SOUTHWEST CHAPTER

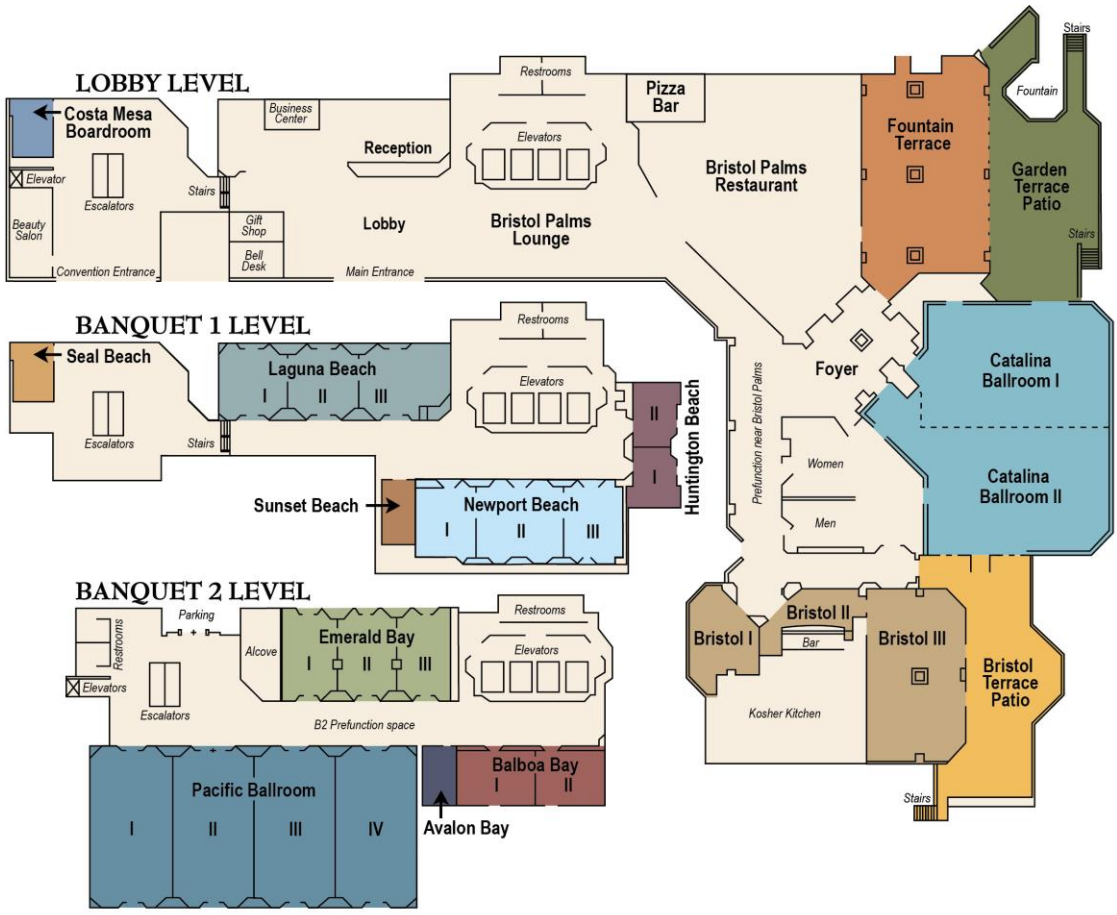
AMERICAN COLLEGE OF SPORTS MEDICINE

2016 ANNUAL MEETING

October 21-22, 2016

Orange County/Costa Mesa Hilton
Costa Mesa, California

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


LOBBY LEVEL
Costa Mesa Boardroom
Business Center
Restrooms
Pizza Bar
Fountain Terrace
Stairs
Fountain
Garden Terrace Patio
Elevator
Escalators
Stairs
Reception
Elevators
Bristol Palms Restaurant
Beauty Salon
Gift Shop
Bell Desk
Lobby
Bristol Palms Lounge
Convention Entrance
Main Entrance
Stairs
BANQUET 1 LEVEL
Seal Beach
Laguna Beach
I II III
Restrooms
Elevators
II
I
Huntington Beach
Foyer
Catalina Ballroom I
Escalators
Stairs
Prefunction near Bristol Palms
Women
Men
Catalina Ballroom II
Sunset Beach
Newport Beach
I II III
BANQUET 2 LEVEL
Parking
Restrooms
Alcove
Emerald Bay
I II III
Restrooms
Elevators
Elevators
Escalators
B2 Prefunction space
Bristol I
Bristol II
Bar
Bristol III
Bristol Terrace Patio
Kosher Kitchen
Pacific Ballroom
I II III IV
Balboa Bay
I II
Avalon Bay
Stairs

Welcome to the

36th Annual Meeting

of the

Southwest Regional Chapter

of the

AMERICAN COLLEGE of SPORTS MEDICINE SM

October 21-22, 2016

Orange County/Costa Mesa Hilton
Costa Mesa, California

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

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The Southwest ACSM annual meeting has been approved for 14 Continuing Education Credits by the American College of Sports Medicine. There is no separate fee for CECs. Please retain the Certificate obtained at registration.

FRIDAY, 21 OCTOBER 2016

Registration **Pacific Ballroom Foyer** **7:30 am – 4:00 pm**

Demonstration Tutorials **8:00 am – 9:00 am**

ECG Prep and Placement **Emerald Bay 1**
Donna Cataldo, Ph.D., Arizona State University

Dartfish Motion Analysis **Emerald Bay 2**
Iain Hunter, Ph.D., Brigham Young University

Multifrequency Bioelectrical Impedance **Emerald Bay 3**
Marta VanLoan, Ph.D., University of California, Davis

General Session **9:15 am – 10:45 am** **Pacific 3 & 4**

Moderator: Glenn Gaesser, Ph.D., President, SWACSM
Arizona State University

SWACSM Recognition Award
Dr. Lee Brown, Cal State University, Fullerton

Preview of Meeting: Dale Wagner, Ph.D., FACSM
Utah State University

D.B. Dill Lecture
Screening, Evaluation, and Management of the Female Athlete Triad
Elizabeth Joy, M.D., MPH
President, American College of Sports Medicine
Intermountain Health Care & University of Utah

Concurrent Colloquia **11:00 am – 12:30 pm**

Myth and Science in Cycling **Pacific 3**
Daryl Parker, Ph.D., California State University, Sacramento

Mitochondrial Health and Metabolic Regulation **Pacific 4**
Andrea Hevener, Ph.D., University of California Los Angeles
Lorraine Turcotte, Ph.D., University of Southern California
Tim Moore, University of California Los Angeles & University of Southern California
Zhenqi Zhou, Ph.D., University of California Los Angeles

Exercise Across the Cancer Survivorship Continuum **Emerald Bay**

Lives: A Telephone-Based Lifestyle Intervention to Improve Progression Free Survival for Ovarian Cancer Survivors
David Garcia, Ph.D., University of Arizona

Importance of Taargeting Cardiometabolic-Related Outcomes with Exercise in Cancer Survivors
Christina Dieli-Conwright, Ph.D., University of Southern California

FITT for Cancer Survivorship: A Comparison of Exercise Prescriptions
Jackie Kiwata, University of Southern California

LUNCH 12:30 PM- 1:45 PM

Student Research Award 2:00 pm – 3:30 pm Emerald Bay

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

2:00 **Regional Variations in Lumbar Paraspinal Muscle Atrophy Following Prolonged Spaceflight**
Kristine T. Khieu, Robert M. Healey, Douglas G. Chang, Jeffrey C. Lotz*, Alan R. Hargens.
Department of Orthopaedic Surgery, University of California, San Diego
*Department of Orthopaedic Surgery, University of California, San Francisco

2:15 **Effects of Verbal, Visual and Kinesthetic Cueing on Knee Joint Mechanics During Cutting**
Mackenzie A. Pierson[1], Mimi Nakajima[1], Wilber Wu[1], James Becker[2]
[1]Department of Kinesiology, California State University Long Beach, Long Beach
[2] Department of Health and Human Development, Montana State University

2:30 **Time Spent in Active Propulsion During Gait Separates Fallers and Non-Fallers**
Murphy, Eryn N., Keeley, David
Biomechanics Laboratory, Department of Kinesiology and Dance, New Mexico State University

2:45 **Non-Invasive Intracranial Pressure Following Simulated Head Contact Events**
Watkins, William., Hargens, Alan R., Baird, Shannon., Clary, Erika M., Chang, Douglas G., Macias, Brandon R..
Department of Orthopaedic Surgery, University of California San Diego

FRIDAY, 21 OCTOBER 2016, continued

3:00 **Hip Energetics of a Golf Swing When Swinging Different Golf Clubs**
Du Bois, Andrea M. & Salem, George J., FACSM.
Musculoskeletal Biomechanics Research Laboratory, Division of Biokinesiology and Physical Therapy, University of Southern California

3:15 **Acute Effects of Unilateral Static Stretching on Handgrip Strength of the Stretched and Non-Stretched Limb**
Jelmini, Jacob D., Khodiguian, Nazareth, & Cornwell, Andrew
Department of Kinesiology and Nutritional Science, California State University, Los Angeles

Concurrent Colloquia 2:00 pm – 3:30 pm

Treatment Options for Chronic Tendinosis/Tendonitis **Balboa Bay 1**
Kenneth Vitale, M.D., University of California San Diego

Neuromuscular Function in Human Movement Science: Applications in Clinical- and Performance-Based Research **Balboa Bay 2**
Brennan Thompson, Ph.D., Utah State University
Pablo Costa, California State University, Fullerton

Concurrent Colloquia 3:30 pm – 5:00 pm

The Gravity of Medicine in Space: From Recent Results to Earth Benefits **Emerald Bay**

Spinal Deconditioning and Atrophy: Lessons from the International Space Station
Douglas Chang, M.D., Ph.D., University of California San Diego

Treating Crew Members' Vision Impairment Syndrome in Space and Glaucoma on Earth
John HK Liu, Ph.D., University of California San Diego

The Gravity of Exercise Countermeasures for Prolonged Space Flight
Alan Hargens, Ph.D., University of California San Diego

FRIDAY, 21 OCTOBER 2016, continued

Altered Running Mechanics: Potential Causes, Consequences, and Fixes — **Balboa Bay 1**

Variability, Aging, and Running Injuries: How are They All Related
Julia Freedman-Silvernail, Ph.D., University of Nevada, Las Vegas

Effects of Anterior Knee Pain on Running and Walking Neuromechanics
Matt Seeley, Ph.D., Brigham Young University

Footstrike Pattern Matters! Changing Footstrike to Keep You on the Pavement
Jenevieve Roper, Ph.D., California State University, San Bernardino

Innnovative Technology in Exercise Science, Physical Activity Promotion, and Pedagogy — **Balboa Bay 2**

i-Challenge! Nutrition and Physical Activity Intervention Using Smartphone in Physical Education Classes
Nobuko Kay Hongu, Ph.D., RD, University of Arizona

Promoting Physical Activity Among African-American Women: Pairing Culture with Technology
Rodney Joseph, Ph.D., Arizona State University

Millennial Instruction: Online and Technology-Assisted Project-Based Learning
Todd Shoepe, Ed.D., Loyola Marymount University

SOCIAL EVENT

Pacific 3 & 4 — **5:00 -7:30 PM**

Poster Presentations

No Host Wine/Cheese Reception

FRIDAY, 21 OCTOBER 2016, continued

SPECIAL EVENT

Balboa Bay **7:00 - 8:00 PM**

Student Jeopardy Bowl

SATURDAY, 22 OCTOBER 2016

Registration **Pacific Ballroom Foyer** **7:30 am - 10:00 am**

Student Colloquium

8:00 am – 9:00 am **Pacific 3**

Continental Breakfast; Give-a-Ways

What They Never taught You in School: Planning Your Career
Moderator: Dale Wagner, Ph.D., Utah State University

Breakout Sessions
Careers in Academia: Dale Wagner, Ph.D., Utah State University
Clinical Careers (Medicine): Kennith Vitale, M.D., University of California San Diego
Clinical Careers (CEPA-Exercise Rehab): Ann Gibson, Ph.D., University of New Mexico
Careers in the Fitness Industry: Jan Schroeder, Ph.D., California State University, Long Beach

Concurrent Symposia **9:00 am – 10:30 am**

Skeletal Muscle Fiber Types and Human Performance: A Cellular and Molecular Perspective **Pacific 3**
James R. Bagley, San Francisco State University
Josh Cotter, Ph.D., California State University, Long Beach
Evan Schick, Ph.D., California State University, Long Beach
Andy Galpin, Ph.D., California State University, Fullerton

Benefits of Aquatic Exercise for Sport and Physical Rehabilitation **Emerald Bay**

High-Intensity Interval Training on an Aquatic Treadmill: A Promising Treatment Approach for Adults with Osteoarthritis
Eadric Bressel, Ph.D., Utah State University

Biomechanical Comparison of the Vertical Jump Performed on Land and in Water
Talin Louder, Utah State University

Effect of Aquatic Treadmill Training on Land Treadmill Running Kinematics
Dennis Dolny, Ph.D., Utah State University

The Past, Present, and Future of Functional Fitness Assessment and Training **Pacific 4**

Pat Vehrs, Ph.D., Brigham Young University
Jim George, Ph.D., Brigham Young University

Gatorade Sports Science Lecture **10:30 am – 11:30 am** **Pacific 3**

Fueling Endurance Athletes
Ellen Coleman, M.A., MPH, RD

Concurrent Colloquia **10:30 am – 11:30 am**

Substrate Utilization Following Exercise: Does It Assist in Maintaining Energy Balance **Emerald Bay**

Lorraine Turcotte, Ph.D., University of Southern California

Get Involved with Exercise is Medicine – The EIM Ambassador Program **Pacific 4**

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

SATURDAY, 22 OCTOBER 2016, continued

General Session **11:30 am – 1:30 pm** **Pacific 3 & 4**

Moderator: Glenn Gaessar, Ph.D., President, SWACSM
Arizona State University

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

Recognition of Host School:
California State University, San Bernardino

Business Meeting

Founders Lecture

Oxygen: Essential for Life, Important for Exercise Performance?
Russell Richardson, Ph.D.
University of Utah

SOUTHWEST ACSM RECOGNITION AWARD

1982	D.B. Dill
1983	Albert Behnke
1984	Steve Horvath
1985	Fred Kasch
1986	John Boyer
1987	Herbert de Vries
1988	Charles Tipton
1989	G. Lawrence Rarick
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
2014	Michael Hogan
2015	Marialice Kern
2016	Lee Brown

Southwest Regional Chapter of the American College of Sports Medicine

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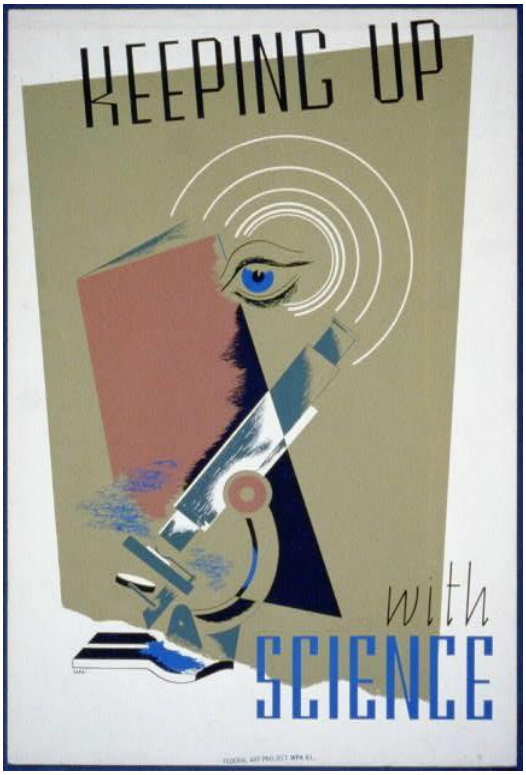
2016 SWACSM

Annual Meeting

ABSTRACTS

Student Research Award
Poster Presentations



STUDENT RESEARCH AWARD

1. REGIONAL VARIATIONS IN LUMBAR PARASPINAL MUSCLE ATROPHY FOLLOWING PROLONGED SPACEFLIGHT.

Kristine T. Khieu, Robert M. Healey, Douglas G. Chang, Jeffrey C. Lotz*, Alan R. Hargens.

Department of Orthopaedic Surgery, University of California, San Diego
*Department of Orthopaedic Surgery, University of California, San Francisco

Purpose: During spaceflight, the absence of gravity has a significant impact on the structure and function of astronaut skeletal muscles, causing atrophy and decreased strength. Following long-duration spaceflight, an astronaut's risk of intervertebral disc herniation increases by 4.3 times. The purpose of this study was to determine the regional differences of atrophy in individual lumbar paraspinal muscles to investigate this increased risk of injury. **Methods:** Six astronauts were studied using 3T MRI data obtained pre-flight (within 90 days before launch), post-flight (within 2 days of return), and following a recovery of 30 to 60 days after landing. Images were assessed from axial sections at the L1-L2 to L5-S1 intervertebral disc levels by measuring cross-sectional and functional cross-sectional areas. The individual paraspinal muscles measured were the psoas, multifidus, erector spinae, and quadratus lumborum. **Results:** Analyses of the lumbar spine revealed that L2-L3, L3-L4, and L4-L5 experienced the greatest decrease in percentage lean muscle. These three levels showed statistically significant ($p < 0.05$) loss of FCSA/CSA post-flight, with an average loss of 21.3 ± 0.4% compared with pre-flight levels. Measurement of lumbar paraspinal muscles document that 3 of the 4 muscles had decreased percentage of lean muscle (FCSA/CSA) without full recovery. Overall, the psoas muscle changed little with spaceflight, but the other three muscles decreased in lean muscle mass post-flight with varying recovery 1 to 2 months later. The average post-flight loss of lean muscle from the multifidus, erector spinae, and quadratus lumborum was 5.3 ± 0.4% with average recovery of 2.2 ± 0.2% (42% of initial loss)**. Conclusion:** Our spine imaging data delineates that PSMs at the L2-L3, L3-L4, and L4-L5 are prone to atrophy with prolonged microgravity exposure. This suggests possible targets for countermeasures to reduce the risks of disc herniation and LBP during spaceflight.

2. EFFECTS OF VERBAL, VISUAL AND KINESTHETIC CUEING ON KNEE JOINT MECHANICS DURING CUTTING.

Pierson, Mackenzie. [1], Nakajima, Mimi. [1], Wu, Wilber[1]. Becker, James [2].

[1]Depearment of Kinesiology, California State University Long Beach, Long Beach
[2] Department of Health and Human Development, Montana State University, Bozeman

Purpose: Performing a cutting maneuver is vital in successful sports performance. However, the cutting maneuver is associated with noncontact anterior cruciate ligament (ACL) injuries. Cueing the body to keep proper alignment using various prompts may be bridge between poor alignment and a reduction in injury. Athletes are cued verbally, visually and kinesthetically throughout the course of a season. The purposes of this study are to determine if knee kinematics and kinetics can be influenced by different cueing techniques, and, if influenced, which type of cueing has the largest variance on knee mechanics. Based on previous sports psychology research regarding how athletes learn new movements, we hypothesize that the kinesthetic cue will have the largest effect on knee mechanics. **Methods**: Twenty competitive female soccer players (age 21.9 ± 3.3 years, height 1.68 ± 0.3 m; mass 68.2 ± 8.2 kg) participated in this study. All participants were experienced soccer players (mean experience 4 ± 2.3 years) who were currently participating in competitive soccer. Prior to performing the cutting trials, 48 reflective markers were attached to specific anatomical bony landmarks with cluster plates on both the thigh and shaft. A one-way repeated measures ANOVA was used to analyze relations between variables. **Results**: A significant omnibus F test was observed for knee flexion ROM (KFROM) and peak knee flexion (PKF), respectively, ($F(3,54) = 5.009$, $p = .004$) ($F(3,54) = 3.769$, $p = .016$). Post hoc comparisons revealed that the KIN cue result in higher PNK ($p=.048$) and ROM ($p=.014$), while VIS cue also results in higher PNK ($p=.044$) and higher PKROM ($p= .010$). No other variable showed significant difference. **Conclusion**: Cueing does alter mechanics at the knee. Increases in PKF and PKROM during cutting can be altered with the use of a kinesthetic or visual cue.

3. TIME SPENT IN ACTIVE PROPULSION DURING GAIT SEPARATES FALLERS AND NON-FALLERS.

Murphy, Eryn N.[1], Keeley, David [1]

[1]Biomechanics Laboratory, Department of Kinesiology and Dance,
New Mexico State University.

Purpose: Falls are the number one cause of injury in older adults, and are the leading cause of mortality after injury. This study is aimed at defining a relationship between time spent in active propulsion during gait and the risk of falling in older adults. **Methods**: A total of 274 subjects over the age of 60 years (age; 72.3±8.7yrs, height; 1482.61±19.4cm, mass; 56.89±7.21 kg) were recruited from 12 testing sites across the Southwest United States by the Electronic Caregiver® Mobile Falls Risk Assessment Laboratory. 15 subjects were removed due to data processing issues. Subjects were separated into two groups based on their history of falling (F) or not falling (NF) in the last year and last 3 years. An independent samples t-test was completed to investigate the difference in the percent of the gait cycle spent in active propulsion time (APT). APT was defined as the time from mid-stance to contralateral heel strike. **Results**: There was a significant difference between groups regarding 1-year falls-history (54.967 ± 2.4192% and 46.949 ± 2.5626% non-fallers and fallers respectively, $p<0.035$). There was no significant difference between groups over a 3-year falls-history. **Conclusion**: APT separates fallers and non-fallers over a 1-year falls-history. Individuals that spend a lesser proportion of time in APT are more likely to fall than those who spend a greater proportion. Individuals that have fallen in the last year, spend approximately 8% less of their gait cycle in active propulsion compared to those who have not fallen. This study suggests that by increasing the time spent in active propulsion either in post-fall rehab or pre-fall prevention, the likelihood of falling may decrease.

4. NONINVASIVE INTRACRANIAL PRESSURE FOLLOWING SIMULATED HEAD CONTACT EVENTS.

Watkins, William., Hargens, Alan R., Baird, Shannon., Clary, Erika M., Chang, Douglas G., Macias, Brandon R..

Department of Orthopaedic Surgery, University of California, San Diego

Background and Purpose: Every year about millions of mild traumatic brain injuries (mTBIs) and concussions, occur in sports. Persistently elevated intracranial pressure (ICP) may occur following repeated head contact events and be the driving mechanism for neuropathological processes. The focus of this project is to simulate elevated ICP and employ noninvasive tools to assess cranial fluid pressures in addition to investigating novel mechanisms to reduce brain fluid volume. **Methods:** Fifteen (7F, 8M) healthy adult volunteers (age 19-60 years) were positioned at sitting posture (5 min), supine posture (5 min), 15° head-down tilt (HDT) (5 min), and 15° HDT (10 min) with lower body negative pressure (LBNP) of 25 and 50 mmHg. Fifteen degrees HDT was used to generate a 15 mm Hg head ward hydrostatic pressure gradient and simulate increased ICP. Noninvasive ICP was measured with a device that measures tympanic membrane displacement (Vm) in nanoliters. Internal jugular vein cross-sectional area (IJV CSA) was measured by standard ultrasound. **Results:** ICP and IJV CSA both decreased after exposure to LBNP (25 and 50 mmHg) at 15° HDT. A 40.0% increase in Vm (indicating a reduction in ICP) was evident after 10 minutes of 15° HDT+LBNP (50 mmHg) relative to HDT posture. Further, with respect to 15° HDT posture, 15° HDT+LBNP (50 mmHg) for 10 minutes decreased IJV CSA by 44.5%. **Conclusion:** LBNP mitigates simulated head contact induced elevations in ICP, and cephalic venous congestion, as measured by internal jugular vein cross-sectional area. Therefore, LBNP may be an effective countermeasure and therapy for increased ICP given the theory that elevated ICP, and CSF outflow obstruction are secondary to fluid accumulation in the head/neck musculature and soft tissue. Our results validate a study design and protocol for assessing ICP and head/neck fluid engorgement following head contact events in sports and recreational activities.

5. HIP ENERGETICS OF A GOLF SWING WHEN SWINGING DIFFERENT GOLF CLUBS.

Du Bois, Andrea M. & Salem, George J., FACSM.

Musculoskeletal Biomechanics Research Laboratory, Division of Biokinesiology and Physical Therapy, University of Southern California

Purpose: The power for the golf swing is initiated through near maximal activation of the proximal hip musculature and carried up the kinetic chain. Golfers use various clubs to achieve the differing demands of a course. It is unknown if energetics differ between clubs; therefore, the purpose was to investigate the work of the lead and trail hip during a golf swing with a 7-iron and a driver. **Methods**: 3D kinematics and kinetics were measured in five healthy, young right-handed male recreational golfers while completing 5 golf swings with a 7-iron and 5 swings with a driver. Triplanar negative work (NW), positive work (PW), and mechanical energy expenditure (MEE) were calculated for the lead (LEAD) and trail (TRAIL) hip by summing the energetics across the three planes and a Repeated Measures ANOVA assessed differences ($p \leq 0.05$). **Results**: Driver swings had a significantly shorter swing time, faster club head speed, and further carry distance. There was a significant interaction for NW and MEE, with a trend towards an interaction for PW ($p=0.053$, partial $\eta^2=0.491$). 7-iron LEAD NW was significantly greater than TRAIL. TRAIL PW was significantly greater than LEAD during both swings. LEAD had a significantly greater NW and lesser PW and MEE during a 7-iron swing as compared to a driver. TRAIL NW was significantly greater during the driver swing. **Conclusion**: During a driver swing, NW is distributed between the limbs by decreasing LEAD NW and increasing TRAIL NW as compared to a 7-iron swing. Additionally, driver swings increase the LEAD PW and MEE demands. It is likely that the altered energetics contribute to the enhanced swing performance with a driver. Therefore, current teaching techniques which first introduce irons to novice golfers should be continued and adequate hip muscle strength should be developed before introducing a golfer to a driver.

6. ACUTE EFFECTS OF UNILATERAL STATIC STRETCHING ON HANDGRIP STRENGTH OF THE STRETCHED AND NON-STRETCHED LIMB.

Jelmini, Jacob D.[1], Khodiguian, Nazareth[1], & Cornwell, Andrew[1]

[1]Department of Kinesiology and Nutritional Science, California State University, Los Angeles, CA

Previous research has demonstrated that an acute bout of static stretching can reduce force and power output from the muscles undergoing the stretching treatment. Although the mechanism for this effect remains unclear, evidence has been presented for both neural inhibition and a decrease in muscle stiffness. To further investigate the presence of a neural inhibitory mechanism, the current study focused on the impact of stretching just one limb on both the stretched limb and the contralateral non-stretched limb. It was reasoned that any decrease in force output from the non-stretched side could only be accounted for by neural inhibition as no mechanical adaptation would have occurred. The purpose of our study, therefore, was to observe the effects of an acute bout of unilateral static stretching on handgrip strength and to discern whether a neural cross- over inhibitory effect is present to cause a decrease in force output and rate of force generation from the non-stretched limb. Thirty participants (15 males, 15 females) performed maximum voluntary unilateral handgrip contractions of both limbs before and after stretching the finger flexors of the strength-dominant side only. Each trial was assessed for peak force and associated muscle activity (iEMG), as well as rate of force generation values. Peak force (p = 0.002) and associated iEMG (p = 0.000) decreased by 4.2% and 4.5% respectively in the stretched limb only. However, rate of force generation was significantly impaired in both the stretched (-15.2%; p = 0.000) and non-stretched limbs (-13.9%; p = 0.006) one-minute post-stretch, and remained similarly depressed for both limbs 15 minutes later. We conclude, therefore, that acute stretching negatively impacts rate of force generation more than peak force. Moreover, a reduced rate of force generation from the non-stretched limb indicates the presence of a cross-over inhibitory effect through the nervous system, which provides additional evidence for a neural mechanism.

