups, VJ, and arm ergometer test in males ( $r=-0.238-0.356$ ). For females, there were no significant relationships between WHR and the fitness tests. With regards to the male between-group comparisons, the low and moderate WHR groups had a better VJ and completed more push-ups compared to the high group. The low WHR group also completed more sit-ups compared to the high group. For females, the moderate WHR group had a greater MBT compared to the high group. **Conclusion:** Male recruits with a greater WHR performed more poorly in tests of endurance (push-ups, sit-ups, arm ergometer) and power (VJ). WHR generally did not indicate differences in fitness for females. Male recruits with a greater WHR should reduce body fat, which could positively influence performance in certain physical tasks.

## 80. DIRECT EVIDENCE THAT ORAL CONSUMPTION OF BISPHENOL A INCREASES GLUCOSE RESPONSES IN ADULTS.

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**Purpose:** Previous observational studies have shown a correlation between urinary bisphenol A (BPA) and type 2 diabetes, however the direct effects of BPA on risk markers in the pathogenesis of diabetes are unknown. The purpose of this study was to determine the effects of oral ingestion of BPA on glucose, insulin, and estrogen responses. **Methods:** After an overnight fast, ten healthy college students (7W, 3M; 40% Hispanic,  $21.0 \pm 0.8$  yrs;  $24.2 \pm 3.9$  kg/m<sup>2</sup>) were block randomized, in a double-blinded fashion, to oral consumption of Placebo (PL), BPA at 4  $\mu$ g/kg BW (BPA-Low), and BPA at 50  $\mu$ g/kg BW (BPA-High). Blood glucose, insulin, and estrogen concentrations and calculated area under the curve (AUC) were assessed at baseline, minutes 15, 30, 45, 60, and then every 30 minutes for the next 2 hours in response to a 75g oral glucose tolerance test using a repeated measures ANOVA. **Results:** Compared to PL, BPA AUC was significantly higher ( $P<0.05$ ) in BPA-Low and BPA-High ( $295 \pm 139$ ,  $2239 \pm 1255$ ,  $14030 \pm 4350$  ng/mL\*min). Compared to PL, glucose AUC tended to be higher ( $P=0.08$ ) in BPA-Low and was significantly ( $P=0.04$ ) higher in BPA-High ( $1150 \pm 23$ ,  $1232 \pm 24$ ,  $1245 \pm 30$  mmol/L\*min). Insulin AUC ( $6360 \pm 382$ ,  $6527 \pm 400$ ,  $5683 \pm 462$  ug/mL\*min) and estrogen AUC ( $12154 \pm 2752$ ,  $12161 \pm 2326$ ,  $11145 \pm 2263$  pg/mL\*min) were not significantly different between conditions ( $P>0.05$ ). **Conclusion:** Oral BPA consumption of 50  $\mu$ g/kg BW significantly increased glucose AUC, but not insulin or estrogen. These data provide the first direct evidence in humans that consumption of BPA alters a risk marker in the pathogenesis of type 2 diabetes.

## 81. EVALUATING BALANCE, COGNITION, OCULAR MOTOR FUNCTION AND PATIENT REPORTED SYMPTOMS AFTER CONCUSSION: PRELIMINARY FINDINGS

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**Purpose:** Sport related concussion (SRC) is the most common type of brain injury in young people. The current best practice for concussion assessment incorporates multiple tools to determine patient symptoms, cognition, balance and neurological status. However, these tools present challenges for healthcare professionals; their clinical usefulness is largely undefined, and symptoms and recovery are variable among concussed patients. We evaluated balance (using a novel BTrackS™ Balance Tracking System), Vestibular Ocular/Motor function (via the VOMS tool), cognition (via the SCAT-3) and patient-reported symptoms (via the PCSST form) in subjects who sustained a SRC. **Methods:** We evaluated 9 intercollegiate athletes (5 women, 4 men; 21 ± 2 yrs) using the four tools at baseline and/or within 24 hours, 48 hours and 72 hours after injury. **Results:** Mean Vestibular Ocular/Motor function was significantly decreased at 24 hours after injury ( $p_{(2,7)}=.008$ ) and improved significantly at 48 hours after injury ( $1.2 \pm 1.4$  symptoms at 24 hrs versus  $0.33 \pm .71$  at 48 hrs;  $p_{(1,8)}=.021$ ). Balance deficits were also evident between baseline and 24 hrs after injury ( $23.4 \pm 6.8$  versus  $21.0 \pm 4.2$ ), although not statistically significant ( $p=.39$ ,  $d=.45$ ). Subjects reported 7 symptoms on average on the SCAT-3 after injury, with cognition scores then improving progressively over time (24hrs =  $54.0 \pm 15.9$  versus 48 hrs =  $39.3 \pm 13.6$  versus 72 hrs =  $36.2 \pm 11.4$ ) although not statistically significant ( $p_{(2,7)}=.17$ ,  $d=1.2$ ). Ocular/Motor function (i.e. VOMS scores) and balance (i.e. BTrackS™ scores) were significantly correlated at 24 hrs ( $r=.72$ ;  $p=.027$ ) and 48 hrs after injury ( $r=.85$ ;  $p=.031$ ). SCAT-3 cognition scores were not significantly correlated to VOMS ( $r= -.07$  to  $.45$ ) or BTrackS™ scores ( $r= .09$  to  $.65$ ). **Conclusion:** These results suggest the VOMS and BTrackS™ tools may provide more useful data to clinicians than traditional tools (i.e. SCAT-3) to assess and manage SRC.

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## 83. LARGER LANDING GROUND REACTION FORCES IN CONTRALATERAL LIMB FOLLOWING UNILATERAL ANTERIOR CRUCIATE LIGAMENT CONSTRUCTION

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**Purpose:** Following ACL reconstruction (ACLR), individuals exhibit knee biomechanical alterations during landing that may contribute to re-injury risk. The purpose of this study was to compare sagittal plane knee mechanics during drop jump landings between the involved and uninvolved limbs of individuals with unilateral ACLR, and to evaluate the relationship between knee kinematics and the ground reaction force (GRF) in the involved limb. **Methods:** Forty-six individuals (35 female, 22.1±2.7 years, 1.70±0.09 m, 71.9±16.1 kg) with primary unilateral ACLR participated in this study and completed a drop-landing task while 3-dimensional kinematics and kinetics were recorded. Individuals landed from a 30cm drop height with their limbs on separate force plates located at a normalized distance of 50% of the participant's height. Dependent variables included the peak knee flexion (KF) angle, KF angle at ground contact, peak external KF moment (KFM), and peak vertical GRF. Three trials were completed, and the average of trials was used for analysis. GRF and KFM were normalized to body weight (BW) and the product of body weight and height, respectively. Paired samples t-tests were used to compare dependent variables between limbs ( $\alpha=0.05$ ). **Results:** The uninvolved limb exhibited greater GRF (uninvolved:  $2.48 \pm 0.77$  BW, involved:  $2.23 \pm 0.69$  BW,  $p=0.034$ ) and KFM (uninvolved:  $0.17 \pm 0.04$  %BW\*height, involved:  $0.14 \pm 0.04$  %BW\*height,  $p<0.001$ ) than the involved limb. Among the involved limbs, smaller GRF was associated with greater KF angle at ground contact ( $r=-0.35$ ,  $p=0.017$ ) and greater peak KF angle ( $r=-0.342$ ,  $p=0.02$ ). **Conclusion:** ACLR limbs had smaller GRF and KFM compared to the uninvolved limb. These findings may indicate knee extensor weakness and a compensatory strategy to offload the involved limb during landings. Larger KF angles in the involved limb may contribute to smaller GRF. Larger GRF in the uninvolved limb may contribute to contralateral injury risk, emphasizing the need to properly rehabilitate both limbs.

## 82. ESTROGEN EFFECTS ON AMPK ACTIVATION IN HUMAN SKELETAL MUSCLE: A PILOT STUDY

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The human menstrual cycle is characterized by fluctuations in the levels of estrogen, progesterone, and other hormones over the course of 21-35 days in healthy adult eumenorrheic females. The effect of these hormone fluctuations on signaling proteins in muscle tissue is poorly understood, frequently dissuading the inclusion of female subjects in studies of muscle physiology. Estrogen has been shown to activate 5'-AMP-activated protein kinase (AMPK) in cell culture and animal models. However, its effects on AMPK signaling throughout stages of the human menstrual cycle remain unknown. **PURPOSE:** Evaluate the effects of physiological and non-physiological blood estrogen on markers of AMPK activity in human skeletal muscle as a single subject pilot study. **METHODS:** Three tissue biopsies of the *vastus lateralis* were extracted from a 32-year old eumenorrheic subject on 1) day 2 (early follicular phase), 2) day 32 (late luteal phase), and 3) after a 10-day ovarian stimulation protocol. Blood estrogen was measured on each day as 25 pg/ml, 205 pg/ml and 4500 pg/ml respectively. Muscle fibers were dissolved in denaturing buffer and analyzed for phosphorylation of AMPK $\alpha$  and acetyl-CoA-carboxylase (ACC, a substrate of AMPK) using capillary nano-immunoassay. **RESULTS:** Phosphorylation of AMPK $\alpha$  was reduced by 40% and phosphorylation of ACC was reduced by 50% between day 2 and day 32 (8-fold difference in estrogen levels). Phosphorylation of both markers was unchanged by ovarian stimulation as compared to day 2 (180-fold difference in estrogen levels). **CONCLUSIONS:** Our results regarding human AMPK activation from non-physiological increases in estrogen did not match previous findings from animal models. Further study is required to determine if activation is affected by physiological changes of estrogen in concert with other hormones occurring throughout multiple stages of the menstrual cycle.

## 84. CORRELATION BETWEEN LEG STRENGTH AND BALANCE OF SPECIAL WEAPONS AND TACTICS TEAM MEMBERS

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**Purpose:** Job demands of special weapons and tactics (SWAT) operatives often require quick high-intensity exertion involving coordination of lower body movements. Whether a relationship exists between lower extremity strength and balance in this special population has not been established. The purpose of this study was to examine the relationship between leg strength and balance. **Methods:** Fifteen healthy SWAT members (mean ± SD; age: 32 ± 6 y, height: 179.6 ± 6.7 cm, body mass: 89.6 ± 10.4 kg) from local law enforcement agencies were recruited for this study. Participants underwent a test to assess dynamic single-leg balance on a Biodex Balance System SD. This was followed with tests to measure unilateral isometric and isokinetic (60°·s<sup>-1</sup>) torque production of the quadriceps and hamstrings on a Biodex Dynamometer. Descriptive statistics were calculated for all variables and Pearson's r was used to determine the correlations between unilateral leg strength and balance. **Results:** Isometric torque of the left quadriceps and hamstrings were 262.7 ± 44.3 Nm and 132.5 ± 21.6 Nm, respectively. Isokinetic torque of the left quadriceps and hamstrings were 238.2 ± 32.0 Nm and 122.0 ± 18.4 Nm, respectively. Isometric torque of the right quadriceps and hamstrings were 282.8 ± 42.5 Nm and 140.7 ± 22.4 Nm, respectively. Isokinetic torque of the right quadriceps and hamstrings were 247.3 ± 27.0 Nm and 146.7 ± 57.8 Nm, respectively. Left and right leg balance were 2.4 ± 1.8 AU and 1.8 ± 0.6 AU, respectively. No correlations existed between balance and any of the strength measures for either leg ( $P \geq 0.05$  for all). **Conclusion:** Lower body strength and balance were not correlated in this sample of SWAT team members. Future studies should examine the importance of leg strength and lower body balance in relation to job demands of this special population.

## 85. COMPARISON OF SPEED, BEAD, AND TRICK JUMP ROPES FOR SPORTS TRAINING

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**Purpose:** Jumping rope provides an accessible form of recreational exercise and can serve as cross-training or conditioning for athletes. Our purpose was to quantitatively compare wrist angular velocities and ground reaction forces (GRF) among jump rope types to assess differences among ropes and consequently, possible applications for sports training. We hypothesize that (1) speed ropes will give us the greatest wrist angular velocity and (2) speed ropes will produce the least amount of GRF. **Methods:** Sixteen subjects (9 male, 7 female) participated in this study. Participants performed 3 separate 15-second trials jumping rope with each type of rope: speed (thin wire), trick (vinyl), and bead. Subjects jumped rope by alternate footsteps while on a force platform. Wrist angular velocity and GRF were measured for each subject. Participants were allowed to jump rope at a self-selected pace. RMANOVA and Bonferroni post-hoc testing were used to test for significant differences ( $p < 0.05$ ). **Results:** Wrist angular velocities showed significant differences among jump ropes ( $F = 8.904$ ,  $p = 0.001$ ). Specifically, jumping with the trick rope showed significantly greater wrist angular velocity than the speed rope. Mean  $\pm$  SD angular velocity for the trick rope was  $648 \pm 227$  °/s and for the speed rope was  $602 \pm 141$ °/s. Also, the bead rope showed significantly greater wrist angular velocities,  $661 \pm 350$  °/s, than the speed rope. No significant differences in GRF were found among any of the rope types. GRF ranged from  $1634 \pm 666$  N to  $1860 \pm 476$  N for the three ropes. **Conclusion:** Overall, the speed rope did not produce the greatest wrist angular velocity as hypothesized. Instead, greatest wrist angular velocity was measured for the bead rope. No differences were found in GRF among the rope types, indicating jump height was similar for all ropes.

## 87. INJURY REPORTING IN COLLEGIATE RUNNERS

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**Purpose:** It is well-known that runners are commonly injured, yet rates of running injuries reported in the literature vary widely, ranging from 19% to 92%. This discrepancy in reported injury rates may be due to several factors, including injury definition, the timeline used when reporting injuries, and whether the reporting method is self-report or reported by medical professionals. Therefore, the purpose of this study was to compare self-reported injury rates to medically-reported injury rates in a group of Division-I cross country runners. **Methods:** Questionnaires regarding pain, injury, and training status were completed at the beginning and end of the 2015 and 2016 seasons. Additionally, injury reports were obtained from the team's certified athletic trainer (ATC). Data were coded as 1) self-reported only; 2) ATC-reported only; 3) self-reported and ATC-reported. Only injuries that occurred within the past year were considered in the analysis. **Results:** In 2015, 12 athletes participated, with 38 reported injuries. Of those, 26 were self-reported (68.4%), 6 were ATC-reported (15.8%), and 6 were both self-reported and ATC-reported (15.8%). In 2016, 9 athletes participated, with 22 reported injuries. Of those, 13 were self-reported (59.1%), 8 were ATC-reported (36.4%), and 1 was both self-reported and ATC-reported (4.5%). Additionally, about half of the reported injuries (47% in 2015; 55% in 2016) led to missed or modified training. Of those injuries that led to missed or modified training, the majority (88% in 2015 and 91% in 2016) were self-reported only. **Conclusion:** The results indicate a marked difference in self-reported injury rates compared with medically-reported injury rates. This demonstrates that the method of reporting injuries may be a contributing factor to the wide range of reported injuries in the literature. Thus, caution should be taken when considering injury rates reported in the literature, as the method of reporting injuries may be influential.

## 86. EFFECTS OF ACUTE AEROBIC EXERCISE ON COGNITIVE FUNCTION IN INDIVIDUALS WITH DOWN SYNDROME

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**Background:** Individuals with Down syndrome (DS) commonly exhibit a mild to moderate level of cognitive impairment, which further affects quality of life in this population. Regular aerobic exercise has been shown to improve cognitive function among individuals with and without DS. However, if an acute bout of moderate intensity aerobic exercise has cognitive benefit in individuals with DS has yet to be explored. **Purpose:** To investigate the effect of an acute bout of aerobic exercise on cognitive function in individuals with and without DS. **Methods:** Forty volunteers with and without DS (DS=20, 25 yrs; Control=20, 25 yrs) participated in this study.  $VO_{2peak}$  was obtained via indirect calorimetry by an individualized maximal exercise treadmill protocol. Participants exercised at 60% of maximal capacity for 20 min on a separate day. Cognitive function tests (task completion time and accuracy of task completion, A Quick Test for Cognitive Speed, AQT) were measured before, immediately after, and 30 min after the submaximal walking bout. Individuals without DS performed an additional cognitive function test, the Flanker test, to avoid the known ceiling effect of the AQT. **Results:** Individuals with DS exhibited impaired cognitive function compared to individuals without DS with slower task completion time and higher error rate. ( $p < 0.05$  for both). AQT components, task completion time and error rate, were not altered after 20 min of treadmill exercise in either group. However, improved reaction time and error rate on the Flanker test (immediate; 30 min post), suggest exercise positively benefited cognitive function among those without DS. ( $p < 0.05$ ). **Conclusions:** Our results indicate that individuals with DS may need a higher intensity or longer exercise time for cognitive improvement. In addition, in-depth cognitive function testing may be more sensitive in detecting changes with exercise in individuals with DS.

## 88. CARDIOMETABOLIC CHANGES DURING THE HORMONAL TRANSITION OF A MALE TO FEMALE TRANSGENDER ATHLETE: A CASE STUDY

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Cardiovascular consequences of female sex hormone exposure on male biology are unknown. We comprehensively assessed the cardiovascular phenotype before and during estrogen treatment for gender reassignment in an aerobically trained, male-to-female transgender athlete.

**Purpose:** To examine the cardiovascular effects of estrogen treatment in a male-to-female transgender athlete. **Methods:** Subject is a biologically male distance runner (age 27yr) that has begun gender reassignment. The subject had completed social male-to-female transition prior to undergoing testing. The following assessments were performed on three occasions: anthropometry, DXA (dual energy x-ray absorptiometry) scan (1st and 3rd visit only), treadmill-based  $VO_{2peak}$ , carotid-femoral pulse wave velocity (cf-PWV), peripheral / central blood pressures and augmentation index (normalized at heart rate of 75bpm; AIX@75). Assessments were made during two separate baseline assessment visits that were completed prior to initiation of estrogen treatment (visits were averaged), and another assessment was made 14 days following initiation of estrogen treatment (10mg estradiol valerate s.c. once per week). Data presented are in response to the first 2 weeks of estrogen treatment. **Results:** Following two doses of estrogen treatment increases in BMI (18.5 to 19.8 kg/m<sup>2</sup>), total body fat (18.8 to 21.8%), and visceral body fat (143g to 274g) via DXA were observed despite no change in exercise training habits. Relative  $VO_{2peak}$  decreased by 2.9 ml/kg/min (58.7 to 55.8 ml/kg/min), but absolute  $VO_{2peak}$  (3.3- 3.3 L/min) did not change. Resting peripheral and central BP (peripheral 120/74 to 111/71 mmHg; central 107/75 to 98/71 mmHg), cf-PWV (6.7 to 6.2 m/s) and AIX@75 (4.75 to -13%) decreased after the initiation of estrogen treatment. **Conclusion:** The results of this case study describe the short-term (2-week) cardiovascular implications of estrogen treatment in a male-to-female transgender athlete. In this case, estrogen therapy resulted in an increase in adiposity and reductions in indices of central vascular stiffness and blood pressure.

## 90. EXERCISE INTENSITY AND SIMULATOR SICKNESS DURING ACTIVE VIRTUAL REALITY CYCLE GAMES

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**Purpose:** Virtual Reality (VR) gaming is a relatively new exercise modality. Currently, few studies have investigated the physiological benefits of VR gaming. Also, recent studies have suggested that VR gaming may cause simulator sickness (SS). The purpose of this study was to determine if exercise intensity levels of participants who played VR cycling games met ACSM guidelines for cardiorespiratory exercise and if participants who played these games experienced SS. **Hypothesis:** We hypothesized that (1) exercise intensity of VR gaming would be classified as either moderate or vigorous and (2) participants would experience an increase in SS symptoms after VR gaming. **Methods:** Eight participants (5 males; 3 females) played three VirZOOM® cycling games (Lasso Game [LG], Race Car [RC], and Bike Race [BR]) in random order. Exercise intensity was measured using oxygen consumption ( $\text{VO}_2$ ), metabolic equivalents (METS), and rating of perceived exertion (RPE).  $\text{VO}_2$  and RPE were collected during 10-minute playing sessions for each game. Between games, participants rested for 5 minutes. Game intensity was quantified as a percentage of  $\text{VO}_2$  reserve ( $\%\text{VO}_2\text{R}$ ) and metabolic equivalents (METS). In addition, participants completed a modified SS questionnaire immediately before playing the first game and immediately after completing their last game. **Results:** Seven participants completed all three games, with one participant dropping out after one game from severe SS. Based on  $\%\text{VO}_2\text{R}$  and METs values, all games were categorized as vigorous. Based on RPE values, LG and BR were categorized as moderate, while RC was classified as vigorous. No difference in pre- and post- SS scores was found. **Conclusion:** Individuals who participated in VirZOOM® VR gaming exercised at vigorous intensity levels and most participants did not experience an increase in SS. Our findings suggest that VR gaming may be an alternative method for meeting ACSM minimum exercise requirements.

## 92. EFFECTS OF CONCURRENT EXERCISE DURING SIMULATED MICROGRAVITY ON SOLEUS MUSCLE FIBER MYONUCLEAR CONTENT

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**Introduction:** Exercise countermeasures administered on the International Space Station are time-consuming and use large/expensive equipment. Aerobic exercise has shown to maintain oxidative capacity of muscle fibers, while resistance exercise preserves muscle mass in Astronauts. Recently, Cotter et al. (2015) determined that concurrent exercise (combining aerobic and resistance exercises; CE) was effective at mitigating deconditioning during ULLS (unilateral lower limb suspension, simulated microgravity) but resulted in differences in fiber-type responses (i.e., fast-twitch vs slow-twitch). This current study provides additional analyses of muscle samples used in Cotter et al. (2015), investigating soleus muscle (mostly slow-twitch) myonuclei. Modulations in fiber size and myonuclear domain (MND; the area each myonuclei controls) may provide mechanisms for preventing unloading decrements. **Purpose:** Our aim was to determine 1) if simulated microgravity affects soleus muscle fiber size and MND size and 2) if CE training mitigates these changes. Sixteen subjects were separated into two groups, 10-day ULLS and 10-day ULLS + CE. **Methods:** Muscle biopsies were taken pre- and post- intervention, which were isolated into individual fibers (muscle cells), stained for myonuclei, three-dimensionally imaged, and analyzed for fiber size and MND size. 2x2 ANOVAs determined potential differences in fiber size and MND size between groups, before and after ULLS. **Results:** No significant differences in fiber size or MND size after 10 days of ULLS were observed. These findings suggest that, while 10 days of ULLS may cause a decline in muscle function (as seen in Cotter et al., 2015), it may not significantly affect soleus muscle fiber size or MND size. However, individual variability occurred, suggesting that some people may be responders (or non-responders) to ULLS and ULLS+CE. **Conclusion:** This suggests a need for additional analyses to help develop "personalized" exercise countermeasures for those undergoing significant periods of unloading (e.g., people in bed rest or Astronauts).

## 89. STRENGTHENING HIP ABDUCTORS TO IMPROVE SIT TO STAND MECHANICS: A PILOT STUDY

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**Purpose:** The sit-to-stand (STS) movement is regarded as a physically demanding activity of daily living (ADL) and for individuals having an indoor sedentary occupation it is estimated that the STS is performed over 60 times per day (Dall & Kerr, 2010). Improper alignment during this task has shown to have deleterious effects on the lower extremity. The purpose of this study is to determine if completing a six-week exercise program, similar to what one may find prescribed as a physical therapy hip abductor strengthening program, will improve frontal plane lower leg alignment during the STS. **Methods:** Kinematic data was collected using the Vicon Nexus 2.3 (Vicon, Inc., Oxford, UK) motion capture system for two middle-aged female subjects, classified as sedentary and overweight by ACSM standards, both pre and post intervention. Foot placement and the height of the chair were self-selected and held consistent for both pre and post measurements. Participants were instructed to perform the STS three times with a 10 second interval between trials; the use of hands was prohibited during the task. Data was processed using Visual 3D software (5.0, C-Motion, Inc., Germantown, MD, USA). **Results:** Subject 1 had a decrease in peak hip abduction angle (PHA) of 4 deg and an increase in peak knee adduction angle (PKA) of 4.3 deg, while Subject 2 had an increase in PHA of 1.6 deg and a decrease in PKA of 0.5 deg. **Conclusion:** Our results show no meaningful differences for either of the frontal plane variables at the hip and knee. Our results suggest that current physical therapy interventions on hip abductors may not be sufficient enough to improve lower leg alignment during this task. Future studies are needed to better understand the role of hip muscle strengthening on frontal plane leg alignment in ADLs.

## 91. IMPACT OF DAILY EXERCISE COMPARED TO EXERCISE ON ALTERNATING DAYS ON EXCESS POST EXERCISE OXYGEN CONSUMPTION IN OVERWEIGHT MEN

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**Purpose:** Acute exercise can result in excess post-exercise oxygen consumption (EPOC) lasting several hours. Whether exercise performed on consecutive days would lead to an accumulating EPOC effect has yet to be determined. The purpose of this study was to compare daily exercise (DE) to exercise performed on alternating days (AE) and a control (CON) on EPOC. **Methods:** Sedentary men aged 18-30yr participated in this three-arm randomized cross-over trial. The primary comparison was the magnitude of EPOC between three groups (control (CON), alternating exercise (AE), and daily exercise (DE)) and within each group over time (day 1, 2, and 3). Both exercise groups were prescribed the same exercise intensity (70-75%HRmax), and total duration of exercise (90min) on a cycle ergometer. DE performed exercise on three consecutive days (three bouts of 30min). AE performed exercise on two alternating days (2 bouts of 45min). After exercise sessions subjects remained in the laboratory for 1-h while  $\text{VO}_2$  was measured continuously. **Results:** Seven overweight (BMI=29±4kg/m<sup>2</sup>), young (22±2years), moderately fit ( $\text{VO}_2\text{peak}$ =34±6ml.kg.min), male subjects completed the study. There was no change in  $\text{VO}_2$  (P=0.075) during CON over the three days. AE had significant changes in  $\text{VO}_2$  (DAY1: 3.8±1, DAY2: 3.1±6, DAY3: 3.5±1ml.kg.min, P<0.001) over the 3d period. DE showed no significant changes in  $\text{VO}_2$  (DAY1: 3.9±1, DAY2: 3.8±1, DAY3: 4.1±2ml.kg.min, P=0.636) over the 3d period. Following day 3 there was a condition difference such that both exercise conditions had higher  $\text{VO}_2$  (CON: 3.1±1, AE: 3.5±1, DE: 3.9±1ml.kg.min, P=0.007) and DE was borderline significantly higher than AE (P=0.062). **Conclusion:** In conclusion, the EPOC effect appeared to not be impacted by back to back exercise sessions. Increased subjects are needed to verify this finding.

# SATURDAY POSTER PRESENTATIONS

## 1. ACCURACY OF MANUAL SYSTOLIC BLOOD PRESSURE ASSESSMENT: MANOMETER WITH AND WITHOUT AUSCULTATION

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**Introduction:** Resting blood pressure (BP) assessment is an important diagnostic tool for healthcare professionals to diagnose and treat hypotension, prehypertension or hypertension based on BP values obtained via a cuff, sphygmomanometer, and stethoscope. Though no peer-reviewed literature on the topic was found, blogs indicating reliance on the observation of the manometer needle jump in lieu of auscultated BP exist. **Purpose:** This study was designed to determine the validity of the “visual-jump” technique of BP assessment as compared to standard procedures – stethoscope and auscultation. We hypothesized that the measurements will be significantly higher for systolic blood pressure (SBP) measured via the “visual-jump” method compared to auscultation. **Methods:** Forty adults (19 males, 21 females, 28.0±11.4 yr) were recruited and consented in accordance with the university’s Institutional Review Board approval. Following standard pretest guidelines for recording manual blood pressure, the technician recorded the subjects BP twice on each arm using the same Diagnostix trigger style palm aneroid sphygmomanometer (American Diagnostic Corporation, Hauppauge, NY) and stethoscope (3M Littmann, Maplewood, MN). The BP technician stated the observed value at the jump and when SBP was heard. Another technician recorded the data. Using Microsoft Excel, the average of each arm’s “visual-jump” and auscultated SBPs were computed and compared via paired t-tests ( $\alpha < .05$ ). **Results:** “Visual-jump” SBP (Left: 132.2±10.5; Right: 132.6±11.2 mmHg) was greater than auscultated SBP (Left: 117.8±9.7; Right: 117.0±9.1 mmHg) in each arm ( $p < .001$ ). Average mean differences between methods showed a significant difference of 14.4±8.5 mmHg and 15.5±8.1 mmHg for the left and right arm. **Conclusion:** Confirming our hypothesis to be correct, the results show estimating SBP via needle jump increases the likelihood that individuals’ BP values will be miscategorized. This may result in unnecessary BP treatment procedures.

## 3. CHANGES IN MAXIMAL OXYGEN CONSUMPTION AND TIME TRIAL PERFORMANCE, INRESPONSE TO HIGH INTENSITY INTERVAL TRAINING PRESCRIBED BY VENTILATORY THRESHOLD

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**Background:** Approximately 20 % of participants demonstrate no change in maximal oxygen uptake ( $\dot{V}O_{2max}$ ) after high intensity interval training (HIIT, Astorino & Schubert 2014). Approximately 50 % of this non-response is hereditary (Bouchard et al 1999), although the other 50 % is unexplored (Mann et al. 2015). Wolpern et al. (2015) showed that MICT prescribed according to Ventilatory Threshold (VT) led to less incidence of individual non-response than when prescribed with HR. **Purpose:** To monitor individual responses in  $\dot{V}O_{2max}$  and Time Trial (TT) performance in response to HIIT. **Methods:** Six habitually active (age and  $\dot{V}O_{2max}$  = 34.0 ± 5.2 yr and 36.9 ± 5.3 mL/kg/min) individuals performed baseline testing of  $\dot{V}O_{2max}$  to determine peak power output (PPO) and VT (Caiozzo et al. 1986). Subsequently, they performed a 8.2 km cycling TT over three separate trials. Subjects underwent 9 sessions of HIIT consisting of 60 s bouts at 130%VT. Controls (CON) (n=4, age and  $\dot{V}O_{2max}$  = 23.0 ± 2.7 yr and 48.0 ± 0.5 mL/kg/min) completed the assessments separated by 3 wk. **Results:** Data showed a significant difference in VT expressed as % $\dot{V}O_{2max}$  ( $p = 0.04$ ) after HIIT versus CON. There was a trend ( $p = 0.13$ ) for enhanced TT performance after HIIT (920.3 ± 71.7 s to 899.7 ± 66.7 s) versus CON (866.7 ± 67.6 s to 866.5 ± 66.2 s) as well as greater mean power output ( $p = 0.12$ ) during TT in HIIT (179.0 ± 34.9 W to 189.3 ± 35.7 W) versus CON (209.4 ± 43.8 W to 209.8 ± 43.7 W). **Conclusion:** A small dose of HIIT at 130 %VT significantly increases VT and likely enhances TT performance. The volume or duration of training used is inadequate to promote greater responses in habitually active individuals.

## 2. EXAMINING THE MODERATING EFFECT OF EMOTIONS ON TEMPERAMENT AND EXERCISE

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**Purpose:** Previous research has identified that temperament and emotion individually influence exercise behavior. The purpose this study was to examine the potential moderation effect of emotions on the temperament and exercise relationship. We hypothesized that negative emotions will moderate the relationship between Behavioral Inhibition System (BIS) of temperament and exercise; and this effect is expected to be stronger in strenuous exercise. Additionally, we hypothesized that positive emotions will moderate the relationship between Behavioral Activation System (BAS) and exercise; and this will be more pronounced in strenuous exercise.

**Method:** Participants (N=1374; M age = 28.24, SD = 10.20; 65.78% female) completed an online survey including measures of temperament (e.g., (BIS/BAS)), exercise (e.g., Leisure-time Exercise Questionnaire (LTEQ)), affect (e.g., Positive and Negative Affect Schedule (PANAS)), and demographics. Hayes’s PROCESS method was used to examine potential moderation effects of affect on temperament and relationships.

**Results:** Analysis revealed a moderation effect for negative affect on BIS and total exercise amount [ $F(1, 1098) = 4.10, p = .04$ ]. Additionally, moderation was observed for negative affect on BIS and strenuous exercise amount [ $F(1, 1102) = 6.23, p = .01$ ]. No significant effects were observed for other exercise intensities, positive affect, or BAS temperament.

**Conclusion:** Understanding why certain individuals drop out of exercise programs could help exercise professionals to individually tailored exercise prescriptions. Our observation that negative emotions may moderate the relationship between BIS and exercise helps to identify when a person will stop exercising. The practical application of this research is for exercise professionals to intervene on negative emotions when working with people high in BIS, rather than prescribing exercise to reduce negative emotions. This approach may increase exercise adherence for these individuals.

## 4. A QUALITATIVE STUDY OF PHYSICAL ACTIVITY INTERVENTIONS AMONG POSTPARTUM WOMEN

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**Purpose:** Fit Moms was a 12-month weight-loss intervention that was delivered to 371 multicultural, low-income postpartum women through WIC clinics. Women in the web-based weight loss program lost significantly more weight than control, but there were no differences in physical activity (PA). The purpose of this qualitative study was to understand Fit Mom participants’ perceptions about the PA component of the intervention and to identify barriers and strategies to increase PA in future studies.

**Methods:** We conducted three focus groups (2 Spanish) with a total of 8 Hispanic FitMoms intervention participants. Participants were asked questions pertaining to the overall program including website features, group meetings, and pedometer use and encouraged to suggest changes that may have better promoted PA. They also were asked about the potential use of apps or activity monitors in future programs to help postpartum moms increase their PA. Interviews were transcribed and coded for themes using NVivo. **Results:** Overall, women were satisfied with the program, indicating “it worked good for me, I started at 140 pounds and ended with 123 pounds” Although discussion prompts were focused on PA predominant responses were about diet, “we never paid attention to how much sugar, trans fat it really had but Fit Moms has definitely helped me become more aware.” When asked about ways the PA component could be improved, women expressed a desire to have group-based exercise programs and home-based exercise education. They also identified cost, location and childcare as structural barriers. Feedback on technology-based interventions was mixed. **Conclusions:** Overall, this sample desired group-based exercise sessions such as zumba. Providing a low-cost program with convenient locations and childcare available were identified as priorities. Future research should examine whether such strategies increase adherence to exercise interventions in low income Hispanic women.

## 5. THE RELATIONSHIP BETWEEN MITOCHONDRIAL OXIDATIVE RECOVERY RATE CONSTANTS AND $VO_{2PEAK}$ ON AN ARM ERGOMETER

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**Purpose:** Vastus lateralis muscle mitochondrial oxidative capacity (MOC) has been established to directly relate to aerobic performance ( $VO_{2peak}$ ) during cycling. However, for people with spinal cord injury, there is a need to identify which arm muscle would better correspond to fitness level. The purpose of the study is to assess the relationship between wrist flexor muscle MOC and  $VO_{2peak}$  during arm cycling exercise. We hypothesized that the association between arm and  $VO_{2peak}$  would be muscle-dependent in a healthy population. **Methods:** Wrist flexor muscle MOC was determined using near-infrared spectroscopy (NIRS) (OxyMon MkIII, Artinis) on ten college-aged participants (age  $25 \pm 2.7$  years). Muscle recovery rate constants ( $k$ ) indicative of skeletal muscle MOC, were measured following repeated arterial occlusions on the radial artery (Hokanson E20 control box and AG101 Compressor). The application of transient repeated arterial occlusions allows for the assessment of muscle oxygen consumption ( $mVO_2$ ) through NIRS. The recovery rate ( $k$ ) of  $mVO_2$  after wrist flexion was determined through non-linear regression analysis.  $VO_{2peak}$  was determined using a metabolic cart (Quark 2, Cosmed) during a continuous ramp protocol on an arm ergometer (Corival, Lode). **Results:** Mean recovery rate constants were within previously published findings ( $k = 1.41 \pm 0.47$  min<sup>-1</sup>). However, wrist flexor muscle recovery rate constants were not found to be significantly correlated with  $VO_{2peak}$  ( $r = 0.52$ ,  $p = 0.12$ ). **Conclusions:** Our data revealed that wrist flexor muscle MOC does not correlate with  $VO_{2peak}$  measured during arm cycling. We will assess other muscles such as elbow flexors and extensors and test the relationship with  $VO_{2peak}$ . Further study could also include the assessment of pre- and post-mitochondrial oxidative capacity in spinal cord injured individuals versus able bodied when a training protocol is implemented.

## 7. BACK SQUAT POTENTIATES BOTH VERTICAL AND HORIZONTAL JUMP PERFORMANCE IN COLLEGIATE ICE HOCKEY PLAYERS

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**Introduction:** Back squats (BSQ) have been shown to transiently improve lower body power and performance in explosive vertical movements such as the vertical jump (VJ). Still, understanding of this phenomenon, termed post-activation potentiation (PAP), remains nebulous as it relates to explosive horizontal movements. Therefore, the purpose of the present investigation was to assess whether heavy BSQ can potentiate both vertical and horizontal jump performance. **Methods:** Nine male ice hockey players from the Long Beach State ice hockey team performed five testing sessions separated by 96-hours. The first testing session consisted of a one repetition maximum (1RM) BSQ to determine subsequent testing loads. The four subsequent testing sessions were randomized, consisting of a back squat followed by horizontal jump (BSQ-HJ), back squat followed by vertical jump (BSQ-VJ), horizontal jump only (CT-HJ) and vertical jump only (CT-VJ). During the potentiated conditions, rest intervals were set at five minutes between the BSQ and either VJ or HJ. Alpha-level was set a priori at 0.05. **Results:** The results indicate that both vertical ( $p=0.017$ ) and horizontal ( $p=0.003$ ) jump were significantly increased (VJ= +5.51cm, HJ= +11.55cm). **Conclusion:** These findings suggest that BSQ may improve both vertical and horizontal jump performance in athletes who participate in sports emphasizing horizontal power, such as ice hockey.

## 6. DIFFERENCES IN BLOOD FLOW DURING ON AND OFF INTERVALS WITH HIGH-INTENSITY INTERVAL EXERCISE

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**Purpose:** High-intensity interval exercise (HIIE) is suspected to improve endothelial function because of the large amount of shear stress exerted on arteries but no study has compared blood flow characteristics between interval and active recovery periods of HIIE. **Methods:** Sixteen healthy males (Age:  $22.5 \pm 3.2$  years, BMI:  $25.5 \pm 3.0$   $VO_{2max}$ :  $43.59 \pm 6.17$  ml/kg/min) completed 2 randomized exercise visits consisting of HIIE (10, 1 min intervals at 90-95% of  $HR_{max}$  with 1 min of recovery between) or MOD (30 min at 70% of  $HR_{max}$ ) on an electronically braked cycle ergometer. Brachial artery diameter, antegrade shear rate, retrograde shear rate, antegrade blood flow, and retrograde blood flow were recorded during exercise using non-invasive ultrasound. To assess differences between the periods of highest intensity compared to periods of lowest intensity 2x30 seconds intervals were calculated: ON (last 15 seconds of one high intensity interval + first 15 seconds of next active recovery) and OFF (last 15 seconds of one active recovery + first 15 seconds of next high-intensity interval). **Results:** Brachial artery diameter was not different between ON and OFF periods (ON:  $4.19 \pm 0.49$ mm, OFF:  $4.15 \pm 0.43$ mm,  $P=0.09$ ). Both antegrade velocity (ON:  $16.62 \pm 7.37$  cm/sec, OFF:  $19.51 \pm 8.15$  cm/sec,  $P<0.01$ ) and antegrade shear rate (ON:  $156.48 \pm 64.03$  sec<sup>-1</sup>, OFF:  $186.07 \pm 75.91$  sec<sup>-1</sup>,  $P<0.01$ ) were higher during OFF compared to ON. Both retrograde velocity (ON:  $-9.09 \pm 3.16$  cm/sec, OFF:  $-5.97 \pm 2.72$  cm/sec,  $P<0.01$ ) and retrograde shear rate (ON:  $-87.24 \pm 30.88$  sec<sup>-1</sup>, OFF:  $-57.89 \pm 27.65$  sec<sup>-1</sup>,  $P<0.01$ ) were of greater magnitude during ON compared to OFF. **Conclusion:** We observed more retrograde, but less antegrade shear stress and blood velocity in the brachial artery during the highest intensity periods of an HIIE session compared to the lowest intensity periods. This study suggests that brachial artery blood flow is decreased during the periods of highest intensity of an HIIE session.

## 8. LOOKING FIT & TONED: HOW DOES SELF-PRESENTATION DIFFER IN THOSE WHO POST ABOUT PHYSICAL ACTIVITY ON SOCIAL MEDIA AND THOSE WHO DO NOT?

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**Purpose:** During social interactions, people desire to be perceived positively by others, this is particularly true for social media (SM) users (Kaplan & Haenlein, 2010). As an individual shapes the content shared over SM networks, that individual may idealize their[K1] character rather than presenting an authentic version (Goffman, 2002). This study examined whether people who post about physical activity (PA) on SM differed in their self-presentational efficacy (SPE) (confidence to present themselves in a positive fashion) when compared to those who do not post. **Methods:** A convenience sample of 113 kinesiology students (males:  $n=62$ , 55%, females  $n=44$ , 45%) completed a cross-sectional survey that included the self-presentational efficacy scale (15 items; Gammage, Hall, & Ginis, 2004). This scale asked about perceptions with regards to specific outcomes such as 'being in good shape' and 'looking fit and toned' in terms of SPE, self-presentational outcome expectancy (SPOE; belief that exercise would lead to each outcome), and self-presentational outcome value (SPOV; the importance placed on each outcome). Independent t-tests were conducted to compare sharers with non-sharers. **Results:** Students self-identified as sharers of PA on SM ( $n=39$ , 34.5%) or non-sharers ( $n=66$ , 58.4%). There were significantly different levels of SPE, with those who posted about PA on SM having higher levels ( $M=75.1$ ,  $SD=17.6$ ) than those who did not post about PA on SM ( $M=64.5$ ,  $SD=22.4$ ),  $t(102)=-2.507$ ,  $p=.014$ ,  $d=1.48$ . No significant differences were found between those who post about PA and those who do not based on SPOE ( $t(62.99)=0.375$ ,  $p=.709$ ,  $d=0.83$ ) or on SPOV ( $t(103)=-1.490$ ,  $p=.139$ ,  $d=1.83$ [K2]). **Conclusion:** Students who use SM to post about PA had higher levels of SPE suggesting the need for future research to explore how SM use may affect or be affected by self-presentation.

## 9. CAN CHOCOLATE MODIFY NEURONAL ACTIVITY DURING EXERCISE AND COGNITION?

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**Purpose:** Flavonoids contained in chocolate provide powerful antioxidants which not only activate the reward neural circuits, but have been demonstrated to enhance neuroprotective mechanisms, cerebral blood flow, and brain synaptic plasticity. The purpose of this study is to assess whether the stimulation of the brain reward circuitry will modify neuronal activity induced by chocolate and exercise. We hypothesized that the consumption of chocolate will improve cognition performance and neuronal activity during exercise. **Methods:** N=5 male adults (age 24.  $\pm$ 4.5 years) participated in this pilot study. In the first of three laboratory visits,  $VO_{2max}$  was measured on a cycloergometer (Monark 828E) (41.84  $\pm$  12.85ml/min/kg). On subsequent days, electroencephalography (EEG) 10-20 system international was used to measure neuronal activity & mean frequency (Mf) collected and analyzed on Mobita TMSi and Acknowledge 4.4 in the region of interest (Channels 1-7 sampled at 250Hz). Subjects were given 10.5g of 72% cocoa chocolate (CHOCO intervention) randomly after resting 2<sup>nd</sup> or 3<sup>rd</sup> visit EEG was recorded continuously through 2<sup>nd</sup> & 3<sup>rd</sup> visits: resting, baseline-stroop, post-chocolate-stroop (randomized), exercise-stroops at 50% of  $VO_{2max}$ , & recovery-stroop. **Results:** Preliminary data showed that exercise has an effect on the reaction time and number of errors only in the CHOCO intervention: 316 vs 282 sec (baseline and recovery respectively) & 5 vs 4 errors (baseline and recovery respectively). However, stroop scores improved following exercise for both conditions. EEG data demonstrated that Mf for the prefrontal cortex (PFC) increased with exercise for both conditions 23Hz (baseline) vs 33Hz(exercise). For the CHOCO, Mf was lower than the control 27Hz vs 31Hz. **Conclusion:** The improvement of the stroop scores in the CHOCO condition corresponded to a decrease in Mf for the PFC. Chocolate might also stimulate other brain regions. Along with the 7 channels we will further analyze the frontal lobe with 7 channels.

## 11. A CROSS-SECTIONAL ANALYSIS ON THE EFFECT OF SEX AND AGE ON PHYSICAL TESTING PERFORMANCE FOR LAW ENFORCEMENT AGENCY CANDIDATES PRIOR TO ACADEMY TRAINING

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**Purpose:** Law enforcement agency recruits are required to complete a series of physical fitness tests to assess their occupational preparedness. Little analysis has been done on the relationship between sex and age on recruit performance in these tests. The study purpose was to investigate the influence of sex and age on the physical performance of recruits prior to academy training. **Methods:** Retrospective analysis of 226 recruits was performed. Data was stratified into males (n = 196) and females (n = 30) and the pooled (males and females combined) data was stratified into age groups (20-24; 24-29; 30-34; 35-39; and 40+ years). The performance tests included: maximal push-up test in 60 seconds (s), maximal sit-up test in 60 s, 75-yard pursuit run (75PR), arm ergometer revolutions completed in 60 s, and a 2.4 kilometer run. A one-way analysis of variance (ANOVA) was used to compare the male and female groups, with significance set at  $p < 0.05$ . To compare the age groups, a one-way ANOVA ( $p < 0.05$ ) was also used, with a Bonferroni post hoc for multiple comparisons. **Results:** The males performed significantly more push-ups and sit-ups, more revolutions in the arm ergometer test, and were faster in the 75PR and 2.4 km run. The 20-24 year, 25-29 year (both  $p < 0.001$ ), and 35-39 year ( $p = 0.023$ ) groups were all significantly faster in the 75PR when compared to the 40+ year group. There were no significant differences between any of the groups for the other tests. **Conclusion:** Sex and age may contribute to the physical performance of recruits. Females and older recruits may be physically below males and younger recruits, respectively, in certain physical assessments. Recruits at a potential physical disadvantage should seek training prior to the academy to prepare for the expected physical demands during this period.

## 10. EFFECTS OF CAFFEINE DURING FATIGUE EXERCISE TESTING

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**Purpose:** The purpose of this study was to assess the effect of pre-workout consumption of caffeine on peak torque and fatigue during maximal isokinetic exercise testing. **Methods:** Six active (exercise  $\geq 3x/week$ ,  $>1$  hour per bout for  $>3$  months) individuals (age  $20.6 \pm 2.3$ , body weight  $72.06 \pm 7.3kg$ , height  $172.6 \pm 14.5cm$ ) participated in a double-blind placebo controlled study. Participants performed three exercise sessions consisting of three sets of 30 maximal knee extensions using their dominant leg. The study utilized a Humac Norm Isokinetic Dynamometer at a velocity of  $180^\circ$  per second. Each testing session was separated by one week and participants were instructed to not consume caffeine 36 hours prior to testing. One hour prior to testing the participants were administered a placebo (NC), low caffeine (LC) (3mg/kg body weight) or high caffeine (HC) (6mg/ kg body weight) pill. Fatigue was quantified as the difference of the average peak torque of the first five repetitions by the average peak torque of the last five repetitions divided by the average of the first five repetitions multiplied by 100. **Results:** Average fatigue rate was found to be 47.39%, 42.82% and 42.78% for NC, LC, and HC respectively. T-tests were ran ( $p < 0.05$ ) and the HC and LC groups were found to have a significant effect on fatigue rate compared to NC. Peak torque per session was averaged between participants and found to be positively affected by LC (448.5 N\*m) compared to NC (431.5N\*m) but unaffected by HC (430.5N\*m). **Conclusion:** Both high and low caffeine were found to reduce fatigue across the bout of exercise, but only LC showed positive effects on peak torque. These results indicate that caffeine consumption prior to exercise may positively influence fatigue and low caffeine consumption may increase peak torque during maximal contractions at the knee.