POSTER PRESENTATIONS

1. TRAINING-INDUCED MODULATION CEREBRAL BLOOD FLOW AND COGNITION

Acosta Gilberto, Benavidez Jose, Christine Dy, Keslacy Stefan

Department of Kinesiology and Nutritional Sciences, California State University, Los Angeles

Exercise may be a means to ameliorate the progression of cognitive decline in older adults, although the mechanisms underlying exercise-induced neuroprotection are not well understood. **Purpose:** (i) To assess cerebral hemodynamics under exercise-induced stress on cognitive function; (ii) To determine the cerebral changes occurring during cognitive tasks; We hypothesized that these effects will be different with training. **Methods:** Right-handed college-aged adults (31 sedentary and 17 athletic) performed 10 minutes of light and moderate (20% and 65% max power) constant-load cycling. Right middle cerebral artery (rMCA) blood flow velocity (CBFv) was continuously monitored during exercise and cognitive test using Transcranial Doppler ultrasonography (TCD). Cognition was assessed using the Cogstate brief battery test: Detection (psychomotor function/ processing speed), Identification task (visual attention), One-card learning (Visual learning & memory), One-back task (working memory) and Groton maze (for visuospatial memory) before and immediately after exercise. **Results:** Exercise increased CBF during 20% with a significant increase of 9.1%($p<.05$) for sedentary participations, nothing for athletes tend to increase. Exercise at 65% decreased CBF with a significant decrease of -9.6%($p<.05$) for athletes. Decrease but not significant for sedentary individuals. Cognitive performance improved significantly during the ONB with a significant increase in reaction time (RT), At 20 and 65% for sedentary and only at 65% for athletes. Speed on the Groton Maze test increased following exercise at 65% however this increase was associated with a significant increase in number of errors in the sedentary participants. Athletes demonstrated increased Groton maze speed however no significant change in errors (1.3%). Athletes also demonstrated an increase in RT for the ONB only following exercise at 65%. **Conclusion:** Training status may demonstrate adaptations to cerebral blood flow and cognition.

3. ACUTE EFFECTS OF ECCENTRIC OVERLOAD ON CONCENTRIC FRONT SQUAT PEAK POWER

Archer, David C., Munger, Cameron N., Leyva, Whitney D., Wong, Megan A., Coburn, Jared W., Costa, Pablo B., Brown, Lee E.

Human Performance Laboratory, Department of Kinesiology, California State University, Fullerton

Eccentric overload is used to enhance strength and power for athletes. The front squat is essential for the power clean, which is used to increase power. **PURPOSE:** To investigate the acute effects of eccentric overload on concentric front squat peak power. **METHODS:** Twenty resistance-trained males (age=23.80 ± 1.82 yrs, ht = 176.95 ± 5.21 cm, mass = 83.49 ± 10.43 kg, 1 Repetition Maximum [1RM] =131.02 ± 21.32 kg) with at least six months experience volunteered. Subjects had to parallel front squat at least 85% of 1.5 times their bodyweight. They performed a dynamic warm up before the 1RM test. Warm-up sets of the front squat were performed with 10 repetitions at 50%, 5 reps at 70%, 3 reps at 80%, and 1 rep at 90% of the estimated 1RM. Eccentric hooks were added to the barbell after the 90% warm up set. Participants were instructed to descend for 3 seconds to the beat of a metronome, until a safety squat device beeped and the eccentric hooks released. Participants performed the concentric phase as fast as possible. Two reps of three eccentric conditions at 105%, 110%, and 120% concentric 1RM were performed in random order with 3 minutes rest between reps. Power for each condition was measured using a force plate. **RESULTS:** Repeated measures ANOVA revealed a significant main effect for condition (P=.036), where peak power at 120% (2225.0 ± 432.38W) was greater than 105% (2021.84 ± 563.54W). The 110% condition (2205.93 ± 461.83W) was not significantly different than the other conditions. **CONCLUSIONS:** Eccentric overload elicited acute peak power enhancements to the concentric action of the front squat. This may have been due to recruitment of larger motor units, increased rate coding of action potentials, or increased muscle spindle activity to increase muscle force.

2. RELATIONSHIP BETWEEN HIP AND KNEE STRENGTH AND SINGLE LEG HOP PERFORMANCE IN WOMEN'S COLLEGIATE BASKETBALL ATHLETES.

Almanza, Morenne, Hua, Anderson, Burns, Karlee, Wu, Wilbur, Vargas, Tiffanye, Nakajima, Mimi.

Center for Sport Training and Research. California State University, Long Beach

Context: Decreased hip and knee control has been shown to affect mediolateral postural sway and forward distance achieved in individuals completing a single leg hop test. Limited research has investigated the relationship between muscular strength and performance in a single leg hop test in the collegiate basketball population. **Purpose:** This study was conducted to determine the relationship between hip and knee strength and distance achieved during a single-hop test in NCAA Division I women's basketball players. **Methods:** Thirteen Division I collegiate female basketball players (age 19.711.20 years; height 175.263.32; mass 71.3612.76 kg) participated in this study. Muscle strength were assessed through manual muscle testing using the handheld dynamometer and normalized based on body weight. Three measurements of hip abduction (ABD), hip internal rotation (IR), hip external rotation (ER), hip extension with knee extended (EKE), hip extension with knee flexed (EKF), knee flexion (KF), and knee extension (KE) were collected and averaged. The subjects then performed three trials of a single-leg hop in the forward direction, maintaining their balance upon landing for two seconds. Maximum hop distance for each leg was recorded. **Results:** A stepwise multiple linear regression was used to test if hip and knee strength significantly predicted distance on single leg hop. Analysis indicated that dominant hip internal rotation ($F(1,10) = 5.528$ $R^2 = 0.356$ $p=0.041$) and non-dominant knee extension ($F(1,10) = 24.084$ $R^2=0.707$ $p=0.001$) were good predictors of single leg hop distance. **Conclusion:** This study showed lower extremity strength can predict distance achieved in a single leg hop. Previous research established a relationship between knee control, hop distance, and mediolateral sway amongst injured athletes. Further studies need to examine the direct relationship between lower extremity strength and balance.

4. FIBER TYPE COMPOSITION & LEG DOMINANCE IN RESISTANCE-EXERCISE TRAINED MEN

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The leg preferred to "kick a ball" is often considered the "dominant leg". However, no study has investigated this phenomenon at the single muscle fiber level. **PURPOSE**: Simultaneously investigated leg dominance and muscle fiber type composition in resistance-exercise trained (RE) men. **METHODS**: Fourteen men (age=24.1±2.6yrs; height=181.6±6.6cm; mass=87.8±10.9kg) answered a leg dominance questionnaire and received muscle biopsies of their vastus lateralis in both their dominant and non-dominant legs. Individual muscle fibers (107.8±34.3 per leg, per person) were isolated under a microscope, and sodium dodecyl sulfate polyacrylamide gel electrophoresis was used to identify their fiber type (MHCI, MHCI/IIa, MHCIIa, MHCIIa/IIx, or MHCIIx) based on myosin heavy chain content. **RESULTS:** Significant differences in MHCI (t (df = 13) = 3.317, p = 0.006) and MHCIIa (t (df = 13) = -3.138, p = 0.008) were identified, where the dominant leg had a higher percentage of MHCI (34.1±10.9% vs. 24.6±15%) and the non-dominant leg had a higher percentage of MHCIIa (54.4±13.3% vs. 62±14.7%) fibers. The dominant leg also had significantly (t (df = 13) = 2.890, p = 0.013) more fibers containing any MHC I isoform (i.e., MHCI and MHCI/IIa) than the non-dominant leg (46.3±17.4% vs. 34.2±14.6%). **DISCUSSION:** When the dominant leg was categorized as the "preferred kicking leg" a higher percentage of the slow-twitch (MHCI) isoforms were present. This is in line with previous research demonstrating more muscle contraction corresponds with more slow-twitch fibers. **CONCLUSIONS:** These results enhance our understanding of leg dominance and the role of fiber type composition in human performance and resistance-trained men. In addition, the asymmetries observed are important considerations when choosing which leg to biopsy when analyzing muscle.

5. COMPARING SMART APPAREL MUSCLE ACTIVITY MEASUREMENTS TO SURFACE ELECTROMYOGRAPHY DURING EXERCISE: PRELIMINARY DATA ANALYSIS

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Introduction: Wearable exercise technologies have gained recent popularity with various forms including, wristband activity trackers, watches, and chest heart rate monitors. Recently, a new form of wearable technology was produced in the form of smart apparel (SA) that can measure muscle activity and muscle activity patterns during exercise. However, with the introduction of this technology being fairly recent, little research exists on its validity. **Purpose**: The purpose of the study is to compare SA muscle activity measurements to surface electromyography (sEMG) muscle activity measurements during exercise. **Methods**: Eleven male participants (Ages 24 ± 4 yrs, Height 179.73 ± 7.07 cm, Mass 80.34 ± 11.11 kg) provided informed consent to participate in the study. During two testing sessions, participants performed a three-minute standardized warm-up, followed by maximal voluntary contractions for the selected muscle groups. Subsequently, participants performed three sets of 12 bodyweight squats and three sets of 12 bodyweight pushups in both SA and sEMG. Participants were allotted up to three minutes of rest in between sets. Conditions (sEMG or SA) were randomly counterbalanced among participants. During the sEMG trial, sensors were placed bilaterally at the following anatomical locations: pectoralis major, medial deltoids, rectus femoris, and biceps femoris. During the SA trial, participants were given the apparel with sEMG sensors attached to the interior of the fabric. Percent of maximal voluntary contractions (%MVC) were measured and calculated for the right side. **Results**: It was determined that there were no significant differences in %MVC between SA and sEMG for each muscle group measured during both pushups and squats ($P > 0.05$). Specifically, the average %MVC difference between the modalities was: 11.5% (R. Pec), 4.5% (R. Delt), 11.9% (R. Quad), and 6.4% (R. Ham). **Conclusion**: Smart apparel muscle activity measurements appear to be consistent with sEMG values.

6. EFFECTS OF 55 day VEGAN OR VEGETARIAN DIET ON VO_2 MAX AND WEIGHT ON EGYPTIAN INDIVIDUALS

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Purpose: Egyptian members of the Coptic Orthodox Church partake in a vegan (sometimes vegetarian) diet during the months of Orthodox Lent (March 7-May 1 2016, 55 days total), while having a normal omnivorous diet otherwise. The purpose of this study was to determine the effects of a short term vegan or vegetarian diet on aerobic performance and weight in Egyptian individuals during this time frame. **Methods**: Eight participants performed a three-minute aerobic step test to determine VO_2 max, and weighed in kg. Three sets of data were taken; set 1 was taken before March 7 and therefore with an omnivorous diet, set 2 was taken week of March 20, and set 3 was taken week of April 24 (during the vegan/vegetarian diet). **Results:** There was no difference in VO_{2max} values (p=0.38) or weight (p=0.38) during the diet intervention. Baseline VO_{2max} was 51.41 ± 15.345 ml/kg/min, set 2 was 46.32± 15.345 ml/kg/min, set 3 was 45.35± 15.345 ml/kg/min; Baseline weight was 77.7 ± 15.35 kg , set 2 was 78.9± 15.35 kg, and set 3 was 79.6± 15.35 kg
Conclusion: Due to the variation between participants we can conclude that diet does not have a statistical significance on VO_2 max and weight in the given time frame of orthodox lent (55 days), despite some minor changes seen between data sets.

7. INFLUENCE OF PROPRIOCEPTIVE PRIMING INTERVENTION ON STRIDE RATE DURING SPRINT STARTS IN ELITE COLLEGIATE SPRINTERS

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Purpose: In sprinting, stride rate and stride length during influence success of the entire run. Since most instruction in sprinting is video-based or consists of verbal instructions, the purpose of this study was to determine investigate the effects of proprioceptive priming in sprint start mechanics. Methods: Three female (age: 20yrs±1.73, height: 1.64m±.07, weight: 58.78kg±9.11) and three male elite sprinters (age: 23yrs±3.464, height: 1.84m±.08, weight: 75.3kg±4.46) from a NCAA Division 1 track and field team participated in the study. Participants performed two baseline trials and two proprioceptive trials involving a resistance band. Joint angles for the rear upper leg (RUL), front upper leg (FUL), rear lower leg (RLL), front lower leg (FLL), and trunk (TR) were measured during set position, RLL at rear foot clear (RFC) and block ankle cross (BAC), FLL and TR at front foot clear (FFC), RLL at ankle cross along with RLL and TR at take-off during first two steps (S1AC, S1TO, S2AC, S2TO). Results: Baseline average stride length for the six sprinters was 1.396m±.188, the proprioceptive average was 1.399m±.184. For stride rate, baseline was 3.12steps/sec±.255 and proprioceptive was 3.06steps/sec±.283. Conclusion: Ideal stride length is 1.25 m and ideal stride rate is 3 steps/second. The analysis showed that the proprioceptive intervention improved stride rate by 0.06 steps per second but brought stride length further away by 0.002 meters.

8. EFFECTS OF VIBRATION TRAINING ON MUSCLE RECOVERY AND EXERCISE INDUCED SORENESS: A SYSTEMATIC REVIEW

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PURPOSE: The positive effects of vibration training (VT) on improving strength and muscle performance are widely documented; however, its ability and feature to diminish the effects of Delayed Onset Muscle Soreness (DOMS) and to initiate muscle recovery has not been thoroughly correlated. **Data Sources** Systematic literature searches for randomized controlled trials between 2009-2014 were performed in the databases of: SOLAR (CSS Library), CINAHL and PubMed between July15 to July 26, 2014. **Study Selection and Data Extraction** Five randomized controlled trials with a total of 163 subjects supported strong evidence with the use of VT to diminish DOMS. **Data Synthesis and Conclusions** The studies presented moderate evidence for the use of VT in muscle recovery parameters of: power, explosive muscle ability, return of strength and maximal voluntary isometric contraction as well as ROM. This review found no evidence on the effects of VT on limb circumference. Vibration Training (VT), when compared to exercise such as a standard sport cool down or treadmill walking, had no significant difference on the return of muscle function measured in terms of strength and power. The same studies however, showed VT had significantly faster recovery time compared to the control (no intervention) group.

9. ACCUTE EFFECTS OF PLYOMETRIC EXERCISE ON GLYCEMIC CONTROL

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INTRODUCTION: Short duration, high intensity exercise has been implemented in various weight-loss programs. Although traditional plyometric training is not prescribed for weight loss, exercises such as jumping are popular in commercial programs. However, the effect of plyometric exercise on blood glucose levels is unknown. **PURPOSE:** To investigate the effect of plyometric exercise on glycemic control. **METHODS:** 10 subjects (3 females age= 24.7 ± 2.9 yrs.; height= 163.0 ± 9.5 cm; mass= 61.1 ± 7.5 kg and 7 males age= 24.1 ± 2.4 yrs.; height= 181.2 ± 5.4 cm; mass= 89.2 ± 10.6 kg) completed five sets of ten maximal effort countermovement squat jumps (SJ) with 50 seconds rest between sets or, alternately sat quietly (SIT) for the time equated to the SJ duration (~4min). Immediately following SJ or SIT, participants drank 75g of anhydrous glucose in 100ml of water (drink). Test order was randomized. Blood glucose measurements were taken via finger prick and analyzed by an Accu-Chek Performa device 10 minutes after quiet sitting, immediately post SJ or SIT, and 5, 15, 30, 60, and 120 min post drink. **RESULTS:** A 2x7 (condition x time) ANOVA revealed a significant interaction where SJ (154.7 ± 22.6 mg/dl) blood glucose levels were greater at 60 minutes post drink compared to SIT (139.8 ± 21.1 mg/dl). A pairwise comparison for SIT revealed that 5 (116.5 ± 13.4 mg/dl), 15 (114 ± 18.4 mg/dl), 30 (161.4 ± 22.9 mg/dl), and 60 (139.8 ± 20.1 mg/dl) min were significantly greater than baseline (98.3 ± 6.3 mg/dl). A pairwise comparison for SJ revealed that 5 (106.7 ± 9.5 mg/dl), 15 (133.3 ± 23.2 mg/dl), 30 (166.1 ± 26.2 mg/dl), and 60 (155 ± 23.8 mg/dl) min were significantly greater than baseline (94.1 ± 7.4 mg/dl). **CONCLUSIONS:** The current plyometric protocol increased post-exercise blood glucose levels at 60 minutes, which may be due to sympathetic nervous system activity associated with exercise or the conversion of blood lactate to glucose in the liver. Sympathetic nervous system activation can increase liver glycogenolysis, thus breaking down more glycogen into glucose and increasing blood glucose volumes.

10. LANDING ERROR SCORING SYSTEM AND HIP STRENGTH IN WOMEN'S COLLEGIATE BASKETBALL PLAYERS

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Context: Decreased hip strength and high Landing Error Scoring System (LESS) scores have both shown to predispose athletes to injury. The LESS is a commonly used clinical assessment tool for jump-landing biomechanics related to injuries. The relationship between LESS scores and hip strength in athletes has not been thoroughly investigated. **Purpose:** The purpose of this study is to determine if hip strength influences LESS scores. **Methods:** Eleven Division I female basketball athletes (age: 19.82 ± 1.17 years; height: 68.82 ± 3.09 cm; weight: 68.93 ± 9.02 kg) participated in the study. Hamstring (hip extension with knee extension; HEKE) and hip internal rotation (IR) and hip external rotation (ER) strength was measured using a hand held dynamometer and normalized by body weight. The participants then performed a double-legged jump from a 30cm box at a distance of half of their body height. Immediately after landing, they performed a maximal vertical jump. The jumps were scored using the modified LESS. Participants were grouped into either low or high LESS scores. **Results:** An independent t-test showed significant differences between HEKE strength for the left leg, low LESS (25.48 ± 1.22 %BW) had higher scores than the high LESS (19.53 ± 3.58); $t(9) = 3.53$ $p = .006$. Another showed HEKE right leg low LESS (26.25 ± 2.84 %BW) also had higher strength than high LESS scores (21.03 ± 4.07 %BW); $t(9) = 2.41$ $p = .039$. Low LESS had increased left hip IR (15.83 ± 2.40 %BW) compared to the high LESS group (12.23 ± 0.86 %BW); $t(9) = 3.41$ $p = .008$. **Conclusion:** Increasing hamstring strength may influence the ability to land with proper mechanics, which improves LESS scores and may ultimately prevent injuries.

11. ELASTIC-CORD ASSISTANCE PROVIDES SUSTAINED SUPRAMAXIMAL-SPRINT SPEED EVEN AFTER ASSISTANCE HAS LAPSED.

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Purpose: Assisted-sprint training using elastic cords has been widely used in many soccer-speed development programs. Research has investigated the effects of this overspeed-sprint running while assisted. However, investigations into sprint-running speed once elastic cords cease to provide assistance is limited. The current investigation examined sprint-running speed once elastic cords cease to provide assistance. **Methods**: Thirteen collegiate women soccer players (age: 19.61±1.04 yrs; ht: 157.10±5.98 cm; body mass= 52.90±3.77 kg) performed a dynamic warmup and then executed a 20m bodyweight sprint with 5m splits recorded, rested one minute, then ran another 20m sprint at 30% body weight assistance. Elastic assistance was no longer provided after five meters when the cord fell off. **Results**: The assisted condition (AC) resulted in increased sprint running speed compared to the bodyweight condition (BC) across all splits even when the cord fell off. 0-5m (BC: 1.24 ± 0.06s; AC: 1.07± 0.10s); 5-10m (BC: 0.86 ± 0.06s; AC: 0.79 ± 0.07s); 10-15m (BC: 0.77 ± 0.05s; AC: 0.75 ± 0.07s); and, 15-20m (BC: 0.74 ± 0.06s; AC: 0.73 ± 0.08s). **Conclusion**: Assisted sprinting with elastic cords appears to have a "catapulting" effect, which propels the athlete faster than baseline sprint-running speeds even when assistance is no longer provided.

12. MUSCLE QUALITY AND ENDURANCE TRAINING: A CROSS-SECTIONAL EXAMINATION IN COLLEGIATE CROSS-COUNTRY ATHLETES

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Purpose: Muscle force is directly related to muscle size, but muscle quality determines how efficiently a muscle is working. Muscle quality (MQ) is the division of strength by muscle size, providing the opportunity to equivalently compare muscle function and structure. Previous assessments involving age and physical activity levels have shown to affect changes in MQ. The purpose of this study was to determine whether sex or endurance training has an effect on muscle quality. **Methods:** Collegiate cross-country runners (males=18, females=17) and normally healthy college student controls (males=89, females=90) participated (8.9±0.9 yrs) in the study. Non-mineral lean mass of the arms was assessed via DXA and combined grip strength was determined from the best of three trials for each hand with at least one minute in between subsequent trials. Combined grip strength divided by the combined lean mass of the arms determined MQ. **Results:** As expected, males were significantly higher in height and weight (178.5±7.5 cm, 72.0±8.9 kg; 163.9±6.4 cm, 60.6±10.1 kg), and the non-athletes demonstrated higher weight and BMI (67.3±11.1 kg, 22.9±2.9 kg/m^2; 60.3±9.0 kg, 20.9±1.5 kg/m^2). In total, males were significantly stronger (83.5±15.0 kg vs. 56.7±8.8 kg), however, the female's MQ was significantly higher than the males' (12.8±2.1 vs. 14.6±2.1). The MQ of athletes was significantly higher than that of non-athletes (13.6±2.3 vs.14.5±1.8). There was no significant group-gender effect. **Conclusion:** The difference between the athlete and non-athlete groups implies a positive relationship between elite-level endurance training and MQ. The causation, however, could go either way, with training causing the increase in MQ, or individuals with inherently higher MQ being more likely to pursue elite-level sports. Even with a MQ difference between genders, the lack of a group-gender effect implies training does not affect the MQ of males and females differently.

13. MONOZYGOUS TWINS WITH 30 YEARS OF DIFFERING EXERCISE BACKGROUNDS.

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PURPOSE: To enhance our understanding of heritability and adaptability of various performance factors we analyzed the physiological profile of a set of monozygous twins with 35 years of differing exercise habits. **METHODS:** A portable brightness mode (B-mode) ultra sound machine (GE/Logic e, Wauwatosa,WI) with a 10-MHz linear array probe was used to image and determine muscular cross sectional area (CSA), muscle thickness (MT), and echo intensity (EI) of the vastus lateralis. The researchers then marked a line at the midpoint of the lateral knee joint surface and the anterior superior iliac spine. CSA, MT, and EI of each location was determined by the mean of the three measurements for each location. Vastus lateralis CSA, MT, and EI was the mean value of the three locations. **RESULTS:** The data from the TT (trained twin) versus the UT (untrained twin) showed a similar average CSA and MT values (-4.45 and -4.50 % diff. respectively). EI between the TT versus UT resulted in a significant difference between values (18.41 % diff.). **CONCLUSION:** TT and UT demonstrated similar vastus lateralis CSA and MT measurements. EI was greater in TT compared to UT. EI is often taken a measure of muscle quality with lower numbers representing higher quality compared to higher numbers. EI is negatively correlated with strength independent of muscle CSA. These results align with the greater force produced by UT during IMVC.

15. DETERMINING THE OPTIMAL WORK RATE FOR CYCLE ERGOMETER VERIFICATION PHASE TESTING IN MALES WITH OBESITY

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Purpose: The applicability of verification phase (VP) testing as a means to confirm the attainment of a 'true' VO_{2max} in males with obesity is widely unknown due to only two previous published studies on this population. The aim of the present study was to assess the validity of verification phase testing on separate days in males with obesity and determine the optimal work rate at which the highest VO_{2max} can be elicited. **Methods**: Nine healthy males with obesity between the ages of 18 and 35 (age = 24.1 ± 6.1 years; body mass index [BMI] = 33.2 ± 4.2 kg□m^{-2}) performed a ramp-style VO_{2max} test on the cycle ergometer followed by four randomly assigned constant power (verification phase) tests on separate days. VP tests were set at 80, 90, 100 and 105% of maximal wattage (W_{max}) attained during the ramp test. **Results**: All participants but one attained a higher, but not significant, VO_{2max} (L/min) during a VP test to values elicited during the initial ramp test. A trend (p=0.06) was shown for VO_{2max} during the 90% (3.61 ± 0.54 L/min) VP to be higher than the ramp (3.37 ± 0.39 L/min). A trend (p=0.06) was also seen for VO_{2max} during the 90% VP (3.61 ± 0.54 L/min) to be higher than the 105% (3.41 ± 0.53 L/min) test. HR_{max} was significantly lower during the 105% VP (170 ± 17 b□min^{-1}) compared to the 80% (177 ± 16 b□min^{-1}, P=0.02) and 90% (176 ± 14 b□min^{-1}, P=0.02) VP tests. **Conclusion**: Verification phase tests at submaximal work rates, of 90% of W_{max} attained during the ramp test, may elicit the highest VO_{2max} and HR_{max} in males with obesity. Using a verification test in this population may provide more accurate VO_{2max} results as well as more accurate HR based exercise prescriptions.

14. THE ACUTE EFFECTS OF HIGH-INTENSITY INTERVAL AND MODERATE-INTENSITY CONTINUOUS EXERCISE ON MEASURES OF VASCULAR FUNCTION

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Flow mediated dilation (FMD), low-flow mediated constriction (L-FMC), and the composite end point of vascular reactivity (COM) are all non-invasive assessments of vascular function. The acute responses of these measures to high-intensity interval exercise (HIIE) and moderate-intensity continuous exercise (MOD) are unknown. Sixteen healthy males (Age: 22.5±3.2 years, BMI: 25.5±3.0, VO_{2max}: 43.6±6.2 ml/kg/min) completed an incremental exercise test followed by 2 randomly assigned exercise visits: 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. Changes in brachial artery baseline diameter (Base), peak diameter (Peak), and minimum-occlusion diameter (MIN) as well as FMD, L-FMC, and COM were measured via high-resolution ultrasound. Base decreased after HIIE (Pre: 4.46±0.36, Post: 4.37±0.39 mm, P=0.04), but not after MOD (Pre: 4.48±0.47, Post: 4.35±0.38 mm, P=0.19). Peak decreased with MOD (Pre: 4.76±0.52, Post: 4.53±0.35 mm, P=0.04), but not with HIIE (Pre: 4.7±0.33, Post: 4.68±0.32 mm, P=0.80). MIN decreased after HIIE (Pre: 4.45±0.37, Post: 4.32±0.33 mm, P=0.02) and showed a trend for decrease after MOD (Pre: 4.47±0.52, Post: 4.27±0.42 mm, P=0.06). No acute changes were seen with FMD or L-FMC within either group. COM increased after HIIE (Pre: 5.64±3.21, Post: 8.57±3.16%, P<0.01) but not with MOD (Pre: 6.62±2.86, Post: 6.16±4.69%, P=0.56). Exercise x time interactions were observed for COM (P=0.02), Peak (P=0.05), and a trend for FMD (HIIE-Pre: 5.44±4.11, Post: 7.58±5.99% vs. MOD-Pre: 6.3±2.89, Post: 4.2±5.75%, P=0.09). HIIE led to vasoconstriction of the brachial artery immediately post exercise, no change in vasoconstriction during cuff occlusion, and no change in Peak even with the lower starting diameter. MOD led to similar results except for a decrease in Peak resulting in lower COM and FMD compared to HIIE. HIIE may have a unique effect of acutely enhancing vascular reactivity.