## 12. ORAL CONTRACEPTIVES ALTERS BLOOD PRESSURE AND BLOOD OSMOLARITY TO HIGH INTENSITY INTERVAL TRAINING

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**Purpose:** 2 weeks of high intensity interval training (HIIT) improves  $VO_{2max}$ . Although women of average fitness using exogenous hormones (EH) improve  $VO_{2max}$  after 2 weeks of HIIT (Zeirke, 2010), they also experience an increase diastolic blood pressure (dBP) during submaximal exercise. The purpose of this study was to investigate if plasma volume, blood osmolality or glomerular filtration rate (GFR) accounted for the increased submaximal dBP after seven HIIT sessions over 2 weeks between EH and controls. **Methods:** Sixteen healthy women of average fitness ( $VO_{2max} = 40.29 \pm 7.51$ ) volunteered for this study (n=8 EH, n=8CON). Prior to participating in the study, the EH women were taking a monophasic or triphasic oral contraceptive pill for  $\geq 4$  months and CON were regularly menstruating.  $VO_{2max}$  and  $sub_{max}$  testing (10% below  $VT_1$ ) were performed on a cycle ergometer pre and post HIIT. Capillary blood hematocrit, creatinine, sodium and potassium values were used to calculate plasma change, glomerular function and blood osmolality. **Results:** There was a significant increase in dBP ( $59.7 \pm 3.0$  mmHg vs  $65.2 \pm 3.12$  mmHg,  $p < 0.05$ ) in EH post HIIT during submaximal exercise. EH had a greater increase in blood osmolality compared to CON ( $1.46 \pm 27.2$  osm/L vs.  $-0.61 \pm 14.1$  osm/L,  $p < 0.05$ ). Increased dBP was positively correlated with increased blood osmolality ( $r = 0.37$ ). No significant pre/post differences between EH and CON groups were found in plasma volume change and glomerular function. **Conclusion:** EH group had a  $\sim 5$ mmHg increase in dBP during submaximal exercise after 2 weeks HIIT. The increase in dBP is not explained by changes in plasma volume or glomerular function. The increase in blood osmolality explains a small proportion, 13.69%, of the variance in submaximal dBP. This indicates that exercise induced vasodilation might be impaired with EH.

### 13. RELATIONSHIPS BETWEEN CIRCULATING MICRORNAS, BONE MINERAL DENSITY AND MUSCLE FUNCTION IN POSTMENOPAUSAL WOMEN

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**Purpose:** MicroRNAs (miRNAs, miRs) are short, non-coding RNA molecules that regulate gene expression at posttranscriptional level. Aging is accompanied by progressive declines in bone mineral density (BMD) and muscle function. The purpose of this study was to examine the relationships between specific circulating miRNAs and bone density and muscle function in older adults. **Methods:** Seventy-five postmenopausal women aged 60 to 85 years old participated in this study. Body composition and areal BMD (aBMD) were measured by DXA. Volumetric BMD (vBMD) and bone strength were measured by pQCT. Muscle function tests, including grip strength, gait speed, and counter movement jumps, were assessed. Serum levels of miRNAs (miR-21, -23a, -24, -100, -125b) were analyzed using real-time PCR. **Results:** MiR-21 was significantly negatively correlated with left trochanter BMC ( $r = -0.252, p = 0.048$ ), right trochanter BMC ( $r = -0.294, p = 0.020$ ), and cortical vBMD at tibia 38% site ( $r = -0.253, p = 0.047$ ). There also was a trend for a significant correlation between miR-21 and lumbar spine aBMD ( $r = -0.249, p = 0.051$ ). MiR-125b was significantly positively correlated with jump velocity ( $r = 0.263, p = 0.05$ ) and relative jump power ( $r = 0.294, p = 0.028$ ). **Conclusion:** Our results suggest that a higher expression level of circulating miR-21 is associated with decreased BMD in relatively healthy postmenopausal women. Future investigations are needed to further explore circulating miRNAs in osteoporotic or fragile older adults.

### 14. EFFECTS OF LEG-DRIVE ON UPPER EXREMITY MUSCLE ACTIVITY DURING A BENCH PRESS

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**Purpose:** The bench press is a universally recognized measure of upper body strength. A method known as “leg drive” was produced from competitive powerlifters who suggest that driving the legs while lifting will allow for more weight to be pressed. However, practically no peer reviewed studies exist regarding how leg activity affects upper extremity performance. The purpose of this study was to determine if muscle activity of upper extremity muscles differed depending on the involvement of the legs during a bench press. **Methods:** 15 males (age 22.1 yrs, height 1.7 m, weight 78.4 kg) and 12 females (age 21.8 yrs, height 1.6 m, weight 61.2 kg) participated. Participants attended two testing sessions one week apart. Session 1: 1-repetition maximum and familiarization with leg-drive. Session 2: surface electromyography (EMG) were placed over the pectoralis major, anterior deltoid, and the lateral head of the triceps brachii. A maximal voluntary isometric contraction (MVIC) was used for normalization. Participants performed 3 repetitions in the bench press with 75% of 1RM under three conditions: 1) standard 2) leg drive, 3) legs in the air. The normalized average of the peaks of the three reps for each muscle were analyzed using a 2 x 3 (gender x condition) repeated-measures ANOVA. **Results:** The ANOVA revealed no significant differences across groups or conditions (pectoralis major  $p = 0.405$ , anterior deltoid  $p = 0.297$ , triceps brachii  $p = 0.092$ ). **Conclusion:** When comparing a standard bench press exercise to leg-drive, our results indicate that similar amounts of muscle activation are required for the task regardless of the leg involvement. Thus, from a muscle activity standpoint, this work indicates that using leg-drive does not reduce the demand placed on the central nervous system and thus does not result in a change in muscle activation compared to a standard bench press exercise.

### 15. EFFECTS OF HIP MUSCULATURE ON BALANCE IN COLLEGIATE ATHLETES

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**Context:** Muscular strength, specifically in the hips, is a vital component of an athlete’s ability to maintain balance and stability. Previous research has shown that those with increased postural control have greater hip strength. Postural control is often times evaluated by using the Star Excursion Balance Test (SEBT) as it compares balance ability and screens for deficits. Therefore, the purpose of this study was to investigate the relationship between hip musculature strength and dynamic postural control in female collegiate basketball athletes. **Methods:** Eleven NCAA Division I female collegiate basketball athletes (age:  $19.09 \pm 1.30$  years, mass:  $74.39 \text{ kg} \pm 16.50$ , height:  $177.80 \text{ cm} \pm 7.67$ ) performed the SEBT in the anterior direction. Their reach distance was normalized by leg length (% leg length). Hip abductors and extensors’ isometric strength measurements were taken using a handheld dynamometer. Three maximal contractions were recorded and averaged, which was normalized by percent body weight. **Results:** Stepwise regression analysis was used to test if hip extensors or hip abductors predicted the athletes’ anterior SEBT scores. The results of regression indicated that left hip extensor strength was a significant predictor for right anterior SEBT ( $F(1,9) = 12.796, p < 0.006$ ), with an  $R^2$  of 0.587. **Conclusion:** Overall, this study suggests that hip extensors, rather than hip abductors, have a greater effect on balance. However, the effect was on the contralateral limb rather than the standing limb, which may indicate that SEBT performance does not solely rely on balance of the standing foot. Prior studies suggest that unilateral exercises can be beneficial for improving postural control of the contralateral leg. Due to the small sample size and the directionality in SEBT performance, further investigation is necessary to reinforce the association between hip muscles and balance.

### 16. WHEN DOES HIGH TRAINING LOAD BECOME HARMFUL IN CYCLISTS?

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**Purpose:** Exercise dependence (EXD) is defined as when excessive exercise becomes harmful and resembles an addiction. EXD measurement is based on the American Psychiatric Association’s multidimensional criteria for substance dependence including seven subscales: tolerance; withdrawal; intention; lack of control; time; reduction in other activities; and continuance. In theory, EXD should negatively affect athletic performance. However, a recent study found that cyclists may be unique, as EXD wasn’t associated with poor athletic performance. It is possible that the high training loads required of cycling athletes may overemphasize symptoms of EXD. Therefore, more research is needed to distinguish increased amounts of exercise from psychological factors of addiction. The purpose of this study was to examine the relationships among EXD subscales and performance outcomes in a sample of cyclists. **Method:** 179 individuals (M age =  $32.47 \pm 12.94$ ; 69.83% male; 74.30% Caucasian; BMI =  $25.71 \pm 3.81$ ) recruited at the 2016 Sea Otter Classic Cycling Festival completed the Exercise Dependence Scale (EDS), a grip strength and endurance test, and the Wingate test. Regression analyses were used to examine the effect of EDS subscales on grips strength, peak power, and watts/kg of body weight. **Results:** Tolerance ( $\beta = .27, p = .01$ ) predicted grip strength and explained 4.3% of the variance. Tolerance ( $\beta = .27, p = .01$ ), time ( $\beta = -.27, p = .03$ ), and continuance ( $\beta = .19, p = .05$ ) predicted peak power and explained 6.1% of the variance. Tolerance ( $\beta = .34, p < .01$ ), and time ( $\beta = -.24, p = .05$ ) both predicted watts/kg of body weight and explained 5.2% of the variance. **Conclusion:** The negative effect observed for the time subscale indicates that there may be an upper limit for when training volume stops being beneficial to cyclists. Increased amount of time in training may also influence tolerance and continuance. Thus, exercise professionals should distinguish when time and continuance, as opposed to increased training load may result in performance detriments.

## 17. THE NEED FOR MULTI-MODALITY IN A WIRELESS SYSTEM FOR MONITORING EXERCISE IN INDIVIDUALS WITH SPINAL CORD INJURY

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**Purpose:** Individuals with spinal cord injury (SCI) face barriers to maintaining physical activity levels. Wireless fitness monitors that track heart rate may help maintain activity; however, due to autonomic dysfunction, heart rate alone may be inadequate. This project determines the need for a multi-sensor wireless exercise monitoring platform and explores which metrics will effectively track the intensity of upper limb exercises in individuals with SCI. **Methods:** Six individuals with SCI (C6-T12) performed 8 weeks of upper limb exercises at target intensity levels while wearing a heart rate monitor. Heart rate was computed as a percentage of the maximum heart rate and compared to target intensity. Wireless EMG was acquired from four upper limb muscles in three individuals without disabilities while performing arm resistance exercises. EMG, heart rate, and oxygen consumption ( $VO_2$ ) were acquired during a  $VO_2$  max test. **Results:** Heart rate was poorly correlated with target intensity levels in participants with SCI. Heart rate exceeded the target zone during 94.3±3.6% of the aerobic exercises and 99.7±0.3% of resistance exercises. However, in exercising individuals without SCI, better correlations were found between heart rate and intensity level. For example, heart rate was correlated with  $VO_2$ , ( $r=0.89$  to  $0.93$ ). Correlations between  $VO_2$  and optimal integrated EMG (iEMG) was on average 6.6% lower than the correlation between heart rate and  $VO_2$ . **Conclusion:** The ineffectiveness of monitoring heart rate in exercising individuals with SCI motivates the need for a multimodal exercise monitoring system. Tracking EMG activity during exercise may be an option if optimal EMG patterns are identified. Our results motivate exploring non-linear combinations of EMG from multiple muscles to develop a better metric for this population. We are therefore developing a wireless "DREAM" system on a mobile platform capable of integrating heart rate, end point acceleration and upper limb muscle EMG.

## 19. WEIGHT CUTTING AND PROFESSIONAL MIXED-MARTIAL ARTISTS: HOW DOES TRAINING CAMP AND START OF WEIGHT CUT LENGTH RELATE TO OVERALL WEIGHT CUT?

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**Purpose:** Cutting weight is common in combat sports. Current peer-reviewed literature is limited on weight cutting practices of mixed martial artists (MMA). Thus, the purpose of this study was to investigate the average start of weight cut and the influence on the amount of weight put back on following rehydration. **Methods:** N=79 male professional mixed martial artists (18-40 yrs) were recruited from every weight class primarily in the states of California and New Mexico. Participants were administered a questionnaire that had been reviewed by a registered dietitian, a certified strength and conditioning specialist, and an exercise physiologist. Data presented as Spearman's Rho correlations and frequencies calculated using IBM Analytics, SPSS v24. Significance was set at  $p<0.05$ . **Results:** Participants ranged in length of time cutting weight, from 1 week to over 8 weeks ( $M = 4.45$  weeks,  $SD = 2.43$ ). The length of time spent cutting weight was positively correlated with the amount of weight cut ( $r_s = .393$ ,  $p < .001$ ). Additionally, those with longer training camps (lasting 8-10 weeks) were more likely to cut over 21 pounds (60%) than those with training campus of 6-8 weeks (48.4%) or less than 6 weeks (50%). Lastly, those who put more weight back on were more likely to rehydrate using over 40 ounces of fluid (100% among those putting back on 21-25 pounds, 66.7% for 16-20 and 6-10 pounds, and 0% for 0-5 pounds). **Conclusion:** Professional mixed martial artists reported that prolonged weight cutting length are correlated to increased amounts of weight cut. Additionally, study participants report that extended training camps are also directly related to the amount of weight cut before a fight. Professional mixed martial artists that cut significant amounts of weight are more likely to rehydrate with over 40 ounces of fluid between weigh-ins and competition.

## 18. GREAT TOE ADDUCTION DECREASES BLOOD FLOW TO PLANTAR FASCIA: A PILOT STUDY

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**PURPOSE:** Physicians have theorized that an adducted great toe, as seen inside a narrow shoe, may put passive tension on the abductor hallucis (ABDH). Since the medial plantar artery (MPA) runs deep to the ABDH between the muscle and the calcaneus, tensing of this muscle may put pressure on the MPA, decreasing blood flow to the plantar fascia. The purpose of this study was to compare blood flow within the MPA before and after passive great toe adduction. **METHODS:** Ten subjects (female  $n=5$ , age:  $29.2 \pm 10.0$  years, height:  $177.5 \pm 9.1$  cm, weight:  $74.8 \pm 17.2$  kg) participated in this study. Blood flow was measured using pulse-wave ultrasound imaging (ML6-15 probe, GE Logiq S8). Subjects were seated with the ankle in  $30^\circ$  plantar flexion. Blood flow was first measured with the great toe in a resting neutral position. The great toe was then passively adducted with moderate pressure enough to cause visible tensing of the muscle, and blood flow was measured again. The MPA was imaged just deep to the ABDH. The diameter of the vessel was measured from the images, and the rate of blood flow was then calculated using the internal software of the ultrasound machine. **RESULTS:** A paired t-test indicated the rate of blood flow was significantly lower post-adduction compared to the pre-adduction condition. (Pre:  $1.51 \pm 0.76$  ml/min, Post:  $0.88 \pm 0.61$  ml/min,  $p=0.001$ ) **CONCLUSION:** Based on this preliminary data, it appears that passive adduction of the great toe may decrease the rate of blood flow within the MPA. Further investigation is needed to confirm these findings and determine the effect of footwear on great toe position and MPA blood flow.

## 20. RELATIONSHIP BETWEEN CARDIORESPIRATORY FITNESS AND RELATIVE GUT MICROBIOTA COMPOSITION IN HEALTHY ADULTS

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**Purpose:** Bacteria residing in the human gastrointestinal tract has a symbiotic relationship with its host. Animal models have demonstrated a relationship between exercise and gut microbiota composition. The purpose of this study is to explore the relationship between cardiorespiratory fitness and relative gut microbiota composition, measured by the ratio of *Firmicutes* to *Bacteroidetes* (F/B Ratio), in healthy adult humans. **Methods:** Twenty-one males and 19 females (aged  $26.1 \pm 2.8$  years), classified as low-risk by ACSM standards and who did not take antibiotics in the last 6 months, volunteered for this study. Participants took a 3-month exercise recall, tracked their nutritional intake for 7 days, and collected their stool sample with an OMNIGENE Gut<sup>®</sup> home stool collection kit. Participant's body composition and cardiorespiratory fitness were measured via air displacement plethysmography using the Bod Pod<sup>®</sup> and a symptom limited graded exercise test to determine maximal oxygen consumption ( $VO_{2max}$ ), respectively. Their relative microbiota composition was determined by analyzing DNA extracted from stool samples by a qPCR approach that specifically measured the amount of a target gene (16s RNA) found in *Firmicutes* and *Bacteroidetes*. **Results:** F/B ratio was significantly correlated to  $VO_{2max}$ , total MET-Minutes, and total minutes of exercise per week in all participants at 0.45, 0.33, 0.39 ( $p < 0.05$ ). Nutritional intake was significantly correlated to F/B Ratio at 0.32 ( $p < 0.05$ ) and anthropological measures did not significantly correlate to F/B Ratio. **Conclusion:** The human gut microbiota composition is related to cardiorespiratory fitness in healthy adults. A causal relationship exists in animal models and our exploratory research suggests that one may exist in humans. If so, exercise may be another medium used to alter the composition of gut microbiota. Future research should confirm if there is a causal relationship between the amount of cardiorespiratory exercise and the gut microbiota composition in humans.

## 21. ASSESSING THE ABILITY OF THE FITBIT CHARGE 2 TO ACCURATELY PREDICT $VO_{2max}$

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**Purpose:** The aim of this study was to assess the ability of the Fitbit Charge 2 (FB) to accurately estimate  $VO_{2max}$  in comparison to both the gold standard  $VO_{2max}$  test and a non-exercise  $VO_{2max}$  prediction equation. **Methods:** Thirty healthy subjects (17 male, 13 female) between the ages of 18 and 35 (age =  $21.7 \pm 3.1$  yr) were given a FB to wear for one week and followed instructions on how to obtain a Cardio Fitness Score (CFS).  $VO_{2max}$  was measured on an incremental test on the treadmill followed by a verification phase.  $VO_{2max}$  was predicted via a non-exercise prediction model (N-Ex) using self-reported physical activity level. **Results:** Measured  $VO_{2max}$  was significantly lower than FB predicted CFS ( $VO_{2max} = 49.91 \pm 6.83$ ; CFS =  $52.53 \pm 8.43$ ,  $P=0.04$ ). N-Ex prediction was significantly lower than CFS but not significantly lower than measured  $VO_{2max}$  (N-Ex =  $48.79 \pm 6.32$ ; CFS vs. N-Ex:  $P=0.002$ ;  $VO_{2max}$  vs. N-Ex:  $P=0.60$ ). There was a trend for FB to predict  $VO_{2max}$  better in females than males ( $VO_{2max}$  – CFS: Female =  $-0.91 \pm 5.25$ ; Male =  $-3.93 \pm 4.88$ ,  $P=0.12$ ). Relationships between both  $VO_{2max}$  vs. CFS and  $VO_{2max}$  vs. N-Ex were good (ICC:  $VO_{2max}$  vs. CFS =  $0.87$ ,  $VO_{2max}$  vs. N-Ex =  $0.87$ ) but the coefficient of variation was greater with CFS than N-Ex ( $6.5 \pm 4.1\%$ ;  $5.6 \pm 3.6\%$ , respectively). Heart rate (HR) estimated by the FB was lower than estimated (Est) HR for pace based on HR extrapolation (FB =  $155 \pm 18$  bpm, Est =  $183 \pm 15$  bpm,  $P < 0.001$ ). The difference in CFS and  $VO_{2max}$  was inversely correlated with the difference in FB HR and Estimated HR ( $r = -0.45$ ,  $P < 0.001$ ). **Conclusion:** The FB CFS overestimates  $VO_{2max}$  in healthy males and females by  $-6.5\%$ . The non-exercise  $VO_{2max}$  prediction equation provides a more accurate  $VO_{2max}$  prediction than the CFS without the need for exercise or purchasing a Fitbit.

## 23. THE EFFECTS OF A 10-WEEK TRAINING PROGRAM ON LANDING KINEMATICS OF FEMALE COLLEGIATE BASKETBALL PLAYERS

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**Purpose:** It has been shown that female athletes have a two to eightfold increase in incidence of anterior cruciate ligament (ACL) injuries than their male counterparts, and roughly 70% of ACL tears are noncontact injuries. Multiple studies have found that women tend to land with decreased knee flexion during loading response when compared to men. Decreased knee flexion during loading response as well as decreased hip strength, has been associated with an increased risk of ACL injuries. **Methods:** Thirteen Division I women's basketball players participated in this study (age  $20.2$  yrs  $\pm 1.6$ ). A baseline pre-assessment was taken prior to beginning the intervention program, and once again after the intervention program had ended. The program consisted of bodyweight squats and jumps, with emphasis placed on proper alignment. The exercises progressed weekly and included in-game simulations towards the end. Participants were tested for L/E range of motion (ROM) and manual muscle testing (MMT). Participants were then fitted with a 55-marker set, and 3D kinematic data were captured using Qualysis motion capture system sampled at 250 Hz. Pre and post assessments consisted of Drop Jump tests on a force plate, Overhead squats, and a dynamic balance assessment. **Results:** After intervention, MMT scores increased for hip extension from  $22.92$  N  $\pm 6.27$  to  $36.84$  N  $\pm 6.83$  ( $p < 0.001$ ), knee extension from  $34.71$  N  $\pm 6.09$  to  $50.59$  N  $\pm 17.68$  ( $p < 0.005$ ), and hip abduction from  $19.59$  N  $\pm 4.59$  to  $24.01$  N  $\pm 4.57$  ( $p < 0.001$ ). Knee flexion during the drop jump test increased from  $88.66^\circ \pm$  to  $97.19^\circ \pm$  ( $p < .05$ ). **Conclusion:** The participants showed improvements to their hip and knee strength, as well as improved landing mechanics by increasing knee flexion angles during landing. These results are a positive step in reducing the potential for knee injury in female athletes.

## 22. DIFFERENCES IN $VO_2$ PEAK OF SURFERS WHEN PADDLING IN WATER VERSUS ON A SWIMBENCH ERGOMETER

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**Purpose:** There are multiple studies in the literature that have assessed the aerobic fitness of both recreational and competitive surfers during simulated paddling on a swimbench ergometer. However, no previous studies have measured oxygen consumption of these athletes while paddling in the water. Therefore, the purpose of this study was to test the hypothesis that surfers will achieve a higher  $VO_{2peak}$  when tested in a swim flume versus on a swimbench ergometer. **Methods:** Thirty-nine proficient surfers (Male: 31, Female: 8) between the ages of 18 and 45 years old participated in the study. Heart rate (HR), oxygen consumption ( $VO_2$ ) and respiratory exchange ratio (RER) were measured in 15-second intervals while subjects performed an incremental (1-minute stages) paddling test either on a Vasa swimbench ergometer or in an Endless Pool Elite swim flume. The order of exercises modality was randomized between subjects and separated by one week. Peak HR,  $VO_2$  and RER at volitional fatigue were recorded for each subject. A paired t-test was used to determine any differences in  $VO_{2peak}$ , HR, and RER between the two testing modalities. **Results:** Participants were  $26.03 \pm 7.26$  years old,  $174.68 \pm 8.53$  cm,  $71.53 \pm 10.58$  kg, and reported  $11.64 \pm 8.15$  years of experience. There were no significant differences in maximal HR (Flume:  $177 \pm 12$  bpm, Ergo:  $176 \pm 17$  bpm) or RER (Flume:  $1.23 \pm 0.11$ , Ergo:  $1.22 \pm 0.10$ ) between the two tests. However,  $VO_2$  peak was significantly higher in the swim flume ( $33.03 \pm 6.48$  ml/kg/min) versus on the swimbench ergometer ( $29.86 \pm 6.76$  ml/kg/min) ( $p$ -value  $< 0.001$ ). **Conclusion:** Results from this study demonstrate that when tested in a training specific environment, surfers significantly increased their  $VO_{2peak}$  by 11%. These data suggest that previous reports of  $VO_{2peak}$  in surfers, as determined by swimbench ergometry, likely underestimated surfer's aerobic fitness. Future research investigating the aerobic fitness of surfers should be done while paddling in water.