16. IMPROVEMENT IN FUNCTIONAL EXERCISE CAPACITY DIFFERS BY ATTENDANCE DURATION BUT NOT INTAKE DIAGNOSIS IN A HOSPITAL-BASED PHASE II OUTPATIENT CARDIAC REHABILITATION PROGRAM

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Purpose: Investigate differences and interactions between intake diagnosis and time-to-completion on functional exercise capacity (FEC) in a hospital-based outpatient cardiac rehabilitation (CR) program in New Mexico. **Methods**: During a 12-month span, 13 women and 47 men eligible for participation in a CR program completed all authorized 36-sessions in the Phase II CR program. Eligible diagnoses were: heart failure (HF), acute coronary syndrome (ACS), and cardiothoracic surgery (CT). A treadmill protocol was used to assess differences between FEC at intake and following completion of the program. FEC was determined by the attainment of an RPE of 15 (Borg 6-20 scale) and reported in METs. Data were de-identified prior to collection and analyses. Patients were separated into groups based on time-to-completion (≤4mo and >4mo) and diagnosis. Group-specific independent *t-tests* were initially applied to examine changes in FEC by diagnosis and time-to-completion. All groups significantly improved FEC (p<.05). A 2 (time) by 3 (diagnosis) ANCOVA was applied to assess group differences and interactions for Post-FEC, controlling for Pre-FEC values as the covariate. **Results**: Sixty patients (60.6 ± 11.0 yrs, 171.4 ± 9.1 cm, 80.2 ± 17.4 kg) completed the CR program during the 12-mo period. Adjusted group means (95%CI) for Post-FEC in METs in ≤ 4mo (n=41) and > 4mo (n=19) groups were 8.03 (7.66-8.79) METs, and 6.71 (5.83-7.60) METs, respectively. Adjusted group means (95%CI) for Post-FEC in METs among HF (n=16), ACS (n=30), and CT (n=14) groups were 7.78 (6.89-8.68) METs, 7.62 (6.94-8.29) METs, and 7.01 (5.90-8.12) METs, respectively. Results indicate a significant (F (1,53) = 8.19, p = .006, partial η^2 = .134) effect between Post-FEC and time-to-complete. **Conclusion**: A completed hospital-based outpatient CR program elicited positive health outcomes across intake diagnoses. Completing the sessions in 4mo or less produced the greatest improvement in FEC regardless of intake diagnosis.

17. COMPARISON OF BRAIN ACTIVITY DURING EXERCISE AND VIRTUAL REALITY

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Exercise has been well established to benefit people suffering from brain-related disease such as dementia. However, it is not always possible for patients to exercise at an intensity that would be beneficial. Virtual Reality (VR) is booming and may represent a new therapeutic modality to stimulate the brain. To our knowledge there has yet to be a study that links cerebral activity, VR and exercise. **Purpose:** to compare cerebral activity using electroencephalogram (EEG) during virtual reality game and exercise. We hypothesized that VR could generate a comparable pattern of cerebral activity.
Methods College age adults played a virtual reality game (VR Flight Sim Google Cardboard). They also performed a steady state exercise at 20% or 65% of maximal power output (Monark 828E). Alpha wave frequency (8-13Hz) was collected and analyzed using the international 10-20 system (Mobita TMSi Conficap and Acqknowledge 4.4) in the region of interest (Channels 1-7 sampled at 250Hz). Alpha was continuously analyzed during last two rest conditions (eyes opened & closed) and last three minutes of VR game and exercises. Results: In this pilot study we found that the VR game had an effect on increase the Alpha waves. There were a trend for a correlation between the 7 channels signal during VR and exercise. **Conclusion**: We will recruit more subjects and test our hypothesis that brain activity during VR could effectively be correlated with brain activity during exercise.

19. CORRELATION BETWEEN ANKLE POWER AND ANKLE STRENTH IN COLLEGIATE CROSS COUNTRY RUNNERS

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Ankle power may be an indicator of running performance, but collecting the data is an expensive and involved process. A more functional gauge of performance may be ankle strength, which provides a quicker, more accessible measure. **Purpose:** The purpose of this study was to identify whether a correlation exists between ankle power and ankle strength in collegiate cross country runners. **Methods**: 5 female intercollegiate cross country runners granted written consent. Isokinetic testing of the right ankle to determine maximal concentric plantarflexion and dorsiflexion strength (3 reps; 30°/sec; Humac Norm3; CSMI, Stoughton, MA) was collected at mid-season. The maximum torque values of all trials was selected. Kinematic and kinetic data collection consisted of participants running along a 10-meter runway embedded with 3 force platforms (1000 Hz, AMTI, Watertown, MA, USA) at a targeted velocity of 3.5 m/s and occurred 2 months later during post-season. Kinematic data were collected via three-dimensional motion capture (200 Hz, Vicon, MX and Vantage, Oxfordshire, UK) and photoelectric timing gates (Lafayette). Trials were individually processed using Vicon Nexus software (version 2.2.3, Oxfrodshire, UK). Trajectory data were interpolated, filtered and processed through Visual 3D (version5, Germantown, MD). Ankle power was calculated using the distal and proximal segments. Peak maximum and minimum ankle power were extracted from the stance phase. **Results:** Mean plantarflexion strength was 45 Nm/kg. Mean dorsiflexion strength was 23.4 Nm/kg. Mean ankle power during propulsion was 750.8 joules and during absorption was -504.6 joules. There was a high positive correlation between plantarflexion strength and propulsion ankle power (0.88). There was a weak negative correlation between dorsiflexion and absorption ankle power (-.019). **Conclusion:** Given that 88% of power can be explained by strength, these results suggest that measuring ankle strength may be a useful tool in evaluating running performance.

18. EXCESS POST-EXERCISE OXYGEN CONSUMPTION FOLLOWING BOUTS OF MODERATE AND VIGOROUS CLIMBING

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Purpose: It has been observed that sustained, steady-state, rock climbing elicits a mean oxygen consumption (VO2) of 20–25ml•kg^{-1}•min^{-1} and VO2 remains elevated into the post-climb recovery period for as much as 10-min (1). To our knowledge, the extent of metabolic recovery time has not been examined following vigorous climbing activity. The purpose of this investigation was to compare excess post-exercise oxygen consumption (EPOC) following bouts of rock climbing at moderate intensity and vigorous intensity. **Methods:** Ten experienced climbers (male=7, female=3, age: 24.5±5, height: 177.4±8.4cm, mass: 70±11.25kg) performed 15min of seated rest to obtain baseline VO2 measures, followed by an indoor rock-wall climb at a self-regulated moderate pace for 10min while connected to the Cosmed k4b2 portable metabolic analyzer. Recovery VO2 was recorded for 15min immediately following the climb. A climb of maximal effort was then conducted across the same distance covered in the steady-state climb and VO2 was recorded for 15min immediately following the maximal climb. All testing was performed in the morning between 0600-1000h. EPOC duration and the magnitude were calculated for both climbs. A within-subjects dependent paired-samples t-test was used for data analysis ($p \leq 0.05$). **Results:** Significance was observed for EPOC magnitude (steady-state = 65.93±25.32 mL O2, maximal effort = 85.88±23.24 mL O2, p=0.23). No significance was observed among duration of EPOC (steady-state = 11±2.75 min, maximal effort = 12.6±2.76 min, p=0.129). The time of completion for the maximal climb was 22% faster than the steady-state climb (7:47.3min±0.002). **Conclusion:** The maximal climb elicited a greater EPOC magnitude response with a lower time of activity. Climbing at near-maximal intensity requires 23% more oxygen post-exercise compared to the steady-state climb; which may elicit a change in substrate utilization during recovery.

20. THE ACUTE EFFECTS OF NUTRITION LABELS ON BEVERAGE CONSUMPTION IN A COLLEGE CAFETERIA

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Previous research is inconsistent in determining if nutrition labels on food and beverages influence consumer behavior. **Purpose**: To determine the acute effect of nutrition labels on consumer beverage consumption in a college cafeteria setting. **Methods**: Consumption of 13 beverages in a university cafeteria was recorded over a two-week period. Week one acted as a control week (CW) and week two as an experimental week (EW). Nutrition labels were placed above beverage dispensers after the CW. Beverages included five enhanced water, five milk, and three juice options. Daily consumption was measured by tracking the total amount of beverage restocked divided by the number of cafeteria patrons (mL/number of patrons). In addition, to better understand the effect of the nutrition labels a three question follow up survey was administered at the end of the two weeks in the cafeteria during dining hours (N=150). One-way ANOVAs were employed for significance testing. **Results**: Passion orange guava (POG) was the only beverage to have a significant difference in consumption between the CW (3.73±1.21) and EW (2.11±1.44), p=0.41. No other enhanced water flavor, type of milk, or juice significantly differed in consumption, p>0.5. Overall, total beverage consumption did not significantly differ between the CW (19.57±4.76) and EW (16.80±9.43), p=0.502. The results of the survey indicated 95% of cafeteria patrons noticed the nutrition labels, but 78% responded the nutrition labels did not influence their behavior towards selecting a particular beverage or the quantity of the beverage consumed. However, 61% of all the respondents preferred having nutrition labels available. **Conclusion**: Nutrition labels appear to have an acute influence to decrease beverage consumption of POG, but not beverages such as milk, enhanced water, or other juices. Further research is needed to determine why nutrition labels may influence the consumption of some products, but not others.

21. EFFECTS OF ATHLETIC TAPE, LUEKOTAPE P, AND PROPYLACTIC BRACING DURING A DYNAMIC POSTURAL CONTROL TEST

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Context: Athletic tape(AT), leukotape P(LEU), and prophylactic ankle bracing(BR) are commonly used in sport activity where dynamic postural control is important in optimal performance. The relationship between balance and these different types of tape and bracing have not been extensively studied. Purpose: The purpose of this study was to examine the effect of no intervention (NO), AT, LEU, and BR on modified Star Excursion Balance Test (SEBT) reach distance. **Participants:** Twenty-four healthy volunteers (9 males, 15 females; age:22.13 ± 2.37 years; height:164.99 ± 8.71 cm; mass:70.06 ± 12.42 kg) who were self-reported recreationally active and have not experienced a lower extremity injury in the past six months participated. **Methods:** NO, AT, LEU, and BR were applied during four randomized trials. Reach distance during a modified SEBT were recorded for individual directions and as composite scores for each leg and standardized by leg length. **Results:** One-way repeated measures ANOVA showed a significance F omnibus value between type of tape and reach distance for right composite score, F(3, 20) = 10.071, p =.000, right anterior reach F(3, 21)= 7.082, p=.002, and left anterior reach F(3, 21) = 6.231 p=.003. Post hoc comparisons revealed that AT condition had significantly less right composite score compared to LEU condition; t(22) =- 3.85, p =.001 and BR condition; t(22) =-4.12, p=.000. Right anterior reach for AT condition was less than NO, t(23) =4.179, p =.000 and BR condition), t(23) =-3.045, p=.006. Left anterior reach for AT was also less compared to NO, t(23) =4.579, p= .000; and LEU; t(23) = -3.690, p= .001. **Conclusion:** AT is often used to address ankle instability, however it may limit dynamic postural control stability. Using other tape or braces may exhibit the same stabilizing effect without impeding dynamic postural control.

22. THE RELATIONSHIP BETWEEN MAXIMUM PULL-UP REPETITIONS AND FIRST REPETITION MEAN CONCENTRIC VELOCITY

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Introduction: Mean concentric velocity (MCV) of exercise execution has been used by strength and conditioning professionals to improve exercise technique, provide accurate feedback, and predict exercise one repetition maximum. There is limited research on velocity based training and no relevant research on the pull-up exercise. **Purpose:** To determine if the maximum number of pull-ups an individual can perform can be predicted by the MCV of a single pull-up repetition. **Methods:** Participants recruited consisted of 56 rested, healthy subjects, who reported they could do at least two pull-ups. Seven participants were excluded from the final analysis, because they could not complete two repetitions using the standardized pull-up technique, were not currently injury free, or had not rested their upper body for 48 hours prior to training. Each subject performed a standardized warm-up, a single repetition, followed by one set of pull-up repetitions to failure. The GymAware Powertool, a linear position transducer (LPT), was used to assess the MCV of each pull-up repetition. Both the MCV of the single repetition and first repetition of the set to failure were recorded, and the greater of the two was used in later analysis. Weighted least squares linear regression was used to assess the relationship between the single repetition MCV and maximum amount of pull-up repetitions. **Results:** The maximum number of pull-ups a person can perform can be calculated by the MCV of a single pull-up repetition (Y= -6.661 + 25.556x, r^2 = 0.841). **Conclusion:** Prediction of maximum pull-up number by a single repetition rather than testing maximal pull-up number may improve efficiency and effectiveness of exercise testing batteries for military, police, firemen, and other populations.

23. PROPRIOCEPTIVE TRAINING EFFECTS ON GROUND AND AIR TIME DURING SPRINT STARTS

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Purpose: The purpose of this study was to evaluate the effectiveness of proprioceptive feedback in improving sprint start mechanics. Currently, there have been few research studies to determine the effectiveness of proprioceptive training on sprint performance. This study investigates the effects of proprioceptive priming on ground time and air time during the initial phase of a sprint start. **Method:** Three males [Age: 23 ±3.46y, Height: 1.84 ± 0.08m, Mass: 75.3 ± 4.46kg] and three females [Age: 20 ± 1.73y, Height: 1.64 ± 0.07m, Mass: 58.79 ± 9.11kg] from a NCAA Division 1 track and field team participated in the study. After completing a warm-up, participants performed two baseline and two trials that followed proprioceptive priming. Whole body kinematics were recorded with a 12-camera motion capture system sampling at 250Hz. Ground and air time values during block clearance (BC), step 1, and step 2 were compared against the "ideal" values from Mann, 2013. Ground time values close to the ideal reflect a greater ability to produce force in the horizontal direction. Ideal air times minimize the vertical component of motion, resulting in more opportunities for the sprinter to produce force in the horizontal direction. **Results:** The proprioceptive training intervention resulted in a general increase in ground time as compared to baseline values and allowed the sprinters to obtain values within 0.65s to the ideal. Post-intervention air times showed a general increase as well, resulting in air time values within 0.16s to the ideal during all three measured phases of the sprint start. **Conclusion:** Proprioceptive training resulted in an improvement in ground time values during the sprint start. Further research is needed to determine whether the proprioceptive intervention can decrease air time and have a long term learning effect.

24. BASEBALL SWING VELOCITY MEASURED BY ZEPP® VS. TIMING LIGHTS

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In baseball, swing velocity is an important component of successful hitting. The Zepp® system makes information instantly available and easily accessible. **PURPOSE**: This study determined swing velocity and the accuracy of the measurements taken from the Zepp®, as compared to a criterion standard of timing lights. **METHODS**: Seven NAIA collegiate baseball players participated in this study (Mean ± SD, age = 20 ± 1.2 years, height (cm) = 178 ± 7.1, weight (kg) = 84.1 ± 14.6). Data was collected from the Zepp® sensor device and a custom bat velocity measurement device utilizing timing lights, (Model E3Z; Omron Electronics, Schaumburg, IL). Each participant performed 9 swings through the timing lights with the Zepp® sensor attached to the bat. Hitters were instructed to perform the 9 swings at varied intensities with 30 seconds of rest in between each swing. The first three swings were 50% of the player's maximum effort, the next three at 75%, and the last three swings at 100% effort. **RESULTS**: Reliability tests of each Zepp® and timing lights swing trials were averaged using intraclass correlation (ICC) (Zepp® ICC = .87; Timing lights ICC = .94). There was no statistically significant correlation between the Zepp® and timing lights at the max batted velocity (p = .076). Pearson's r correlation showed that there was a moderate positive correlation between Zepp® and timing lights at maximum effort (r = .706). **CONCLUSION**: The results of the study indicate that there is no significant relationship between the Zepp® and timing lights. Mean measurements of the two variables differed from each trial each was reliable.

25. EXPLORING REACTION TIME DIFFERENCES ACROSS SPORT IN UNIVERSITY ATHLETES

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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 (e.g. volleyball, softball, baseball, rugby), RT is a key component of effective competitive play. The current study sought to compare differences in RT across sports in university athletes. **Methods:** Student athletes volunteered to complete RT testing within a controlled setting (volleyball n = 15, softball n = 24, baseball n = 5, rugby n = 9). The MOART Reaction Board was used to measure simple RT with both the right and left 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 30 trials. **Results:** A one-way ANOVA revealed significant differences in RT across groups (Right hand: $p<.01$, $F_{(3,53)}=50.9$); Left hand: $p<.01$, $F=_{(3,53)}$ 58.2). Tukey post hoc comparisons revealed differences between all sports except baseball and rugby ($p<.01$). Baseball and rugby were faster than volleyball or softball. Mean RT for each sport is as follows: volleyball (right = 253(51)ms, left = 255(53)ms), softball (right = 234(38)ms, left = 240(41)ms), baseball (right = 228(44)ms, left = 223(34)ms), rugby (right = 220(34)ms, left = 217(34)ms). **Conclusions:** Baseball and rugby athletes have faster RT than volleyball or softball likely due to gender differences which are well documented in the literature.

26. EFFECT OF BREATHING APPARATUS ON THE PATTERNS OF RESPONSE FOR PHYSIOLOGICAL VARIABLES DURING AN INCREMENTAL TEST TO EXHAUSTION

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Purpose: To examine the patterns of responses for physiological variables during an incremental treadmill running test to exhaustion utilizing both a mouth piece (MP) and breathing mask (MSK) apparatus. **Methods:** 16 subjects (MSK: mean ± SD age: 20.8 ± 1.3 yrs; 73.2± 9.7 kg; 175.3± 8.3 cm; MP: mean ± SD age: 21 ± 0.9 yrs; 62.2 ± 7.6 kg; 171.5 ± 6.4 cm) performed an incremental treadmill running test to exhaustion for the determination of maximal oxygen consumption (VO_{2peak}), and peak values for heart rate (HR_{peak}), breathing frequency (Fb_{peak}), and respiratory exchange ratio (RER_{peak}). All submaximal values from the incremental test were normalized as a percent of their peak value (value corresponding to VO_{2peak}), and data points were normalized across subjects and represented as a percent of time to exhaustion (T_{lim}: 20, 30, 40, 50, 60…100% T_{lim}). Statistical analysis included polynomial regression analyses to determine the patterns of responses for the physiological variables in MP and MSK conditions. **Results:** There were significant, positive, linear relationships for mean, normalized VO_2 (r^2 MP=0.99 and r^2 MSK= 0.99; $p < 0.01$) and HR (r^2 MP =0.97 and r^2 MSK=0.99; $p < 0.01$) versus T_{lim} during the incremental tests to exhaustion. There were significant, positive, quadratic relationships for mean, normalized F_b (R^2 MP=0.98 and R^2 MSK=0.99; $p < 0.05$ and $p < 0.01$, respectively) and RER (R^2 MP=0.99 and R^2 MSK=0.99; $p < 0.01$) versus T_{lim}. **Conclusions:** VO_2 and HR followed the same pattern of response (linear), while F_b and RER exhibited quadratic patterns for both MP and MSK conditions. These findings indicate that there are differences in the patterns of response among physiological variables, but that there is no effect of breathing apparatus on the patterns of responses for VO_2, HR, F_b, and RER during an incremental test to exhaustion.

27. THE EFFECTS OF LOWER BODY FATIGUE ON VERTICAL JUMP GROUND REACTION FORCES

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Introduction: Ground reaction forces may be used as an indicator of lower body performance and fatigue. It is known that a decrease in force-generating capacity of the musculature is an indicator of fatigue. Therefore, the purpose of this investigation is to determine the effects of lower body fatigue on ground reaction force measures. **Methods**: Nineteen recreationally trained males and females participated in a combined familiarization and testing session. During familiarization, participants signed an informed consent and anthropometrics were recorded. Participants then performed a dynamic warm-up and were familiarized with the two types of vertical jumps and fatiguing protocol. Three trials for both the static jump (SJ) and countermovement vertical jump (CMVJ) were performed on a force plate, pre and post Bosco fatigue test. The dependent variables calculated from the force plate were rate of velocity development (RVD), peak force (PF), impact force (IF), peak velocity (PV), and peak power (PP). Paired-sampled t-tests were used to analyze pre/post differences for each dependent variable. **Results:** There was a significant difference between pre and post PF ($p>0.003$), IF ($p>0.001$), peak velocity ($p>0.002$), and PP ($p>0.001$) measures for CMVJ. There was a significant ($p>0.001$) difference between pre and post measures for SJ peak force**. Discussion:** For CMVJ, the Bosco protocol significantly decreased PF, IF, PV, and PP. The fatigue protocol also significantly decreased PF for SJ. This is due to the decrease in force generating capacity in the lower-body musculature following fatigue. A decrease in force production may lead to an overall increase in injury risk. As force production decreases, so does the ability to maintain proper mechanics. This study shows performing a fatiguing activity, such as the 60s Bosco protocol, significantly alters force production in recreationally trained populations, indicating that programming high-intensity multi-joint activities before maximal vertical jump performance can lead to muscle fatigue.

28. CHARACTERIZATION OF REGIONAL SKIN TEMPERATURES IN RECREATIONAL SURFERS WEARING A WETSUIT

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Purpose: The dynamic nature of surfing exposes the body to variable rates of convective heat loss through both water and air. Currently, there is a paucity of research regarding the thermoregulatory responses to prolonged partial submersion in seawater while surfing. The purpose of this study was to investigate skin temperatures across surfers' bodies while wearing a wetsuit during recreational surfing. **Methods**: Forty-seven male recreational surfers were recruited and agreed to participate in this study (Age: 30.6±9.3 years, Height: 1.78±0.07 m, Weight: 77.4±7.6 kg, Years surfed: 14.1±10.1 years). Participants were instrumented with eight wireless iButton thermal sensors [chest, back, lower abdomen, lower back, arm, forearm, thigh and calf], a Polar RCX5 heart rate monitor, and a custom 2mm full wetsuit. Skin temperature and heart rate measurements were sampled at 1-minute intervals. Environmental conditions were obtained for each surf session using information from the National Oceanic and Atmospheric Administration. Following instrumentation, participants were instructed to engage in recreational surfing activities as normal, with the duration of each session determined by the individual. **Results:** Significant differences ($p<0.001$) in mean skin temperature were found across the body (chest: 30.7±1.6°C, back: 33.6±1.5°C, lower abdomen: 27.9±1.6°C, lower back: 32.7±2.2°C, arm: 31.3±2.1°C, forearm: 29.4±1.2°C, thigh: 27.0±1.6°C, and calf: 26.1±1.6°C) while wearing a wetsuit during recreational surfing. In addition, within session changes in skin temperature were significant for several regions of the body ($p<0.001$), and the magnitude of these changes varied significantly between regions (chest: 7.8±5.6%, back: 6.3±5.6%, lower abdomen: 15.7±5.6%, lower back: 13.4±7.0%, arm: 8.3±6.4%, forearm: 11.1±4.4%, thigh: 16.8±5.9%, calf: 20.5±4.9%). **Conclusion:** These data are the first to demonstrate that significant differences exist in skin temperature across the body while wearing a wetsuit during an average recreational surfing session. These findings may have implications for wetsuit design.

29. DOES RECOVERY INTERVAL ALTER DETERMINATIONS OF MAXIMAL KNEE EXTENSION/ FLEXION TORQUE AND MUSCLE ACTIVATION?

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Aim: The aim of this study was to examine differences in force production and muscle activation during maximal isokinetic knee extension at varying recovery durations between bouts. **Methods:** Fourteen recreationally active men (age = 23.4 ± 2.5 yr) participated in this study. Subjects performed two sets of five maximal isokinetic contractions with their dominant leg at a velocity of 60°·sec-1, with randomized intervals of passive recovery equal to 10, 30, and 60 s provided between sets. Peak torque (PT) was measured on an isokinetic dynamometer. Quadriceps activation was measured using an electromyogram (EMG) system and processed on MATLAB 7.9.0. Four electrodes were placed on the quadriceps muscles, two on the rectus femoris (RF) and two on the vastus medialis oblique (VMO) of the dominant leg. Two-way repeated measures ANOVA was performed to determine significant differences in torque and muscle activation during isokinetic contractions across rest interval and bouts. **Results:** Peak torque decreased ($p < 0.05$) between bouts 1 and 2, with 10 s rest eliciting significantly lower PT than the other two intervals. Average power (AP) decreased ($p < 0.05$) between bouts, and post hoc analysis revealed that AP was significantly different between bouts for 10 s and 30 s rest intervals. No significant difference ($p > 0.05$) was found in EMG for any bouts. **Conclusion:** The data suggest that a relatively brief rest period (10 s) between maximal isokinetic exercise is insufficient to optimize muscle function. In contrast, 60 s of passive recovery is adequate to fully restore peak and average torque of the lower extremity. EMG data revealed no significant change in amplitude between bouts or rest intervals, which suggests that muscle fatigue in response to exhaustive, short-term exercise is not related to alterations in motor unit recruitment.

31. THE EFFECTS OF GENDER ON STAIR DESCENT MECHANICS IN THE ELDERLY

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Purpose: Previous research found kinetic and kinematic gender differences in a younger population during stair-to-ground descent transition in the sagittal plane (Hong and Shin, 2015). The purpose of this study was to determine gender differences in stair-to-ground descent mechanics in an elderly population in the sagittal and frontal plane. **Methods:** Fifteen males and seventeen females, aged 65-91 years, participated with six Vicon Vantage V5 cameras (120 Hz) capturing the movement of 18 reflective markers affixed on anatomical landmarks along with two Kistler force plates (1200Hz). Data was analyzed for both the continuous phase (stair to stair) and the transition phase (stair to floor) of stair descent. Independent t-tests were used to compare joint angles, joint powers and GRF values between Females and Males. **Results:** When leading with their preferred foot, Females had significantly less hip abduction than Males (6.2±4.0° vs. 10.4±3.3°; p=0.019) and more plantarflexion (29.0±5.7° vs. 21.0±5.9°; p=0.008) at TD during the continuous phase. At TD in the transition phase, Females trended towards having less hip abduction than Males. When leading with their non-preferred foot, Females had less knee flexion at TD in the continuous phase (4.4±3.4° vs. 10.7±5.5°; p=0.004). Joint power differences only existed at the hip during the transition phase with Females having larger values with preferred lead foot. Females had larger peak propulsive ground reaction forces during the transition phase (1.81±0.38 vs. 1.56±0.33 N/kg; p=0.048) with their preferred foot and in the continuous phase when leading with their non-preferred foot (2.27±0.49 vs. 1.91±0.37 N/kg; p=0.011). **Conclusions:** Female and Male exhibited similar kinematic and kinetic characteristics when descending stairs. However, the differences that exist may be functionally important.

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30. DOES TIME OF DAY OF EXERCISE INFLUENCE BODY WEIGHT MAINTENANCE IN WOMEN: THE EFFECT OF MORNING VS. EVENING EXERCISE

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Purpose: To compare the effect of 8 weeks of morning exercise or evening exercise on body weight and composition in healthy women. **Methods:** Fifty-six participants were randomized to either a morning exercise (AM) (6:30-9:30am) or an evening exercise (PM) group (6:30-9:30pm). Each participant followed an exercise program that began at moderate-intensity (40-59% heart rate reserve [HRR]) and progressed to include vigorous-intensity exercise (60-89% HRR) on four days per week, 45 minutes per session, for eight weeks. Three exercise sessions each week were supervised and the fourth session was unsupervised but verified. Body weight and composition were determined using a digital scale and dual-energy x-ray absorptiometry (DXA), respectively, at baseline and 8 weeks. Other neural, hormonal, and dietary variables were assessed but not reported here. **Results:** Eighty-two percent of participants completed the study; 21 (78%) from the AM group (25.78±4.2 y; 25.97±4.67 kg/m2; 39.14±7.24 % BF) and 25 (86%) from the PM group (25.18±6.28 y; 23.11±3.51 kg/m2; 33.21±5.49 % BF). For finishers, 94.75% of the prescribed exercise sessions were completed. In the AM group body weight was 70.16±13.57 kg at baseline and increased to 70.96 kg at 8-weeks ($F=5.05$; $p=0.0361$) and in the PM group was 65.92±9.07 kg at baseline and decreased to 65.71 kg at 8-weeks ($F=0.52$; $p=0.4764$). The group*period interaction was significant ($F=4.90$; $p=0.0321$) and persisted with an intent-to-treat analysis ($F=5.12$; $p=0.0287$) and control of baseline body weight ($F=5.02$; $p=0.0301$). Total body fat (g) and fat-free mass (g) changes were not statistically different nor were these group*period interactions significant (ps>0.05) **Conclusion:** Time of day of exercise may influence body weight. Morning exercisers were more likely to drop out and tended to gain weight while evening exercises were more likely to finish the program and tended to lose weight. There was no detectable change in body composition for either group.