## 24. DIFFERENCES IN MUSCLE ARCHITECTURE OF THE GASTROCNEMII AND TIBIALIS ANTERIOR BETWEEN FOREFOOT AND REARFOOT RUNNERS

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**Purpose:** Running related injuries are related to foot strike pattern (FSP). Cross-sectional area (CSA) and muscle quality (represented by echo-intensity (EI) of the lower limb musculature contribute to plantarflexion (PF)/dorsiflexion (DF) strength, and may contribute to FSP. The purpose of this investigation was to compare CSA, muscle quality, and strength of the triceps surae and tibialis anterior (TA) between forefoot (FF) and rearfoot (RF) runners. **Methods:** 31 recreational runners (21 male/10 female; age =  $22.26 \pm 3.01$  years; height =  $1.72 \pm 0.08$  m; mass =  $65.20 \pm 8.97$  kg) participated in this study. CSA and EI of the medial and lateral gastrocnemii (MG and LG, respectively) and TA were assessed using ultrasonography. PF and DF maximal strength values were obtained using handheld dynamometry. FSP was obtained using foot strike index (FSI), and 15 RF and 16 FF runners were identified. Spearman  $\rho$  was used to evaluate the association between FSI and CSA, muscle quality, and strength; whereas Pearson  $r$  was used to evaluate relationships between strength and ultrasound measurements. Independent samples t-tests were used to compare dependent variables between groups. **Results:** Lower (i.e. "better" quality) MG EI ( $\rho = -0.305$ ,  $p = 0.042$ ) and LG EI ( $\rho = -0.358$ ,  $p = 0.020$ ) were associated with greater FSI (i.e. more forefoot). Greater PF strength was associated with greater MG CSA ( $r = -0.508$ ,  $p = 0.001$ ), lower MG EI ( $r = -0.343$ ,  $p = 0.026$ ), and lower LG EI ( $r = -0.413$ ,  $p = 0.08$ ). FF runners had lower MG EI ( $p = 0.043$ ,  $ES = 0.638$ ) and LG EI ( $p = 0.028$ ,  $ES = 0.716$ ) compared to RF runners. There was a trend towards larger MG CSA in the FF compared to RF runners ( $p = 0.130$ ,  $d = 0.41$ ). **Conclusions:** Triceps surae muscle CSA and quality are associated with a FF strike in runners. Muscle quality may be more relevant than size to FSP, and may be a suitable target for intervention when transitioning between FSPs in runners. TA strength and function may not provide a substantial contribution to FSP.

## 25. LEARNING EFFECT AND REPEATABILITY OF METATARSAL DOMING

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**Purpose:** Measuring foot muscle strength is difficult due to a lack of reliable quantitative measuring techniques. Foot muscles are activated and strength can be tested when individuals perform a doming movement, however this is an unfamiliar motion for most people. The purpose of this study was to investigate the influence of both practice and device interface on force generation during metatarsal doming (MD). **Methods:** 45 healthy subjects were recruited for two sessions of strength testing two weeks apart. Subjects were fitted into two custom devices that recorded the force exerted when engaging in MD. In the first device (MDpull) a molded cuff was placed around the dorsum of the foot and connected by a cable to a force transducer located below the foot. In the second device (MDpush) a force transducer was attached to a pad placed above the dorsum of the foot, providing compressive resistance. Subjects performed three trials per device and session, exerting maximal effort in MD for approximately three seconds. Between sessions subjects practiced 2 sets of 10 repetitions of the doming motion everyday. Differences between the two sessions were assessed using paired t-tests. Intraclass correlation coefficients (ICC) were also used to assess repeatability on the second session. **Results:** Strength increased between sessions for both devices ( $p < 0.001$ ). MDpull increased 35% ( $24.8 \pm 14.5$  to  $33.4 \pm 18.7$ ) and MDpush increased 7% ( $17.9 \pm 7.1$  to  $22.5 \pm 7.9$ ). Repeatability was excellent for both MDpull and MDpush (ICC = 0.973 and 0.974, respectively). **Conclusion:** Both devices were repeatable and exhibited learning effects. Subjects may have felt more comfortable in the MDpush device, reducing the learning effect. Alternately, there may have been misalignment between the MD motion and the fixed transducer axis in the MDpull device, which could explain why the force was lower and the learning effect was smaller.

## 27. 12-WEEK VIDEO CONFERENCE-BASED HEALTH COACHING INCREASES BLUETOOTH DEVICE ADHERENCE, PHYSICAL ACTIVITY, AND PRODUCES FAVORABLE WEIGHT LOSS IN OBESE PARTICIPANTS.

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**PURPOSE:** Healthy rate of weight loss is defined as 1-2% of body weight loss per week. The objective of this pilot study is to investigate Bluetooth device adherence (scale and activity tracker), average weight loss per week using a fully online, 12-week, medically monitored weight management program incorporating a multidisciplinary team. Our hypothesis was that video conference-based health coaching will increase adherence produce clinically significant weight loss ( $> 7.5\%$ ) in an obese population. **METHODS:** N=25 obese participants (12 males, 13 females) were recruited for this commercially available fully on-line 12-week multi-disciplinary weight loss program (InHealth Medical Services, Inc. Los Angeles, CA). Participants were randomly assigned to either an intervention group (INT) ( $n=13$ ,  $106.8 \pm 25.46$  kg,  $BMI=35.19 \pm 3.91$  kg/m<sup>2</sup>) or control group (CON) ( $n=12$ ,  $99.8 \pm 19.14$  kg,  $BMI=34.86 \pm 4.43$  kg/m<sup>2</sup>). All participants were given two bluetooth devices (step tracking watch and body weight monitoring scale) that connected them direct with the research team and data tracking. The INT group conducted video-conference-based visits monthly by a physician and weekly by a registered dietitian who discussed nutrition, fitness, and behavior change goals individually, while the CON group met once at baseline and once at study completion. To analyze the data, independent samples t-tests and  $\chi^2$ -tests were performed via SPSS v24 with data displayed as average $\pm$ SD; significance set to  $p > 0.05$ . **RESULTS:** Participants in the INT group had increased adherence to devices ( $96 \pm 0.05$  vs  $8.25 \pm 3.77\%$ ,  $p < 0.05$ ), steps ( $26,844 \pm 33,243$  vs.  $-5,972.0 \pm 22,286$  steps/week,  $p < 0.05$ ), and weight loss ( $-0.74 \pm 1.8$  vs  $0.18 \pm 1.8$  kg) per week when compared to the CON group. **CONCLUSION:** Results indicate implementation of a multi-disciplinary medical weight management program through telemedicine can be an effective tool to increase Bluetooth device adherence, physical activity, and induce body weight loss each week.

## 26. METABOLIC COSTS OF A 58-MINUTE STRONG BY ZUMBA® AEROBIC EXERCISE SESSION WITH AND WITHOUT MUSIC OR CUEING

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**Purpose:** It is unclear if the presence or absence of music and cueing influence total caloric expenditure (metabolic costs) during a STRONG BY ZUMBA® exercise program. Thus, the purpose of this study was to determine the metabolic costs of a 58-minute aerobic exercise session with and without music or cueing using HR estimation and indirect calorimetry. **Methods:** Using a randomized crossover design, twenty-two participants (6 males; 16 females;  $27.64 \pm 10.33$  yrs) were randomized into two groups (Group A = 11; Group B = 11). All participants performed a 58-minute exercise session under the two conditions: with music (WM) and without music or cueing (WOM). Total caloric expenditure was obtained through the Activio heart rate system for all 22 participants. Metabolic costs were also analyzed via indirect calorimetry through the metabolic cart. Paired samples t-tests were performed using to compare energy expenditure using HR estimations and indirect calorimetry using IBM Analytics, SPSS v24. and significance was set at  $p < 0.05$ . **Results:** There were no significant differences between WM and WOM for mean metabolic costs using HR estimations or indirect calorimetry ( $p > 0.05$ ). No significant differences were also found when comparing WM and WOM mean metabolic costs using HR estimations versus indirect calorimetry ( $p > 0.05$ ). **Conclusion:** These results indicate that the presence of music and cueing does not significantly increase caloric expenditure during STRONG by ZUMBA®, a 58-minute aerobic exercise session. Music, therefore, cannot effectively or independently increase the metabolic costs of physically active individuals during aerobic activity.

## 28. SINGLE AND DOUBLE-LEG DROP VERTICAL JUMP

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**Intro:** The vertical jump is a commonly performed athletic move in a number of sports. The purpose of this investigation is to determine if any differences exist in peak ground reaction force (vGRF), rate of force development (RFD), or knee joint compliance between the single leg and double leg drop vertical jump (DVJ) during the first landing. It was hypothesized that the vGRF and RFD will be different in a single and double leg DVJ. **Methods:** This study examined college aged male and female volunteers ( $n=11$ , Males=3, Females=8 age= $21.6 \pm 2.0$  years; height: $1.75 \pm 0.23$  m; mass:  $72.9 \pm 18.3$ kg). Each participant performed a total of 10 DVJs (5 single leg and 5 double leg). The DVJ task consisted of the participant dropping down from a 0.31 m box, and participants were asked to land before performing a maximum vertical jump from either two legs or one leg, depending on the condition. **Results:** Between single and double leg DVJs the average knee flexion angle and knee valgus angle were statistically different ( $70^\circ$  vs.  $93^\circ$  flexion,  $p = .0005$ ;  $6.2^\circ$  vs  $4.8^\circ$  valgus,  $p = .04$ ). Between single and double-leg DVJ, the average relative vGRF and RFD showed no statistical difference ( $2.9$  BW vs.  $3.1$  BW,  $p = .2$ ,  $48.3$  BW/s vs.  $41.3$  BW/s,  $p = .2$ ). **Discussion:** The kinematic analysis in single and double leg DVJs revealed that the single leg DVJ experienced an increased knee valgus angle and decreased knee flexion angle. In addition, the kinetic analysis of the single and double leg DVJs showed no significant difference for the vGRF and RFD. The findings of this study indicate that sport-specific movements involving landing and jumping off of a single leg place an athlete at much greater risk for an ACL injury.

## 29. WRIGHT BALANCE® STANCE AND PREFERRED STANCE CENTER OF PRESSURE DIFFERENCES DURING STANDING AND SQUATS

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**Purpose:** Stance has been determined to be a functional component in a variety of movement activities. Traditionally, a stance width in which the feet are shoulders width has been accepted in multiple sport and clinical settings. The purpose of this study was to evaluate whether an individual's center of pressure (COP) changes with the Wright Balance® Stance (WBS) versus their preferred stance (PS).

**Methods:** Twenty-six healthy college-age students (age  $21.42 \pm 2.16$  years; height  $169.06 \pm 11.22$  cm; mass  $71.80 \pm 16.89$  kg) participated in the study. The participants' PS was determined first, followed by measurements to determine each participant's WBS. The participants stood on the Sports Balance Analyzer (SBA) (Tekscan, Boston, MA) in their PS and WBS and while performing 3 squats in each stance. COP was collected for the duration of the 3 squats and 20 seconds for each stance with Eyes Open (EO) and Eyes Closed (EC). COP area, COP variance, anterior-posterior (AP) and left-right (LR) excursion data was collected using the SBA. The order of stances was counterbalanced across each participant. **Results:** Paired samples t-tests were conducted to analyze the relationship between PS and WBS width. Based upon the analysis, no significant differences were found between the PS and WBS for COP area, COP variance, AP excursion, nor LR excursion during EO and EC conditions. There was a trend for a smaller total COP area for WBS ( $22.48 \text{ cm} \pm 11.25 \text{ cm}$ ) while performing the squats compared to the PS ( $24.37 \text{ cm} \pm 12.17 \text{ cm}$ ). **Conclusion:** WBS has anecdotally shown to improve asymmetry of a person's stance. However, more research is needed to determine the reason for the perceived improvement.

## 31. THE EFFECTS OF PLAYGROUND GREENING ON PHYSICAL ACTIVITY AND SOCIAL BEHAVIORS OF ELEMENTARY SCHOOL CHILDREN: A LONGITUDINAL STUDY

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**Purpose:** Elementary schoolchildren can accumulate up to 40% of their recommended physical activity (PA) during recess. Research shows that children engage in more creative and collaborative play in green playground spaces compared to hardscape areas. The purpose of this longitudinal study was to analyze the changes in PA and social interactions after a large-scale elementary school playground greening project in Los Angeles. **Methods:** Recess behaviors were recorded for 306 students (grades 1-5) with the validated SOCARP observation tool pre-, immediately post- and four months post-playground greening. **Results:** Linear mixed model analyses revealed an interaction effect between time, zone, and sex ( $F_{1,313} = 7.05, p=.008$ ) and between zone and grade ( $F_{4,307} = 2.60, p=.036$ ) for PA as well as an interaction effect between time and sex ( $F_{2,375} = 3.33, p=.037$ ) for antisocial behavior. Although boys were more active than girls pre-greening, post-greening hardscape PA was not different between sexes. After four-months, greenspace PA remained 37.9% higher than hardscape PA for girls while PA was not different between surfaces for boys. Fifth graders spent more time sitting and less time in vigorous PA on hardscape compared to younger grades. Grade-level differences were not observed on greenspace. Antisocial behaviors increased pre- to post-greening for both sexes. After four months, the frequency of antisocial behaviors returned to baseline for girls and were significantly lower than baseline for boys. **Conclusions:** The results suggest that a large-scale playground greening project has the potential to induce lasting positive changes on PA levels of elementary school students on all playground surfaces. These benefits may be more profound for girls and older students, children who are traditionally more sedentary during recess. Additionally, after a period of adaptation, playground greening may decrease social conflict. The long-term impact of playground greening on health and academic outcomes is unknown.

## 30. ARCH HEIGHT AND FOOT STRENGTH

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**Introduction:** Foot structure has been implicated as a factor in running related injuries and used as a predictor in functional interventions. While arch height has been associated with passive foot mobility, researchers have only theorized that foot structure can also be affected by intrinsic foot muscle strength. **Purpose:** To investigate the potential relationship between foot structure and intrinsic foot muscle strength. **Methods:** Fifty-three healthy subjects participated (Ht =  $171.5 \text{ cm} \pm 10.1$  Wt =  $71.0 \text{ kg} \pm 13.1$  Age =  $25.2 \pm 6.4$ ). Foot structure was measured using the Arch Height Index Measurement System (AHIMS). The subjects then completed three separate foot dynamometry tasks in random order comprising lateral toe flexion, great toe flexion, and doming (or short foot exercise). Pearson correlations were used to compare the dynamometry results to the arch height index and arch stiffness from the AHIMS. **Results:** Pearson correlations showed insignificant relationships for all variables ( $p \geq 0.512$ ). The correlations closest to significance included doming and arch height ( $r = -0.225, p=0.137$ ) and doming and foot stiffness ( $r = 0.112, p=0.463$ ). **Conclusion:** The data does not support the hypothesis that high arched individuals have stronger intrinsic foot muscles. Instead, it suggests that people with higher arches may rely on their bony structure, rather than muscle or soft tissue to maintain their arch height. The non-significant relationships found may be due to the extremely small range of arch heights along with much larger ranges found in foot strengths. Specifically targeting high and low arch subjects could help to improve the range and possibly the correlations.

## 32. THE LINK BETWEEN SELF-PERCEIVED QUALITY OF LIFE AND LEVEL OF PHYSICAL FITNESS

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Whittier College Yao Yuan Sze Kinesiology Fellowship

**Purpose:** There has been research regarding a correlation between self-perceived QoL and Physical Fitness but for the most part these studies have focused on either populations recovering from injury or illness and elderly populations. Not much has been done regarding young, relatively healthy populations. The purpose of this experiment is to see if a such a relationship exists in a population of college age students (18-25). The results of this study could be used to illustrate to college students how important or unimportant physical fitness is to a person's overall quality of life. **Methods:** 23 participants first completed a QoL survey provided by RAND Health titled Measures of Quality of Life Core Survey which was uploaded to the website Survey Monkey. **Proposed Methods:** The rest of the procedures listed are yet to be completed. To assess level of physical fitness participants will be scored in 5 areas; cardiovascular endurance, muscular endurance, flexibility, muscular strength, and body composition. The next test participants will undergo is a walking VO<sub>2</sub> max test conducted to measure cardiovascular endurance. To test muscular endurance subjects will attempt push-ups, sit-ups, and to hold a wall squat for as long as they can. Next to test flexibility participants will do a sit and reach test, the zipper test, a shoulder rotation test, and then have measured their practical range of motion at their ankles, hips, groins, necks, shoulders, elbows, and the wrists using a goniometer. To measure body composition the Bod Pod will be used on participants. To measure muscular strength participants will do a one repetition maximum test on bench press and squats. Using the results of these tests participants will be scored against their same age/gender average scores. The results of the psychological survey and physical testing will be compared to look for a relationship.

### 33. THE EFFECTS OF TREADMILL TRAINING WITH ROBOTIC-APPLIED RESISTANCE ON TREADMILL AND OVERGROUND WALKING IN RODENT MODEL OF SPINAL CORD INJURY

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**Purpose:** There is evidence that robotic-assisted treadmill training with body weight support did not improve the recovery of stepping patterns after a spinal cord injury (SCI). Applying robotic resistance, however, may be beneficial although, to date, proper controls have not been included in experiments of robotic resistance. We examined the effects of robotic-applied resistive forces in a rodent model of SCI and how it affected overground walking. **Methods:** Twenty female Sprague Dawley rats received severe mid-thoracic spinal cord contusion injury. Baseline test was performed two weeks later, after which treadmill training began. A robotic device was used to apply viscous forces that opposed horizontal movements of the hindlimbs during treadmill training. The experimental group (n=7) was trained with a robotic horizontal force (HF). Controls consisted of a group of rats receiving treadmill training without robotic resistance (n=6) and a group of untrained rats (n=6). Training was performed 15 minutes/day, 5 days/week. Overground performance was assessed using the circular body weight supported, ambulatory rodent trainer (CBART). Bony landmarks for the ilium, hip, ankle, and metatarsal-phalangeal joint were tagged using ink and the limbs were video recorded. The recorded sequences were analyzed using MATLAB software developed in-house. **Results:** After 4 weeks of training with robotic resistive forces, improvements in step cycle kinematics were observed based on ankle position data collected by the robotic device. Training with HF significantly increased step length and forward displacement by 24% and 16%. No significant changes were observed in untrained controls or in rats that were trained without the resistive forces. We also found no significant changes in overground stepping performance in any groups. **Conclusion:** These findings have implications for the use of robotic technology in treadmill training therapies following SCI, and also suggests that specificity of training plays an important role in adaptation to resistive forces.

### 35. FALLS AND FRACTURES: BIOMECHANICALLY BASED FALL RISK ASSESSMENT

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**Introduction:** After a fall, hip fractures are a common and disastrous occurrence in the elderly. To generate a risk assessment, the modeling of a fall can be utilized to determine hip impact forces and fracture loads. **Purpose:** 1) To model falling forces and compare these against experimental data, 2) to generate a model for femoral fracture load, and 3) to use the results to generate a means of fall risk analysis. **Methods:** A developed falls model, using anthropometric data and previously published falls data, was used to replicate a lateral fall. Femoral fracture load was modeled by using functions for bone mineral density (BMD) and dependent fracture load. **Results:** The modeled data revealed that female fracture loads were lower than males, and that safe fracture load decreased with age, which is consistent to previously reported experimental data. **Conclusion:** The use of modeling is a safe and consistent method for testing falls. The use of this model could be further implemented into building strategies to reduce fall risk or injuries from falls.

### 34. THE EFFECT OF A NOVEL JAK/STAT INHIBITOR ON SKELETAL MUSCLE INFLAMMATION AND INSULIN SENSITIVITY OF DIET-INDUCED OBESE MICE

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The Janus kinase (JAK)–signal transducer and activator of transcription (STAT) pathway has an important role in the control of immune responses. Studies show that insulin resistance is linked to chronic inflammation and enhanced JAK/STAT signaling in skeletal muscle (SM). **Purpose:** We examined the effect of the novel JAK/STAT inhibitor (SGI-1252) on inflammatory markers in SM, and insulin sensitivity of diet-induced obese mice. **Methods:** Mice were fed either a western style diet high in fats (WD) or a standard diet (SD). Mice from each group were then administered either a high dose (40mg/kg)(HD), low dose (20mg/kg)(LD), or no dose (ND) of SGI-1252 3 times per week for 6 weeks. After the treatment period, TA and Gastrocnemius muscles were removed, sectioned, and stained to quantify T-cells. Glucose and insulin concentrations were measured from blood samples and HOMA scores were calculated as a measure of insulin sensitivity. **Results:** Relative to the SD (2.20±0.1 HOMA), the WD (5.96±0.6 HOMA) resulted in the loss of insulin sensitivity. Both the low (1.81±0.2 HOMA) and high (2.27±0.3 HOMA) doses of SGI-1252 were able to restore insulin sensitivity back to normal levels in the WD group after 6 weeks. For mice fed a standard diet, a low dose of SGI-1252 resulted in the accumulation of SM T-cells (5.1±4.1 T-cells/mm<sup>2</sup>) compared to control (1.75 ±1.4 T-cells/mm<sup>2</sup>). Conversely, in the mice on the WD, the low dose resulted in a decrease of SM T-cells (0.07 ± 0.13 T-cells/mm<sup>2</sup>) compared to control (2.34±1.6 T-cells/mm<sup>2</sup>). SM T-cell accumulation in the high dose showed no significant differences. **Conclusion:** These preliminary data suggest that SGI-1252 improves insulin sensitivity of mice with diet induced type II diabetes. SGI-1252 appears to affect T-cell infiltration of skeletal muscle, yet more data are needed to further elucidate the role of SM inflammation on diet induced insulin insensitivity.

### 36. SIGNIFICANCE OF THE QUADRICEPS, HAMSTRINGS, AND GLUTEUS MAXIMUS STRENGTH FOR BALL TOSS DISTANCE

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**Context:** A medicine ball toss is a test used to determine power and general athletic ability. Being a part of preseason testing for NCAA athletes is important by setting a baseline for muscular strength. This is helpful for injury prevention and to find areas of improvement before season begins. **Purpose:** The purpose of this study was to determine the significance of the quadriceps, hamstrings, and gluteus maximus strength on performance in a backwards medicine ball toss (BMBT) and a forward medicine ball toss (FMBT). **Methods:** Fifteen male NCAA Division I collegiate track and field athletes (age: 20.13 ± 1.46 years; height: 185.97 ± 8.72 cm; weight: 74.27 ± 4.56 kg) performed a BMBT and FMBT with an eight pound medicine ball as part of their pre-season assessment. The maximum distance from three trials was recorded for each throw. A handheld dynamometer was used to measure quadricep, hamstring, and gluteus maximus strength bilaterally. The athletes performed three maximal isometric contractions, which were averaged and then normalized by body weight percentage. **Results:** Multiple regression analysis was used to determine if any of the muscular strength had an effect on the throw distance. The results showed no significant relationship between muscle strength and BMBT and FMBT. **Conclusion:** This study was not able to determine the effect of lower extremity muscular strength on medicine ball toss possibly due to a limited sample size. Additional research is needed to determine the impact of muscle strength for a medicine ball toss. Further research should also examine whether bilateral muscular imbalances impact lower extremities explosive movements, such as the medicine ball toss.