32. MAX EFFORT THIRTY REPETITION ISOKINETIC FATIGUE TEST DOES NOT CORRELATE WITH CLASSIC THORSTENSSON TEST

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INTRODUCTION: The classic Thorstensson test (CT) of fatigability involves performing fifty maximal voluntary isokinetic knee extensions. The CT calculates fatigability by comparing the average of the first 3 and last 3 repetitions. Recent data suggest that measuring the peak isokinetic torque to rep 30 (P30) may correlate with peak isokinetic torque to rep 50 (P50) when performed as a single test. However, when performed separately, subjects may give greater effort on the shorter P30 test. **PURPOSE:** To investigate the correlation of fatigue percentage between thirty maximal knee extension repetitions and the CT and P50. **METHODS:** Nine subjects (6 male, 3 female) (age= 23.78 ± 1.79 y, mass= 76.39 ± 18.58 kg, height= 172.56 ± 8.93 cm) performed two tests on a Biodex isokinetic dynamometer in random order consisting of either the CT or the P30 at 180 d/s. **RESULTS:** P50 fatigue percentage (75.45 □ 6.27) was greater than P30 (60.25 □ 9.27) but not different than CT (72.87 □ 6.79). The greatest correlation was identified between CT and P50 (r= 0.90). Whereas the correlations between CT and P30 (r= 0.061) and P30 and P50 (r= 0.312) were very low. **CONCLUSIONS:** The greatest correlation was seen between the P50 and CT test. These findings suggest that peak torque to 30 repetitions does not correlate with CT or P50 for measuring fatigability and should not be used as a substitute test. This may be due to subjects pacing themselves on the longer P50 test.

33. ACUTE EFFECTS OF UPPER BODY RESISTANCE EXERCISE ON DIASTOLIC BLOOD PRESSURE IN NORMOTENSIVE AND PREHYPERTENSIVE MALES

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Purpose: Exercise has been used as a method to achieve, maintain, and improve health, fitness, and sport performance. Furthermore, it is often prescribed to treat, manage, or prevent the onset of hypertension. Aerobic exercise leads to acute decreases in diastolic blood pressure (DBP) post-exercise; however, it is unknown whether upper body resistance exercise (UBRE) results in similar reductions. The purpose of this study was to investigate DBP during 60 minutes of rest following UBRE. **Methods**: Twenty-four recreationally trained males (age = 24.7 ± 3.7 yrs.; ht = 176.8 ± 8.0 cm; mass = 89.0 ± 23.4 kg) who were either normotensive (BP<120/80 mmHg) or prehypertensive (BP of 120-139/80-89 mmHg) completed twenty minutes of quiet seated rest followed by an upper body warm-up with a resistance band. They then performed UBRE consisting of bench press, lat pull down, and seated barbell shoulder press (4 sets of 6 repetitions at 75% 1RM with 2 minutes rest between sets, and one minute rest between exercises). This was followed by another 60 minutes of quiet seated rest. DBP was measured before, immediately after UBRE and every 10 minutes for 60 minutes. **Results**: A 2x8 (group x time) repeated measures ANOVA revealed no interaction or main effect for group, however there was a main effect for time. A 1x8 follow up ANOVA revealed that DBP at 10 minutes post (59.08$\pm$1.85mmHg) and 20 minutes post (60.29$\pm$1.50) was less than baseline (63.10$\pm$1.57mmHg) with no other differences between time points. **Conclusion**: DBP decreased below baseline values for 20 minutes after UBRE. This hypotensive response may be due to decreased peripheral resistance, which may be attributed to either decreased sympathetic nervous system activation, or increased parasympathetic activation post exercise.

34. SIZE OF LATERAL MUSCLES IN THE LOWER LEG FOUND TO BE A GOOD PREDICTOR OF TIME TO STABILITY IN SINGLE LEG, BAREFOOT LANDINGS

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Purpose: A single leg, barefoot landing is a functional movement often executed in athletic events. The inability to quickly stabilize the ankle joint during a landing may contribute to injury risk. The purpose of this study was to determine whether the size of specific medial and lateral muscles crossing the ankle could be used to predict shorter time to stability in female athletes performing single leg, barefoot landings. **Methods**: Twenty-one female collegiate gymnasts and cheerleaders (age: 21.2 ± 1.4 years; height: 1.6 ± 0.06 m; weight: 58.1 ± 5.7 kg) completed a dominant single leg, barefoot landing onto a force plate from a height of 15". The time to stability was calculated from the recorded medial to lateral force after landing. The size of the tibialis anterior (TA), tibialis posterior (TP), flexor digitorum longus (FDL), fibularis brevis (FB), and fibularis longus (FL) were measured using ultrasound imaging (12L probe, GE Logiq P6). The TA, TP, and FL were assessed at a distance of 30% from the knee joint-line to the tip of the lateral malleolus, while the FDL and FB were measured at a distance of 50% from the knee joint-line to the medial malleolus. Muscle sizes (thickness for the TA and TP and cross sectional area for FDL, FB and FL) were measured from the ultrasound images. Alpha set to 0.05. **Results**: A stepwise regression (including height, weight, and muscle size(s)) indicated that the two best predictors of time to stability were the FB and FL (r^2=0.45, FB p=0.002, FL p=0.083). **Conclusion**: Based on this study, it appears athletes with larger FB and FL had shorter time to stability. These results suggest strengthening of the lateral muscles may be a key component in both the prevention and rehabilitation of ankle injuries among gymnasts and other barefoot athletes.

35. EXERCISE ATTITUDES AND COGNITIONS AS A MEDIATOR FOR THE RELATIONSHIP AMONG EXERCISE AND WEIGHT DISSATISFACTION

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Purpose: Previous research has demonstrated exercise reduces weight dissatisfaction. Intervening on exercise attitudes and cognitions may encourage appropriate amounts of exercise sufficient to reduce weight dissatisfaction. Thus, affecting these factors may be paramount when working with individuals attempting to exercise due to weight dissatisfaction. The primary purpose of this study was to investigate if exercise attitudes and cognitions mediate the relationship among exercise and weight dissatisfaction. We hypothesize that exercise attitudes and cognitions will mediate the exercise and weight dissatisfaction relationship. **Method:** Participants (N=1374; M age = 28.24, SD = 10.20; 65.78% female) completed an online survey that included measures of exercise cognition and attitudes (e.g., Exercise Dependence Scale (EDS)), Leisure-time Exercise Questionnaire (LTEQ), and demographics (i.e., self-reported weight and ideal-weight questions used to calculate weight dissatisfaction). First, correlations were run to determine associations among variables. Next, Hayes's PROCESS method was used to examine the potential mediation effect of exercise attitudes and cognitions on the exercise and weight dissatisfaction relationship. **Results:** The overall model examining exercise and exercise attitudes and cognitions on weight dissatisfaction was significant (p <.01) and explained 2.96% of the variance. Less exercise (β=-.14, p<.01) and higher EDS scores (β=-.11, p=.03) both predicted greater amounts of weight dissatisfaction. The interaction among EDS scores and exercise was significant (β=-.04, p=.04) suggesting that the combined effects of EDS scores and exercise significantly affect weight dissatisfaction. **Discussion**: Exercise attitudes and cognitions exhibited a mediation effect on the exercise and weight dissatisfaction relationship. Results suggest intervention on exercise attitudes and cognitions may be advantageous when working with individuals who want to exercise to reduce weight dissatisfaction. These results inform exercise professionals how to successfully work with clients that want to exercise as a result of weight dissatisfaction by directing them to a potential targets for intervention.

36. RELATIONSHIP BETWEEN 1RM BENCH PRESS AND ISOMETRIC PUSHUP FORCE

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Purpose: The bench press and pushup are used to develop upper-body strength. The purpose of this study was to examine the correlation between a 1RM bench press and isometric pushup force. **Methods**: 10 subjects (7 male age=24.7± 3.3 yrs; height=179.1 ± 8.2 cm; mass=83.9 ± 8.4 kg and 3 female age=25.3 ± 4.0 yrs; height=165.6 ± 3.8 cm; mass=58.3 ± 3.4 kg) performed both an isometric pushup test and 1RM bench press test. Subjects grip width on the bench press was measured as the distance between each middle finger. This distance was used for hand placement during the pushup. Once positioned, isometric force was measured on an AMTI force plate for 3 seconds in the up and down pushup positions, in random order. For the down position, the triceps were parallel to the floor, while for the up position, the triceps were perpendicular to the floor. Next, participants were tested for 1repetition maximum bench press with 3 minutes rest between attempts. **Results**: There was a significant, strong relationship between bench press 1RM and the down (r=.914) pushup position. Also, there was a significant, strong relationship between bench press 1RM and the average of the up and down pushup positions (r=.906). Finally, the relationship was weaker between the bench press 1RM and the up (r=.802) pushup position. **Conclusion**: Force output is greatest in the down push-up position, which correlates to the high force output that is required during a bench press 1RM.

37. THE PREDICTIVE ABILITY OF CENTRAL POST-EXERCISE HYPOTENSION ON CENTRAL BLOOD PRESSURE REDUCTIONS IN RESPONSE TO A TWO-WEEK AEROBIC TRAINING INTERVENTION

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Introduction: To assess the efficacy of acute post-exercise hypotension (PEH), measured at the aorta, to predict the results of a two-week aerobic intervention on reducing resting central blood pressure (CBP). CBP has been shown to be an independent predictor of adverse cardiovascular outcomes. Considering 25% do not respond to exercise as a method of lowering blood pressure (BP), predictors of exercise responders are warranted. **Method:** Sedentary men with slightly elevated BP men aged 18-30 were asked to participate in a two-phase trial. Phase one assessed acute PEH in response to 40 minutes of aerobic exercise on a cycle ergometer at a rate of 65-70% of VO_2peak. Phase two required 5 additional training sessions. Primary outcome measures were brachial BP and CBP 48 h following last exercise bout. Pearson correlation was used to assess the predictability of PEH on resting CBP reductions. **Results:** 16 men, aged 24 ± 4 yr with a resting central systolic BP (CSBP) of 111 ± 8 / 78 ± 6 mmHg completed the study. There was a significant association between acute PEH in brachial SBP and the change in BSBP following the last exercise session (R = .577, P = 0.019). It was also found that there was a significant association between the magnitude of CSBP acute PEH (-4±6 mmHg) and resting CSBP (-3±5 mmHg) reductions following six training sessions (R=.535, P=.033). **Discussion:** PEH explained approximately 30% of the variance when predicting the impact of a 2-week aerobic regimen on both central and brachial BP. Thus, a person would only need to have one exercise session to predict the efficacy of exercise to lower their BP.

38. DOES SERUM COMP REPRESENT THE INFLAMMATORY ENVIORNMENT OF THE KNEE BEFORE AND AFTER EXERCISE?

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Purpose: Serum cartilage oligomeric matrix protein (COMP) is a biomarker that is relatively easy to measure and has been used to represent knee articular cartilage turnover. Serum COMP, however, originates from numerous anatomical locations, including the knee joint. Intra-articular inflammation is thought to be associated with cartilage degeneration. The purpose of this study was to determine whether serum COMP is associated with intra-articular knee inflammation before and after exercise. **Methods**: Two experimental sessions were completed by six recreational runners (5 males and 1 female, 26 ± 7 years, 71 ± 6 kg, and 174 ± 8 cm). For both sessions, baseline 10-ml blood and 0.5-ml synovial fluid samples were obtained. For the run session, participants ran for 30 minutes on a treadmill. For the control session, participants sat unloaded for 30 minutes. After the 30 minute run or unloading, a second 10-ml blood sample was collected. A second synovial fluid sample was taken 15 minutes later. Serum COMP and the concentration of eleven cytokines were quantified. **Results**: Serum COMP, before exercise, correlated significantly with inteleukin-6 (p=.035). After exercise, serum COMP did not significantly correlate with any intra-articular cytokine. However, there was a statistical trend for MCP1 (p=.058). When comparing the change of serum COMP to the change of the inflammatory biomarkers, 5 inflammatory biomarkers were significantly correlated (GM-CSF: p=<0.001; IL10: p=0.01; IL1a: p=0.01; MIP1a: p=<0.01; MIP1b: p=0.02) and two others demonstrated trends towards significance (IL15: p=0.07; IL1Ra: p=0.07). **Conclusion:** Serum COMP does not seem to accurately represent the inflammatory environment of the knee before or after exercise. However, the change of serum COMP (pre- to post- exercise) may be a good measurement of the change in inflammatory environment due to exercise.

39. CORRELATION BETWEEN VARYING BACK SQUAT DEPTHS ON SPEED AND VERTICAL JUMP PERFORMANCE IN NORTH AMERICAN HIGH SCHOOL FOOTBALL PLAYERS

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The back squat exercise is perhaps the most popular and most effective exercise for developing lower body musculature. Development of the lower body musculature is paramount for increasing ground reaction forces which in turn can translate to increased explosiveness in movements such as sprinting or vertical jumping (VJ). For athletes in particular, developing lower body strength can be of utmost importance. There is however dispute over which back squat depth is most optimal. **Purpose:** This study attempted to determine which of two back squat depths (90 degree knee flexion or 45 degree knee flexion) would correlate with superior sprint times and VJ performance. **Methods:** Participants were high school aged males on a North American football team (age: 15.1±0.9 yrs, mass: 77.0±13.2 kgs). Twenty three athletes performed the 36.6 meter (36.6M) sprint and VJ tests along with performing a 3RM back squat at 90 and 45 degrees of knee flexion on randomized separate days. A Pearson Correlation Coefficient (r) test was used to compare the squat scores with sprint times and VJ performance. **Results:** Variable measures were 36.6M: 5.23±0.26 secs, VJ: 59.6±6.6 cms, 90° 3RM squat: 116.1±21.0 kgs, and 45° 3RM squat: 132.1.±22.2 kgs. Low correlations were found at both knee flexion angles: 90° 3RM squat (36.6Mr=-0.32, VJr=0.33, p<0.01), and 45° 3RM squat (36.6Mr=-0.31, VJr=0.33, p<0.01). However, moderate correlations were revealed when comparing the 3RM back squat/body mass ratio with the participant's 36.6M sprint times (90r=-0.46, 45r=-0.46, p<0.01). **Conclusion:** Within the parameters of this study, low to moderate correlations were determined between back squat strength and sprint speed as well as VJ at both 90 and 45 degrees of knee flexion.

40. KINEMATICS OF SHOD, BAREFOOT AND SIMULATED BAREFOOT TREADMILL RUNNING

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Purpose: Much attention has been given to barefoot running, but not for individuals who habitually run on a treadmill for fitness. The purpose of this study was to compare the kinematics of shod, barefoot and simulated barefoot running on a treadmill. **Methods:** Twelve recreationally active college students (6 males and 6 females) who regularly ran shod on a treadmill participated in this study. After a four minute warmup, each subject ran for one minute at 7.4 mph (~3.3 m/s) in three different conditions on a Biodex RTM400 treadmill. The first condition was in their own running shoes, the second was barefoot, and the third they ran in their shoes "like they were barefoot", as instructed (simulated barefoot). Sixteen reflective markers were affixed to enable motion capture with a six camera Vicon system (120 Hz). Sagittal and frontal plane joint angles were obtained during stance, from foot strike (TD) to toe off, during steady state running. Angle values at TD and during stance were averaged over ten strides. Repeated measures ANOVA with SPSS v.22 was used to determine differences between conditions with post hoc testing done with Bonferroni corrections ($p < 0.05$). **Results:** At TD, there was a significant difference in ankle flexion (p=0.011) with the shod condition being significantly different than the barefoot condition (p=0.046) and the simulated barefoot condition value being between the two (4.5±5.3° vs -4.7±12.0° vs -2.0±13.0°). During stance, there was a significant difference in maximum plantarflexion (p=0.003), maximum dorsiflexion (p=0.023), and the corresponding ROM (p=0.009). During stance, the minimum hip flexion and maximum knee flexion angles differed (p=0.022 and p=0.023, respectively). Both stride length and stride time were significantly smaller for the barefoot condition (p<0.001 for both). **Conclusion:** Subjects effectively mimicked barefoot running with most changes occurring at the ankle.

41. THE EFFECTS OF LONG-TERM VS. SINGLE DOSE NITRATE SUPPLEMENTATION ON SKELETAL MUSCLE OXYGENATION DURING A SIMULATED CYCLING TIME TRIAL

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A transient augmentation in the energy efficiency of working skeletal muscle is the purported basis for dietary nitrate (NO_3^-) supplementation amongst competitive and recreational athletes alike. Previous studies support the ergogenic benefits of NO_3^- as results indicated improved microvascular blood flow, skeletal muscle oxygenation, and exercise performance with relatively short-term supplementation. As with most ergogenic aids, the optimum duration of supplementation prior to performance or competition, i.e. loading phase, is a critical determinant for efficacy. **Purpose:** Therefore, the purpose of this study was to investigate the effects of long-term vs. single dosing NO_3^- supplementation on skeletal muscle oxygenation and cycling performance. **Methods:** In a randomized, placebo controlled, double blind, parallel design study, healthy, recreationally active male (n=15) and female (n=14) subjects (age= 18-29 yrs.) completed a 5-mi simulated cycling time trial before and after a 14-day supplementation period with either a NO_3^- supplement (pre-nitrate loading; PRE) (n=14) or placebo (single nitrate dosing; SGL) (n=15). Both groups consumed a single dose of the NO_3^- supplement 2 hours prior to the post-treatment time trial. In addition, skeletal muscle oxygenation was measured via near-infrared spectroscopy during each time trial. **Results:** Fourteen days of NO_3^- supplementation (i.e. PRE) significantly decreased time to completion (TTC) (p=0.01) and increased average power (PWR_{AVG}) (p=0.04) and speed ($SPEED_{AVG}$) (p=0.02) from pre- to post-treatment while a single dosing (i.e. SGL) produced no significant changes to these measures. There were no significant differences over time and across treatments for any other measures including muscle oxygenation variables. **Conclusion:** Overall, long-term NO_3^- supplementation appears to have slight benefits over a single pre-exercise dosing in terms of cycling performance. However, this ergogenic response cannot be explained by changes to skeletal muscle oxygenation, thus controverting previously purported mechanisms of action.

43. THE EFFECTS OF EXERCISE TRAINING ON SELF-REPORTED FATIGUE AND MUSCULAR VARIABLES IN CANCER SURVIVORS

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Purpose: The IMPAACT Study (Improving Physical Activity After Cancer Treatment) is a collaborative study examining the effects of physical activity on cancer survivors and their risk factors for cancer recurrence and chronic disease. This sub-study aimed to examine the effects of exercise on self-reported fatigue (SRF) and muscular performance in participants from the 2015-2016 cohort. **Methods**: Female cancer survivors (*n*=51; 65.1±7.1 years of age; height 1.63±0.06 m; weight 79.6±19.9 kg; 6.4±7.6 years since last treatment) were evaluated using the NIH PROMIS Fatigue Scale along with muscular performance testing before and after 13 weeks of combined aerobic and resistance training (CART). Age (*r*=-0.386) and time-since-treatment (*r*=-0.359) were negatively (*p*<0.05) correlated with SRF at baseline and after 13 weeks. Participants were separated into three equal groups (low=0-17, mid=18-28, and high=>28) based on number of exercise sessions attended. **Results**: Change in standardized sit and reach scores for flexibility significantly increased (low=-0.5±3.4; mid=2.0±3.8; high=3.5±3.1 cm) and trends were observed for increase in percent change in handgrip strength and peak isometric torque of the quadriceps muscle. **Conclusions**: The finding that age is associated with lower levels of SRF is perhaps counterintuitive and warrants further investigation. In support of recent findings from a previous cohort of IMPAACT, exercise during the first year post-treatment facilitates significant increases in muscular health. These data suggest a dose-response effect of CART on muscular strength and flexibility. These data suggest that CART performed following cancer treatment can promote desired alterations in muscular performance that could positively impact quality of life in older female cancer survivors.

42. ASSESSING EXPLOSIVENESS USING A RANGE OF MEDICINE BALL WEIGHTS FOR THE BACKWARDS OVERHEAD MEDICINE BALL THROW

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Introduction: The backwards overhead medicine ball (BOMB) throw is an effective method for measuring total body explosive ability. Distance thrown is typically evaluated for the BOMB throw, although medicine ball (MB) weight has varied across studies. **Purpose:** To directly measure how different MB loads affect force, power and velocity output during the BOMB throw. **Methods:**16 Division-II softball players performed a BOMB throw with 4 different MB loads (6, 8, 10 and 12 lb). There were multiple familiarization sessions prior to testing to minimize the learning effect. Peak power, peak force, and peak velocity during the throw were measured using a force plate. With the loads in randomized order, athletes threw each MB three times in using the two best trials for later analysis. Intraclass correlations and repeated measures ANOVAs were used to assess reliability. Repeated measures ANOVAs were used to compare differences between MB weights. **Results:** Peak force was not different between trials (p=0.308), regardless of MB weight (p=0.749), nor was peak force different between each weight (p=0.750). Peak power was different between trials (p=0.002), but this difference was not influenced by MB weight (p=0.770). MB weight did not affect peak power (p=0.109). Peak velocity was different between trials (p=0.001), but this difference was not influenced by load (0.818). Peak velocity was not influenced by MB weight (p=0.659). Intraclass correlations for peak force, peak velocity and peak power were r=0.964, r=0.881 and r=0.900, respectively. **Conclusion:** Changing MB weights of 6-12lb did not affect force, power, and velocity outputs, thus training the BOMB throw within this range of loads may elicit similar adaptations. Future studies might consider using more familiarization sessions prior to testing the BOMB throw.

44. THE ACUTE EFFECTS OF A PROPRIOCEPTION INTERVENTION ON THE BLOCK STARTS OF ELITE SPRINTERS

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Purpose: Proper starting technique to the sprint is vital to the performance of elite track runners. Proprioceptive training is often used as a preventative and rehabilitative application in sport, but there is little research to show much for the acute effects of proprioceptive training on impulse, peak force production, and force angle. This study seeks to observe the acute effects of proprioceptive on the kinetic aspects of the sprint start in elite college sprinters. Particularly in regards to force, impulse, and force angle. **Methods:** Nine elite male and female sprinters participated in this study. The subjects performed 8 block starts: 2 baseline without an intervention, 2 with a proprioception intervention, 2 with a sport psychology intervention, and 2 with a combination of both. For the proprioception intervention, a resistance band was wrapped around the sprinters lower thigh area. Instructions were given to the sprinters to walk while driving their legs forward without letting the band slide up their thigh. Immediately after, they practiced driving their thigh forward against the resistance band while in the starting block position. When the sprinter felt comfortable, they performed their block start. Both force and force angle were recorded over using force plates. **Results:** Two-tailed t-tests found no significant difference was observed between the baseline and proprioception trials in impulse, peak force, force angle. **Conclusion:** The proprioception intervention with the resistance band had no acute effects on block start performance. It is possible that two sessions that are done in one day, may not be enough to illicit a change in block performance. Future research can be done to determine if there is a minimum amount of resistance band sessions that is needed for an increase in performance to be observed.

45. CARDIOVASCULAR RESPONSES TO RECREATIONAL SKATEBOARDING IN YOUTH

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Purpose: Recreational skateboarding continues to gain popularity in youth within the United States and abroad. Surprisingly there is a paucity of research regarding the cardiovascular responses of youth participating in recreational skateboarding. Therefore, the purpose of this study was to test the hypothesis that skateboarding would elicit heart rates and durations consistent with the American College of Sports Medicine (ACSM) recommendations for cardiovascular fitness in youth. **Methods:** Seventy-three recreational skateboarders (Male: 65, Female: 8) between the ages of 6 and 17 years old participated in this study. Data were acquired at nine skate parks in the local community. Following parental consent, participants completed a questionnaire and were instrumented with a heart rate monitor (Polar V800 GPS Sports Watch), which recorded heart rate, duration, and distance at one second intervals. Prior to their session, participants were instructed to engage in typical skateboarding activities, with the duration and intensity of activity determined by the individual. **Results:** Participants were 10.6±2.9 years old and had participated in skateboarding for 3.1±2.4 years. Subjects skateboarded on average 56±24 minutes, at a heart rate of 142.8±7.6 bpm, and covered a distance of 2.7±1.8 km. **Conclusion:** Results from this study suggest that youth participating in recreational skateboarding at community skate parks attain exercise intensities and durations that are comparable with the ACSM's exercise recommendations for cardiovascular fitness in youth. These findings may hold implications for city planners considering the impact of community skate parks on physical activity in youth and overall public health.

46. MEDICATION STATUS AND GAIT MECHANICS IN OLDER ADULTS: A MULTIVARIATE ANALYSIS

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Purpose: Falls are the leading cause of unintentional deaths in older adults. The purpose of this study was to investigate whether gait mechanics are associated with number of medications in older adults. **Methods**: A total of 384 subjects (age; 73.2±2.2yrs, height; 145.81±16.4cm, mass; 54.92±6.81 kg) were recruited from across the Southwest United States (TX, NM, AZ, NV, CA) by the Electronic Caregiver® Mobile Falls Risk Assessment Laboratory. All 384 completed the Comprehensive Falls Risk Survey Instrument (CFRSI), which includes questions about medication type and number. Cadence, gait velocity, stride-length, swing-time and double-support time were collected using a walkway gait analysis system. Factor analysis was employed to determine whether the gait characteristics were similar to those observed in other studies. A multivariate analysis with univariate follow-up was employed to determine group differences in gait factors and variables according to medication number (four or more medications, n= 262 vs. three or fewer medications, n= 122). **Results**: The factor analysis reveals that the present data behave similarly to those in previous work; with cadence (factor loading coefficient (FLC) = 0.745), gait velocity (FLC = 0.922), stride-length (FLC = 0.789 for left and 0.790 for right) loading positively on a "pace" factor and swing-time (FLC = 0.728 for right and 0.683 for left) and double-support time (FLC= 0.723) loading positively on a "rhythm" factor. The Multivariate test reveals differences in gait factors between groups according to medications. Univariate follow-up tests reveal that double-support time is longer and stride-length is shorter in persons on four or more meds as compared to those on three or fewer. **Conclusion**: The findings of this study indicate that the certain gait differences in older adults are associated with taking four or more medications. Future studies should examine the extent to which gait changes and medications interact to predict falls.

47. SALVIA OFFICINALIS INGESTION IMPROVES LUNG FUNCTION IN YOUNG ATHLETES

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Salvia Officinalis or Sage herbal is an evergreen subshrub that is native to the Mediterranean region. Recent studies have demonstrated that Salvia consumption may improve symptoms associated with lung and sinus disorders. The effect of Sage consumption on respiratory parameters in healthy athletic populations is not clear. **PURPOSE:** To assess the effect of Sage consumption on respiratory measures in well-trained soccer players. **METHODS:** Twenty-one soccer players (age = 17.48 ± 0.82 yr, mass 64.19±6.44 kg, and competitive experience 6.81±1.24 yr) were asked to participate in this study. The participants consumed 60-70 ML of cold Salvia after boiling twice a day with aerobic exercises for 6-weeks. Dependent measures were taken immediately before (pre-test) and after (post-test) the 6-week period and included vital capacity (VC), inspiratory vital capacity (IVC), peak expiratory flow (PEF), forced vital capacity (FVC), forced expiratory volume (FEV1). **RESULTS:** There were differences between pre-test and post-test values for all measures ($p < 0.05$) except FEV1/FVC and FEV1/VC ($p > 0.53$). For example, VC post-test values were 15% greater than pre-test values (4.88±1.15 L vs 5.62± 0.72 L) and IVC post-test values were 14% greater than pre-test values (4.45±1.18 L vs 5.06± 0.64 L). A similar observation was made for FVC, PEF, and FEV1 values. **CONCLUSION:** The results indicate that healthy athletic soccer players who consume Sage for 6-weeks improve some respiratory parameters as evidenced by greater VC, IVC, and FVC values during post-test than pre-test. Moreover, these results are encouraging and suggest drinking sage may help improve respiratory parameters in healthy individuals who play competitive soccer.