### 37. BIOMECHANICAL COMPARISON OF THE TRADITIONAL STRETCH AND SLIDE-STEP DELIVERY IN BASEBALL: IMPLICATIONS FOR INJURY PREVENTION

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**Purpose:** In baseball, the traditional stretch (TD) and slide-step (SS) are defensive strategies used by pitchers. During TD, the lead leg is first lifted and drawn back. This proximal-to-distal sequencing of the body segments is omitted in SS. The purpose of this study was to compare kinetic and kinematic positions of the throwing elbow and shoulder between TD and SS deliveries. **Methods:** Twelve pitchers [10 collegiate, 2 professional] volunteered for this study [RH:9, LH:3, Height 185.15±8.08 cm, Weight 92.92±19.04 kg]. Pitch delivery was divided into six temporal segments; initial front foot movement (IFFM), front foot contact (FFC), maximum shoulder external rotation (MSER), ball release (BR), and maximum shoulder internal rotation (MSIR). Following warmup, participants' anthropometrics were recorded. Accommodation trials were used to simulate intra-inning warmup before both sets of test trials. For testing, participants were numbered 1-13; odd numbered participants delivered ten fastballs in TD first, and even numbered participants in SS. A fifteen-minute break was given between deliveries to simulate between inning rest. Following rest, participants switched deliveries (TD to SS; SS to TD) and delivered ten fastballs. **Results:** Time between temporal parameters for TD and SS were: IFFM to MSIR (1.562±0.261s and 1.225 ±0.304s); FFC to MSIR (0.413±0.129s and 0.462s±0.208s); FFC to BR (0.209±0.030s and 0.220±0.028s); FFC to MSER (0.168±0.030s and 0.177±0.028s); and MSER to MSIR (0.245±0.116s and 0.285±0.193s). Peak elbow valgus torque was not significantly different between (p=.913) TD and SS (-618.525 and -591.845 Nmm/kg). Peak shoulder angular velocity was not significantly different between (p=0.961) TD and SS (-981.729 and -972.608 Nmm/kg). **Conclusion:** Although there were no significant differences in elbow valgus torques and shoulder angular velocities, SS showed a significant decrease in time to completion from IFFM to MSIR. Therefore, this study suggests that SS appears to be more efficient in proximal-to-distal sequencing for pitch delivery.

### 39. ASSESSING MOTOR PROFICIENCY IN CHILDREN WITH AUTISM SPECTRUM DISORDER

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**Background:** Several factors may relate to motor proficiency in children with Autism Spectrum Disorder (ASD) including the severity of social impairment (Hirata et al., 2014) and impaired executive functioning (Hartman et al., 2010). However, limited research has examined these associations. **Purpose:** This study explored the association of motor proficiency with social impairment and executive functioning in children with ASD as well as the challenges with assessing motor proficiency in this sample. **Methods:** Four children (Age 7-9 years old) with ASD, and a parent participated in this study. A researcher administered the Bruininks-Oseretsky Test, Second Edition (BOT-2) Short Form with each child to assess motor proficiency. Parents completed the Behavior Rating Inventory of Executive Functioning (BRIEF) and the Social Responsiveness Scale, Second Edition (SRS-2; severity of social impairment). Given the small sample size, scatterplots were used to analyze the relationship between scores on the BOT-2, SRS-2, and BRIEF. Data collected were part of a baseline assessment from a pilot physical activity program. **Results:** Three of the children scored well-below average on their motor proficiency and the other child scored average. Behavioral techniques used for three children while administering the BOT-2 included: a visual schedule—crossing off completed items (n=2) and earning a short break for completing tasks (n=1). Children (n=3) were classified as having moderate and severe (n=1) social communication impairments on the SRS-2. Based on the scatterplots, there appeared to be a negative relationship between BOT-2 and SRS-2 scores with children with greater social impairment scoring lower in motor proficiency. There seemed to be little relationship between BOT-2 and BRIEF. **Conclusion:** Children with ASD demonstrated challenges in motor proficiency and their ability to attend, communicate, and mimic multi-step tasks needs consideration during assessments. Despite the small sample size, it appeared that motor proficiency may be related to social impairment.

### 38. COMPARISON OF A-MODE AND B-MODE ULTRASOUND FOR MEASUREMENT OF SUBCUTANEOUS FAT

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With lower cost devices and technological advancements, ultrasound has been undergoing a resurgence as a method to measure subcutaneous adipose tissue. Amplitude (A-mode) ultrasound produces a spike at the interface between subcutaneous fat and muscle, while brightness (B-mode) ultrasound produces an image of the underlying tissues. **Purpose:** This study aimed to determine if a low-cost, low-resolution A-mode ultrasound designed specifically for body composition assessment could produce subcutaneous fat thickness measurements comparable to an expensive, high-resolution B-mode device. **Methods:** Subcutaneous fat thickness was measured on 41 participants (21 female, 20 male; 29.6 ± 11.0 y; BMI 25.3 ± 5.1 kg/m<sup>2</sup>) at 7 different sites (chest, subscapula, mid-axilla, triceps, abdomen, suprailiac, and thigh) with two different devices: a 2.5 MHz A-mode ultrasound (BodyMetrix BX 2000), and a 12 MHz B-mode ultrasound (GE NextGen LOGIQ e R7). **Results:** Pearson correlation coefficients between the two ultrasound devices exceeded 0.80 ( $P < 0.001$ ) at all measurement sites. Mean differences in fat thickness were not significantly different between the devices ( $P > 0.05$ ) with the exception of the triceps site ( $P = 0.021$ ); however, the mean difference at this site (0.53 mm) was not clinically relevant. The variability between devices was greatest at the abdomen, the site with the greatest thicknesses. However, Bland-Altman plots revealed no systematic bias between devices at any site. **Conclusions:** Given the strong relationships, insignificant mean differences, and lack of systematic bias, the low-cost, low-resolution A-mode ultrasound provides subcutaneous fat thickness measurements similar to the more expensive, high-resolution B-mode ultrasound.

### 40. INFLUENCE OF PARENTAL PHYSICAL ACTIVITY ON YOUNG CHILDREN PHYSICAL ACTIVITY: CONSIDERING TIME TOGETHER

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**Background:** Parents' are thought to play a key role in modeling physical activity (PA) for their child (Beets, Cardinal, & Alderman, 2010). However, only half of studies using objective measures showed a relationship between parent and child PA (Bingham et al., 2016). As social learning theory suggests that behavior is learned through observation (Bandura, 1977), one might expect that modeling only occurs when the child is with the parent. **Purpose:** This study examined the parent-child PA relationship in preschool aged children using a momentary perspective that accounts for time the parent is with the child (parent presence). **Methods:** Dyads (N=26) consisting of one parent (22 Mothers) and child (Mean age = 3.9 years) completed a questionnaire and then wore accelerometers for 10 days. During this time, parents recorded times away from their child in an online diary. Regression was used to predict overall child PA (light, moderate, vigorous, and moderate-to-vigorous PA (MVPA)) using the respective parent PA. To consider the momentary perspective, multilevel modeling was used to predict child PA each hour using parent PA from that hour, parent presence, and their interaction. **Results:** Overall parent PA did not predict child PA ( $ps > .05$ ). In the multilevel models, the interaction between parent presence and parent PA was significant for light, moderate, and MVPA ( $p < .05$ ) and approached significance for vigorous PA ( $p = .071$ ). In all cases, parents' PA when with their child was positively related to their child's PA ( $ps < .05$ ). When not together, the relationship between parent PA and child PA was weaker (light PA;  $p = .003$ ) or not present (moderate, vigorous, and MVPA;  $ps > .05$ ). **Conclusions:** Supporting social learning theory, being active alone was not sufficient for a parent's PA to relate to their child's PA, but rather being active when the child is around that was important.

#### 41. THE RELATIONSHIP BETWEEN ENGAGEMENT IN COLLEGIATE CLUB RUGBY, STUDENT EXPERIENCES, AND PERCEIVED STUDENTS GAINS

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**Purpose:** Students' experiences in college affect their perceived gains. Sport participation provides ranges of potential benefits for college student success including positive social experiences, physical health, and academic success. The purpose of this research was to assess the relationship between participation in club rugby and its effect on student experiences and perceived gains. **Methods:**

At the beginning of the Spring semester, rugby (n=36) and non-athlete (n=33) students completed a demographics questionnaire, the Perceived Stress Scale, Student-Athlete Experiences Inventory-Revised, and the Student-Athlete Gains Inventory. Stepwise linear regression models were used to predict factors impacted perceived gains. **Results:** Rugby, active involvement, and academic pursuits significantly predict practical arts gains ( $r^2=0.275$ ,  $F=9.358$ ,  $df=(3,63)$ ,  $p < 0.0001$ ). The negative slope estimate for rugby in this models shows that rugby players have lower practical arts gains than non-athlete students ( $t = -2.3$ ,  $p = 0.0247$ ). Social interaction was the only significant predictor of liberal arts gains ( $r^2=0.17$ ,  $F=14.56$ ,  $df=(1,65)$ ,  $p = 0.0003$ ). Although we initially forced rugby into the model, it was not found to be a statistically significant predictor of liberal arts gains ( $t = -.457$ ,  $p = 0.65$ ). **Conclusion:** Active campus involvement and academic pursuits are needed for a positive relationship with practical arts gains. Data shows rugby players had lower practical arts gains than non-rugby students. There is a positive relationship between social interaction and liberal arts gains, indicating that with or without rugby, students liberal arts gains increased with more social interactions. Although rugby players had lower practical arts gains, the results indicate active campus involvement and pursuing academics will increase perceived career preparedness. The results showed that engaging with a wide variety of diverse social interactions on campus will positively impact a student's social skills.

#### 43. FEASIBILITY AND EFFECTIVENESS OF CIRCUIT RESISTANCE TRAINING USING ELASTIC BANDS FOR INDIVIDUALS WITH SPINAL CORD INJURY

Le Lisa N, Keslacy Stefan, Ramirez Joel, de Leon Ray, Dy Christine

**Purpose:** Exercise is associated with better health, fitness, and psychological well-being for individuals with spinal cord injury (SCI). In particular, circuit resistance training (CRT) has been shown to increase muscle strength and fitness. The two major obstacles to exercise for individuals with SCI is cost and access to facilities. The purpose of this study was to develop a modified CRT protocol which would be affordable and be done at home. We hypothesize that a modified CRT protocol using elastic bands will be intense enough to increase heart rate (HR) and oxygen consumption (VO<sub>2</sub>) usually seen with traditional exercise modalities. **Methods:** Individuals with SCI, tetraplegics and paraplegics, were eligible to participate in the study. Following a maximal exercise protocol to measure peak oxygen consumption test (VO<sub>2peak</sub>) with an arm cycle ergometer (Corival, Lode) participants (5 males, ages 38 ± 14 years; 1 female, age 25 years) completed a modified CRT session. For the VO<sub>2peak</sub> test, subjects were asked to maintain 65 rpm while resistance increased every two minutes until they reached exhaustion. CRT followed a protocol proposed by Jacobs and colleagues (2002), but was modified to be used with resistance bands (Theraband, USA). The CRT protocol consisted of three rounds of 6 upper extremity resistance exercise interspersed with 2-minute bouts of high cadence, low resistance exercise. Oxygen consumption was recorded via open-circuit spirometry (CPET, Cosmed) and heart rate (HR) measured through a chest strap monitor (Tickr, Wahoo Fitness) was collected on both visits. **Results:** Subjects were able to reach 71% ± 0.09 (N=2, tetraplegics) and 39% ± 0.08 (N=4, paraplegics) of their VO<sub>2max</sub> during the modified CRT protocol. HR reached 92%±0.05 and 70%±0.06 of HR<sub>max</sub>, for tetraplegics and paraplegics respectively. **Conclusion:** This new CRT protocol allowed our subjects to effectively reach levels of exercise intensity that usually correspond to health benefits.

#### 42. THE RELATIONSHIP BETWEEN LOWER EXTREMITY STRENGTH AND OVERHEAD SQUAT

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**Context:** Impaired lower extremity muscle strength can put athletes at risk of injuries. Assessing the relationship between muscle strength and knee instabilities during overhead squat (OHS) can help prevent injuries of collegiate female athletes. **Purpose:** Examine the relationship between lower extremity muscle strength and the depth and knee wobbling during overhead squat (OHS). **Methods:** Eight in-season Division 1 collegiate women's tennis athletes and 10 in-season Division 1 collegiate women's basketball athletes (age: 18.94 ± 1.35 yrs., height: 1.75 ± 0.08 m, weight: 71.61 ± 14.05 kg) participated. Participants hip flexor, extensor, and abductor muscle strength was measured with a hand held dynamometer and the average of three trials was normalized by body weight (%BW). Participants then performed three consecutive OHS as low as possible and were video recorded for post processing from the frontal and sagittal planes. Following the assessment, participants were grouped into Above Parallel (AP) or Below Parallel (BP) depth and knee wobbles or no wobbles during OHS. **Results:** The mean differences of hip flexor, extensor, and abductor strength were compared for BP and AP groups. Three participants were grouped into BP and 15 were grouped into AP. An independent t-test showed significant differences of left hip abductor strength of AP (mean=17.82 ± 4.05 %BW), compared to BP (mean=21.67 ± 1.41 %BW);  $t(18) = -2.900$ ,  $p = 0.016$ . No significant differences were found between muscle strength and knee wobbling. **Conclusion:** Overall, no relationship between knee wobbling and the lower extremity strength was found. However, there was a statistically significant relationship in OHS depth and hip abductor strength on the left side. Previous studies have demonstrated decreased hip abductor strength may cause patellofemoral pain syndrome (PFP) and knee valgus. Future studies should look at increasing hip abductor strength and its effects on PFP and knee valgus during functional movements.

#### 44. ULTRASONOGRAPHIC ASSESSMENT OF FEMORAL CARTILAGE THICKNESS IN ULTRAMARATHON RUNNERS

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**Purpose:** Due to high running volume, ultramarathon runners may be at heightened risk of knee articular cartilage thinning, a potential indicator of osteoarthritis (OA) onset. Previous research has examined changes to articular cartilage thickness during short, moderate physical activities; however, no research has examined the acute effects of long distance running on cartilage thickness. Therefore, the purpose of this study was to examine the acute changes to knee articular cartilage thickness in a population of ultramarathon runners during a 100-mile race. **Methods:** 8 experienced ultramarathon runners volunteered to participate in this study [Gender:Male=4, Female=4; Age:39.50±14.43 years Height:1.76±0.13 m; Mass:73.70±20.63 kg]. Bilateral knee ultrasound scans were conducted prior to the race and at miles 20, 40, 60, 80, and 100 (finish). Cartilage thickness was measured using ImageJ. Additionally, a numerical pain scale questionnaire (0=no pain, 10=worst pain) was given to participants at each collection interval. **Results:** A repeated measures ANOVA indicated no significant difference in cartilage thickness across collection sites ( $p>0.05$ ). A significant increase in left knee pain was observed ( $p<0.05$ ) while no significant changes to right knee pain were observed. There was no relationship between knee pain and cartilage thickness ( $p>0.05$ ). **Conclusion:** The lack of change to cartilage thickness contrasts the findings of previous research on shorter duration activities in which cartilage thickness decreased. Environmental factors, hydration status, and individual genetic factors could be potential causes for the lack of significant change in cartilage thickness. Additionally, the repetitive loading of the knee joint throughout the race, leading to potential mechanical trauma and cartilage edema, could have contributed to variations in the measured cartilage thickness.

#### 45. BIOMECHANICAL DIFFERENCES BETWEEN WEARING A BABY AND CARRYING A BABY: AN ANALYSIS OF THE ERGOBABY

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**Purpose:** The trend of babywearing is increasing and allows the caregiver to be close to their child while also attending to other tasks. Much research has been completed to show the benefits of babywearing for interactions between caregiver and child. Additionally, it is understood that load carriage alters movement biomechanics, but very little is known about how babywearing may alter movement biomechanics. The purpose of this study is to identify biomechanical changes that occur during gait due to babywearing. **Methods:** Five female participants (Height: 161 cm  $\pm$  10 cm, Mass: 69.4  $\pm$  24 kg) walked on an instrumented treadmill (Bertec, Inc, Columbus, OH) at a self-selected speed for three conditions: unloaded, carrying a baby mannequin in arm, and carrying a baby mannequin in a carrier (Ergobaby, Inc., Los Angeles, CA). Biomechanical data was collected with Vicon Nexus 2.3 (Vicon, Inc., Oxford, UK) and processed through Visual 3D (5.0, C-Motion, Inc., Germantown, MD, USA). **Results:** Carrying a baby in arm elevated the loading peak knee extension moment (0.97 Nm/kg) compared to the carrier (0.91 Nm/kg) and walking conditions (0.86 Nm/kg). The push-off knee extension moment showed a trend towards greater values during in arm condition (0.55 Nm/kg) compared to walking (0.46 Nm/kg) and carrier conditions (0.49). No significant differences were observed for the frontal plane knee moments. **Conclusion:** Results of this study show that there are biomechanical adaptations that occur while transporting a baby. In the sagittal plane the practice of holding a baby in arm appears to place greater demands on the knee joint when compared to both walking and babywearing. Babywearing led to gait biomechanics that more closely resembled those of unloaded walking and may lead to more normal loads on the musculoskeletal system during baby transport.

#### 47. COMPARISON OF PRESSURE MAT AND TOE DYNAMOMETER TO ASSESS GREAT-TOE FLEXION STRENGTH.

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**Purpose:** Foot muscle weakness may be related to many different foot disorders. Difficulty arises in assessing foot muscle strength due to a lack of reliable quantitative measuring techniques. This study seeks to compare the repeatability of three methods for measuring great-toe flexion (GTF) strength. **Methods:** Forty-five subjects had GTF strength assessed using three methods. Subjects completed each method in a randomized order, with 3 trials per method. For each method, subjects were instructed to exert maximal effort during GTF for 3 seconds, with a 20 second rest between trials. In method 1 (FT) the subject gripped and then pulled on an S-biner directly attached via cable to a force transducer that was allowed to pivot. In method 2 (PMrecip) subjects flexed the great-toe, pressing down into a pressure mat while simultaneously lifting all of the toes of the contralateral foot. In method 3 (PMsf) subjects again flexed the first toe into the pressure mat while relaxing the toes of the contralateral foot. Comparisons consisted of correlation and intraclass-correlation coefficient (ICC). **Results:** GTF strength assessed by the two pressure mat tests (PMrecip, PMsf) were strongly correlated to each other ( $r = 0.85$ ,  $p < 0.01$ ). GTF strength measured with FT was moderately correlated to PMsf ( $r = 0.57$ ,  $p < 0.01$ ), while FT was weakly correlated to PMrecip ( $r = 0.37$ ,  $p < 0.05$ ). There was excellent repeatability for all methods (FT,  $ICC_{3,k} = 0.96$ ; PMrecip,  $ICC_{3,k} = 0.93$ ; PMsf,  $ICC_{3,k} = 0.93$ ). **Conclusion:** All devices showed excellent repeatability. Both pressure mat tests were strongly correlated, indicating similar actions. The moderate/weak correlation between the FT and pressure mat tests suggests that there are inherent differences in the action tested. For example, the relative contribution of extrinsic and intrinsic flexor muscles may be different between these tests.

#### 46. VALIDATION OF ACTIVITY MONITORS ON ESTIMATION OF SEDENTARY ACTIVITY

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**Purpose:** The purpose of the present study was to compare sedentary time estimates from ActiGraph (hip, wrist) compared to the activPAL (AP) accelerometer across five different activity domains in a free-living environment. **Methods:** Participants ( $n = 10$ , mean age = 23.3 yrs, 50% female) wore two AG wGT3X-BT accelerometers (right hip, non-dominant wrist), and one AP accelerometer (thigh) for two, 2-hour sessions. Each participant completed 2 out of 5 activity domains that represent daily life: Work, household, errands, sedentary leisure, and active leisure. The Sojourn 3x (S3x) machine learning method and Freedson method were used to classify AG hip data while a random forest machine learning method (RF) was used to classify AG wrist data. Pearson correlations were used to test relationship of AG methods to AP. A paired t-test was used to examine mean differences across all activity conditions and a linear mixed effects model was used to test for any significant interaction between AG methods to activity domain. P-values  $< 0.05$  are considered statistically significant. **Results:** Participants completed a total of 20 sessions: 7 Active Leisure, 3 Errands, 4 Household, 4 Sedentary Leisure, and 2 Work. Compared to AP, S3x was highly correlated ( $R = 0.95$ ), Freedson ( $R = 0.78$ ), and wrist RF were moderately correlated ( $R = 0.77$ ) for RF estimates. Compared to AP, S3x was 10.2 minutes higher ( $p = 0.03$ ), Freedson was 19.4 minutes higher ( $p = 0.03$ ), and RF was 5 minutes under ( $p = 0.4$ ). The S3x estimates were similar to AP across all activity domains ( $p = 0.51$ ) while accuracy of Freedson method differed by activity domain ( $p < 0.001$ ). RF estimates also appeared to differ by domain ( $p = 0.05$ ). **Conclusion:** The S3x method was the most accurate and precise when compared to AP across all domains. Future research should expand the sample and include direct observation measures of sedentary time compared to AP and AG.

#### 48. TECHNICAL NOTE: PROCEDURES TO ANALYZE CORE TEMPERATURE DURING SWIMMING IN DIFFERENT TRIATHLON WETSUITS USING CORE TEMPERATURE PILL

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**Purpose:** Triathlon wetsuits offer swim performance and thermoregulation benefits to athletes. However, there is minimal data on the influence of wetsuits on core temperature. Recently, an ingestible pill has become commercially available that allows field testing of core temperature. The purpose of this study was to explore the use of the ingestible pill to measure core temperature while swimming in different triathlon wetsuits. **Methods:** A single subject (Male, experienced triathlete) completed three swim conditions: No wetsuit (NW), wetsuit model 1 (W1), wetsuit model 2 (W2). W1 was designed for more thermoregulation benefit than W2. All swim conditions were completed in a river with water temperature (16.7°C) measured by having a thermometer tethered to the subject's ankle. A Global Position System (GPS) watch was worn (Garmin 920XT) as well as a heart rate (HR) monitor. The order of swims was W1, W2, NWS. The GPS watch was used to monitor swim distance with data analyzed post swims with effort matched using rating of perceived exertion. Core temperature data were analyzed by averaging across the time period where temperature plateaued. **Results:** Core temperature was similar while wearing both wetsuits (W1: 38.0  $\pm$  0.05°C; W2: 38.1  $\pm$  0.07°C) but greater compared to resting (37.2  $\pm$  0.15°C) and NWS (37.33  $\pm$  0.46°C). During NWS, core temperature continued to decrease reaching a low of 36.5. Swim metrics during wetsuit swims were similar (distance (W1: 1,796 m; W2: 1,701 m), velocity (W1: 1.03 m/s; W2: 0.94 m/s)), but lower during NWS (864 m, 0.85 m/s). HR was similar during each swim (W1: 115 bpm; W2: 108 bpm; NWS 111 bpm). **Conclusion:** For this subject, both wetsuits provided adequate thermoregulation since core temperature increased with each swim whereas during swimming without a wetsuit, core temperature decreased rapidly.

## 49. THE ACUTE EFFECT OF MODERATE INTENSITY STAIR-CLIMBING ON POSTPRANDIAL BLOOD GLUCOSE LEVELS

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**Purpose:** To investigate the effects of moderate intensity stair-climbing of various durations on postprandial glucose response in healthy men and women. The postprandial glucose response is strongly associated with cardiometabolic disease risk. **Methods:** Twenty males (26.8±6.0y) and fourteen females (24.8±4.5y) completed a 75g oral glucose tolerance test (OGTT). On three subsequent visits, participants completed an OGTT combined with either 1min, 3min, or 10min of stair-climbing, all ending 28 min after subjects finished the drink. Fingertick blood glucose measurements were taken at baseline and every fifteen minutes thereafter for one hour.