48. THE EFFECTS OF EXERCISE TRAINING ON MUSCULAR VARIABLES IN CANCER SURVIVORS

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Purpose: The IMPAACT Study (Improving Physical Activity After Cancer Treatment) is a collaborative study examining the effects of physical activity on cancer survivors and their risk factors for cancer recurrence and chronic disease. This sub-study aimed to examine the effects of exercise on the anabolic state and muscular performance of participants from the 2014-2015 cohort. **Methods:** Cancer survivors (n=18; 63.6±12.9 years of age; height 1.65±0.07 m; weight 79.6±19.7 kg; 5.5±7.7 years since last treatment) were evaluated before and after 24 weeks of combined aerobic and resistance training (CART). Participants were separated into groups (<1 year, ≥1 year) based on time since last cancer treatment (TST) and assessed for changes in insulin-like growth factor-1 (IGF1), insulin-like growth factor binding protein-3 (IGFbp3), and functional capacity. **Results:** TST was significantly related to increases in peak isometric force of the quadriceps (10.8±8.5% vs. 2.8±5.9%) for those within one year and greater than one-year post cancer treatment, respectively. Significant increases in IGF1 (371%) and decrease in IGFbp3 (76%) were correlated with number of exercise sessions attended. **Conclusions:** This data suggest a dose-response effect of CART on muscular strength. Desired alterations in anabolic hormones coupled with a non-significant change in cortisol could play a role in mediating favorable muscular improvements. Additionally, there appears to be a critical window of opportunity for strength improvement as demonstrated by larger improvements in strength in the group that had more recently completed cancer treatment. CART immediately following treatment cessation appears to favorably improve muscular performance in older adults.

49. IS MUSCLE ACTIVITY A FACTOR THAT DETERMINES PREFERRED STRIDE FREQUENCY DURING RUNNING OUTDOORS?

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Purpose: The purpose of this study was to determine if muscle activity is affected by different stride frequencies (SF) at preferred running velocity while running outdoors. **Methods**: Participants (n=10, 26.4±8.7 years, 72.6±18.3 kg, 170±8.7 cm) were given a self-selected warm-up after signing an informed consent. Wireless electromyography sensors (sample rate = 1926 Hz) were attached to four muscles on the right side: the rectus femoris (RF), biceps femoris (BF), tibialis anterior (TA), and gastrocnemius (GA). Maximum voluntary contractions were performed for five seconds prior to moving outside for data collection. Preferred running velocity and preferred stride frequency (PSF) were determined outdoors. Participants performed seven randomized conditions, each at their preferred running velocity, consisting of a specific SF. The conditions were 115%, 110%, 105%, 100%, 95%, 90%, and 85% of their PSF. SF was controlled by having subjects match a metronome. Absolute value of EMG were averaged across a 5-second window for each SF for each muscle. A repeated measures analysis of variance was used to compare muscle activity between SF conditions. **Results:** There was no significant difference in BF between SF conditions (p=0.352). There was no significant difference in RF between SF conditions (p=0.229). There was no significant difference in TA between SF conditions (p=0.342). There was no significant difference in GA between SF conditions (p=0.758). **Discussion:** Despite large changes in SF, average muscle activity was not different for any of the muscles tested when running a set speed outdoors. It does not seem that average muscle activity is a factor determining preferred stride frequency.

51. COMPARISON OF PITCHING KINEMATICS BETWEEN PITCHERS WITH AND WITHOUT ULNAR COLLATORAL LIGAMENT DAMAGE

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Purpose: The ulnar collateral ligament (UCL) is the primary stabilizer of the elbow during pitching. However, comparisons of the biomechanics in pitchers with and without UCL damage are unavailable. Therefore, the purpose of this study was to compare pitching kinematics across UCL intact and UCL deficient pitchers during an extended performance. **Methods**: Using the MotionMonitor™, sensors were attached to the medial torso, pelvis, bilaterally on the distal/lateral humerus and forearm and bilaterally on the distal/lateral area thigh and shank. Pitching kinematics calculated using ISB standards, were time normalized and were assessed at major temporal periods in the movement for caparison purposes. **Results**: Data indicated major kinematic changes throughout the performance and those changes observed at the shoulder and elbow were consistently larger in the UCL deficient pitcher. **Conclusion**: The kinematic changes at the shoulder may function to decrease varus stresses ultimately increasing net valgus stress experienced. Additionally, the change in elbow flexion at maximum external rotation may be the result of an effort to compensate for lack of structural integrity in the anterior band of the UCL anterior bundle and shift the load to the posterior band of the UCL anterior bundle by increasing elbow flexion at maximum external rotation. As kinematic changes were observed for the UCL deficient pitcher, it may be possible to track the magnitude of changes in shoulder abduction and elbow flexion angle during a performance to assess potential UCL vulnerabilities.

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50. EFFECTS OF TORSO LEAN AND TORSO RANGE OF MOTION DURING CUTTING MANEUVER

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Context: Torso lean and torso range of motion (ROM) can impact on body kinematics and kinetics during the phases of a cutting maneuver (CM). To maximize efficiency during the cutting maneuver, torso control should be evaluated to minimize the impaction of other body segments.
Purpose: The purpose of this study was to observe the effect of torso lean and ROM during a two-step cutting maneuver in collegiate soccer players.
Participants: Twenty competitive female soccer players (age 21.9 ± 3.3 years, height 1.68 ± 0.3 m, mass 68.2 ± 8.2 kg, mean soccer experience 4 ± 2.3 years) participated in the study. Athletes were currently participating in competitive soccer, did not have any pain within the past three months that limited their physical activity for more than a day, and did not exhibit any type of physical pain during testing.
Methods: Upon athlete's completion of preferred warm-up, 48 reflective markers and cluster plates were attached to bony landmarks and lower body segments, allowing for an examination of whole body kinematics and kinetics throughout the trials. Athletes were given three cues, verbal, visual, and kinesthetic, at random to minimize influence, on proper cutting mechanics. Athlete would verbally verify understanding of each cue prior to performing the trial. **Results:** Torso Lateral Lean: (F (3, 54) = 3.673, p=0.012) and Torso Flexion ROM: (F (3, 54) = 5.028, p=0.054) These results indicate that the kinesthetic cue decreases the lateral lean from baseline and limits the ROM during a cutting maneuver. **Conclusion:** With the use of the kinesthetic cue, proper torso alignment can be achieved. This may help decrease poor movement patterns during cutting.

52. THE SIZE OF MEDIAL AND LATERAL EXTRINSIC FOOT MUSCLES INFLUENCES TIME TO STABILITY IN BAREFOOT SINGLE LEG LANDINGS

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Purpose: The extrinsic foot muscles work together to help stabilize and produce motion of the foot and ankle joints. Excessive inversion and eversion moments at the ankle can lead to injury in athletes. The ability to control these forces at the sub-talar joint may decrease injury risk. The purpose of this study was to compare medial extrinsic (tibialis posterior (TP) and tibialis anterior (TA)) and lateral extrinsic (fibularis brevis (FB) and fibularis longus (FL)) muscle size to the time-to-stability (TTS) after a dominant leg, barefoot landing. **Methods:** 21 female collegiate gymnasts and cheerleaders (age: 21.2 ± 1.4 years; height: 1.6 ± 0.06 m; mean weight: 58.1 ± 5.7 kg) completed dominant leg, barefoot landings from a .4 m height. TTS was the time it took the medial-lateral center of pressure (COP) to become stable as recorded by a force plate. The cross-sectional area of the FB and FL, and the thickness of the TP and TA were measured using ultrasound imaging. FB was assessed at the mid-point of the distance from the lateral knee joint line to the tip of the lateral malleolus, while the FL, TP and TA were assessed at 30% inferior to the knee joint line. **Results:** A stepwise regression analysis with weight and the muscle sizes used to predict the TTS indicated a model containing TA, FL, and FB size as important variables related to TTS (r^2=0.67, p=0.001; wt: p=0.133; TA, p=0.003; FB, p<0.001; FL, p=0.006). **Conclusions:** It appears the size of the TA, FB, and FL are important factors in determining TTS as measured by COP. Logically, strengthening these muscles may be beneficial in sports that require balancing or landing on a single leg. Injury risk may also be decreased with increased muscle size reflective of improved strength.

53. INVESTIGATING THE INTERACTION BETWEEN ENVIRONMENTAL FACTORS AND WALKING AID USE IN FALLERS AND NON-FALLERS OVER THE AGE OF 65 YEARS

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Purpose: Both environmental risk factors and use of walking aids play a significant role in falls risk. Unfortunately, it is not currently known how these variables interact with regard to falls history. Thus, the purpose of this study was to determine if an interaction exists between environmental risk factors and the use of a walking aid. **Methods**: A total of 348 participants over the age of 60 years were recruited from various testing sites within the Southwest Region of the United States. Participants completed a medical history form that included information regarding falls history. Data were analyzed such that subjects were grouped by the sum of environmental factors reported. After grouping, a univariate ANOVA was conducted to test for the presence of an interaction between the use of a walking aid and environmental group membership as it relates to history of falls history. **Results**: Of the 348 participants, 11 were identified as being in the high environmental concerns, 176 were in the moderate environmental concerns group and 161 were in the low environmental concerns group. Mean difference testing indicating presence of an interaction between environmental group membership and walking aid use ($F_{2,342}$ = 5.810, p = <0.001) and a main effect for walking aid use ($F_{1,342}$ = 5.544, p = <0.001). **Conclusion**: There is no main effect for environmental group, but a main effect was observed for use of a walking aid. However, when examining both walking aid use and environmental group membership, the significant interaction has the potential to impacts fall risk. Thus, it is vital that home health care providers utilize both pieces of data when assessing fall risk and designing effective and targeted interventions.

54. A TRANSDISCIPLINARY APPROACH TO IMPROVING SPRINT START MECHANICS: BIOMECHANICS, MOTOR CONTROL, AND SPORT PSYCHOLOGY

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Purpose: An effective block start is crucial to the success of competitive sprinters. To have success a sprinter must exert an impulse to change his/her momentum while also staying low to the ground, in order to maximize the amount of forward force. **Methods:** Seven collegiate level sprinters (Gender: 3 female, 4 male, Mean Age: 21.5 ±2.9 yrs, Height:1.74m ±.13m, Weight: 67 kg ±11.10kg) performed 8 block start trials (2 Trials per intervention). Participants were fitted with a 55-marker set with 2 clusters on each leg (thigh and shank). Sprinting blocks were placed on a force plate and each held down with 100 lb weights to prevent movement. Three interventions were attempted to improve block start mechanics: proprioceptive, psychological, and a combination of the two. The proprioceptive component consisted of using a TheraBand® to encourage hip flexion while maintaining minimal knee flexion (i.e., keeping the foot close to the ground). The psychological component consisted of the subjects repeating a "mantra" of their choice (i.e., "I will explode off of the blocks") prior to coming out of the blocks. The combination trial included both of these interventions at the same time. **Results:** Impulse, Angle of GRF (Sagittal plane), and Average Force were measured beginning from toe-off of the trail leg to 1/5 of a second following toe-off (50 frames). There were no significant changes in impulse or average force between interventions. There was, however, a significant difference between the force angle produced during proprioceptive (51.7º ±3.6) and combination (46.6º ±8.6) interventions (p<0.05). **Conclusion:** There seems to be no effect on force production caused by any of the interventions in this study. This study points to a potential to alter angle of force using these methods, which could improve performance by applying force more effectively along the horizontal.

55. WITHIN-SESSION RESPONSES TO HIGH INTENSITY INTERVAL TRANING IN SPINAL CORD INJURY

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In the past decade, high intensity interval training (HIIT) has shown to be a robust alternative to conventional aerobic training. In most individuals, incorporation of HIIT elicits increases in maximum oxygen uptake and overall health status, yet its feasibility in persons with spinal cord injury (SCI) is unknown. **Purpose:** The aim of this study was to compare acute changes in cardiorespiratory and metabolic variables during different HIIT regimes versus continuous exercise (CEX). **Methods:** Nine habitually active men and women (injury duration = 6.8 ± 6.2 yr) with SCI initially underwent determination of peak oxygen uptake (VO_2peak) on an arm ergometer. During subsequent sessions, they completed CEX, HIIT, or sprint interval training (SIT). Gas exchange data, heart rate (HR), and blood lactate concentration were measured. Each session was broken up into 16 phases (eight exercise and eight recovery data points for HIIT/SIT) for which mean oxygen uptake and HR were determined. Rating of perceived exertion (RPE) was also acquired pre, during and post-exercise. **Results**: Oxygen uptake and HR increased ($p < 0.05$) during HIIT and SIT and were similar ($p > 0.05$) to CEX. Peak VO_2 and HR were higher ($p < 0.05$) with HIIT (90 %VO_2peak and 99 % HRmax) and SIT (80 %VO_2peak and 96 %HRmax) versus CEX. RPE within session was also significantly higher ($p < 0.05$) in HIIT and SIT versus CEX. **Conclusion:** Despite a higher intensity, all participants preferred HIIT or SIT versus CEX. Compared to CEX, submaximal or supramaximal interval training elicits higher peak oxygen uptake and heart rate. The long-term efficacy and feasibility of HIIT in this population should be explored, considering that exercise intensity seems to be the most important variable manipulated in exercise programming to optimize maximal oxygen uptake.

56. COGNITIVE, SOMATIC, AND PHYSIOLOGICAL AROUSAL FOR DIFFERING MINDSETS ON PERFORMANCE OF A NOVEL TASK

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Background: An important component in learning a new skill is the individual's perception of ability as static (i.e., Fixed mindset) or malleable (i.e., Growth mindset). However, little is known regarding a person's mindset influence on arousal and performance of a novel task, such as archery. **Purpose:** Our objective was to determine if differing mindsets varied in: (1) cognitive and somatic arousal before performing a novel task, (2) performance accuracy over time, and (3) physiological arousal during a novel task. **Method:** Thirty undergraduate students volunteered to participate [20 males, 10 females; *M*age 22.55±4.03yrs]. Participants completed a survey about their background, mindset, and cognitive and somatic arousal while baseline heart rate (HR) was recorded. Participants then watched a 10-minute instructional video and completed three rounds of archery, five shots per round with HR and accuracy recorded after each shot. **Results**: Almost half of the sample (14/30) had a Strong Growth Mindset (SGMS), while the other half (16/30) recorded a Growth Mindset with Fixed Ideas(GMSFI). There were no significant differences ($p > .05$) in cognitive arousal scores for SGMS (*M*=5.71, *SD*=1.54) and GMSFI (*M*=5.81, *SD*=1.54) or in somatic arousal scores for SGMS (*M*=5.14, *SD*=2.03) and GMSFI (*M*=5.13, *SD*= 2.13). The two mindset groups did not perform significantly different from each other in any of the three rounds ($p > .05$). Finally, there was no significant difference for the two mindset groups in baseline HR or HR over the three rounds of archery. **Conclusion:** Differing mindsets (SGMS and GMSFI) did not vary in cognitive nor somatic arousal before performing the novel task of archery. Furthermore, these mindsets did not differ in accuracy or physiological arousal over time. Of note, no participants reported a Fixed mindset. Future research should include participants with a wider variety of mindset types.

57. EFFECTS OF HIGH INTENSITY AND SPRINT INTERVAL TRAINING FREQUENCY ON 1.5 MILE RUN TIMES IN AIR FORCE ROTC CADETS

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Purpose: The effects of varying high intensity interval training (HIIT) and sprint interval training (SIT) frequency on 1.5 mile (2.4km) run performance in Air Force ROTC cadets were studied. **Methods:** Twenty-seven cadets (21.6 ± 2.8 years) were stratified then randomly assigned to 3 groups: a high frequency group (HF) that performed HIIT/SIT 3x week, a low frequency group (LF) that performed HIIT/SIT 2x week, and a continuous training group (CG) that performed moderate intensity training 3x week. HIIT workouts consisted of 4 x 3 min intervals at 90-100% of velocity at maximal oxygen consumption (vVO_2 max) with 4 min of active recovery between sets. SIT workouts consisted of 4 x 30s all out sprints with 4 min active recovery between sets. Baseline 1.5 mile run performance was measured, then retested at 6 and 10 weeks. **Results:** At the end of 6 weeks, all groups significantly improved in mean 1.5 mile run time (LF, 7.3% $\pm$ 4.2, $p<0.001$; HF, 9.7% $\pm$ 3.5, $p<0.001$; CG, 8.7% $\pm$ 4.8, $p<0.001$). No significant differences between groups were found at any point in time ($p>0.05$). Additional workouts beyond the 6-week point yielded no significant gains in run performance for any group. **Conclusion:** In conclusion, 2 days per week of combined HIIT/SIT training was as effective at improving 1.5 mile run performance as either 3 days/week of HIIT/SIT or continuous training, and the majority of initial performance gains from HIIT were achieved within the first 6 weeks of training.

58. COMPARISON OF PHYSIOLOGICAL RESPONSES BETWEEN MODERATE INTENSITY CONTINUOUS EXERCISE AND VARIOUS REGIMES OF HIGH INTENSITY INTERVAL TRAINING

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Background. High intensity interval training (HIIT) elicits similar physiological adaptations as moderate intensity continuous exercise (MICT) but in less time (Gillen et al., 2014). However, less data (Wood et al. 2015) have compared acute physiological responses to HIIT especially using bouts of sprint interval training (SIT). **Purpose.** To compare acute physiological responses between MICT and three HIIT regimes. **Methods.** Active adults (ten men and nine women, age = 24±3.3 yr) who were unfamiliar with HIIT initially performed a VO_2max test to determine workload for all sessions on the cycle ergometer, whose order was randomized. Sprint interval training (SIT) consisted of six bouts of 20 s of all-out cycling at 140% of maximum watts (Wmax). Low-volume HIIT ($HIIT_{LV}$) consisted of eight 60 s bouts at 85% Wmax. High-volume HIIT ($HIIT_{HV}$) consisted of six 120 s bouts at 70% Wmax. MICT consisted of 25 min at 40% Wmax. Work was not matched across regimes. Heart rate, VO_2, blood lactate concentration (BLa), and energy expenditure were continually assessed throughout exercise. **Results.** Repeated measures ANOVA revealed a significant difference between MICT and SIT, HIIT-HV and HIIT-LV ($p<0.05$) for VO_2, HR ($p<0.05$), and BLa ($p<0.05$), Subjects expended more calories ($p<0.05$) in CEX (204 ± 37 kcal) than HIIT-HV (181 ± 35 kcal), HIIT-LV (173 ± 29 kcal), and SIT (121 ± 26 kcal). Mean and peak VO_2 was significantly lower ($p=0.017$) in MICT versus HIIT-HV, HIIT-LV, and SIT. **Discussion.** HIIT-HV, HIIT-LV, and SIT elicited higher VO_2, HR and BLa compared to MICT, although VO_2 was highest in the HIIT regimes. However, caloric expenditure was highest in MICT versus the high intensity regimes. If training adaptations are based on attaining the highest fraction of peak oxygen uptake, chronic HIIT may be the best approach to augment increases in VO_2max.

59. FEASIBILITY OF THE GIRLS DANCING AND SLEEPING FOR HEALTH (GIRLS DASH) PROGRAM IN A LOW SOCIOECONOMIC STATUS URBAN COMMUNITY

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Purpose: Insufficient sleep is a major public health epidemic disproportionately effecting elementary age girls living in low socioeconomic status (SES) urban communities. Increasing physical activity (PA) may improve sleep in these children. The purpose of this study was to examine the feasibility of an 8-week PA and sleep education intervention for elementary age girls in a low SES urban environment. **Methods:** The goal was to recruit 36 urban elementary age girls (age, 8.8 $\pm$ 1.6 yrs.) and randomize them into one of three 8-week interventions: PA+S (PA = weeks 1-8; sleep education = weeks 5-8), S+PA (sleep education = weeks 1-4, PA = weeks 5-8) or a traditional health education intervention (CON; weeks 1-8) with < 30% attrition. The PA intervention was centered on dance and was implemented for 60 minutes/day for 4 days/week. The sleep education intervention was implemented over three sessions. Process evaluation data were collected throughout the intervention and objective and subjective assessments of sleep and PA were obtained at baseline, 4-weeks and 8-weeks via accelerometer and validated questionnaires. Linear mixed models were used to examine changes in outcome variables. **Results:** Recruitment (n = 42) goals were met, however the overall attrition rate was 52%. Complete outcome data was obtained on 33% of the sample. Moderate-to-vigorous PA (MVPA) increased in the intervention groups compared to the CON group (F (2, 12.0) = 4.0, p = 0.04). **Conclusion:** This was the first study to test the feasibility of a PA and sleep education intervention in girls. Results suggest that improvements must be made to the intervention and assessment components in order to improve the feasibility of such a strategy in this population. While MVPA increased and parent-reported problems with SD decreased, these findings are limited by a small sample size and large percentage of missing outcome data.

60. LOWER LEG MUSCLE SIZE MAY PREDICT PEAK ANGULAR VELOCITY OF CALCANEAL EVERSION DURING DROP LANDINGS

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Excessive rearfoot eversion has been associated with an increased risk of lower-limb injuries.[1] **Purpose:** The purpose of this study was to investigate the effect of lower leg muscle size on peak angular velocity of calcaneal eversion (PAVCE) during single-leg drop landings. **Methods:** 11 female collegiate athletes [age: 20.5±1.6 years, height: 162.4±5.5 cm, weight: 57.9±6.5 kg] volunteered to participate. To obtain muscle size, images of tibialis anterior (TA), tibialis posterior (TP), fibularis brevis (FB), fibularis longus (FL), and flexor digitorum longus (FDL) were captured using ultrasound imaging. Thickness for TA and TP and cross-sectional areas for FB, FL, and FDL were obtained by tracing along fascial borders. To obtain peak angular velocity of calcaneal eversion, subjects hung from wooden rings and performed single-leg drop. Subjects dropped from a height of 40-cm, which was measured from the plantar aspect of the heel to the floor using a meter stick. 28 reflective markers were attached to the skin of the subjects' dominant/landing leg and foot according to a customized multi-segment foot model modified from Bruening et al (2012). A static trial was captured before drop landing trials. PAVCE was calculated using Visual 3D. **Results:** There were no significant correlations between PAVCE and any of the muscles measured (Table 1).

Individual muscle size correlations with PAVCE

TA	TP	FB	FL	FDL
r=-0.038	r=-0.083	r=-0.188	r=0.108	r=-0.382
p=0.911	p=0.807	p=0.579	p=0.753	p=0.247

Conclusion: Lower leg musculature likely has an influence on PAVCE. However, no significant correlations were found in our preliminary data, which may be due to low power.

61. EXAMINING THE PREVALENCE OF SUBSTANCE USE DISORDERS IN EXERCISE DEPENDENCE

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Introduction: Behavioral addictions have been known to overlap with substance use disorders. Few studies have researched the similarities in prevalence of these disorders. Thus, examination of common etiology and prevalence in behavioral and substance addiction is needed. The purpose of this study is to examine the prevalence of substance abuse in exercise dependence. **Methods:** Participants (N=1374; *M* age = 28.24, *SD* = 10.20) completed an online survey that included the Exercise Dependence Scale (EDS), Positive and Negative Affect Schedule, Alcohol Use Disorders Identification Test (AUDIT), and Drug Abuse Screening Test (DAST). First, scores from the EDS were used to categorize participants as "at-risk", "symptomatic", or "asymptomatic" of exercise dependence. ANOVAs were conducted to examine differences in AUDIT and DAST scores in EDS categories. **Results:** Negative affect was significantly correlated with all variables (ps <.001) and was subsequently entered as a covariate for ANOVAs. Significant differences were found among EDS groups and AUDIT scores [F(3,963) 29.78, *p* <.001; η^2=.085]. Bonferroni post hoc analyses revealed the "at-risk" group reported higher alcohol use problems scores than "symptomatic" and "asymptomatic" groups (*p*s <.001). Individuals in the "at-risk" for exercise EDS group reported AUDIT scores indicative of harmful alcohol use problems. Significant differences were found among EDS groups and DAST scores [F(3,1029) 32.85, *p* <.001; η^2=.087]. Bonferroni post hoc analyses revealed the "at-risk" group reported higher drug use problems scores than "symptomatic" (p = .037) and "asymptomatic" groups (p = .005). **Discussion**: Affect regulation has been theorized as an etiological factor for multiple addictions. Specifically controlling this variable we observed comorbidities that were relatable in behavioral and substance addiction. Specifically, alcohol abuse was more prevalent in exercise dependence. Drugs use scores were high, but it didn't reach the threshold for addiction. Our study suggests common etiology of both exercise addiction and substance use disorders.

62. TENASCIN C EXPRESSION IN OLD AND YOUNG HUMAN SKELETAL MUSCLE IN REPSONSE TO DAMAGING EXERCISE

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Purpose: Human skeletal muscle is adaptable to work and regenerative after damage. Skeletal muscle extracellular matrix (ECM) appears to play an important role in the remodeling process. Specifically, tenascin C (TN-C) is a deadhesion protein that separates the ECM from the sarcolemma allowing the necessary regenerative components to access the site of damage. Human skeletal muscle loses peak functionality with age and little is understood about the regenerative capacities of old muscle. The purpose of this study was to examine the activity of TN-C in response to muscle damaging exercise in old and young human skeletal muscle. **Methods**: Seven old (70.9± 7.5y) and nine young (22.7± 2.25y) subjects completed an eccentric exercise to damage the muscle. Biopsies were taken prior to exercise as well as 3-hr, 24-hr, and 72-hr following exercise from the *vastus lateralis*. Immunohistochemical staining was carried out to determine the expression of TN-C. The florescence of TN-C was quantified as a percentage of the total area using cellSens imaging software. **Results**: Analysis showed that TN-C was elevated by the 24-hr time point for both the old and the young subjects (p<0.05) relative to the pre and 3-hr post exercise time points. Statistical analysis indicates a potential trend between the old and young groups (p=0.058). **Conclusion**: These data indicate a difference in ECM remodeling between old and young subjects, which may help explain the decreased regenerative potential of old muscle.

63. SEX DIFFERENCES IN MUSCULAR STRENGTH AND POWER IN RECREATIONALLY-TRAINED INDIVIDUALS

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Purpose: It is know that there is a strong correlation exists between muscular strength and power, however little is known how prescribed exercises affect sexes differently. Therefore, purpose of this study was to investigate sex differences in baseline muscular strength and power among recreationally trained individuals. **Methods:** Twenty-one females and twenty-four males volunteered to participate in two testing sessions. On day one (familiarization), participants filled out an informed consent and Physical Activity Readiness Questionnaire followed by being familiarized with the vertical jump, the 1-repetition max (1-RM) bench press and squat, and the isokinetic torque protocols. On day two (testing), participants performed a dynamic warm-up followed by three countermovement vertical jumps utilizing the Vertec and force plates to obtain peak power (PP), rate of velocity development (RVD), and peak velocity (PV); the maximal vertical jump height (JVH) of the three trials was used for analysis. Maximal peak torque (PT) was taken from 5 repetitions for bilateral hamstrings and quadriceps was assessed using an isokinetic dynamometer. Lastly, muscular strength was evaluated through the 1-RM bench-press and 1-RM squat. During the squats, participants used the True Squat App to ensure they reached a depth of 75° of knee flexion for the 1-RM. Independent t-tests were used to analyze sex differences in all performance variables. **Results:** Independent t-tests revealed that there were significant differences between sexes, with males being greater than females in absolute 1-RM squat strength (p<0.01), relative 1-RM squat strength (p<0.01), absolute 1-RM bench (p<0.01), relative 1-RM bench (p<0.01), right quadriceps PT (p<0.01), right hamstrings PT (p<0.01), left quadriceps PT (p<0.01), left hamstrings PT (p<0.01), PP (p<0.01), RVD (p<0.01), and PV (p<0.01). **Conclusion:** Males displayed greater power and relative/absolute strength. This suggests that females may benefit from an exercise prescription that emphasizes both strength and power equally.