**Results:** All stair-climbing trials reduced peak (30 min) postprandial blood glucose levels compared to the control (12±31 to 35±30mg/dL,  $p \leq .001$ -.038). At the 45min time point, there were significant reductions compared to the control for the 3 and 10min trials (11±29 and 23±30mg/dL,  $p = .037$  and  $p \leq .001$ ), but not between 1min and control (2±33mg/dL,  $p = .701$ ). No significant differences exist in BG between any trials at baseline, 15, or 60min time point ( $\Delta = -0.3$ – 5.1mg/dL,  $p = .391$ -.882). There were significant differences in AUC compared to the control for the 3min and 10min trials (436±1126 and 896±1108mg/dL\*min,  $p = .036$  and  $p \leq .001$ ) but not for the 1min (272±1112mg/dL\*min,  $p = .177$ ). For iAUC, there were significant differences compared to the control for the 3 min and 10 min trials (424±1124 and 901±903mg/dL\*min,  $p = .038$  and  $\leq .001$ ) but not for the 1 min (107±918mg/dL\*min,  $p = .509$ ). **Conclusion:** Moderate intensity stair-climbing bouts as short as one minute in duration are effective at attenuating peak postprandial blood glucose with longer bouts producing more substantial attenuation.

## 51. THE RELATIONSHIP BETWEEN STATIC ARCH HEIGHT AND MIDFOOT KINEMATICS DURING LANDING

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**Purpose:** Static measures of arch height are commonly used in the classification and treatment of foot disorders; however, a relationship between static foot posture and foot kinematics remains elusive. A dynamic loading task, such as landing, might magnify any static/dynamic relationships. The purpose of this study, therefore, was to determine the relationship between measures of static arch height and midfoot range of motion (ROM) and midfoot stiffness during a dynamic landing task. **Methods:** 44 collegiate females volunteered to participate in this study (age: 20.4±1.8 years, height: 1.6±0.1 m, weight: 57.3±5.5 kg, BMI: 21.6±1.7 kg/m<sup>2</sup>). Standing arch height index (AHI) of the dominant leg was measured using the Arch Height Index Measurement System (AHIMS) during equal weight-bearing stance. A custom marker set was then attached to the subject's dominant foot for 3D motion capture data collection. A static trial was taken prior to drop landings and was used to obtain a standing midfoot angle (MA). Single-leg drop landing trials were performed onto a force platform from a hanging height of 40 cm. Midfoot ROM and midfoot stiffness were obtained and compared to static measures of arch height from AHIMS and motion capture. **Results:** Standing AHI and standing MA values were strongly correlated to each other ( $r = -0.699$ ,  $p < 0.001$ ), but neither were significantly correlated with either of the midfoot kinematic measures ( $p > 0.062$ ). **Conclusions:** Examining the relationship between AHIMS and motion capture technology on measures of static arch height showed a strong correlation suggesting both methods are appropriate for quantifying static foot posture. However, static measures of arch height may not be adequate at predicting midfoot kinematics during dynamic activities such as drop landings.

## 50. CHANGES IN PERCEIVED STUDENT GAINS OF COLLEGIATE CLUB RUGBY PLAYERS

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**Purpose:** The variety of experiences in college will affect students' perceived gains. Research has shown that sport participation provides a range of benefits for college student success including positive social experiences, along with benefits to self-esteem, mental and physical health. Additionally, physical activity has been shown to enhance student academic success. The purpose of this research was compare the changes in student experiences and perceived gains in an academic semester. We hypothesized there would be a positive effect of participating in collegiate club rugby on students' perceived gains. **Methods:** At the beginning and end of the Spring semester, rugby (n=22) and non-athlete (n=22) students completed the Perceived Stress Scale, Student-Athlete Experiences Inventory- Revised, and the Student-Athlete Gains Inventory. Repeated measures ANOVAs were used to determine between group differences on changes in outcomes. **Results:** Repeated measures ANOVAs indicated an increase of stress levels of all students (baseline: 16.5 ± 5.9, post: 18.7 ± 7.0,  $p = 0.015$ ), with no differences between groups nor interaction effect. There were no significant changes in student experiences or practical arts gains. However, students reported a significant decrease in liberal arts gains (baseline: 3.0 ± 0.5, post: 2.8 ± 0.5,  $p = 0.015$ ), again with no difference between groups nor interaction effect. **Conclusion:** Perceived stress levels increased for both rugby and non rugby players. The increase in stress is likely due to the survey being taken close to the semester finals. Both groups decreased in liberal arts gains. The results indicate that both groups decreased in perceived social skills, possibly because of the increase in stress.

## 52. PHYSIOLOGICAL FITNESS PROFILE OF FEMALE CROSSFIT PARTICIPANTS

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**Purpose:** CrossFit® training may improve muscular strength, muscular endurance, body composition, anaerobic endurance, and power in females. The purpose of this study was to analyze the physiological fitness profile of female CrossFit® participants. **Methods:** Sixteen females (mean +/- SD; age = 27.1 +/- 5.9 y, height: 161.5 +/- 4.71 cm, body weight = 66.3 +/- 7.3 kg) volunteered to participate in one testing session. A hand-held bioelectrical impedance device (BIA) was used to measure body composition. The participants were assessed in the standing long jump (LJ), 1 repetition maximum (RM) power clean (PC), 3-RM squat, push-ups to failure (PU), and a 300-yard shuttle run (RUN) per NSCA guidelines. Participants had three attempts to record their best attempt for the assessments with the exception of the 300 yard shuttle, where only one attempt was recorded. **Results:** The participants mean +/- SD body fat percentage (BF) = 22.1 +/- 3.1%, LJ = 194.8 +/- 20.1 cm, 1 RM PC = 67.5 +/- 14.2 kg, 1 RM squat estimate = 95.2 +/- 23.4 kg, PU = 21.9 +/- 7.4, and RUN = 72.4 +/- 6.4 sec. **Conclusion:** In comparison to normative data established by the ACSM or the NSCA, the participants had a BF in the fair category compared to 20-39 year old females, LJ in the 10<sup>th</sup> percentile compared to elite female athletes, 1 RM PC and estimated 1 RM squat in the 90<sup>th</sup> percentile compared to division 1 softball players, very good category in PU for females 20-39 years old, and 30<sup>th</sup> percentile for the RUN compared to division 1 softball players. CrossFit® training may benefit females to develop muscular strength and endurance but may not be as effective at improving power, body composition, or anaerobic endurance.

### 53. COMPARISONS OF VASTUS LATERALIS AND BICEPS FEMORIS ACTIVITY DURING LOADED BARBELL AND FLYWHEEL SQUAT EXERCISES

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**Purpose:** Zero-gravity conditions during spaceflight result in accelerated muscle atrophy for astronauts. Withdrawal of weight-bearing activities alters pathways of muscle protein synthesis and can induce muscle loss. Flywheel devices offer gravity independent countermeasures utilizing inertial resistance. It is hypothesized that the utilization of a flywheel device will elicit higher average muscle activity than conventional weights due to the rapid eccentric movement provided by inertial loading via a flywheel. The aim of this study is to compare muscle activation between loaded barbell and flywheel squat exercises. **Methods:** In this pilot study, three untrained participants (22, +/- 2.6 yrs) performed squatting exercises on a flywheel device and using a loaded barbell. Each participant attended three sessions: 1) familiarization and one repetition max (1RM) testing, 2) loaded barbell back squatting, 3) flywheel squatting. Sessions were randomized following four days of rest. Five repetitions were measured in each trial. Integrated electromyography (iEMG) for muscle activation of the vastus lateralis (VL) and biceps femoris (BF) was recorded utilizing Noraxon MR3 software. **Results:** Flywheel trials elicited higher mean values of activation for the VL (104.9, +/- 36.8  $\mu$ V) than loaded barbell trials (78.6, +/- 26.7  $\mu$ V). Peak values of the flywheel were also larger (374, +/- 139.4  $\mu$ V vs Barbell 388.3, +/- 194.9  $\mu$ V). For the BF, flywheel trials elicited lower mean activation (47.0, +/- 29.1  $\mu$ V vs barbell 48.3, +/- 26.2) as well as peak activation (180.0, +/- 75.9  $\mu$ V vs barbell 183.3, +/- 82.9  $\mu$ V). **Conclusion:** This preliminary data suggests that muscle activation of the VL, but not the BF, is enhanced with the squat exercise on flywheel devices. Further data should be collected to help elucidate these changes. Additionally, future research should examine other anti-gravity muscles in relation to different flywheel exercises for optimal loading schemes to be implemented during long term spaceflight.

### 55. FEASIBILITY AND EFFECTIVENESS OF USING ELECTROMYOGRAPHY TO TRACK PHYSICAL ACTIVITY

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**Purpose:** To assess the feasibility of different means of tracking physical activity (PA) in circuit resistance training (CRT). Physical activity tracking has become popular due to access to tracking devices. These devices commonly use accelerometry, biotelemetry, and global positioning to monitor and quantify PA. While convenient, these devices may not be suitable for use by in all exercise tasks. The purpose of this pilot study was to evaluate muscle activity along with cardio-metabolic (CM), heart rate (HR), and accelerometry (ACC) data during CRT exercise performed by able-bodied (AB) individuals. We hypothesize that electromyography (EMG) may be an effective alternative to other standard means of tracking. **Methods:** N = 3 neurologically intact participants (age = 25.3  $\pm$  1.5 yr, height = 178.2  $\pm$  13.5 kg, weight = 77.7  $\pm$  18.9 cm) visited the lab two times. On day 2, participants performed a  $\dot{V}O_{2peak}$  test using an arm ergometer (Corival, Lode) and analyzed via indirect calorimetry (Quark2, Cosmed). The graded exercise required participants to maintain >70 rpm cadence with increasing resistance until exhaustion. On day 2, participants performed a CRT exercise protocol consisting of six resistance exercises (RE) with interspersed bouts of high cadence arm cycling. Oxygen consumption (Quark2, Cosmed), heart rate (Tickr, Wahoo Fitness), accelerometry (Actigraph GT9X), limb movement (Nexus, VICON); and muscle activity (Freeemg, BTS Bioengineering) were measured. RE was performed at constant tempo with both a light (L) or heavy resistance band (H) (Theraband). **Results:** Limb kinematics were similar between RE performed with a light or heavy weight band. Oxygen consumption and heart rates increased with heavy resistance. Accelerometry increased a small amount from the light to heavy band condition. EMG seemed to better correlate with change in cardiometabolic values. **Conclusion:** All means of tracked data varied with respect to activity. Accelerometry appeared to under represent intensity of activity.

### 54. TIME-DEPENDENT CHANGES IN EMG ACTIVITY OF THE VASTUS LATERALIS AND BICEPS FEMORIS DURING A LOADED BARBELL SQUAT AND A GRAVITY-INDEPENDENT FLYWHEEL DEVICE

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**Intro:** The barbell back squat is known to increase lower body muscular size, strength, and performance. The YoYo is a gravity-independent flywheel device that utilizes rotational inertia for loading. Flywheel devices may serve as a potential alternative to current devices used for mitigating the deconditioning in muscular strength and size occurring in microgravity. **Methods:** In this pilot study, three untrained individuals (22 +/- 2.6 yrs) performed a loaded barbell squat and a squat utilizing the YoYo device. Testing included three sessions: 1) a familiarization and barbell squat one repetition-max (1RM) testing, 2) 5 repetitions of the barbell back squat and 3) 5 repetitions of a squat on the YoYo device using a torso supported vest. Electromyography of the vastus lateralis (VL) and biceps femoris (BF) was collected and analyzed across repetitions. **Results:** VL and BF mean EMG data was collected for each subject during each 5 repetition sets of the YoYo and Barbell Squat. VL and BF slope-intercept analysis focused on EMG trend over time of the YoYo (YS) vs. Barbell Squat (BS) displayed (y-intercept, slope,  $r^2$ ): (30.167, 3.233, 0.9748)VL<sub>YS</sub>, (13.567, 2.233, 0.5085)VL<sub>BS</sub>, (28.9, 6.233, 0.8309)BF<sub>YS</sub>, (15.733, 2.933, 0.2512)BF<sub>BS</sub>. **Conclusion:** Using EMG, greater activity in the VL and BF was found using the YoYo device ( $\bar{x}$ =38.73<sub>VL</sub>,46.93<sub>BS</sub>) compared to the Barbell Squat( $\bar{x}$ =30.4<sub>VL</sub>,24.07<sub>BF</sub>). The raised mean EMG values support the potential of more efficiently mitigating the deconditioning of muscular strength and size during long-term space flight. A slope-intercept analysis of the YS and BS further proved training efficiency of the YS due to higher progression through repetitions (m=3.233<sub>VL</sub>,6.233<sub>BF</sub>), along with a greater correlation coefficient ( $r^2$ =0.9748<sub>VL</sub>,0.8309<sub>BF</sub>). Future statistical analysis of the data along with increased number of subjects will elucidate these preliminary findings. Additionally, this data will help with designing optimal loading schemes regarding the implementation of exercise during spaceflight.

### 56. BONE STRENGTH DIFFERENCES ACCORDING TO PEAK POWER NORM TABLE CATEGORIES

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**Purpose:** To determine if a commonly used peak power (PP) norm table (Patterson & Peterson, 2004) discerns differences in bone strength between PP categories. Fractures become more prevalent with age due to bone strength losses. Bone strength is a predictive factor of fracture risk (Clark et al., 2006; Schuit et al., 2004) and previous research has shown muscle strength is significantly correlated to bone strength variables (Frost, 2003; Yingling, 2017). An accessible field measure of PP that detects differences in bone strength may be an important step in optimizing bone strength, thus preventing fracture later in life. **Methods:** 114 participants, 62 F and 52 M (age (yrs) 21.1  $\pm$  3.3) performed a maximal vertical jump test. PP was calculated from vertical jump height (Sayers, 1999) and categorized into the following groups: Well Above Average, Average, and Well Below Average. Moment of Inertia (J), Cortical Area (Ct.Ar), cortical Bone Mineral Density (cBMD), and Strength-Strain Index (SSI) were measured using peripheral Quantitative Computed Tomography (pQCT) to quantify bone strength at the 50% tibia site. A one-way ANOVA and a Tukey post hoc test assessed differences between PP categories at a significance level of p<0.05 (Graphpad Prism). **Results:** Bone strength variables were significantly different between PP norm table categories, except cBMD in males. Females: SSI ( $p=0.0001$ ), J ( $p=0.0001$ ), Ct.Ar ( $p=0.0001$ ), cBMD ( $p=0.0063$ ). Males: SSI ( $p=0.0457$ ), J ( $p=0.0101$ ), Ct.Ar ( $p=0.0226$ ). Post hoc testing revealed a significant difference between the Well Above Average and Well Below Average groups for both genders. **Conclusion:** Current PP norm table categories show a significant difference between Well Above Average and Well Below Average. This indicates that those in the Well Below Average category for PP could benefit from exercise prescription targeted for bone strength optimization.

## 57. CASE STUDY: USING DIFFERENT SQUAT VARIATIONS AND SPRINTING TO IMPROVE VERTICAL AND BROAD JUMP

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Quarter squats, half squats, full squats and sprinting are common to use individually to improve vertical and broad jump performances. However, little research is done on whether the combination of these exercises positively influences jump performance. **Purpose:** To determine whether or not a five-week training program using the quarter, half and full squats concurrent with sprinting would improve vertical and broad jump for a single subject. **Methods:** One trained male athlete (27 years-old, 170.2 cm tall, 78.6 kg) with over eight years of weight training experience but little sprint training. Training sessions were completed five days a week (Monday–Friday) with two days (Saturday, Sunday) off for five-weeks. Upper body was trained Monday, Thursday which was followed with sprints of 30, 60, 100 meters. Lower body was trained Tuesday, Thursday followed by lower intensity running. Wednesday was Olympic lifts followed by sprinting of the football stadium steps. Intensity for squats used ranged from 75-120% exceeding no more than five reps per set over a five-week period. Time of day the athlete trained tried to remain consistent as much as possible between 9am-1pm along with a consistent diet as well. Jump height was measured using a Vertec, broad jump using a broad jump mat, weight using a digital scale. Descriptive statistics were calculated for pre and post training program measurements. **Results:** Body mass increased 2.3 kg (pre: 78.6 kg; post: 80.9 kg), vertical (pre: 92.7 cm; post: 97.8 cm) and broad (pre: 297 cm; post: 307 cm) increased 5.5% and 3.4%, respectively. **Conclusion:** For this athlete, the combination of different squat variations accompanied with sprinting resulted in improved vertical and broad jump performance. This proof-of-concept work provides a foundation to conduct a training study for a group of subjects. The training study would include both experimental and control groups.

## 59. RESPIRATORY IMPEDANCE ENHANCES RECOVERY AND PERFORMANCE DURING REPEATED BOUTS OF HIGH-INTENSITY EXERCISE

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**Purpose:** Impedance threshold devices (ITD) were initially developed to maintain blood pressure during battlefield trauma. By creating a greater negative intrathoracic pressure, venous return is enhanced (Ryan et al., 2008). Convertino et al. (2005) found that spontaneous breathing through an ITD increased stroke volume and cardiac output during the initial 10 s of standing from a squat position and was an effective countermeasure against hypotension initiated by the squat-to-stand test. This study evaluated the efficacy of using an ITD during recovery following three consecutive 30 s, high-intensity exercise bouts on a bicycle ergometer. **Methods:** Fifteen participants (11 men, 4 women, 24 ± 5 years-of-age,  $M \pm SD$ ) completed two exercise conditions separated by at least 7 days: control (no ITD) and breathing through an ITD during recovery (ResQGARD®, Advanced Circulatory Systems, Eden Prairie, MN). Each exercise bout was performed with a resistance set at 60 g/kg body weight and 4 min recovery between bouts. **Results:** Ratings of perceived exertion ranged between 7.9 and 9.5 on the Borg category-ratio scale during the three exercise bouts with ratings slightly lower during the ITD condition ( $F(1, 54) = 4.774, p < .05$ ). There was a significant interaction effect for ratings of perceived recovery ( $F(3, 40) = 2.980, p < .05$ ) with participants indicating they felt better recovered after bout 3 when using the ITD. There was also a significant interaction effect for mean power ( $F(2, 28) = 3.842, p < .05$ ) with power better maintained during bout 3 when using the ITD. In contrast, there were no significant effects of the ITD on peak power or blood lactate compared to the control condition. **Conclusion:** Using an ITD between repeated bouts of high-intensity exercise may help individuals feel better recovered and, thus, able to maintain higher mean power during subsequent exercise bouts.

## 58. DEVELOPING AND VALIDATING A MUSCULAR POWER MEASURE FOR OLDER ADULTS IN THE SIT-TO-STAND

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**Purpose:** Muscular power (force x velocity) is important to performing activities of daily living (ADLs), is key to maintaining independence, reduces risk of falls and injuries (Gray et al., 2014), and declines faster than strength with age (Chodzko-Zaiko et al., 2009). Many tests of muscular power are contra-indicated in older adults, thus we tested the validity of a familiar, functional test of muscular power, the sit-to-stand (STS) to assess power in older adults. To assess if lower limb muscular power measures obtained during the STS using the GymAware linear power transducer (LPT) are valid and reliable assessments in our population. **Methods:** Forty-five asymptomatic adults (ages 60-95 yrs.;  $79.5 \pm 9.9$ , mean ± SD) were recruited from California State University, East Bay (CSUEB) campus, and local independent-living senior populations. Velocity was assessed in the STS using: 1) GymAware LPT and 2) Dartfish, a video motion analysis software, and measures were compared. Power measures will be calculated and compared. Maximal hand grip strength, resting blood pressure (BP), heart rate (HR), body weight, height, and body mass index (BMI) were also assessed. **Results:** Results from a paired Student's t-test revealed no significant differences between velocity ( $p = 0.1574$ , ns) assessed with Gymaware ( $0.3493 \pm 0.135$  m/s) and Dartfish ( $0.3704 \pm 0.146$  m/s). Pearson product moment correlation coefficient ( $r$ ) revealed a strong correlation between velocity ( $r = 0.9318$ ) assessed with Gymaware and Dartfish.

**Conclusion:** These results suggest that velocity assessments with GymAware in the STS are valid in older adults. Power analysis is currently underway and will be presented here.

## 60. BONE MINERAL DENSITY AND BODY COMPOSITION OF SPECIAL WEAPONS AND TACTICS TEAM MEMBERS

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**Purpose:** Special Weapons and Tactics (SWAT) team members work in situations that involve carrying heavy loads while performing high impact activities such as running, rappelling off buildings, and unloading from helicopters. The stress of these impacts might be better tolerated when the body is supported by sufficient bone mineral density (BMD), optimal levels of body fat, and sufficient lean body mass. However, body composition and BMD of SWAT team members have been minimally investigated. Therefore, the purpose of this study was to examine the bone mineral density and body composition of SWAT team members. **Methods:** Fourteen healthy men (mean ± SD; age =  $33.1 \pm 5.7$  y, height =  $180.7 \pm 5.4$  cm, mass =  $90.6 \pm 10.0$  kg) from SWAT teams of local law enforcement agencies completed a total body dual-energy x-ray absorptiometry (DEXA) scan to determine lean body mass (LBM), fat mass (FM), bone mass (BM), BMD, and a BMD T-score. Descriptive statistics were determined for all test variables. **Results:** Participants had a mean LBM of  $70.1 \pm 7.2$  kg, FM of  $17.2 \pm 5.5$  kg, BM of  $3.7 \pm 0.6$  kg, a BMD of  $1.3 \pm 0.1$  g/cm<sup>2</sup>, and a T-Score for BMD of  $1.06 \pm 1.15$ . **Conclusion:** According to normative data from the World Health Organization, these SWAT team members had a higher BMD T-score than an average 30-year-old adult. Furthermore, the participants had a fair body fat percentage ( $18.7 \pm 4.7\%$ ) according to ACSM normative data for males in the 30-39 year old category. While BMD T-scores were high, SWAT team members may benefit from reducing body fat to enable them to perform their jobs more effectively.

## 61. MUSCLE DEPENDENT VARIATIONS IN NF-kB p65 NUCLEAR TRANSLOCATION FOLLOWING TRAUMATIC SPINAL CORD INJURY

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**Purpose:** Muscle associated cellular signaling may yield new horizons for improving exercise based rehabilitation post traumatic spinal cord injury (SCI). The transcription factor nuclear factor-kappa B (NF-kB) is recognized as the “master controller” of inflammatory pathways. P65 has been established as the main sub-unit which is held in the cytoplasm until activated in which nuclear translocation occurs. Accordingly, we hypothesized that p65 would be upregulated in the nuclear extracts of rodent muscles that sustained a traumatic SCI. **Methods:** A low-thoracic spinal cord contusion was performed on 4 Sprague Dawley rats. Soleus (Sol), gastrocnemius (GM), tibialis anterior (TA), and extensor digitorum longus (EDL) muscles were dissected. Cytoplasmic and nuclear proteins were separated (NE-PER, FisherScientific), and immunoblot analysis for protein detection was performed. A Bradford assay was used for protein concentration and equal amount of proteins were loaded on 4-12% SDS-PAGE. Following transfer (TransBlot Turbo, Bio Rad), membranes were blocked in 5% w/v milk and incubated overnight at 4°C with a primary antibody (p65, Cell Signaling). Following incubation with a peroxidase conjugated secondary antibody, bands were visualized by ECL, imaged and densitometry was determined (ImageLab, Bio-Rad). **Results:** From preliminary data, we found a basic expression of P65 in the nuclear extract of GM in control animal, however, P65 was more expressed in the cytoplasmic extract ( $P < .05$ ). In SCI, nuclear P65 is upregulated in the GM when compared to cytoplasmic levels ( $P < .05$ ) and in the TA, p65 is not translocating following SCI ( $P < .05$ ). **Conclusion:** In our previous study, we found that SCI increased the expression of total P65, we now demonstrated that this increase corresponded to a nuclear translocation. It also seems that this is muscle dependent as P65 translocated in GM and not TA. We will assess the expression of nuclear P65 in other postural muscles. This SCI-dependent regulation of P65 activity may also be attenuated by body weight supported treadmill training.

## 63. PHYSIOLOGICAL FITNESS PROFILE OF MALE CROSSFIT PARTICIPANTS

Sanchez, Roberto, Orozco, Jennifer, Lino, Carlos, Escalante, Guillermo

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**Purpose:** CrossFit® integrates anaerobic and aerobic training, but minimal research has shown its effects. The purpose of this study was to analyze the physiological fitness profile of male CrossFit® participants. **Methods:** Thirteen males (mean  $\pm$  SD; age = 33.2  $\pm$  5.1 y, height: 176.3  $\pm$  7.1 cm, body weight = 88.6  $\pm$  9.8 kg) volunteered to participate in one testing session. A hand-held bioelectrical impedance device (BIA) was used to measure body composition. The participants were also assessed in the standing long jump (LJ), 1 repetition maximum (RM) power clean (PC), 3-RM squat, push-ups to failure (PU), and a 300-yard shuttle run (RUN) per NSCA guidelines. Participants were given three attempts to record their best attempt for the assessments with the exception of the 300 yard shuttle where only one attempt was recorded. **Results:** The participants mean  $\pm$  SD body fat percentage (BF) = 18.8  $\pm$  4.5%, LJ = 249.8  $\pm$  22.0 cm, 1 RM PC = 111.2  $\pm$  17.6 kg, 1 RM squat estimate = 155.5  $\pm$  29.4 kg, PU = 42.7  $\pm$  14.1, and RUN = 64.6  $\pm$  6.2 sec. **Conclusion:** In comparison to normative data established by the ACSM or the NSCA, the participants had a BF in the fair category compared to 30-39 year old males, LJ in the 30<sup>th</sup> percentile compared to elite male athletes, 1 RM PC and estimated 1 RM squat in the 80<sup>th</sup> percentile compared to division 1 baseball players, excellent category in PU for males 30-39 years old, and 20<sup>th</sup> percentile for the RUN compared to division 1 baseball players. CrossFit® training may particularly benefit males to develop muscular strength and endurance but may not be as effective at improving power, body composition, or anaerobic endurance.

## 62. PRELIMINARY LOOK AT THE FEASIBILITY OF AUTOMATED EXERCISE MONITORING IN A VIRTUAL REALITY ENVIRONMENT

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**Purpose:** Integrating virtual reality with physical therapy is distinctly different from the traditional process of rehabilitation. Virtual reality (VR) is computer technology that creates a simulated environment that the user can interact with, influencing new physical and mental experiences. It has many other applications, like exercise. The purpose of this study was to investigate the feasibility of a VR rehabilitation system and if it has potential for exercise assessment. **Methods:** In order to determine feasibility, we employed a variety of methods. We explored the size and content of the available literature through Google Scholar search of the key terms [“Microsoft Kinect”, exercise, therapy, rehabilitation]. Working across academic disciplines, our team developed a working virtual environment where an instructor guides the participant through an exercise routine which is monitored by a Microsoft Kinect V2 sensor. 12 college students volunteered to participate in this study [Age: 18-23y]. The coordinates of the body’s position were recorded while they followed a VR mock rehabilitation protocol which consisted of stretches and exercises. Our team developed data visualization software using Matlab to produce a report of the exercise routine for consumption by fitness and rehabilitation professionals. Lastly, we have an exit interview from a subset of our participants reporting on their experience. **Results:** The literature review returned more than 3,400 papers. The size of this literature base is highly suggestive of the interest and applicability of the V2 sensor for this use case. The VR environment design proved to be practical and was built in just 3 months with a team of 3. The exit interviews describe this system as being effective, appreciable, and beneficial for the participants. **Conclusion:** Although our work is still in progress, it is very encouraging to see the emerging feasibility of using automated exercise monitoring for fitness and rehabilitation settings.

## 64. MUSCLE ACTIVATION OF THE PALMARIS LONGUS AND FLEXOR CARPI RADIALIS MUSCLES IN DIFFERENT ROCK CLIMBING HOLDS

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Rock climbing is a popular sport with very dedicated athletes and fan base. Climbing performance, especially for new climbers, should increase when climbers develop the appropriate muscle strength to execute a variety of different climbing holds. This study investigated which of four popular rock-climbing holds caused the greatest recruitment of the Palmaris Longus (PL) and the Flexor Carpi Radialis muscles (FCR). Muscle activation was measured in eleven experienced rock climbers: seven males and four females. Electromyography (EMG) sensors were placed on PL and FCR muscles. Participants performed four different types of rock climbing holds in random order. The PL activation, in all holds, was greater than the FCR activation. The Sloper hold caused greater PL activation than the Jug, Crimp, or Pinch holds as well as greater activation for the FCR in the Crimp and Pinch holds. Developing rock climbers should be able to increase their physical capacity to climb more quickly if they supplement their training with exercises aimed at increasing the strength and endurance of their PL muscle as it is highly recruited when executing holds. Ability to climb more difficult routes may advance quickly by training the Sloper hold as its performance required the greatest recruitment of both the PL and FCR muscles.

## 65. THE EFFECT OF *THE LEVEL*® ON OXYGEN CONSUMPTION WHILE STANDING

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**Purpose:** The human obesity epidemic is one of the greatest threats to public health and is the consequence of a chronic imbalance between energy uptake and energy expenditure. Non-exercise activity thermogenesis (NEAT) plays a central role in our predisposition towards weight gain. Therefore, the purpose of this study was to determine the metabolic effect of a recently developed standing desk device, *The Level*® by *Fluidstance*, when compared to normal standing posture. **Methods:** Eighteen subjects [8 males, 10 females, Age 21.8y ± 4.2, Ht. 182cm ± 13, Wt. 73.7 kg ± 22.4] volunteered to participate in this study. Oxygen consumption was measured on each subject during the final 10 minutes of three consecutive 20-minute conditions: 1) resting supine, 2) Standing Metabolic Rate (SMR) standing while moving for comfort, and 3) standing on *The Level* LEVEL Metabolic Rate (LMR). Each standing condition was done for 20 minutes while watching a non-emotive nature video. Subjects were instructed to “move for their own comfort”. **Results:** Absolute oxygen consumption (SMR 0.284 l/min ± 0.69, LMR 0.435 l/min ± .41, p<.001), and relative oxygen consumption (SMR 4.102 ml/kg/min ± .835, LMR 4.907 ml/kg/min ± 1.23, p<.001), and ventilation (SMR 8.01 l/min ± 1.53, LMR 9.11 l/min ± 2.09, p < 0.001) were significantly higher when standing on *THE LEVEL* as compared to regular standing posture. **Conclusion:** Standing posture on *THE LEVEL* increases oxygen consumption as compared to standing normally by 42.2% which equates to an increase of 45.4 Kcal/hr. *THE LEVEL* appears to be a tool to increase NEAT and therefore increase daily energy expenditure.

## 67. GROUND REACTION FORCE SYMMETRY IN THE SIT-TO-STAND MOVEMENT AND THE ROLE OF HIP EXTENSOR STRENGTH

Seddio, Anthony E., Gottmer, Spencer, & LeBlanc, Michele

Biomechanics Laboratory, Exercise Science Department, California Lutheran University, Thousand Oaks, CA

**Purpose:** Previous research has shown that the sit-to-stand (STS) movement is mechanically demanding, requiring more lower extremity joint torque and range of motion than walking or stair climbing (Berger et al., 1988). The purpose of this study was to investigate the symmetry of STS movement in middle aged adults and to determine if hip muscle strength plays a role in any identified asymmetry. **Methods:** Healthy adults between the ages of 47 and 70 (6 males, 14 females) performed several STS movements while eight Vantage 5 cameras (200 Hz) and two Kistler force plates (1000 Hz) collected body landmark and 3-dimensional ground reaction force data, respectively. Hip extensor muscle strength was measured using a handheld dynamometer. GRF data was analyzed for the entire STS movement from initiation of hip flexion until the subject was standing upright. Dependent t-tests were used to compare GRF peak and average values between legs defined by strength and preference. **Results:** There was a difference in the hip extensor strength between the stronger and weaker legs (209.02±53.72 N vs. 190.22±54.66 N; p<0.0001) and a trend between the preferred and non-preferred legs (p = 0.078). Twelve out of the twenty subjects preferred their weaker leg. During the STS movement, subjects had a larger average lateral GRF on their preferred side vs. their non-preferred side (0.215±0.106 N/kg vs. 0.203±0.107 N/kg; p=0.016). Additionally, they had a trend towards larger average lateral GRFs on their weaker side (0.204±0.109 N/kg vs. 0.214±0.104 N/kg; p=0.055). **Conclusions:** Leg preference and hip extensor strength do not affect vertical GRF values during the STS, but leg preference plays a dominant role in frontal plane GRF values.

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## 68. EFFECTS OF WEARING A COMPRESSION GARMENT ON TORQUE PRODUCTION AND MUSCLE DAMAGE DURING RESISTANCE EXERCISE

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**Purpose:** Compression garments, derived from their use in clinical settings, have gained popularity in the sports performance industry. Enhanced venous hemodynamics and reduced muscle oscillation are some of the proposed mechanisms of the graduated pressure profile design of these garments. Benefits of using compression during both exercise and recovery are elusive as previous research provides mixed findings. The purpose of this study was to evaluate the effects of wearing compression during resistance exercise on muscular fatigue and damage. **Methods:** Ten healthy, untrained individuals ([mean ± SD] 8 females, 2 males, 22.10 ± 2.23 years, 159.09 ± 3.47 cm, 66.22 ± 15.93 kg) performed two exercise trials: 1) wearing compression tights and 2) without compression (loose fitting shorts). Exercise trials were randomized and separated by seven days. The exercise protocol consisted of 12 sets of 10 repetitions of knee extension, at a velocity of 60 degrees per second, in the CON/ECC mode of an isokinetic dynamometer (HUMAC NORM) to elicit pliometric contractions on the quadriceps muscle group. Leg circumference, ratings of perceived muscle soreness and a blood sample for the analysis of creatine kinase (CK) were collected before, immediately after, and 24, 48 and 72 hours after exercise. **Results:** Main effects for time revealed significant increases in leg circumference, ratings of perceived muscle soreness and CK however, no differences were observed between conditions. Additionally, a main effect for time revealed significant reductions in average torque (N\*m) from the first four sets to the middle four sets and again during the final four sets. There were no differences between conditions on average torque. **Conclusion:** Wearing lower body compression during resistance exercise did not influence indices of muscular fatigue or damage.

## 69. REACTION TIME DIFFERENCES ACROSS FEMALE COLLEGE SPORTS

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**Purpose:** Reaction time (RT) is the amount of time it takes to respond to a stimulus and is relevant both clinically and in the context of sports. In sports that require rapid movements (i.e. softball, volleyball, and rugby), RT is a key component of effective competitive play. It is documented that male reaction times tend to be faster than females; however, specific female sport differences have not been explored. The current study sought to make comparisons in RT across sports in female university athletes. **Methods:** Student athletes volunteered to complete RT testing within a controlled setting (volleyball n = 15, softball n = 24, rugby n = 24). The MOART Reaction Board was used to measure simple RT in the dominant hand. Athletes responded to a visual stimulus and were instructed lift their finger off a sensor as quickly as possible when a red light illuminated on the board. Each individual completed 5 trials and the mean was used for statistical analysis. **Results:** A one-way ANOVA revealed significant differences in RT between groups ( $P < .01$ ,  $F_{(2,61)} = 5.45$ ). Tukey post hoc comparisons revealed that softball RT was significantly faster than volleyball and rugby ( $P < .05$ ). Mean RT for each sport is as follows: softball = 235(41)ms, volleyball = 254(50)ms, rugby = 256(58)ms. **Conclusion:** Female collegiate athletes participating in softball have a greater overall reaction time which may be due to the speed at which motor units are recruited and the specific sensory demands of the sport. This is likely due to specific training programs that have an emphasis on the use of their hands and the demand for rapid visual sensory processing and motor responses.

## 71. PHYSIOLOGICAL EFFECTS OF A 100 MILE TRAIL RUN: A CASE STUDY

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**Purpose:** The purpose of this study was to determine the physiological impact of competing in a 100-mile ultramarathon. **Methods:** One recreational male runner (38 yrs, 73.3 kg, 177.8 cm) completed the 100-mile distance in 30:39:55. Measurements were collected pre-race, at each support crew accessible aid station (~every 20 miles) throughout the race, and post-race. Measures included blood markers (sodium, potassium, chlorine, urea nitrogen glucose, hematocrit, hemoglobin), body mass, and foot volume. Blood markers were measured from a finger stick blood sample using an iStat Handheld blood analyzer. Foot volume was determined by wrapping a cloth measuring tape around the ankle and mid foot in a figure 8 pattern. Caloric expenditure was tracked using a Garmin Fenix 3 HR sport watch. Caloric intake was monitored by a combination of self-reporting, product wrapper collection, and unconsumed fluid measurement. Caloric values were entered into a nutrition based application for macro/micro nutrient intake. **Results:** The estimated caloric expenditure was 13,756.2 kcal (447.4 kcal/hr), while caloric intake was recorded to be 6666 kcal (216.8 kcal/hr). The participant consumed a total of 1365 g carbohydrate (CHO), 107.5 g fat (FAT), and 212 g protein (PRO) over the course of the race, equating to 44.4 g/hr CHO, 3.5 g/hr FAT, and 1.7 g/hr PRO. A total of 10,051 mg of sodium was consumed (326.9g/hr). Measured blood values remained consistent throughout the event, as did foot volume. Body mass decreased 3% from pre to post-race (73.3 to 71.1kg). **Conclusion:** Despite the duration of the activity and the large discrepancy between estimated caloric output and caloric intake, the nutritional strategy employed by this athlete was sufficient to maintain blood values within normal ranges, prevent > 3% loss in body mass, and supply sufficient macronutrients to complete the distance.

## 70. VALIDATION OF RESEARCH-GRADE ACTIVITY MONITORS ON THE ESTIMATION OF MVPA

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**Purpose:** The accuracy and precision of wrist-based methods to estimate time spent in moderate-vigorous intensity physical activity (MVPA) in free-living environments is unclear. The purpose of this study was to compare ActiGraph wrist estimates of MVPA to ActiGraph (AG) hip and activPAL (AP) in five distinct activity domains. **Methods:** Ten adults (5F and 5M; age 18-33y) participated in two, 2-hr activity sessions that were categorized by activity domains; household (H, N=4), active leisure (AL, N=7), sedentary leisure (SL, N=4), work (W, N=2), and transportation/errands (TE, N=3). During the sessions, the participants wore AG (non-dominant wrist, right hip) and AP on the right thigh. MVPA was estimated for AG-hip using machine learning (S3x) and Freedson method (F), and AG-wrist using a random forest (RF). Pearson correlations and paired t-tests were used to compare MVPA estimates across methods. Linear mixed effects models were used to test if there was a significant interaction by activity domain. P-values <0.05 was considered statistically significant. **Results:** Pearson's correlation between the wrist RF and S3x methods was 0.75, wrist RF and F was 0.78, and wrist RF and AP was 0.77. The wrist estimates were significantly higher compared to S3x (16.1 min), the Freedson method (20.8 min), and the AP (17.0 min), all  $p < 0.01$ . The agreement between methods differed across domains for the S3x method ( $p = 0.01$ ), but not for Freedson or AP. **Conclusion:** The wrist RF method was moderately correlated with established measures, but consistently overestimated the mean minutes of MVPA. Wrist algorithms may need to be refined to improve estimates for activities that require upper extremity or hand movement but are low in energy expenditure. Future research using a criterion measures (direct observation) is needed.

## 72. BRAIN AND MUSCLE: THE COMPETITION IS ON DURING EXERCISE AND VIRTUAL REALITY

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**Purpose:** Research studies have shown that cognition-dependent increases in brain oxygenation ( $O_2Hb$ ) does not seem to limit performance of physical activity when assessed in a laboratory setting. In a natural environment, however, physical activity is often accompanied by an increase in cognition stimulation. Thus, we hypothesize that enhancing cognitive stimulation during exercise through the use of virtual reality (VR) will increase cerebral  $O_2Hb$  and modify the relationship with muscle oxygen demand. **Methods:** Male participants (N = 4, age  $23 \pm 2$  years) first performed a graded  $VO_{2max}$  test on a cycle ergometer (828E, Monark) and returned to the lab to perform the VR paradigm. The VR test was performed on a stationary bicycle made to synchronize with a cycling game (VR bike, ViRzoom). Participants wore a virtual reality headset (Playstation 4, Sony) and cycled at a moderate intensity (60% of Pmax). Near-infrared spectroscopy (NIRS, Artinis Oxymon MkIII) was used to measure  $O_2Hb$ , deoxyhemoglobin (HHb), and total hemoglobin (tHb) from the left and right frontal brain cortices (LFC, RFC) and the right vastus lateralis (RVL) muscle. **Results:** Exercise (no VR) caused an increase in brain  $O_2Hb$  in both frontal cortices. The addition of VR caused an additional 11% increase in mean  $O_2Hb$  in the LFC, while it caused mean  $O_2Hb$  in the RFC to increase by over 432%. In muscle, exercise with VR triggered a large consumption of oxygen which was dramatically suppressed in the presence of visual stimulus. **Conclusion:** Our preliminary data are promising in showing that a cognitive stimulation during exercise by VR may affect brain oxygen delivery and utilization and modify the relationship between brain and muscle. This paradigm is relevant because during normal exercise, both muscle and brain are stimulated.

### 73. ASSOCIATION BETWEEN TOTAL CALORIC EXPENDITURE AND RATING OF PERCEIVED EXERTION DURING STRONG BY ZUMBA® WITH AND WITHOUT MUSIC OR CUEING

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**Purpose:** Ratings of perceived exertion (RPE) is a subjective measure of intensity thought to be directly correlated with total energy expenditure (TEE). However, the correlation between RPE and TEE in group fitness exercise sessions with music (WM) and without music or cueing (WOM) have not been studied. The purpose of this study was to investigate the association between RPE and TEE using HR estimation and indirect calorimetry during a STRONG by ZUMBA® session WM and WOM. **Methods:** Using a randomized crossover design, twenty-two participants (6 males; 16 females; 27.64±10.33 yrs) were randomized into two groups (Group A = 11; Group B = 11). All participants performed a 58-minute exercise session under two conditions: WM and WOM. Descriptive statistics were used to average raw RPE scores (RPEavg) obtained at 10, 25, 40, and 55 minutes. Total caloric expenditure (TEE) was obtained through the Activo heart rate system and via indirect calorimetry. Paired sample t-tests and Pearson's *r* correlation were performed using using IBM Analytics, SPSS v24. and significance was set at  $p < 0.05$ . **Results:** There was no significant difference in RPEavg under both conditions ( $p = 0.882$ ). There was low correlation between RPEavg and TEE using HR estimation WM and WOM conditions for  $N=22$  ( $r = 0.276$  vs.  $0.069$  respectively); moderate correlation between RPEavg and TEE using HR estimation WM and WOM conditions for  $N=8$  ( $r = 0.702$  vs.  $0.663$  respectively); moderate correlation between RPEavg and TEE using indirect calorimetry WM and low correlation WOM ( $r = 0.608$  vs.  $0.368$  respectively). **Conclusion:** Results indicate that music does not significantly alter RPE scores during a 58-minute exercise session.

### 75. DIFFERENCES IN BODY DISSATISFACTION, MOOD, AND EXERCISE AMOUNT IN INDIVIDUALS WITH EXERCISE DEPENDENCE, EATING DISORDERS, AND REGULAR EXERCISERS

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**Purpose:** Exercise dependence (EXD) is a behavioral problem similar to addiction, when someone engages in exercise despite negative impacts. Two variants of EXD have been identified. Primary EXD is when exercise is the only problem. Secondary EXD is when an individual uses exercise related to another disorder, such as an eating disorder (ED). Because exercise can change body composition, individuals with body dissatisfaction are considered at risk for EXD and ED. The mood regulating effect of exercise has also been identified as a risk factor for ED. The purpose of this study was to examine differences in body satisfaction, exercise amount, EXD, and mood in primary and secondary EXD. **Method:** Participants were 748 individuals that exercised regularly [mean age = 28.33±10.02, mean BMI = 26.50±5.71, 61.23% female, 65.77% Caucasian, 56.42% university students] grouped as regular exercisers ( $n=423$ ), primary EXD ( $n=11$ ), secondary EXD ( $n=14$ ) and at-risk for ED only ( $n=175$ ). Measures included the Exercise Dependence Scale (EDS), Leisure-time Exercise Questionnaire (LTEQ), Positive and Negative Affect Schedule (PANAS), Eating Disorders Examination Questionnaire (EDE-Q), and demographics (i.e., self-reported weight and ideal-weight used to calculate weight dissatisfaction). ANOVA were used to examine group differences on each variable. **Results:** Significant differences were found among weight dissatisfaction [ $F(3,730)=18.54$ ,  $p < .01$ ], exercise amount [ $F(3,744)=6.57$ ,  $p < .01$ ], positive affect [ $F(3,707)=3.12$ ,  $p = .03$ ], and negative affect [ $F(3,721)=23.80$ ,  $p < .01$ ]. Bonferroni post hoc group comparisons will be presented. **Conclusion:** Participants with secondary EXD reported highest levels of negative affect and second highest levels of positive affect. This could indicate the importance of exercise in regulating mood in individuals who exercise and have an eating disorder. Moreover, participants in the regular exerciser group had lower weight dissatisfaction. Participants with ED-risk only had the highest level of body dissatisfaction. Therefore, this supports previous research suggesting exercise can help with body satisfaction.

### 74. A PILOT STUDY OF PHYSICAL FUNCTIONAL CORRELATES OF FALLS RISKS AND THE STEADI SCREENING PARADIGM

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**Purpose:** The purpose of this study is to explore relationships among measures of physical function and falls risk, for the purpose to ultimately provide support to the CDC's STEADI falls-risk screening paradigm. **Methods:** We are recruiting a convenience sample of older adults ( $\geq 60$  years) residing in Las Cruces, NM. Volunteers complete the Comprehensive Falls Risk Screening Instrument (CFRSI), the Short Physical Performance Battery test (SPPB), the 10-item Continuous Scale Physical Function Performance Test (CS-PFP10) and the STEADI algorithm for falls risk classification. Summary scores for the CS-PFP10 and CFRSI were correlated (Pearson *r*) with each other and with individual test items of the SPPB and STEADI mobility tests. Alpha was set at  $p < 0.01$ . While a limited sample at present, we also report the sensitivity and specificity of the STEADI results in predicting CFRSI total falls risk scores above or below 35. **Results:** Thus far we have complete data on 13 older adults ( $n=5$  male, 8 female; age:  $78.8 \pm 6.4$  years; wt:  $70.6 \pm 14.4$ kg; ht:  $168.4 \pm 9.12$ cm). The average total CFRSI, CS-PFP10, and SPPB scores were  $26.9 \pm 11.7$ ,  $59.9 \pm 14.4$ , and  $10.7 \pm 1.5$ , respectively. Eleven of the 13 participants are classified as "low risk" according to the STEADI algorithm, and the other two are classified as "moderate risk." Numerous significant correlations exist between CFRSI and the 3-m gait time test of the SPPB as well as CS-PFP10 summary scores. Using 35 points as an established threshold for elevated risk on the CFRSI, the STEADI classification scheme resulted in a sensitivity of 33% and a specificity of 90%. **Conclusion:** These preliminary data are the first to demonstrate that the CS-PFP10 summary scores are correlated with falls risks as determined by the CFRSI, but also reveal poor sensitivity of the STEADI fall-risk classification paradigm.