64. RELATIONSHIP BETWEEN DYNAMIC POSUTRAL CONTROL AND CORE STRENGTH IN COLLEGIATE WOMEN'S BASKETBALL PLAYERS

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Context: Core strength and balance have been emphasized as important pieces to injury prevention, however, there is limited research regarding the relationship between the two. The Star Excursion Balance Test (SEBT) has been used to predict injury rate in athletic populations. **Purpose:** The purpose of this study was to evaluate the relationship between dynamic postural control using the modified SEBT and core strength in NCAA Division I women's basketball players. **Methods:** Fourteen Division I collegiate women's basketball players (age 19.71 ± 1.20 years; height 175.26 ± 7.32 cm; mass 71.36 ± 12.76 kg) completed a modified SEBT and core strength tests in a single testing session. Reach distance during the modified SEBT was collected in the anterior, posteromedial, and posterolateral directions and normalized by leg length. Composite score was calculated by adding individual directions. Core strength was measured using endurance tests for back extension, trunk flexion, and single leg wall sits, all for time. **Results:** There was a significantly moderate correlation $r(12) = 0.599$, p = 0.024 between combined composite SEBT score and trunk flexion holds. There was a significantly moderate correlation $r(12) = 0.568$ p = 0.04 between right leg anterior reach and back extension holds. A regression analysis was performed and determined that back extension holds was a good predictor of right anterior reach $R^2 = 0.460$ p = 0.009. **Conclusion:** This study corresponds with previous studies that shows the positive relationship between core strength and dynamic balance. Despite sample-size limitations, this study showed that increase in some core strength parameters may influence dynamic postural control.

65. CHOOSING A MULTI-SEGMENT FOOT MODEL FOR SPORTS APPLICATIONS

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Purpose: The many multi-segment foot models that have been developed for gait analysis may also be useful for sports applications; however, their complexity may hinder expanded use. These models can be simplified into two types based on reference orientation: 1) a traditional clinical viewpoint where the foot segments are aligned parallel with the floor, and 2) orientation along anatomical structure (e.g. calcaneal inclination). Our purpose was to compare these two types of models in sports applications. **Methods**: A combined 24-marker set from two different representative foot models (Oxford and Shriners Hospitals- Erie Models) were placed on three healthy participants' (26±2 yrs.) dominant legs. Participants performed three trials each of a walk, a run and a cut. Visual 3D software was used to compare range of motion (ROM) and means (indicative of the offset between reference frames) across stance phase for the ankle, midtarsal and metatarsophalangeal (MTP) joints. **Results**: Compared to walking, sports movement ROM was up to 5.1° greater at the ankle (sagittal plane run) and 7.4° at the midtarsal (sagittal plane cut). Across all movements, ankle and midtarsal ROM was similar between models (max 1.9° transverse midtarsal run). However, the MTP ROM differed substantially (max 25.7° for sagittal walk and 24.2° for transverse cut). Offsets between models were greatest in the sagittal plane at the ankle (max 9.4°) and midtarsal (max 21.8°) joints, and were similar across movements. **Conclusions:** When deciding between models for sports applications, the main factor to consider is likely anatomical specificity vs. statistical power. The SHCE and similar models include structural information (e.g. arch height) that may be important in individual comparisons, whereas Oxford style models will generally have less group variability. In ROM studies, results will be similar between models independent of the activity.

67. VALIDITY OF A CONSUMER BIOELECTRICAL IMPEDANCE ANALYSIS SCALE TO MEASURE BODY COMPOSITION IN HEALTHY ADULTS

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Purpose: With the rise of home health electronics, bioelectrical impedance analysis (BIA) scales, such as the Fitbit Aria®, have gained popularly in monitoring fitness progress at home, yet the accuracy of this scale is unknown. This study aimed to assess the validity of body fat percentage (BF%) measurements from the Aria® scale compared to the industry "gold standard" of hydrostatic weighing (HW) and the BodPod. **Methods:** Twenty healthy individuals, male (n=10) and female (n=10), volunteered to participate [age: 25.8±3.2y; height: 171.6±10.3cm; mass: 69.6±16.2kg; body mass index (BMI) range: 16.8-27.6]. Participants arrived at the laboratory 3h fasted after 12h without exercise and underwent measures of 1) residual lung volume (for HW calculations), 2) hydration status, and 3) BF% via BodPod, Aria® scale ('Lean' and 'Regular' modes), and HW. Body composition validity of the Aria® was compared to HW using Bland-Altman Plots, identifying Mean Biases±Limits of Agreement (LoA) between devices/methods (for all participants, men and women) with significance set at p≤0.05. **Results:** Using HW as the validity criterion, mean BF% was 23.5±7.5% for all participants (range: 5.3-35.8%; male mean: 22.0±9.0%; female mean: 24.6±6.5%). HW and BodPod BF% measures were similar among all participants (p>0.05). Compared to HW (using Mean Bias±LoA), the Aria® scale (in 'Lean' mode) underestimated BF% by -6.6±8.4% for all participants (males: -8.7±9.1%; females: -4.5±6.5%) (p≤0.05). In 'Regular' mode, the Aria® scale underestimated BF% by -2.2±9.0% for all participants (p≤0.05); however, there was no significant difference (p>0.05) when analyzing BF% independently by sex (males: -2.5±8.1%; females: -2.0±10.3%). **Conclusion:** Compared to HW, the Aria® scale underestimated BF% in 'Lean' mode, and this discrepancy appears to be even more pronounced in males. However, the Aria® scale agreed with HW when analyzing BF% individually by sex in 'Regular' mode. This initial data suggests the "mode" chosen on consumer BIA devices greatly impacts validity.

66. PROMOTING ROUTINE STAIR USE: EFFECTIVENESS OF A COMMUNITY PHYSICAL ACTIVITY PROGRAM FOR OLDER ADULTS

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Purpose: Stair use is a convenient method for increasing physical activity that is associated with physiological benefits including greater lower limb strength. With the aim of developing a new community physical activity program for older adults, we evaluated the effectiveness of promoting routine stair use by objective measurement of stair climbing at weekly health education sessions for 6 months. **Methods:** Seventy-four healthy older adults (50 women, 24 men, mean age, 73.5 ± 5 years) were recruited. Participants attended weekly physical activity sessions at their community center and recorded their daily walking and stair climbing steps using a pedometer (Omron, HJA-403C). Prior to and after the 6-month study period, height, weight and leg strength (i.e. abductor muscle strength) were measured. Qualitative outcomes were also used to describe their opinions or satisfaction with the program. **Results:** Forty-nigh participants (34 women, 15 men) completed the study. They recorded 120 stair steps per day, which was 2% of their total walking steps. After the 6-month, the mean walking steps (6,607 ± 3,235 vs. 7,556 ± 2,715 steps) and stair steps (119 ± 90 steps vs. 166 ± 123 steps) increased significantly ($p \leq 0.01$). The accuracy and precision of the pedometer were about±10%. In men, the correlation coefficient between the stair steps and abductor muscle strength was 0.428 (p=0.037). **Conclusions:** The study exhibits a stair use campaign that increased routine daily stair use by about 50 steps per day in older adults. However, main barriers to stair use were also reported: lower extremity pain and reduced/loss of commitment to use stairs. In a proposed future study, cross-sectional evaluations of stair steps and leg strength will be examined to estimate objective goals, such as individual total stair steps in order to increase leg strength, which may help increase older adults' commitment to use of stairs.

68. RELATIONSHIP BETWEEN LOWER EXTREMITY STRENGTH AND CLUB HEAD VELOCITY

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Context: A positive relationship has been observed between lower extremity strength and golf swing performance. However, few studies have explored this relationship in collegiate athletes. **Purpose:** The purpose of this study was to investigate the relationship between lower extremity strength and club head velocity. **Methods:** Seven female collegiate golfers (age: 20.71 ± 0.76 yrs, height: 163.82 ± 5.34 cm, mass: 63 ± 4.17 kg, golf experience 12.86 ± 0.38 years) participated in the study. Flightscope ball tracking system was used to obtain club head velocity in miles per hour. The best of five trials were recorded. Lower extremity strength data were collected using manual muscle testing with a hand-held dynamometer. The assessment included hip adductors, abductors, extensors, internal, external rotators, knee flexors, extensors, shoulder internal and external rotators. The average of three trials were recorded and normalized by body weight. **Results:** A multiple stepwise linear regression showed that lead hip external rotator muscle strength was a good predictor of club head velocity speed ($F(1,5) = 23.374$ $p=.005$) with an R^2 of .824. None of the other variables entered the equation. **Conclusion:** This study revealed that lead leg hip external rotation was a strong predictor for club head velocity. Although our sample size was small our results agree with previous research that have found strong correlations in hip strength and club head velocity.

69. THE INFLUENCE OF NEUROMUSCULAR ACTIVATION PATTERNS ON PLANTAR PRESSURE DURING MAXIMAL ROWING

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Purpose: In rowing, force generation at the foot stretcher is acquired through the activation of appropriate muscle patterns. However, it is unknown how different strategies of foot force application influences muscle activation and force-time profiles. The purpose of this study is to determine if force generation and muscle activation differ when pushing under different areas of the foot. **Methods**: Seven collegiate rowers (5-female, 2-male) completed two trials of ten maximal strokes while pushing through the balls of the feet, and pushing through the heels. EMG of the erector-spinae(ES), lastissimus-dorsi(LD), gluteus-maximus(GM), and rectus-femoris(RF) were bilaterally recorded. Pressure distribution under both feet was recorded while using a wireless Tekscan in-shoe plantar-pressure system sampling at 500Hz. For each condition, force under the total foot, heel and forefoot was determined for the middle five strokes. Analyzed plantar pressure variables included peak force, rate of force development and impulse. Analyzed EMG parameters included timing of muscle activation, duration, and integrals (iEMG) of drive activation. **Results**: The EMG analysis did not reveal significant differences for onset, duration and integration of muscle activation between conditions. In five of the seven participants, pushing through the ball of the foot resulted in higher peak forces (466.9±95.7N), impulse (327.0±59.0N*s), and a higher rate of force development (2301.7±849.0N/s), compared to pushing through the heels (441.4±111.2N, 307.2±56.6N*s, and 2114.9±752.1N/s). The other two participants demonstrated opposite patterns. **Conclusion**: Pushing through the ball of the foot may provide a better technique for force generation than pushing through the heel. However, among all participants muscle activation and sequencing patterns between conditions did not differ. It is of interest to know how greater force production is being achieved through different pressure techniques without influencing appropriate muscle sequencing. Future research should examine whole-body kinematics to determine whether this truly is a beneficial adaptation.

71. INFLUENCE OF PROPRIOCEPTIVE PRIMING ON SPRINT START MECHANICS

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Purpose: Proprioceptive priming is a technique used to provide feedback about motion. The purpose of this study is to explore the effects of proprioceptive priming, and determine whether or not it can be used as an effective training aid for sprinters. A lower vertical distance traveled by the foot during block clearance (BC), step one (S1), and step two (S2) of a sprint start means the sprinter spends less time in air, and therefore has more opportunity to apply forces to the ground during a sprint start. **Method:** Three female (age: 20yrs±1.73, height: 1.64m±.07, weight: 58.78kg±9.11) and three male (age: 23yrs±3.464, height: 1.84m±.08, weight: 75.3kg±4.46) sprinters, from a NCAA Division 1 track and field team participated in the study. After completing a standardized warm-up, participants performed two baseline sprint trials. The proprioceptive intervention was then performed using a resistance band to reinforce minimal vertical foot motion and force production. Two sprint trials were then performed. **Results:** Paired sampled T-tests were performed. Average peak toe height during BC for the six sprinters before and after the proprioceptive intervention: .191535± .038598m, and .133537±.012128m, ($p < .05$). As for S1, average peak toe height before and after the intervention: .261637±.114494m, and .24097±.054431m, ($p > .05$). During S2, average peak toe height before and after: .238787±.054096m, and .23171±.057302, ($p > .05$). **Conclusion:** A significant difference was found in peak toe height in the BC. There was no significant difference found in the S1 or S2 peak toe height. These results suggest the proprioceptive priming technique utilized has potential to increase sprint start mechanics and performance.

70. CHANGES IN ENDOTHELIAL FUNCTION FOLLOWING 4 WEEKS OF SUPPLEMENTAL FEEDING AND EXERCISE TRAINING IN OVERWEIGHT/OBESE MALES

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Purpose: Caloric excess induces endothelial dysfunction. Exercise can improve endothelial function or mitigate the negative effects of excess caloric intake. We hypothesized that exercise training would prevent deterioration in endothelial function associated with 4 weeks of fat-sugar supplemental feeding. **Methods:** 27 overweight/obese (BMI = 30.0±3.7 kg/m^2) males (age = 29.3±7.4 yr) underwent 4 weeks of supplemental feeding (+14,579 ±413kcal), in the form of donuts (6 days/week) added to their regular diet. Participants were randomized to one of three conditions: 1,000 kcal/week supervised moderate-intensity (MOD; n=8) exercise (50% peak VO_2), 1,000 kcal/week supervised high-intensity interval (HIE; n=10) exercise (90-95% peak heart rate), or no-exercise control (CON; n=9). All participants were tested in the morning following a >10 h overnight fast at baseline and 4 weeks. Endothelial function was assessed by brachial artery flow-mediated dilation (FMD) and was further normalized for shear rate (FMD/shear rate). Two-way repeated measures ANOVA was used to detect time, condition, or time x condition interaction effects. **Results:** FMD was unchanged in all groups (Control: Pre FMD = 4.6 ± 1.2 %, Post FMD = 3.7 ± 2.1 %, p=0.28; HIE Pre FMD = 6.0 ± 2.7%, Post FMD = 5.5 ± 2.3%, p=0.56; MOD Pre FMD = 6.2 ± 2.4%, Post FMD = 5.5 ± 2.4%, p=0.43). With all groups combined there was a trend towards a reduction in FMD (p=0.16) and FMD/shear rate (p=0.09). Baseline diameter, peak diameter, blood flow velocity and shear rate were unchanged within all groups ($p > 0.05$). **Conclusions:** An additional ~14,500 kcal of a fat-sugar supplement over 4 weeks was not sufficient to induce deleterious changes in endothelial function in overweight/obese males. The fat-sugar supplement may have prevented improvements in FMD expected with HIE and MOD exercise training.

72. FMRI ASSESSED NEURAL ACTIVATION in BLOOD-FLOW-RESTRICTED HANDGRIP EXERCISE

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Purpose: Blood-flow-restricted (BFR) exercise is reported to improve strength and elicit muscle hypertrophy, although little is known about its neural effects. The purpose of this study was to investigate brain neural responses in BFR and control conditions during handgrip exercise. **Methods:** Twenty-five subjects completed dynamic handgrip exercises during two conditions: BFR and control. fMRI scans were acquired during both exercise conditions, separated by 72 hours. The exercise protocol consisted of five 30-second sets of squeezing a non-metallic handgrip exerciser (a reported 13.6 kg resistance), doing as many repetitions as possible, with 20-second rest intervals between sets. **Results:** We saw a significant main effect of exercise condition in the premotor dorsal ($F = 5.71$, $p = 0.022$), premotor ventral ($F = 8.21$, $p = 0.007$), and right ventral striatum ($F = 7.36$, $p = 0.01$). When considering anatomical regions of interest, we found no significant differences between exercise conditions in the bilateral primary sensory cortex ($p > 0.82$), primary motor cortex ($p > 0.33$), supplementary motor area ($p > 0.66$), cerebellum ($p > 0.70$), insular cortex ($p > 0.45$), anterior cingulate cortex ($p > 0.24$), or thalamus ($p > 0.66$). Significant linear trends ($p = 0.001$) over the five exercise sets were found in the bilateral anterior cingulate cortex, right middle frontal gyrus, and the right primary sensory cortex. The right primary sensory cortex, left primary sensory cortex, and the right anterior cingulate cortex showed a main effect of set ($p < 0.02$). **Conclusion:** The BFR exercise completed less total work, but achieve similar brain neural activation as a higher volume control exercise. BFR exercise has direct effects the central nervous system.

73. ANKLE JOINT MUSCLE FORCES DURING STAIR ASCENT FOLLOWING TOTAL KNEE REPLACEMENT

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Purpose: Total knee replacement (TKR) surgeries are steadily increasing among older populations. The purpose of this study is to better understand surrounding joint compensations and muscle group alterations in TKR patients. This study may help improve efficiency of rehabilitation and healing after surgery for TKR patients. **Methods:** Biomechanical data were collected on five TKR (age: 63.6) and five healthy (age: 57.8) participants during stair ascent using a 5-step staircase with 3 instrumented steps at a self-selected pace. A generic musculoskeletal model of 12 segments, 19-degrees of freedom and 92 muscle (Gait 2392 Model, OpenSim 3.0.1, SimTK, Stanford, CA, USA) was used to simulate muscle forces of the major muscles surrounding the ankle joint during the stance phase of the second step during stair ascent. Muscle forces exhibited by participants were individually simulated and compared to show possible effects of the replacement surgery. **Results:** During the loading phase of stair ascent TKR participants had reduced peak peroneus brevis force (0.33 ± 0.27 N/kg) compared to healthy participants (2.04 ± 1.5 N/kg). During the push-off phase of stair ascent, TKR participants had deficits in the soleus (14.7 ± 5.7 N/kg) compared to healthy participants (24.0 ± 4.8 N/kg) as well as the tibialis posterior (1.78 ± 0.9 N/kg vs. 4.46 ± 2.4 N/kg). The peroneus brevis and extensor digitorum longus muscles showed trends towards significant differences (p = 0.10). **Conclusion:** Results of this study show that muscle deficits are apparent in plantarflexors during the push-off phase in TKR patients compared to healthy individuals. Therefore, targeted therapy programs to improve these muscles have the potential of improving post-surgery functionality of TKR patients.

75. THERMOREGULATORY EFFECTS OF SHIRT VARIATION WHILE SURFING IN TROPICAL ENVIRONMENTS

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Purpose: In hot environments, loose clothing is often utilized to protect from the sun and to aid in the cooling process. This has lead surf apparel companies to create a loose fitting surf shirt as a substitute for the traditional rash guard, primarily for use in tropical areas. The effectiveness of these shirts in the thermoregulation process while surfing, however, is unknown. The purpose of this study was to investigate the thermoregulatory effects of wearing a surf shirt instead of a traditionally worn rash guard or no shirt while surfing in a tropical environment. We hypothesized that skin temperature while surfing would be lower while wearing a surf shirt compared to a rash guard or no shirt. **Methods:** 16 surfers (13 males, 3 females, mean age 23.3+/-8.8 years) completed 3 randomized surfing trials in Costa Rica. Each trial consisted of a 20-minute surfing session wearing either a surf shirt, rash guard, or no shirt. Skin temperatures were measured during each trial at 1-minute intervals using thermistors (iButton Thermochrons) placed on the skin at two locations. Skin temperatures were taken prior to and after each surf session on the right hand using a Fluker Foodpro Plus Infrared Thermometer to account for potential differences in starting skin temperatures between trials. Average heart rate (HR) was measured during each trial using a HR monitor (Polar F21) to examine whether surfing intensity was consistent between trials. **Results:** No significant differences were observed in mean HR (P=.48) and mean starting skin temperatures (P=.46) between the surf shirt, rash guard, and no shirt trials. Further, no significant differences were observed in skin temperatures between the three trials on either the back (P=.12) or the chest (P=.06). **Conclusion:** These data suggest that shirt type does not significantly affect the body's thermoregulatory process while surfing.

74. Radiation and Exercise Training Effects on Muscle Strength and Quality in Female Cancer Survivors

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Purpose: The IMPAACT Study (Improving Physical Activity After Cancer Treatment) is a multi-factorial study that examines the effects of exercise on cancer survivors and the risk factors of reoccurrence. Radiation is a common treatment that uses high-energy particles to kill or damage cancer cells. Little is known about the potential damaging effects of radiation treatment and muscle. Our sub-study aimed to look at the effects of radiation on the strength and muscle quality. **Methods:** Female gynecological cancer survivors (n=26;64.1±8.1 years;163.7±6.4cm;41.1±7.3 body fat %) attended tri-weekly aerobic and resistance training sessions. Pre- and post- maximal voluntary isometric torques (MVIT) were assessed using an isokinetic dynamometer (HUMAC NORM), and combined handgrip (HG) strength. Dual-energy x-ray absorptiometry was used to evaluate mineral-free regional lean muscle mass of the arms and legs. Muscle quality (MQ) was calculated by dividing combined HG or MVIT by the respective regional lean mass. Percentage change was calculated for each of absolute strength and muscle quality variables for the HG and quadriceps. A two-way, multivariate ANOVA, with the covariates, number of exercise sessions attended and time-since cessation of treatment, assessed change scores in muscular variables.**Results:** Participants who had been treated with radiation (n=16) saw significantly higher changes in absolute HG (-7.8±14.6% vs. +13.3±19.1%, p=0.003) and leg strength (-8.6±38.3% vs. +15.7±55.1%, p=0.048). Likewise, the radiation group showed significantly greater improvements in MQ of the HG (-9.6±14.6 vs. +13.3±18.0) and the quadriceps (-29.4±48.7 vs.+4.9±26.2). There were no differences seen for chemotherapy or surgery. **Conclusion:** A suppression of muscle strength and quality following radiation therapy during cancer treatment appears to be largely reversible following prolonged exercise programming.

76. ASSOCIATION BETWEEN LOWER EXTREMITY ASYMMETRY AND MUSCULAR STRENGTH OF RECREATIONALLY-TRAINED INDIVIDUALS

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Current ACSM exercise prescription guidelines recommend exercising all major muscle groups to avoid imbalances. Previous investigations have examined muscular asymmetries and exercise or sport performance of athletes, but recreationally active individuals have been less examined. **PURPOSE**: The purpose of this study was to investigate the relationship between lower extremity asymmetries and measures of lower body strength in recreationally-trained individuals. **METHODS:** Forty-five recreationally active men and women (mean ± SD; age = 23 ± 2 y, height = 166.5 ± 24.4 cm, mass = 73.9 ± 13.3 kg) performed maximal concentric and eccentric isokinetic knee actions on both legs at a velocity of $60°\cdot s^{-1}$ to measure peak torque (PT) of the quadriceps and hamstrings. Then lower body muscular strength was assessed via one-repetition maximum (1-RM) of the back squat. To examine unilateral asymmetries, the percentage difference (%Δ) in PT between the hamstrings and quadriceps of each leg was calculated and used in the analysis. To examine bilateral asymmetries, the %Δ in PT of the musculature between the left and right legs was calculated and used in the analysis. **RESULTS:** There was no correlation between the degree of unilateral asymmetry of each leg and lower body strength (left: 50.2 ± 9.2%Δ, right: 48.6 ± 9.3%Δ; 1.39 ± 0.55 $kg\cdot kg^{-1}$ body mass; $P \geq 0.05$ for both). Similarly, there was no correlation between the degree of bilateral asymmetry of lower body musculature and lower body strength (hamstrings: 8.7 ± 9.2%Δ, quadriceps: 9.17 ± 6.6%Δ; $P \geq 0.05$ for both). **CONCLUSION:** There were no significant correlations between muscular imbalances and strength of the lower extremities in recreationally-trained individuals. Asymmetries might not affect lesser-trained individuals as much as their elite counterparts. Future studies might consider comparing populations of different training states along with the effect of imbalances on injury risk of these different populations.

77. EXER-STUDY: FOR THE BRAIN, FOR THE BODY. WALKING WHILE STUDYING PROVES MORE EFFECTIVE THAN SEDENTARY STUDY.

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Purpose: A positive relationship exists between exercise and cognitive performance. When examining exercise effects on learning, studies have focused primarily on proactive or reactive effects. Little research exists on simultaneous exercise and learning. The purpose of this study was to examine the effectiveness of simultaneous exercise and studying in college students when compared to sedentary studying. **Methods**: Thirty participants were randomly assigned to one of three study mode groups: jogging (n=10), walking (n=10), or sedentary (n=10). Participants were given a 30-word baseline vocabulary test. They then studied the words with correct definitions for ten-minutes while walking or jogging on a treadmill at a self-selected pace, or seated at a desk. Participants repeated the vocabulary test at 5-minutes and 24-hours post study session to measure learning performance and retention. **Results:** MANCOVA omnibus results indicated a significant difference across mode of study for the combined posttests ($F_{(4, 40)} = 3.661$, $p = .012$, $\eta^2 = .268$). Individually, the effect of mode of study was significant on both the 5min and 24hr posttests ($F_{(2,119)}=4.153$, $p=.030$; $F_{(2,163)} = 4.656$, $p=.021$ respectively). Pairwise comparisons showed significance in 5min posttest scores, as well as 24hr between the walking and jogging groups, with walking performing significantly better. The 24hr posttest trended toward significance between the walking and sedentary groups. **Conclusion**: Walking at a self-selected pace while studying is more effective for both immediate learning performance and retention of learned information than jogging or sitting sedentarily while studying. Walking while studying may be the optimal mode of study for cognitive performance in college-aged students.

79. Differences in Intervertebral Disc Fluid between an Active and Inactive Individual

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Purpose: Intervertebral disc health is related to taking up and expelling fluid, which is how the disc receives nutrition and discharges waste. Activity levels can influence the efficacy of this process, which can have lasting effects. Diffusion-weighted imaging, an MRI technique, measures the rate of water diffusion within the disc along the 3 principal axes. The apparent diffusion coefficient (ADC) can then be calculated. This shows the average diffusion of water molecules in each pixel with higher values indicating better fluid flow and consequently better nutrition within the disc. This study outlines 2 cases of middle aged individuals who have very different levels of activity and how their lifestyle choices have influenced the health of their intervertebral discs. **Methods:** One subject was a 45 year old male with a BMI of 21.5 who enjoys the occupation of running and does so up to 100 miles per week. The other subject was a 50 year old female with a BMI of 38.3 who has a desk job and sits for the majority of her day. Subjects were placed supine on the MRI table for the scan. 2D EPI Diffusion Tensor Imaging at 2.25 mm isotropic resolution was used for the MRI scan. The ADC was then compared between the two individuals. **Results:** The ADC of the active individual was $1.972 \times 10^{-3} mm^2/s$. The more sedentary individual had an ADC of $0.011 \times 10^{-3} mm^2/s$. **Conclusion:** Based on these case studies, a relatively high level of activity throughout life may be associated with improved fluid flow within intervertebral discs, whereas a more sedentary life is associated with a more rapid decline in the disc's ability to transport fluid in and out, which can lead to degeneration and pain.

78. THE EFFECTS OF A HEAVY RESISTANCE WARM-UP ON SPRINT SPEED: A POST ACTIVATION POTENTIATION STUDY

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Sprint speed is a fundamental physical characteristic that is necessary for the successful participation in many sports. Post activation potentiation (PAP) is defined as an acute enhancement of muscle power output following an intense muscle conditioning activity. **Purpose:** The purpose of this study was to determine the effects of a PAP conditioning activity on sprint speed with an emphasis on the role of specificity regarding the preparatory conditioning activity. It was hypothesized that a unilateral conditioning activity (barbell lunge) would provide a greater PAP effect on short sprint ability than a bilateral conditioning activity (barbell back squat). **Methods:** Sixteen NCAA Track Athletes participated (7 male, 9 female) in the study. The experiment employed a repeated measures crossover design where, following a familiarization session, each subject completed a randomly assigned a separate warm-up (WU) on three different days with at least 48 hours between sessions. Following the randomly assigned WU, sprint speed was tested over a distance of 36.6 meters as well as quartiles. The WU's were: a dynamic WU, a dynamic WU followed by a unilateral barbell lunge (BL) as the PAP conditioning activity, and a dynamic WU followed by a bilateral back squat (BS) as the PAP conditioning activity. The load of the BL and BS conditioning activities were both 6 repetitions of 80% 1-RM. A repeated measures ANOVA was utilized to determine if there were significant differences between sprint times for each WU strategy. **Results:** There were no statistically significant differences in sprint times between WU conditions at 36.6 m or any quartile ($p > 0.05$). **Conclusion:** Within the parameters of this study, neither an intense bilateral or unilateral conditioning activity improved short sprint performance beyond that of a dynamic WU activity.

80. MUSCLE STRUCTURE IN MONOZYGOUS TWINS WITH 35 YEARS OF DIFFERING EXERCISE BACKGROUNDS.

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INTRODUCTION: Variations in physical ability between individuals depends on both genetic inheritance and lifestyle. No previous research has examined monozygous (MZ) twins with both substantial and long-term differences in physical activity patterns. **PURPOSE:** Examine vastus lateralis (VL) size, thickness, and quality in a set of MZ twins (age=52y) with decades of differing exercise habits. **METHODS:** A portable brightness mode (B-mode) ultrasound machine (GE/Logic e, Wauwatosa,WI) with a 10-MHz linear array probe was used to assess muscle thickness (MT), cross sectional area (CSA), and echo intensity (EI) of the right VL. Over the past 35y, the trained twin (TT) accumulated ~39,431 running miles (ht=186cm mass=94kg bf%=19.2%) while the untrained twin (UT) did not engage in any formal training (ht=183cm, mass=104.5kg, bf%=27.8%). Researchers marked a line at the midpoint of the lateral knee joint surface and the anterior superior iliac spine (ASIS). Two more lines were drawn 2 and 4 cm distal to the midpoint. Transmission gel was used to improve acoustic collection. Three images from each marked location (9 total images) were analyzed and averaged to generate a final MT, CSA, and EI. **RESULTS:** Distance from the ASIS to mid-patella was 66cm (TT) and 61cm (UT). CSA (TT: 1049.6 cm^2, UT: 1097.5 cm^2, 4.5% difference) and MT (TT: 15.4cm, UT: 16.1cm, 4.5% difference) were within ~5% between the co-twins. However, EI was 18.4% higher in TT (77.1 vs. 64.1 arbitrary units). **CONCLUSION:** EI is a measure of muscle quality with lower numbers representing higher quality. Thus, our findings unexpectedly favor UT. EI negatively correlates with strength, independent of CSA. This aligns with our previously reported data that UT produced more force during a maximal leg contraction. This collectively suggests long-term endurance training might not alter muscle size or thickness and might negatively influence muscle quality.

81. THE EFFECT OF PROPER RUNNING MECHANICS ON ENERGY EFFICIENCY

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Purpose: A more efficient runner is a more comfortable, prolific, and more competitive runner. More efficient running technique should lead to decreased respiratory exchange ratio (RER), VO2 Max, heart rate (HR), Exercise intensity (MET) and rating of perceived exertion (RPE). Such physiological changes should lead to performance improvements such as delayed onset of fatigue and decreased recovery time. We analyzed how improving arm movement and cadence could reduce a runner's efficiency. **Methods:** To date, 4 novice runners, aged 18-50, participated in the study (3 males, 1 females). Thirty nine 3D reflective motion sensors were placed on the upper body of each subject. Movement was analyzed by the iPad application Coaches Eye. Trial 1 consisted of an uncoached 5-minute running bout at pre-determined target heart rate, determined by the Karvonen formula, which coincided with 50% of runner's VO2 Max. After the first trial, subjects were coached on proper running mechanics and were encouraged to practice employing their enhanced technique for one week. Trial 2 was similar to trial 1 except that runners used their improved mechanics. Exercise intensity, HR, VO2, RER, and movement angles for the shoulder, wrist, and thorax were measured. Paired t-tests were performed for each set of values to compare trial 1 with trial 2. **Results:** Increased RER and changes in shoulder movement on all axes were observed. A trend for increased MET and VO2 was noted. Decreased RPE was reported when running with improved mechanics. **Conclusion:** While subjects report working less intensely (RPE) to run with improved mechanics, increases in RER, and trends for increased VO2 and MET do not support greater running efficiency with improved mechanics in our training and testing model. Reassessment of strategy and completion of the study with complete cohorts should shed greater light on the value of our intervention.

83. MUSCLE QUALITY AS A PREDICTOR OF SELF-REPORTED FATIGUE IN CANCER SURVIVORS

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Purpose: The IMPAACT Study (Improving Physical Activity After Cancer Treatment) investigates the effects of physical activity on cancer survivors and assesses risk for cancer recurrence and other chronic diseases. The purpose of this sub-study was to determine the predictive value of muscular performance variables as a means of better understanding self-reported fatigue. **Methods:** Female gynecologic cancer survivors from the 2015-2016 cohort (*n*=36; 64.6±7.6 yrs; 163±5.2 cm; 79.5±18.7 kgs; 43.0±7.4% body fat) were evaluated using the NIH PROMIS Fatigue Scale (SRF) at baseline and following 26 weeks of combined aerobic and resistance training (CART). Maximal voluntary isometric torque (MVIT) was assessed using an isokinetic dynamometer (HUMAC NORM), and combined handgrip (HG) strength from the best of three trials for each hand. A maximal, 30-repetition isokinetic concentric/concentric exercise bout at 90 degrees/second for the knee extensors and flexors was followed by three successive MVIT trials separated by one minute to assess both rate of fatigue and recovery. Dual-energy x-ray absorptiometry was used to evaluate mineral-free regional lean muscle mass of the arms and legs. Muscle quality (MQ) was calculated by dividing combined HG or MVIT by the respective regional lean mass. A stepwise linear regression predicted the relationship of muscle performance variables on the self-reported fatigue scores at each time point. **Results:** Leg MQ at baseline was the best predictor of the SRF at the beginning of the study (*r*=0.38). A significant model was also generated for combined leg MQ and MVIT at baseline (*r*=0.49). In addition, at post-testing, torque fatigue percent was found to be the only predictor of SRF (*r*=0.39). **Conclusion:** Leg MQ and MVIT are useful predictors for future SRF in female cancer survivors prior to beginning an exercise program. However, after training torque declines during fatiguing exercise become more correlated to SRF.

82. EXAMINATION OF CARDIOVASCULAR RISK FACTORS AMONG UNIVERSITY EMPLOYEES PARTICIPATING IN A WORKPLACE WALKING PROGRAM

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Purpose: Worksite sponsored physical activity programs are prevalent at university worksites in an effort to improve many health indicators, including risk factors for cardiovascular disease. The purpose of this project was to compare cardiovascular risk factors of university employees participating in a worksite sponsored walking program versus those who do not participate.
Methods: The research was a matched pairs design, with two groups. The study group (n=31) participated in the university sponsored "Workplace Walkoff Challenge" for 6 weeks, while the control group (n=11) did not participate. All cardiovascular risk factors, as defined by ACSM Guidelines, were assessed two weeks prior to the start of the walking program and then repeated during the last week. Risk factors assessed included family history, age, smoking status, physical activity amount, blood pressure, body composition (waist circumference and BMI), dyslipidemia (total cholesterol, HDL, LDL), and fasting glucose. To assess differences in these variables, dependent t-tests were performed.
Results: Walking program participants significantly improved their physical activity amount (p=.05), body mass index (p=.003), waist circumference (p=.03), diastolic blood pressure (p=.005) and fasting glucose (p<.001) from baseline to end of program. There were no significant improvements for participants in systolic blood pressure or cholesterol (total, HDL). Despite a trend towards less cardiovascular risk factors, there was no significant decrease in total number of risk factors. The control group had no significant changes in physical activity, BMI, waist circumference, blood pressure or fasting glucose from baseline to follow up. However, the control group had a significant reduction in total cholesterol (p=.05).
Conclusion: The participants in the walking program had many health indicators improve following the six week walking program. Therefore, short-term worksite walking programs may be effective in improving cardiovascular risk factors. Future research should focus on programming's effect on long-term adherence to physical activity and health indicators.

84. OXYGENATION OF BRAIN AND MUSCLE DURING EXERCISE AND COGNITIVE STIMULATION

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Purpose: Brain oxygen demand does not seem to limit exercise performance. However, it is not known if an increase in cognitive activity during exercise could alter oxygen demand. We hypothesize that a cognitive stimulation during exercise will increase cerebral oxygenation and modify muscle oxygen demand. **Methods:** Male participants (n=3, 23±4 years) performed light (20% of Pmax) and moderate intensity exercise (65% of Pmax), with and without cognitive stimulation (solitaire on Ipad). Oxyhemoglobin (O_2Hb), deoxyhemoglobin (HHb) and total hemoglobin (tHb) were synchronously measured in left and right frontal cortex (LFC, RFC) and right vastus lateralis (RVL) using a Near Infrared System (Artinis Oxymon MkIII). **Results:** Brain O_2Hb mean values at 20% increased with game (RFC -1.32 vs. 3.15, LFC 0.52 vs.1.35) while there was no difference for muscle. Brain HHb increased with game (RFC 0.97 vs. 4.60; LFC 0.95 vs. 2.22) while it decreased in muscle (1.22vs. -0.97). Brain tHB increased with game (RFC -0.35 vs. 6.68; LFC 1.48 vs. 2.90) while it decreased in the muscle (-2.41 vs.-9.89). At 65%, brain O_2Hb mean values decreased with game (RFC 14.67 vs. 3.05; LFC 5.33 vs. 1.69) while it increased in muscle (RVL -4.92 vs. -0.51). HHb for the brain decreased with game only for RFC (8.64 vs.3.72) and increased for muscle (12.98 vs.10.23). RFC tHB decreased (23.31 vs.14.59) and LFC increased (9.90 vs.17.37) with game, while it decreased in the muscle (8.06 vs.4.23). **Conclusion**: We will collect more data to confirm these promising findings to demonstrate that cognitive stimulation during exercise at different intensity affects brain and muscle oxygenation. We will also correlate these changes with oxygen consumption (VO2).

85. EFFECTS OF KETTLEBELL SWING VS. EXPLOSIVE DEADLIFT TRAINING ON RATE OF FORCE DEVELOPMENT

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INTRODUCTION: Fast movements in sports require explosive force. **PURPOSE:** To compare the effects of kettlebell swing vs. explosive deadlift training on rate of force development (RFD). **METHODS:** Thirty-one resistance-trained men volunteered to participate (age = 23.13 ± 2.38 years, height = 175.52 ± 6.66 cm, mass = 83.97 ± 13.85 kg, 1RM deadlift = 159.89 ± 31.73 kg) and were randomly assigned to one of two groups [kettlebell swing group (KBG) = 15, or explosive deadlift group (EDLG) = 16]. Each participant's isometric mid-thigh pull (MTP) was measured pre and post training for RFD at 50, 100, 150, 200, 250 ms. Both groups attended 8 training sessions, twice a week for 4 weeks. The first four sessions consisted of 4 sets of 5 reps at 10% MTP for the KBG, or 30%1RM for the EDLG with 2 minutes rest between sets. Volume and intensity were increased to 6 sets of 4 repetitions at 12.5% MTP and 40%1RM for the KBG and EDLG respectively in the final 4 training sessions. **RESULTS:** A 3 way ANOVA (2 times x 2 groups x 5 RFDs) showed a 3 way interaction. This was followed up with five 2 way (2 groups x 2 times) mixed factor ANOVAs which revealed an interaction for RFD at 150 ms. KBG showed an increase (pre 10673.04 N/s ± 2871.59 N/s, post 11793.64 N/s ± 3413.20 N/s) while EDLG showed a decrease (pre 10260.40 N/s ± 3704.01 N/s, post 9139.07 N/s ± 3796.39 N/s). There were no differences for the other RFD time points. **CONCLUSIONS:** Athletic movements happen in a short amount of time and increasing RFD can enhance athletic performance. Strength and conditioning professionals may use kettlebell swings to increase rate of force development at 150 ms.

86. NO SPRINT POTENTIATION FOLLOWING SLED TOWING

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INTRODUCTION: The training for field sport athletes can be designed to encourage postactivation potentiation (PAP), which is where a power-based activity can be acutely enhanced following a preloaded stimulus. Sled towing is commonly incorporated into the speed training programs for field sport athletes. However, little is known about the acute effect of sled towing as a preload stimulus on sprint speed, and whether this is influenced by the recovery period provided. **PURPOSE**: To examine the PAP effect of different rest periods on body weight (BW) sprint speed following sled towing. **METHODS**: 20 male field sport athletes (age = 23.00± 2.79 yrs, height = 177.45± 6.34 cm, mass = 82.52± 8.79 kg) completed a standardized warm up before performing 30-meter sprints while towing a sled loaded at 30% BW. After completion of the sled tow sprints, subjects rested for randomized periods of 2, 4, 6, 8 or 12 minutes before completing a 30-meter sprint without the sled. A repeated measures ANOVA was used to determine differences in sprint potentiation between rest times relative to baseline. **RESULTS:** Sprint times after any of the rest periods (2 min = 4.51± 0.24s; 4 min = 4.54± 0.25s; 6 min = 4.56± 0.25s; 8 min = 4.55± 0.26s; 12 min = 4.55± 0.26s) were not significantly different than baseline BW sprint times (4.49± 0.19s). **CONCLUSION:** BW sprint times did not change following sled towing regardless of the rest period provided. The 30% sled towing load may not have provided the requisite intensity to potentiate 30-meter sprint performance. Future studies may wish to examine different combinations of intensity, volume, and rest period duration following sled towing on BW sprint speed.

87. NUTRIENT INTAKE DIFFERENCES BETWEEN VEGETARIAN AND OMNIVORE ENDURANCE ATHLETES

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Purpose: Vegetarian diets have consistently been associated with a reduced risk of developing numerous chronic diseases. Although some research regarding nutrient intake differences between vegetarians and omnivores have been conducted in the general population, there is a dearth of studies comparing dietary intake differences between vegetarian and omnivore athletes. The purpose of this study, therefore, was to determine whether there are nutrient intake differences between vegetarian and omnivore adult endurance athletes as nutrient composition of the diet may affect athletic performance. **Methods**: Thirty-eight omnivore (24M/14F) and twenty-two vegetarian (10M/12F) endurance athletes completed seven-day food logs. Participants either participated in a collegiate club sport, such as cycling, or were actively training for a race such as a triathlon, marathon, or other endurance event. Participants were instructed by a Registered Dietitian (RD) about how to accurately complete a food log. Data were entered into The Food Processor Nutrition Analysis Software and analyzed as one-way ANOVAs controlling for gender using the Statistical Package for Social Sciences (SPSS) 23.0 for Mac (SPSS, Inc, Chicago, IL, USA). **Results**: Total caloric and fat intake were similar between groups, but vegetarians consumed more carbohydrate ($p=0.010$) and fiber ($p<0.001$), and less protein ($p<0.001$), than omnivores. Micronutrient intakes were not significantly different between groups. **Conclusion**: This study highlights that primary differences in nutrient intake between vegetarian and omnivore athletes involve protein and carbohydrate intake, and that micronutrient intake is not significantly different between diets. Unlike studies involving the general population, our study did not show differences between vegetarians and omnivores for total fat or calorie intake. Given the importance of protein and carbohydrate in supporting metabolic processes during exercise, sports dietitians should be aware of potential dietary differences when supporting vegetarian and omnivore athletes for strategic nutritional intake.

88. PREDICTORS OF SUCCESS AMONG COMPETITIVE CROSS-FIT ATHLETES

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PURPOSE: The sport of CrossFit is relatively new compared to many other professional sport competitions with World CrossFit Championships first held in 2007. The sport has grown exponentially in the past decade and become a viable athletic career for some elite athletes. Success in CrossFit requires a broad range of skills and fitness, therefore coaches and athletes would benefit if the fitness components most predictive of CrossFit success could be determined. **METHODS:** In an attempt to determine the best predictors of success among competitive CrossFit athletes, a battery of fitness and skill assessments was conducted on a population of highly trained, competitive CrossFit athletes participating in the 2016 CrossFit Open Competition (n=37: 18 men, 19 women). Fourteen assessments including upper and lower body strength, power, endurance (1.5 mile run), gymnastics (hand-stand push-ups, muscle-ups, pull-ups), multi-modal intervals and body size and composition were completed. Results from the fitness assessments were compared to individual world rankings using step-wise regression analysis to determine which fitness components were most strongly related to success in the CrossFit Open Competition during the 2016 season. **RESULTS:** Predictors differed, so men and women were analyzed separately. Among men, in order of importance the significant predictors of success were: 1RM shoulder press, fatigue rate during 4x30 second maximal row intervals, body mass and standing broad jump. Combined, these variables explained 94.5% of the variability among men's world rankings. Among women, the strongest predictors were two of five mixed-modality intervals consisting of wall balls, double-unders, burpees, box jumps, kettlebell swings, and snatches, as well as the 1RM shoulder press. These variables explained 89.3% of the variability among women's world rankings. **CONCLUSION:** Given both men and women had significant 1RM shoulder press measures, upper body strength is a common predictor of success among competitive CrossFit athletes. Sport specific exercise capacity (mixed modalities) had greater impact among women, while power production and fatigue rates in addition to body mass had greater impact among men.

89. THE ACUTE EFFECT OF BREAKING UP PROLONGED SITTING ON POSTPRANDIAL GLUCOSE: A META-ANALYSIS OF RANDOMIZED CLINICAL TRIALS.

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Decreasing sedentary behavior was associated with improvement in metabolic health, but the acute effect of interrupting prolonged sitting on postprandial glucose is unclear. **Objective**: To conduct a systematic review and meta-analysis of randomized controlled clinical trials to explore the association of breaking up prolonged sitting by standing, light intensity physical activity (LPA), and moderate to vigorous physical activity (MVPA) with improvement in postprandial glucose levels in adults with and without diabetes.
Method: Pubmed, Cochrane Central Register of Controlled Trials, and ClinicalTrials.gov databases were searched from January 1980 through May 2016. Eligible articles were RCTs that assessed the acute effect of interrupting prolonged sitting with intermittent physical activities in adults with and without diabetes, that provided test meals during intervention and reported the area under curve (AUC) of postprandial glucose. Two reviewers independently conducted the data extraction and analysis of the included studies. **Results:** Of 3843 potentially relevant articles, 13 randomized crossover trails were included. Pooled standardized mean differences (SMD) in AUC of blood glucose between intervention and control groups were calculated using the generic inverse variance method in a random-effects model. Breaking up sitting with standing (four studies) was not associated with a glucose iAUC reduction (SMD, -0.59; 95% confidence interval [CI], -1.28 to 0.10; I^2, 87.3%), as compared with prolonged sitting. In contrast, LPA breaks (seven studies; SMD -0.87; 95% CI, -1.42 to -0.33; I^2, 87.5%) and MVPA breaks (four studies; SMD, -0.48; 95% CI, -0.74 to -0.21; I^2, 50.2%) were each associated with reductions in postprandial glucose AUC, as compared with prolonged sitting. **Conclusions:** Breaking up prolonged sitting with LPA or MVPA was associated with a reduction in postprandial glucose levels in adults with metabolic risk factors. The health benefit of breaking up prolonged sitting with standing on postprandial glucose needs further investigation.

90. A MILE TRAIL RUN CAN PREDICT PERFORMANCE FOR A 5K TRAIL RACE

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Purpose: A common desire and strategy for many runners is to predict race time off of a shorter time trial. It is unknown whether these strategies apply to trail races. The purpose of this study was to determine if a 1-mile trail run could predict performance on a 5K trail race. It was hypothesized that a significant correlation would be present between a timed 1-mile run and 5K run time. **Methods**: Thirteen participants [Female: 3, Male: 10, Age:23±5 y, Height:175±9 cm, Mass:74±12 kg, BMI: 24±4] reported to the trailhead (Practice Loop, Three Peaks Recreation Area, Cedar City, UT) and completed a 1-mile and a 5K timed trail run one day apart in a counterbalanced order. Elevation at the trailhead was 1,641 m (5,385 feet) with a rise of 17 m (56 feet) throughout the marked 1-mile course, and 61 m (201 feet) on the 5K course. Testing was completed between 1500 and 1700h on both days. Environmental measures of temperature (23.9°- 25.6° C; 75°-78° F), humidity (13%-15%), and wind speed (4-9 mph) varied throughout the testing days. Data were analyzed using a Pearson product moment correlation coefficient with significance accepted at the $p \leq 0.05$ level. **Results**: A significant correlation was observed between 1-mile time and 5K performance ($r=0.987$, $p=0.0001$, $R^2=0.974$). The equation to predict 5K time from the mile time trial was: 5K time (expressed as a decimal) = 4.2881*mile time (expressed as a decimal) – 4.5521. The average running velocity during the 1-mile trail run was 3.94±0.9 $m.sec^{-1}$, and 3.4±1.0 $m.sec^{-1}$ for the 5K. **Conclusion**: Our results show that a 1-mile trail run time trial can be used to predict performance for a 5K trail race. Also, based on these data, 5K trail running velocity is approximately 15% less than during a 1-mile trail run bout.

91. EFFECT OF TOPICAL EMLA APPLICATION ON CUTANEOUS SYMPATHETIC C-FIBER FUNCTION

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Purpose: Activation of nociceptive afferents (small C-fibers) in the skin results in the activation of an axon reflex mediated increase in cutaneous blood flow. Topical lidocaine (EMLA) is often used to mitigate the axon reflex and its impact on the skin blood flow response to local heating. However, it is possible that EMLA would impact cutaneous sympathetic nerves which are also small C-fibers. **Methods:** To evaluate this hypothesis, we examined the effect of topical EMLA application on axon reflex mediated sweating induced by intradermal electrical stimulation in 10 subjects with and without EMLA application. Local sweat rate (SR) was measured by passing dry gas through a small sweat capsule mounted on the skin. The skin was 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 using two small stainless steel stimulating electrodes. This procedure produced a sigmoid shape stimulus-response curve when we plotted the area under the SR-time curve versus stimulus frequency. **Results:** In control conditions peak local SR during 64 Hz stimulation averaged 0.364 ± 0.219 mg • min^{-1} • cm^{-2} which was significantly ($p<0.05$) reduced by application of EMLA to 0.078 ± 0.098 mg • min^{-1} • cm^{-2}. The stimulus-response curves were significantly different from each other with a significant reduction in the plateau with EMLA (11.7 ± 1.3 versus 2.6 ± 0.6, $p<0.05$) but with a similar EC_{50} values (7.2 ± 0.11 versus 9.9 ± 0.2 Hz). **Conclusion:** These data support the hypothesis that topical application of EMLA does impact cutaneous sympathetic C fiber function. As such, topical EMLA cream should not be viewed as an appropriate method to selectively eliminate superficial sensory fiber activity from studies of human cutaneous blood flow.

92. EFFECTS OF MODERATE VERSUS HIGH INTENSITY INTERVAL TRAINING ON EXERCISE AND POST-EXERCISE CALORIC EXPENDITURE

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Purpose: To compare the effects of an acute bout of moderate versus high intensity interval training (HIIT) exercise on caloric expenditure and excess post-exercise oxygen consumption (EPOC). **Methods:** Eighteen males (mean ± SD = 22.17 ± 1.58 yrs, 80.01 ± 9.71 kg, 176.77 ± 6.48 cm) and 15 females (22.4 ± 2.20 yrs, 62.79 ± 10.46 kg, 164.07 ± 4.91 cm) volunteered for this study. Height, body mass, body fat percentage, resting heart rate, baseline VO_2, VO_{2max}, and maximal resistance on the cycle ergometer (Watts) were measured in a familiarization session. In the subsequent two visits, subjects took part in randomly-ordered HIIT or moderate exercise conditions. VO_2 was collected for five minutes before, during, and 30 minutes after completing each exercise session. In the HIIT protocol, participants exercised for a total of 15 minutes, consisting of 5 repetitions of exercise at 90% of peak power for 1 minute, alternated with 2 minutes of active recovery at 50% of peak power. The moderate exercise consisted of 30 minutes of exercise at 40-59% of heart rate reserve. **Results:** The moderate intensity protocol resulted in a higher total caloric expenditure during (265.22 vs. 143.65 kcals, respectively) and after exercise (10.72 vs. 10.04kcals, respectively) compared to the HIIT protocol ($p \leq 0.05$). Caloric expenditure immediately and five minutes after exercise was significantly higher than baseline collapsed across condition and sex ($p \leq 0.05$). **Conclusion:** Moderate intensity exercise caused a greater caloric expenditure during exercise as well as in the post-exercise phase compared to HIIT. A 15-min HIIT protocol was not sufficient to elicit similar energy expenditure during or after exercise as a moderate, albeit longer, protocol. Individuals seeking to exercise for weight loss or weight management might wish to seek an exercise program incorporating moderate intensity aerobic exercise, or a longer HIIT intervention.

93. THE EFFECTS OF LOW VOLUME AND HIGH VOLUME RESISTANCE TRAINING PROTOCOLS ON MUSCLE STRENGTH, POWER AND BODY COMPOSITION

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Purpose: Many different methods have been used to illicit improvements in muscle strength and power. Recently, there is much debate as to whether low or high volume resistance training programs are best for gains in strength and power. Thus, this study compared the effects of a low and high volume resistance training protocol on muscle strength, power and body composition. **Methods:** Twenty-four recreationally active college students were recruited and pair matched based on their baseline 1 repetition max (1RM) into 1 of 3 treatment groups: 1) low volume (LV), 2) high volume (HV) resistance training groups or 3) control (CON) (n=8 per group). The LV training consisted of 5 single repetitions pushing a weight sled for 10 yards. The HV training consisted of a multi-set protocol of 3 sets of 5 pushing a weighted sled for 10 yards. Training for both groups consisted of 3 weekly workouts performed on nonconsecutive days for 6-weeks. The weight was progressively increased for the LV group only. This study utilized a pre- and post-test study design consisting of 1RM, Wingate, standing long jump, vertical jump and body composition. The CON only performed the pre- and post-tests. **Results:** Following 6-weeks of sled push training there was a similar, but significant, increase in 1RM for both groups (pre-test; LV= 500 $\pm$ 32.6 lbs vs HV 480 $\pm$ 42.9 lbs; post-test; LV= 658.1 $\pm$ 33 lbs vs HV= 632.5 $\pm$ 35.3 lbs). However, there were no significant improvements in Wingate, standing long jump, vertical jump or body composition between pre- and post-tests for both training groups. There were no improvements for CON. **Conclusion:** This study suggests that a low volume resistance training protocol is as effective as a high volume protocol for improving muscle strength. However, its effectiveness on muscle power and body composition requires further investigation.

94. NUTRITIONAL STATUS OF FOOD SERVED AT RESIDENTIAL ALCOHOL REHABILITATION CENTERS ACROSS THE UNITED STATES

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Nutritional intake, and specifically consumption of omega-3 polyunsaturated fatty acids (n-3 PUFAs) and vitamin D, may be related to successful recovery from alcohol use disorder (AUD). These nutrients have been shown to be important to the brain and nervous system, and therefore mental health. Little is known about the dietary quality of foods served at alcohol rehabilitation centers. Purpose: To determine whether residential rehabilitation centers are serving clients foods high in n-3 PUFAs and vitamin D, two nutrients that are implicated in recovery from AUD. Methods: The Substance Abuse and Mental Health Services Administration (SAMHSA) substance abuse treatment facility locator was used to identify residential alcohol rehabilitation centers in the United States. Multiple centers in each state were randomly selected and contacted via email and/or phone. Of the 117 centers contacted,16 agreed to provide typical weekly menus of the foods served to clients at their facility. Menus for 58 weeks were obtained and were analyzed for n-3 PUFAs and vitamin D content by summing the number of times foods high in these nutrients, such as fish and milk were offered. Results: Our survey showed that fish was offered at only 3% of the meals with 25% of the centers lacking any opportunity to consume this high PUFA food. Access to foods high in vitamin D, i.e. milk, was frequent, with 47% of the meals containing dairy products. Additionally, no centers reported providing PUFA or vitamin D supplements. Conclusion: While residential centers provide opportunities for clients to consume vitamin D at half of eating occasions, access to foods high in n-3 PUFAs is limited. Given these findings, there may be an opportunity to improve treatment outcomes by providing more fish, nuts/seeds, or PUFA supplements to individuals in recovery.