### 76. INERTIAL MEASUREMENT OF FUNCTIONAL MOVEMENT TESTS: A PILOT INVESTIGATION FOR THE 30 SECOND CHAIR STAND

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**Purpose:** Movement testing in older adults is important for assessing functional capacity. Unfortunately, it is performed infrequently and may not allow adequate assessment. This study aimed to determine the validity of inertial measurement devices for remote assessment of the 30 second chair stand test. **Methods:** Eighteen adults over 60 years provided consent to participate and were asked to complete the STEADI recommended 30 second chair stand test. While completing the functional test, a multi-axis inertial measurement device was affixed to the lower back region (L3-5) and data describing vertical acceleration were collected at a rate of 400 Hz. A parallel set of clinically relevant data describing the number of chair stand repetitions was also collected during testing. IMU data were processed via MatLab using standard signal processing techniques (Butterworth Filter, Discrete Wavelet Transform, and Peak Analysis functions). Conjointly, an algorithm was constructed to count the peaks of the processed signal, estimating the total repetitions performed. Percent agreement between the two systems and the Interclass correlation coefficients were both calculated. **Results:** Percent agreement between the two methods was observed at 94.4% across all subjects (17 of 18). The ICC calculated between the two testing methods was observed to be 0.99 ( $p < 0.01$ ). **Conclusion:** The IMU based collection method demonstrated high accuracy when compared with the clinical data. Of the 18 trials, 17 returned the same number of repetitions across the two data collection methods with the single trial not return a corresponding number of repetitions being trial with the lowest number of repetitions performed. The results of this investigation indicate utilization of an inertial measurement device attached to the lower back effectively displays a mode in which to perform chair stand repetition assessment. Future studies will aim to perform remote analysis of other important biomechanical signals indicative to falls risk.

## 77. RELATIONSHIP OF MOTOR SKILLS AND AUTISM PHENOTYPE IN CHILDREN

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**Purpose:** Previous literature suggests that fine and gross motor skills differ among the autism spectrum. Infants and adolescents have been studied, though not middle childhood. Thus, we sought to explore motor skills across the spectrum during middle childhood. **Methods:** Nine typically developing children age 10.4 +/- 1.9 years (range from 6.75 to 12.25) visited the lab. The Autism Quotient assessment was used to measure the phenotypic behavior, and the Timed Up and Go was used to measure gross motor and coordination abilities. A custom ball rolling paradigm was used to evaluate fine motor coordination, in the form of reaction time in response to fast and slow ball velocities. An adjustable height ramp was used to create different ball velocities. An optitrack motion capturing system monitored: motion of the ball, the child's wrist and index finger as they moved to catch the ball. Reaction time was extracted as the time difference between the initial ball movement and the first motion of the child's index finger from a still position on the table. Separate (slow and fast) multiple regressions were calculated to observe the relationship of age, autism phenotype, and gross motor on reaction time behavior. **Results:** In the slow ball condition we found a relationship between the factors ( $R=0.89, p=0.03$ ), with age being the only significantly weighted factor ( $r=0.01, p=0.052$ ). In the fast ball condition the relationship was marginally significant ( $R=0.087, p=0.056$ ) with AQ and TUG indicating significant weighting ( $r=0.03, p=0.026, r=-0.18, p=0.042$ , respectively). **Conclusion:** In response to slow balls older children move later. In response to fast balls children who were fast on the TUG moved later. Combined, these results suggest that good reaching is more than just reaction time. Higher autism phenotype indicated later initiation of hand movement. Further investigations among reaching characteristics are warranted before assigning judgment to this result.

## 79. EVALUATION OF PLANTAR PRESSURE DISTRIBUTION IN PREDIABETIC AND DIABETIC INDIVIDUALS

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**Purpose:** Higher peak plantar pressures (PPP) and abnormal pressure distribution along with neuropathy were identified as the leading causes of diabetic foot ulcers (DFU) resulting in morbidity and amputation. Therefore, plantar pressure distribution measurement was shown to be clinically useful in diagnosis and prevention of DFU. Recent research suggested that larger directional variations in peak plantar pressure, known as peak pressure gradient (PPG), could damage the plantar soft tissue. The purpose of our study was to quantify the differences in pressure distribution in forefoot, midfoot, and rearfoot during walking in pre-diabetic and diabetic patients. **Methods:** We recruited 12 pre-diabetic (7 Male, 5 Female, age = 57.5±13.1 years, mass = 101.8±19.5 kg, height = 1.67±0.70 m) and 10 diabetic (6 Male, 4 Female, age 60.5±6.7 years, mass = 88.5±11.4 kg, height = 1.63±0.70 m) individuals for the study. After providing written consent, which was part of the institutionally-approved protocol (IRB#777036), the participants performed five walking trials on a 10-meter walkway while wearing Medilogic® pressure-measuring insoles inside a pair of socks. Insole pressure data was processed using a custom written algorithm to compute the value and location of PPP and PPG, during the stance phase of walking. **Results:** Analysis of the right foot showed that the forefoot (59.47±7.35 vs. 57.20±12.01 N/cm<sup>2</sup>) and midfoot PPPs (29.75±17.40 vs. 24.27±10.75 N/cm<sup>2</sup>) were slightly elevated in the diabetic compared to the pre-diabetic subjects. PPG was also higher in the forefoot (19.45±9.71 vs. 15.80±5.33 N/cm<sup>2</sup>) and midfoot regions (8.29±5.86 vs. 5.27±4.34 N/cm<sup>2</sup>) for diabetics than for pre-diabetic subjects. **Conclusion:** Higher plantar pressures and pressure gradients observed in the diabetic compared to pre-diabetic groups during overground walking, which may indicate a greater risk for DFU. Future studies should investigate longitudinal changes in foot pressure distribution, which would include velocity effects to identify patients at risk for DFU.

## 78. EFFECTIVENESS OF STRONG BY ZUMBA® 12-WEEK GROUP EXERCISE PROGRAM ON MUSCULAR ENDURANCE, AGILITY, AND POWER.

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**Purpose:** Manipulation of exercise programming variables can improve muscular strength, endurance, agility and power. However, it is unknown if the STRONG by Zumba® program in a group fitness setting is effective at improving these variables. Thus, the purpose of this study was to investigate the physiological changes of a mixed-intensity aerobic group fitness class STRONG by Zumba® is unknown. **Methods:** Using a pre-post design, all participants (N= 23, 20 females, 3 males, 36.83±7.11 years, 1.66±0.13m) were assessed on the following parameters; vertical jump, timed t-test, plank hold to fatigue, YMCA push-up and timed wall-sit assessments. All participants completed the STRONG by Zumba® group training program as a one hour session, 2 days per week over a 12-week period. Paired sample t-tests were performed using IBM Analytics, SPSS v24. and significance was set at  $p<0.05$ . **Results:** Muscular endurance increased push-ups (26.57±13.30 to 35.14±15.02), wall-sits (66.90±35.71 sec), and planks (74.41±31.57 to 106.94±41.63 sec) following the 12-week study duration ( $p<0.05$ ). Timed t-test agility significantly improved (13.00±2.07 to 11.67±1.16 sec,  $p<0.05$ ), as well. There were no significant changes in vertical jump or power. **Conclusion:** STRONG by Zumba® can be effective to increase muscular endurance and agility in a group fitness setting following 12-weeks.

## 80. EXPLORING MOTIVATION FOR PHYSICAL ACTIVITY ACROSS KINESIOLOGY STUDENTS OF VARIOUS ETHNICITIES

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**Purpose:** Physical activity levels have been reported to vary across different ethnicities (NCHS, 2017). People from all backgrounds may have different motivations to perform physical activity (PA), which may be influenced by their cultural background (Langøien et al., 2017). This study explored the motivation for PA across several different ethnic groups (Hispanic, Caucasian, Asian, & Pacific Islander) and as well as their PA and resistance training (RT) levels. **Methods:** Participants consisted of a convenience sample of 113 undergraduate kinesiology students (Hispanic:  $n=36$ , Caucasian:  $n=27$ , Asian:  $n=31$ , Pacific Islander:  $n=6$ ). Other ethnicities were excluded from the analysis due to too small group sizes ( $n=13$ ). Students completed a cross-sectional survey that asked about PA participation which included the Godin Leisure Time Exercise Questionnaire (Godin & Shepard, 1985) and RT questions (3 items created for this study). Motivation was assessed using the Behavioural Regulation in Exercise Questionnaire (BREQ-3; Mullan, Markland & Ingledew, 1997) that classifies motivation into amotivation, external regulation, introjected regulation, identified regulation, integrated regulation, and intrinsic regulation. One-way ANOVAs were used to compare differences between ethnicities. **Results:** External regulation motivation varied across ethnicities ( $F(3, 96)=2.739, p=.048; R^2=7.9\%$ ). Asian students reported greater levels of external regulation than Hispanic students. Amotivation, introjected regulation, identified regulation, integrated regulation, and intrinsic regulation motivations did not show any significant differences ( $p>.05$ ). There were no differences between ethnicities on resistance training ( $p=0.478$ ) or PA ( $p=0.503$ ). **Conclusion:** The lack of differences in PA and RT by ethnicity may due to the active sample of kinesiology students. However, motivations did vary by ethnicity as Asian students were more motivated by external pressures such as rewards or punishments (External regulation) than Hispanic students. This may be related to the prioritizing of collectivism within the family and respecting elders in Asian culture (Kim, Yang, Atkinson, Wolf, & Hong, 2001).

## 81. THE RELATIONSHIP AMONG TEMPERAMENT, EXERCISE, AND EATING IN OVERWEIGHT AND NORMAL WEIGHT INDIVIDUALS

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**Purpose:** The development of obesity typically involves several psychological factors related to unhealthy behaviors such as overeating and sedentary behavior. Temperament has been proposed as a factor that may influence behaviors. Previous research has examined temperament in specific populations (e.g., obese, regular exercisers, etc.) and found support for Behavioral Activation (BAS) being related to exercise behavior and Behavioral Inhibition (BIS) related to obesity. However, few studies have examined these associations concurrently in large community-based samples or included weight-related behaviors (e.g., exercise and eating) in analyses. The purpose of this study was to examine temperament, exercise, and eating behaviors in normal versus overweight/obese individuals.

**Method:** Participants were 1294 individuals (M age =28.32±10.31; 66.41% female; 66.21% Caucasian) who completed an online survey including self-reported weight and height, the Leisure-time Exercise Questionnaire (LTEQ), Eating Disorders Examination Questionnaire (EDEQ), and Behavioral Inhibition and Activation Scales (BIS/BAS). Participants were grouped by body mass index (BMI; 42.66% BMI=20.0-24.9, 57.34% BMI ≥30.0). Regressions were used to examine the relationship among BIS/BAS and exercise and eating outcomes for each group. **Results:** For normal weight individuals, total exercise amount was negatively related to BIS ( $\beta = -.143, p = .003$ ) and positively related to BAS ( $\beta = .140, p = .003$ ) and BIS was related to the EATING subscale of the EDEQ ( $\beta = .212, p < .001$ ). For overweight/obese individuals, BIS was negatively related to total exercise amount ( $\beta = -.184, p < .001$ ) and the EATING subscale of the EDEQ ( $\beta = .246, p < .001$ ). **Conclusions:** Overall, individuals high in BIS may overeat more and exercise less. However, the association of BAS with exercise was only observed in normal weight individuals. Thus, clinical work with overweight/obese individuals should focus on enhancing BAS to help increase exercise behaviors.

## 83. CHANGES IN AUTONOMIC FUNCTION DURING HIGH ALTITUDE TREKKING: A PILOT INVESTIGATION

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**Introduction:** Acclimatization to higher altitudes has been well characterized in terms of pulmonary, renal, and acid-base physiology. What is less clear is how the regulatory mechanisms of cardiac physiology acclimatize to increasing altitude. **Purpose:** The purpose of this pilot study was to observe the changes in HRV as mountaineers trekked to higher elevations. **Methods:** Six mountaineers trekking to the top of Mt. Whitney monitored their HRV using the Polar H7 chest strap and Elite HRV (app). HRV data was collected upon arrival at the trailhead in the evening and morning before departure. Repeated measurements were made in the evening at the first camp (3,100m) and the following evening at the second camp (3650m). Prior to measurement each subject voided their bladder and assumed a seated position for 5 minutes prior to the 5 minute data capture. Upon return subjects submitted their data for retrieval. Data were filtered for ectopy and where appropriate, ectopic beats were deleted. The square root of the mean of the squared differences (RMSSD) was used to quantify the parasympathetic influence on HR. Three of the subjects did not save their measurements properly, so data are present for three of the subjects. **Results:** The average RMSSD upon arrival at altitude in the evening was 39.04 ms and rose slightly in the morning after an overnight stay (2.8%). Following ascent to the first camp the RMSSD fell 40.4% to 23.3ms. Upon ascending to the second camp the RMSSD increased 43.1% from the second camp (33.3ms) despite an increase in altitude. Although the RMSSD increased, it was still 14.7% lower at camp 2 than arrival at altitude. **Conclusion:** It appears that autonomic acclimatization begins during the 3<sup>rd</sup> day of altitude exposure as the parasympathetic tone began to increase despite the increasing altitude.

## 82. CARDIAC RESPONSE TO ALTITUDE EXPOSURE IN PHYSICALLY ACTIVE COLLEGE STUDENTS

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Heart Rate Variability (HRV) is a potentially sensitive clinical marker that may predict risk for acute mountain sickness (AMS) for people hiking at altitude. AMS is associated with low blood oxygen saturation, and is characterized by excessive fatigue, headaches, gastrointestinal interruptions, and in extreme cases, death. **PURPOSE** To compare HRV and symptoms of AMS at different altitudes in college students of varying fitness levels, trekking in the Himalayas. **METHODS** Resting HRV data, oxygen saturation (pO<sub>2</sub>) and heart rate (HR) were measured in college aged students (n=17,9F age=20±1.7yrs, BMI 23±3kg/m<sup>2</sup>) at three different elevations (300m,1900m,4500m above sea level). Analyzed HRV variables were root-mean-squared standard-deviation (RMSSD ms), percent of successive N-N intervals varying>50ms (pNN50), Low-Frequency and High-Frequency Power normalized-units (LFP,HFPnu) and Poincare-plot SD1ms and SD2ms. **RESULTS** Oxygen saturation(pO<sub>2</sub>=87±3), HRV mean and Stdev measures (300m;1900m;4500m) were obtained: HR(80±13;84±8; 83±11bpm), RMSSD (62±34;44±42;58±41ms), pNN50(23±15;13±14;20±19), LFPnu (58±16; 72±12;61±16), HFPnu (42±16;28±12;39±16), LF:HFnu (1.77±1;3.47±2;2.89±3), SD1 (44±24; 31±30;41±29ms), SD2 (123±42;80±45;98±52ms). Effects of RMSSD (p=0.001)\*\*, Poincare plot SD1 (p=0.001)\*\*, SD2 (p=0.037)\*, and pNN50 (p=0.062) by altitude and HR were revealed by linear mixed-models analysis. **CONCLUSION** Statistically significant effects of HRV by altitude and HR suggest HRV may be a novel indicator of AMS risk.

## 84. THE ACUTE EFFECTS OF INTERVAL EXERCISE, CONTINUOUS EXERCISE, AND COLORING ON ANXIETY AND MOOD

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**Purpose:** To compare the effects of treadmill interval exercise, continuous exercise, and sedentary coloring on state anxiety, mood, and enjoyment of activity. **Methods:** Twenty-seven participants, ages 18 to 37, completed four individual testing sessions. All participants performed a preliminary VO<sub>2</sub>max test, and assessments of trait anxiety, personality, and depression. Three experimental protocols were completed in a randomized order on separate days. The conditions involved 20-minutes of: interval exercise (IE) consisting of 10 intervals (1-min at 55% VO<sub>2</sub>R and 1-min at 95% VO<sub>2</sub>R) on the treadmill, continuous treadmill exercise (CE) (75% VO<sub>2</sub>R) on the treadmill, or coloring at rest (C). Assessments of state anxiety (STAI-S) and mood (POMS) were completed immediately pre-, 5-min post- and 20-min post-condition. Activity enjoyment (PACES) was assessed 5-min post- and 20-min post-condition. **Results:** Preliminary analyses showed a significant interaction for vigor; both exercise conditions significantly improved post-condition compared to sedentary coloring (F(3.2, 123.2) = 6.22, p < .001,  $\eta^2 = .14$ ). There was a significant main effect of condition for enjoyment of activity, F(2, 78) = 5.38, p = .006,  $\eta^2 = .12$ ; exercise led to significantly higher levels. Lastly, a main effect of time was revealed for state anxiety, anger, confusion, fatigue, tension, and total mood disturbance; all improved from pre- to post-condition. **Conclusion:** Exercise lead to greater activity enjoyment compared to sedentary coloring, and a larger increase in feelings of energy after 20-minutes of treadmill work (interval or continuous). Sedentary coloring may be as effective as exercise for reducing state anxiety, anger, confusion, fatigue, tension, and total mood disturbance. Effects did not vary based on the type of treadmill exercise (continuous vs. interval) when examining state anxiety, mood, and activity enjoyment. Future analyses will examine the potential moderating effects of personality (BIS/BAS), depression (BDI-II), trait anxiety (STAI-T), and fitness level (VO<sub>2</sub>max) on outcome measures.

## 85. FATIGUE RESISTANCE TO ECCENTRIC CONTRACTIONS IN OLDER ADULTS

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**Purpose:** Aging is associated with a loss in skeletal muscle force producing capacity. There is evidence that old muscle is more resistant to fatiguing isometric muscle contractions than young muscle. It is unknown if age-related fatigue resistance occurs with eccentric (lengthening) contractions (EC). The purpose of this study was to test the hypothesis that skeletal muscle of older adults is more resistant to fatigue induced by EC relative to muscle of young individuals. **Methods:** 10 young ( $22.7 \pm 2.25$  yrs) and 8 physically active old ( $70.9 \pm 7.5$  yrs) subjects completed 30 sets of 10 repetitions on a Biodex dynamometer, and torque, power, and work were measured. Between each set of 10 reps, there was a one minute rest period. **Results:** There were no significant differences between young and old for anthropometric measures. Likewise, the total amount of functional work (young:  $44.2 \pm 13.1$  vs old:  $47.6 \pm 10.6$  kJ), average torque (young:  $50148 \pm 13011$  vs old:  $54450 \pm 11507$  N\*m) and average power output ( $28105 \pm 6985$  vs old:  $30825 \pm 5405$  watts) that was completed during the bout of ECs was similar between groups. However, as hypothesized, the rate of functional decline (fatigue) was greater in the young relative to the old throughout the 30 sets of ECs for average work ( $p=0.038$ ) and power output ( $p=0.024$ ), but not average torque ( $p=0.63$ ) as indicated by a group x time interaction. **Conclusion:** Consistent with other studies, we show that, contrary to isometric force production, eccentric force production is preserved in old muscle. Furthermore, older subjects demonstrated significantly greater fatigue resistance through the eccentric exercise session than did the young subjects. High-force LC may be an ideal exercise for maintaining muscle mass in older individuals given the higher force production, and preservation of functional capacity when compared to shortening contractions.

## 87. LOWER EXTREMITY STRENGTH ON SINGLE LEG HOP PERFORMANCE FOR DIVISION I COLLEGIATE TRACK AND FIELD ATHLETES

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**Context:** Widely-used across the sports arena, preseason testing, which can include manual muscle testing (MMT) and Single Leg Hop (SLH) tests, can be used to establish strength and conditioning programs tailored to individual athletes in order to maximize performance and minimize injury risk. The purpose of this study will be to examine if lower extremity strength influences SLH distance in males versus females. **Methods:** Thirty-nine male and female NCAA Division I track and field athletes participated in preseason testing (age:  $19.6$  yrs  $\pm 1.4$ , weight:  $64.8$  kg  $\pm 8.9$ , height:  $174.6$  cm  $\pm 10.7$ ) Participants completed MMT testing consisting of bilateral maximal voluntary isometric contractions for knee extensor and flexor strength measured with a handheld dynamometer. The average of three trials was recorded and normalized as a percentage of body weight (%BW). For the SLH, the participant jumped and landed on the ipsilateral limb, absent of external support or loss of balance. SLH was normalized using leg length, and the Q/H ratio was calculated by dividing average quad strength in %BW over average hamstring strength in %BW. **Results:** Multiple regression analysis considered the prediction of muscular strength on SLH distance. The results for males showed no significant effect on either leg. However, results did indicate that the females' Q/H ratio on the left leg explained 23.0% of the variance ( $R^2=.261$ ,  $F(1,25)=8.476$ ,  $p<.01$ ;  $\beta=-0.511$ ,  $t=-2.911$ ,  $p<.01$ ) in SLF performance, with an inverse relationship between Q/H ration and SLH jump distance. **Conclusion:** These results suggest that a more balanced Q/H ratio may contribute to improved SLH performance. This information can be valuable in terms of maximizing performance via implementation of strength and conditioning programs for individual athletes that promote muscular symmetry. Overall strength, in addition to muscular symmetry, should also be emphasized to help increase performance.

## 86. HEALTH AND WELLNESS RESOURCE UTILIZATION AMONG COLLEGIATE ATHLETES

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**Purpose:** Student-athletes often have strenuous demands to perform both in the classroom, and for their sport. While universities try to provide health resources for students, much of the decision to utilize campus resources may be influenced by their social environment, knowledge of what resources are available, and perceptions of mental health (Moreland, Coxe & Yang, 2017; Dahlberg & Krug, 2006). One study demonstrated that utilization of resources (e.g. academic and recreational) was positively associated with retention and/or GPA (Robins et al., 2009). The purpose of this study was to determine 1) if Division I athletes from a Southern California university were knowledgeable of resources available for health and wellness, and 2) if they were being used. **Methods:** Thirty-four athletes completed a questionnaire with a total of 44 items. Questions delved into the kinds of activities utilized by the resources provided, as well as exploratory and demographic measures about their athletic, academic and ethnic backgrounds. **Data Analysis:** A two-way ANOVA for gender and age was conducted. **Results:** The results could indicate how the available sources to athletes are being used and how gender and year in college may influence the decisions to use available resources for health and wellness. **Implications:** Results relating to gender and age may implicate how athletes can be educated on the resources and how they are applicable to each athlete, and how athletes could benefit from the provided resources for mental health.

## 88. EFFECT OF TRUNK FORWARD LEAN ON WALKING BIOMECHANICS: IMPLICATIONS FOR KNEE OSTEOARTHRITIS

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**Purpose:** Increased knee flexion moment has been linked to the onset and progression of medial compartment knee osteoarthritis (OA) and patellofemoral joint OA. A more forward lean trunk has been reported to reduce knee flexion moment during running. It remains unclear how trunk lean affects knee moment during walking. This preliminary study aimed to evaluate the effects of trunk forward leaning on knee biomechanics during walking. **Methods:** Eight asymptomatic adults (6 female,  $22.4 \pm 2.3$  y/o) participated in this study. Participants walked on a treadmill at a controlled speed (1.0 m/s) under three trunk conditions: baseline, self-lean, fixed-lean. At baseline, participants walked with their natural trunk posture. In the self-lean condition, they were instructed to increase their trunk lean within a range they felt comfortable. In the fixed-lean condition, participants were asked to increase trunk forward lean by  $10^\circ$ . Real-time biofeedback was given to ensure they maintained the target trunk position. Three-dimensional gait kinematics and kinetics were collected under each condition (Qualisys motion capture, 200Hz; Bertec forceplate, 1000Hz). Peak trunk flexion angle, knee flexion angle and moment during stance were computed and exported for descriptive statistical analysis. **Result:** At baseline, mean peak trunk flexion was  $5.97^\circ$ . It increased by  $5.21^\circ$  in the self-lean and  $10.41^\circ$  in the fixed-lean condition. Compared to baseline ( $0.53 \pm 0.15$  Nm/kg), peak knee flexion moment decreased by 9.3% in self-lean condition ( $0.48 \pm 0.15$  Nm/kg), and 38.4% in fixed-lean condition ( $0.32 \pm 0.32$  Nm/kg). Peak knee flexion angle decreased by  $6.4^\circ$  and increased by  $0.5^\circ$  in the self-lean and fixed-lean conditions, respectively. **Conclusion:** Our preliminary findings show that trunk forward lean may be utilized to reduce knee flexion moment during walking. Further studies are needed to include more subjects to validate the findings and explore its application in people with or at risk of knee OA.