95. STATIC-STRETCHING PROTOCOL OF THE PECTORALIS MAJOR DECREASES TRICEPS BRACHII ACTIVATION DURING A MAXIMAL ISOMETRIC BENCH PRESS EXERCISE

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Purpose: Static stretching (SS) not only increases the range of motion (ROM) of the stretched muscle but can also enhance the ROM of homonymous and heteronymous contralateral muscles. Whereas prolonged SS can lead to performance impairments of the stretched muscle, deficits in muscle activation have not been investigated with non-stretched muscles that contribute to a task such as a bench press. The purpose of this study was to examine the effect of prolonged SS of the pectoralis major (PM) muscle on the activation of the triceps brachii (TB) muscle during an isometric bench press action. **Methods**: Fourteen young, healthy, resistance-trained men had their shoulder complex passively stretched (horizontal abduction) with six stretches of 45-sec each, with 15-sec rest between each stretch at an intensity of 70-90% of the point of discomfort. The Rating of Perceived Exertion (RPE), and integrated electromyography (IEMG) activity of the PM and TB were monitored during a maximal isometric bench press action. Paired *Student's t-test* was used between pre- and post-intervention to ROM, RPE, and IEMG of both PM and TB, separately. **Results**: Passive shoulder ROM significantly increased 5.5%. Both PM (32.60%) and TB (12.60%) IEMG decreased from pre- to post-SS. There were no significant differences between pre- and post-SS for RPE. **Conclusion**: Prolonged SS of a muscle (PM) can negatively impact the activation of auxiliary muscle (TB) involved with the same multi-joint action, which can have implications for individuals who are training or competing.

96. FUNCTIONAL INTERVAL TRAINING (FIT) to OPTIMIZE MENTAL AND PHYSICAL FUNCTION IN OLDER ADULTS

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As humans grow older, age-related declines in mental and physical function occur but the slope of these declines can be modified by lifestyle factors such as exercise training. Regular physical activity has been shown to reduce the risk of dementia, including Alzheimer's disease, by as much as 50% (Erickson, 2012). Furthermore, since muscular weakness (relative risk of 4.4) and balance deficit (relative risk of 2.9) are both risk factors for falls, exercise training that improves muscular strength and balance should decrease these risks. (Guideline for the Prevention of Falls in Older Persons, 2001). Past research has utilized metabolic fitness methods (cardiovascular and strength training) as its means of exercise training (Erickson, 2011). More recent research has shown that newer training methods, in the form of coordination training, can also decrease an individual's risk of dementia (Voelcker-Rehage et al., 2011). Coordination exercise such as functional interval training (FIT) relies on higher-level cognitive processes with less automation, and an emphasis on agility, balance, coordination, movement speed, and spatial orientation (Voelcker-Rehage and Niemann, 2013). Coordination training attenuates age-related loss of hippocampal volume, a brain structure that plays an important role in learning and memory (Niemann et al., 2014). The aim of this study was to develop exercise-training modules (BrainBalance, BrainMobility, BrainPower, BrainStrength) to improve mental and physical function in older adults. Each module was developed with the intention of incorporating coordination training using equipment readily available. The modules can be completed in as little as two minutes, increasing up to 10 minutes per module across a four-week period. We hypothesize that adherence to this exercise training program will improve the mental and physical function of older adults by delaying age-related cognitive decline and improving coordination training components such as agility, balance, coordination, power and strength.

97. EFFECTS OF KETTLEBELL SWING VS. EXPLOSIVE DEADLIFT TRAINING ON STRENGTH AND POWER

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INTRODUCTION: Recent research has compared traditional exercise to kettlebell training observing their effects on strength. The kettlebell swing and explosive deadlift share a hip hinge movement pattern, but have not been compared. **PURPOSE:** To compare the effects of kettlebell swing vs. explosive deadlift training on power. **METHODS:** Thirty-one resistance-trained men volunteered to participate (age = 23.13 ± 2.38 years, height = 175.52 ± 6.66 cm, mass = 83.97 ± 13.85 kg, 1RM deadlift = 159.89 ± 31.73 kg) and were randomly assigned to one of two groups [kettlebell swing group (KBG) = 15, or explosive deadlift group (EDLG) = 16]. Each participant's vertical jump height, isometric mid-thigh pull (MTP), and 1RM deadlift were measured pre and post training. Both groups attended 8 training sessions, twice a week for 4 weeks. The first four sessions consisted of 4 sets of 5 reps at 10% MTP for the KBG, or 30%1RM for the EDLG with 2 minutes rest between sets. Volume and intensity were increased to 6 sets of 4 repetitions at 12.5% MTP and 40%1RM for the KBG and EDLG respectively in the final 4 training sessions. **RESULTS:** A 2 (time) x 2 (group) mixed factor ANOVA revealed a significant increase from pre to post in deadlift 1RM (p = .000) KBG (pre 164.85 ± 32.43 kg; post 173.03 ± 32.47 kg) and EDLG (pre 155.26 ± 31.39 kg; post 165.17 ± 31.83 kg) and vertical jump height (KBG: pre 55.84 ± 9.99 cm; post 56.94 ± 9.67 cm; EDLG: pre 57.31 ± 10.08 cm; post 58.86 ± 10.02 cm), but the increases did not differ between groups. There were no significant changes in MTP. **CONCLUSIONS:** Strength and conditioning professionals may use kettlebell swings and explosive deadlifts to increase strength and power.

98. PREDICTION OF CARDIOVASCULAR RISK FROM ANALYSIS OF SEDENTARY BEHAVIOR

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Purpose: Estimates suggest that 83.6 million older adults in America present with cardiovascular disease (CVD).[1] Physically active individuals are at lower risk of developing CVD than the sedentary population.[2] Older adults meeting the physical activity guidelines may still, however, present with risk factors for CVD, including hypertension, dyslipidemia, and elevated plasma glucose, due to accumulated sedentary behavior.[2] The purpose of this study is to determine if patterns of sedentary behavior (i.e. how sedentary time is accumulated) predict the number of CVD risk factors in physically active older adults. **Methods:** CVD risk factors (blood pressure, waist circumference, fasting blood glucose, cholesterol, metabolic syndrome) were measured in a group of community-dwelling older participants in a university-based multicomponent exercise program. Sedentary behavior and physical activity were assessed via accelerometry over 7 consecutive days. Sedentary bouts were defined as <100 counts per minute and sedentary breaks were defined as >100 counts per minute, both for 10 consecutive minutes.[3] Linear regression modeling was used to examine relationships between sedentary bouts, sedentary breaks, and the number of CVD risk factors, adjusting for wear time. **Results:** A total of 25 older adults (76% female; age = 73.5 ± 6.9 years) participated in this study in which 21/25 of the participants had valid accelerometer data. Sedentary bout length was significantly associated with the number of CVD risk factors (β= 0.539; R^2= 0.263; p<.05). The association between the number of breaks in sedentary behavior and the number of CVD risk factors was also significant (β= 0.507; R^2= 0.226; p<.05). **Conclusion:** Prolonged sitting and fewer breaks in sedentary behavior are significantly associated with poorer cardiometabolic health, even in physically active older adults. These findings support the need for interventions aimed at reducing sedentary time among all older adults. Further research is needed to define specific guidelines for sedentary behavior.

99. EFFECTS OF DEHYDRATION AND GLYCEROL ON ANAEROBIC POWER IN MALE COLLEGIATE WRESTLERS

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Purpose: Collegiate wrestling is separated into 10 weight classes. Wrestlers attempting to reach a specific weight class use rapid weight loss (RWL) to do so. RWL has been associated with high levels of dehydration, and dehydration is known to hinder athletic performance. Currently the NCAA allows 1-2 hours of recovery after a weigh-in before competetion, which grants a need for wrestlers to optimize re-hydration. Glycerol is a common suppliment used by endurance athletes to improve fluid retention. However its use in rehydration is understudied. The purpose of this study is to observe the effects of rapid weight loss (RWL) on anaerobic power in male colligate wrestlers; additionally, we aim to see the impact of glycerol on rehydration and anaerobic power **Methods:** Seven colligate wrestlers completed a control and experimental trial in a randomized counterbalanced design. Preliminary testing consisted of baseline body mass, body composition, and VO_{2max}. For both trials subjects were assessed for body mass, hydration, and mean power output (W_{mean}) before exercise (pre). Participants ran on a treadmill at 70% of VO_{2max} in a heated room (30°C) until 3% body mass loss (BML). Hydration, body mass, and W_{mean} were assessed at 3% BML (dehydrated). Subjects rehydrated drinking either 26 ml/kg of water (control) or a 3% glycerol (treatment) solution containing 26 ml/kg of water and 1 g/kg of glycerol. **Results:** Participants successfully lost 2.9% (treatment) and 3% (control) of their body mass from the pre to dehydrated conditions. Participants' urine specific gravity exceeded 1.020 for both the control (1.021 ± 0.008) and treatment (1.023 ± 0.004) groups, deeming them dehydrated. Mean wattage was not statistically different across time (p=0.877) or condition (p=0.809) **Conclusion**: The key finding of this study was that 3% BML did not impair lower body anaerobic power. Additionally, glycerol had no significant impact on acute hydration.

100. EPIGENETIC RESPONSE TO AN ACUTE BOUT OF RESISTANCE EXERCISE IN TRAINED MEN

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INTRODUCTION: Epigenetics is the study of changes in gene expression of an organism in response to environmental stimuli. The human epigenetic response to resistance exercise (RE) is poorly understood. This is problematic because RE is a powerful stimulus with numerous performance and health benefits. **PURPOSE:** To investigate the human epigenetic response to an acute bout of heavy RE in trained males**. METHODS:** Resting muscle biopsies were performed on the right vastus lateralis of three highly trained males (age=26.3±1.5 y; body mass=89.1±8.4kg; ht=178.3±10.6 cm). Participants then performed three sets of 10 repetitions at 70% of their 1 repetition maximum (1RM) of a leg press and leg extension exercise (1 min rest between sets). Muscle biopsies were taken 30min and 4h post-exercise with separate incisions, ~3cm proximal to the initial biopsy location. Global DNA methylation patterns in the muscle tissue were analyzed at each time point using long interspersed nucleotide elements (LINE-1) via bisulfite pyrosequencing. Single muscle fiber type distribution was analyzed using sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE). **RESULTS:** Mean global DNA methylation among participants was 75.78% at rest, 73.07% at 30min post RE, and 74.36% 4h post RE. Muscle fiber type distribution was 20.00% MHC I, 11.43% MHC I/IIa, 68.57% MHC IIa, and 0.75% MHC IIa/IIx. **CONCLUSION:** These initial results indicate that a prescribed acute lower body RE bout was sufficient to induce a post-exercise global hypomethylation, with a subsequent global hypermethylation 4h post-exercise. The hypomethylation likely allows increased gene expression, which is necessary for long-term adaptation.

101. EFFECTS OF SEX, RESISTANCE TRAINING HISTORY, AND ALCOHOL INTAKE ON MUSCLE QUALITY IN COLLEGE STUDENTS

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Purpose: Sex differences in absolute strength are largely due to differences in lean body mass. Muscle quality (MQ), defined as strength per kilogram of lean body mass, acts as an indicator of muscle performance and reflects both physiological functional and structural composition of muscle tissue. The purpose of this study was to examine the effects of resistance training history and alcohol intake on differences in MQ between male and female college students. **Methods**: A total of 90 females (18.7±0.6 yrs; BMI 22.9±3.3 kg/m^2) and 89 males (18.7±0.7 yrs; BMI 22.8±2.5 kg/m^2) volunteered for the study. Regional body composition was assessed with dual-energy x-ray absorptiometry and MQ was determined by summing the maximal right and left handgrip (HG) strength divided by non-mineral lean mass of both arms. Lifetime resistance training (RT) was determined via the bone-specific physical activity questionnaire (BPAQ) and average daily alcohol consumption over the previous year was determined from the 2014 Block Food Frequency Questionnaire. **Results**: Males demonstrated significantly (p<0.05) greater absolute HG (83.2±14.9 vs. 57.0±9.2 kg) and lower muscle quality (12.6±2.1 vs. 14.5±2.1 kg) than females. Although both sexes revealed greater HG with a history of heavy RT, MQ was significantly lower in individuals who reported heavy RT (12.3±2.2) compared to their light (13.0±2.0) and non-lifting (14.3±2.3) counterparts. At alcohol intakes above 0.4g/kg, an interaction between alcohol and sex trended toward lower muscle quality (p=0.11). Additionally, participants reporting the highest beer consumption exhibited trends for lower muscle quality (p=0.13). **Conclusions**: Preliminary findings suggest sex differences in MQ with long-term history of RT appearing to negatively impact muscle quality. These results contrast with previous work showing MQ increases following short-term resistance training and suggest duration of training could impact MQ inversely. A longitudinal examination of the potential effects of alcohol consumption on MQ is underway.

103. ENERGY EXPENDITURE AND STEP COUNT ANAYLSIS OF THE FITBIT FLEX ACTIVITY TRACKER

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Purpose: To investigate energy expenditure (EE) and step count (SC) measurements of the Fitbit Flex (FF) activity tracker during two walking protocols. **Methods**: 49 volunteers (male, N=26, female N=23; age (years) 23.43±6.57; height (m) 1.72±0.11; mass (kg) 76.15±18.46 walked protocol one and 46 (male, N=24, female N=22; age (years) 23.39±6.69; height (m) 1.72±0.11; mass (kg) 76.52±18.73 walked protocol two. 31 (male, N=18, female N=13; age (years) 24.39±7.59; height (m) 1.73±0.10; mass (kg) 77.95±21.52 were used for reliability. Subjects walked for 3 minutes at 1.5, 2.5, and 3.5mph at 0% grade for each protocol. EE and SC values for each speed were compared to a MOXUS respiratory cart and a manual count of steps respectively. **Results**: EE@1.5mph (r=0.52, p<0.01; α=0.56; FF:19.43±7.12 Kcal, MOXUS:11.9±3.09 Kcal, p<.01), 2.5mph (r=0.53, p<0.01; α=0.72; FF:25.0±7.3 Kcal, MOXUS:14.43±3.67 Kcal, p<.01), 3.5mph (r=0.61, p<.01; α=0.67; FF:27.2±7.55 Kcal, MOXUS:19.43±4.76 Kcal, p<.01). SC@1.5mph (r=0.4, p<.01; α=0.55; FF:231.05±58.75 steps, Observed:268.95±25.17 steps, p<.01), 2.5mph (r=0.37, p<.01, α=0.50; FF:322.64±42.74 steps, Observed:331.6±21.22 steps, p=.03), 3.5mph (r=0.53, p<.01; α=0.66; FF:366.02±31.35 steps, Observed:379.83±21.58 steps, p<.01) **Discussion**: Because of the popularity of activity trackers such as the Fitbit Flex, it is important to evaluate their accuracy and consistency. By underestimating steps taken and overestimating the caloric cost associated with it, the Fitbit Flex may be hindering people from reaching the recommended levels of daily exercise that have shown to provide minimum health benefits.

102. INFLUENCE OF QUADRICEPS STRENGTH ON RUNNING KINETICS IN INDIVIDUALS WITH UNILATERAL ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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Purpose: Individuals with anterior cruciate ligament reconstruction (ACLR) are at greater risk for knee osteoarthritis (KOA), partially due to chronic quadriceps dysfunction. Impaired quadriceps function contributes to higher loading rates during gait, and may exacerbate cartilage breakdown. The purpose of this study was to examine the association between indices of quadriceps function and ground reaction forces (GRF) characteristics linked to KOA development during running in individuals with ACLR. **Methods:** Quadriceps function and running biomechanics were assessed in 20 individuals with unilateral ACLR (age=22.3±3.3 years, height=1.73±0.09m; mass=71.8±15.3kg; females=15). Indices of quadriceps function included isometric peak torque (PT) and rate of torque development (RTD), and isokinetic peak torque measured at 180°/second and 240°/second. Running kinetics included peak vertical impact force (PIF), average vertical loading rate (ALR), and instantaneous vertical loading rate (ILR). Partial correlation was used to assess the association of quadriceps function and running kinetics after accounting for self-selected running speed. **Results:** Quadriceps RTD was negatively correlated with PIF (r=-0.401, p=0.04) and ALR (r=-0.481, p=0.03). A trend was observed between quadriceps RTD and ILR (r=-0.360, p=0.07). Isometric PT and isokinetic strength at 180°/second and 240°/second were not associated with any running biomechanics variable. **Conclusion:** The ability of the quadriceps to generate rapid force prior to heel contact is necessary for GRF attenuation during gait. Lesser quadriceps RTD is associated with greater PIF, and ALR during running. Greater PIF and ALR are linked to cartilage degradation in individuals with knee pathologies. These results emphasize the role of quadriceps dysfunction in KOA development following ACLR, and indicate that improving quadriceps RTD may reduce loading characteristics that negatively influence cartilage health.

104. ENERGETICS OF SWIMMING WITH DIFFERENT SIZE HAND PADDLES

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Purpose: Many swimmers use hand paddles during training. However, little is known regarding their contribution to energy expenditure during swimming. The purpose of this study was to determine how increasing hand paddle size affects energy use during submaximal, front-crawl (*i.e.*, freestyle) swimming. **Methods**: Twenty-six proficient, adult swimmers (13 males, 13 females) completed six 3-min trials in a flume at a constant pace (102 cm/s; 1:38 per 100 m). Trials were performed in random order, using one of five pairs of hand paddles of different sizes or no paddles at all. Paddle surface areas were 201, 256, 310, 358 and 391 cm^2 per hand. Oxygen consumption (VO_2), heart rate (HR) and stroke cadence were measured continuously throughout each trial, while shoulder pain and fatigue were reported on a 0-10 scale after each bout. **Results**: VO_2, HR and cadence without paddles were 23.2±3.8 ml/kg/min, 118±17 bpm and 29.4±5.4 strokes/min, respectively. Use of hand paddles resulted in significant differences in VO_2 (p<0.001), HR (p<0.001), and cadence (p<0.001) among trials. These variables were altered by paddle size, with larger paddles yielding lower values of VO_2, HR and cadence, but with diminishing returns for largest paddles. Though VO_2 was reduced when using larger paddles, the oxygen cost per stroke was highest for the largest size paddles (p<0.001). Fatigue was also greatest without paddles and lowest with the four largest paddles (p<0.001). No differences in shoulder pain were noted across any of the conditions tested (p=0.573). **Conclusion**: Results from this study suggest that an optimal hand paddle size exists (256-358 cm^2) for proficient, adult swimmers, which reduces the energy cost and lowers fatigue while maintaining a low energy cost per stroke.

105. Cardiovascular and Metabolic Reponses of High Intensity Sprint Protocols on the Cybex Spark™ Trainer: Preliminary Data

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Purpose: Aerobic interval training protocols have been shown to significantly improve aerobic capacity and selected markers of health in both normal individuals and in diseased patients, and in some cases have been shown to be superior to traditional aerobic training. We investigated the metabolic and cardiovascular effect of 3 sprint interval training protocols using a new device (Spark Trainer™). **Methods**: Six healthy (Male=3, Female=3) college-aged participants (ages 19 - 28 years) volunteered to participate in the study. Each participant performed an individualized maximal aerobic capacity test on a motor driven treadmill for the determination of VO_2 max (40.7 ± 5.6 ml/kg/min). Each participant then performed 3 different high intensity interval protocols in a randomized fashion (either 10, 15 or 20 minutes in duration): ten bouts of either 30/30 sec, 30/60 sec or 30/90 sec work-to-rest ratio. Oxygen consumption was continuously collected and monitored during each training protocol. A one way repeated measures ANOVA (SPSS v22; $p \leq 0.05$) was used to examine differences between protocol work-to-rest ratios. **Results**: Average 15 second VO_2 data (30/30: 31.9 ± 8.9 ml/kg/min, 30/60: 29.0 ± 6.7 ml/kg/min, 30/90: 29.2 ± 3.3 ml/kg/min), RER (30/30: 1.01 ± 0.10, 30/60: 1.01 ± 0.05, 30/90: 1.06 ± 0.04) and average caloric expenditure (30/30: 11.7 ± 4.2 kcal/min, 30/60: 10.6 ± 3.6 kcal/min, 30/90: 10.6 ± 2.6 kcal/min) illustrated no statistical significance across protocols ($p > 0.05$). **Conclusion**: Under such work-to-rest ratios, varying rest duration in a range of 30 to 90 seconds had limited impact on metabolic responses during repeated 30-second-high-intensity exercise bouts. These data suggest that a 30/30 second approach may be advocated as a time-efficient strategy for eliciting considerable caloric expenditure benefits in a college aged population.

107. ACUTE EFFECTS OF ECCENTRIC OVERLOAD ON CONCENTRIC FRONT SQUAT PEAK VELOCITY

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Eccentric overload is used to enhance athletic performance. The front squat is important because it is a precursor to the clean; an exercise to increase performance. **PURPOSE:** To investigate the acute effects of eccentric overload on concentric front squat peak velocity. **METHODS:** Twenty resistance-trained males (age=23.80±1.82yrs, ht=176.95±5.21cm, mass=83.49±10.43kg, 1 Repetition Maximum [1RM] front squat=131.02±21.32kg) with at least six months experience with the front squat volunteered. Subjects were able to parallel front squat at least 85% of 1.5x their bodyweight. A dynamic warm-up of 10 yards knee hugs, walking lunges, and leg kicks was performed. Warm-up sets of front squat were performed with 10 repetitions at 50% estimated 1RM, 5 repetitions at 70%, 3 repetitions at 80%, and 1 repetition at 90%. Three minutes rest was provided between sets. Then, eccentric hooks, capable of temporarily increasing resistance, were added to the barbell. They were instructed to descend for 3 seconds to the beat of a metronome, until a safety squat device beeped and the eccentric hooks released. They performed the concentric lift as fast as possible. Two repetitions were performed for each condition with 3 minutes rest between sets. There were three randomly-ordered conditions with the concentric phase of the front squat always at 90% 1RM with 105%, 110%, and 120% of 1RM during the eccentric phase. **RESULTS:** ANOVA revealed significant main effects for time and condition (P<0.05), where post velocity (1.01±0.10m/s) was greater than pre (0.96±0.11m/s) and 120% (1.00±1.11m/s) was greater than 105% (0.96±0.11m/s). 110% (0.99±0.10m/s) was not significantly different than 105% or 120%. **CONCLUSIONS:** Eccentric overload elicited acute velocity enhancements to the concentric phase of the front squat. Eccentric overload may have elicited recruitment of larger motor units, increased rate coding, or increased muscle spindle activity to increase peak velocity during the concentric phase.

106. VALIDATION OF HEART RATE SENSOR AND PHONE APP IN LAB VERSUS HOME-BASED ENVIRONMENT

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Purpose: Heart rate variability (HRV)—beat-to-beat changes in the time interval between consecutive cardiac cycles—is a manifestation of the autonomic nervous system. The existing literature reflects validation studies of HRV using portable devices as compared to data generated by an electrocardiogram. In view of this agreement the present investigation, using a portable system, sought to establish if HRV measurements taken in the laboratory and home environments were equivalent. **Methods**: Twenty men (Age 24.4, ±3.9 year; Height 179.3 ±8.0 cm; Weight 86.9 ±19.4 Kg) volunteered to obtain six HRV readings on separate days, three in a controlled laboratory (L) environment and three days at home (H). A coin toss determined the environment in which three HRV recordings would occur first. A commercially available heart rate (HR) sensor coupled to a cell phone app was used to record all data; the results were analyzed by a downloaded HRV software package. Subjects were familiarized with the HR sensor and phone app prior to data collection. All data were recorded in the morning with subjects resting in the supine position and breathing normally. No device was used for pacing purposes. The phone app recorded 60 sec of coronary electrical signals for analysis. **Results**: Nonsignificant environmental differences in grand mean HR (H=62.9, L=61.2), mean RR (H=1008.8, L=1024.8), RMSSD (H=86.06, L=79.41), pNN50 (H=39.72, L=42.72), and LF/HF (H=2.151, L=2.386), were found. A subject-to-subject means regression contrasting environments yielded a positive correlation for HR (.65), mean RR (.70), RMSSD (.85), pNN50 (.67), and LF/HF (.07). **Conclusion**: For our sample, a commercial heart rate sensor and phone app provided a valid system for recording morning HRV at rest in a home-based setting; these findings consequently open the door for future field research using this monitor and phone app system.

108. RELATIONSHIP OF INTERNET ADDICTION AND EXERCISE-RELATED PATHOLOGY

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Purpose: Faulty ideals of health and fitness promotion often target individuals on internet-based social media. Previous research has found relationships among excessive use of these platforms and exercise, exercise dependence independent of eating disorders (e.g., primary exercise dependence), and exercise performed to facilitate an eating disorder (e.g., secondary exercise dependence). Moreover, internet addiction and exercise dependence have been theorized to have common underlying etiological factors. This may have implications in internet over-use and the development of exercise-related pathology. The purpose of this study was to examine internet addiction in individuals with primary exercise dependence, secondary exercise dependence, and regular exercisers. We hypothesized that individuals with secondary exercise dependence will report significantly higher internet addiction scores. **Method:** 755 participants [*M* age = 28.31(9.98); 61.25% female; 67.72% Caucasian; *M* Body Mass Index = 26.50(5.71)] completed the Leisure-time Exercise Questionnaire (LTEQ), Exercise Dependence Scale(EDS), Eating Disorders Examination-Questionnaire (EDE-Q), and Problematic Internet Use Questionnaire (PIUQ) as part of a larger online survey study. Participants were grouped as: Regular Exercisers (LTEQ≥24; n=637), Primary Exercise Dependence (EDS≥77 and EDE-Q≤2.98; n=23), Secondary Exercise Dependence (EDS≥77 and EDE-Q≥2.99; n=47). ANOVAs were used to examine group differences in PIUQ scores and PIUQ subscales. **Results:** Significant differences were found among PIUQ scores [$F(2,704)=52.35$, $p<.01$, $\eta=.129$]. Bonferroni post hoc revealed the Secondary group reported higher scores than Primary ($p=.04$) or Regular exercisers ($p<.01$). ANOVA also revealed similar patterns of significant differences for all PIUQ subscales (p's <.01). **Conclusion:** Individuals with secondary exercise dependence had the highest PIUQ scores. Results also confirmed previous research suggesting individuals with primary exercise dependence neglected important aspects of their lives to spend more time online. These results suggest exercise professionals should be aware of potential overlapping symptoms and consequences of exercise dependence and internet addiction.

109. SEX AND AGE DIFFERENCES IN TRAIL HALF MARATHON RUNNING

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Purpose: Men typically complete endurance running events at faster velocities than women due to physiological differences including greater ability to carry out gas exchange, lower percent body fat, and increased relative muscle mass. Velocity differences between the top male and female finishers of the marathon are approximately 10%, and the gap widens with increasing age, likely due to lower numbers of female finishers compared to men. Interestingly, female competitors outnumber their male counterparts in trail running races. The purpose was to evaluate sex and age differences in top finishers of a trail running half marathon. **Methods:** Finishing times of the top 10 male and female finishers in 10-year age categories between 20 and 69 years were analyzed for the Moab Trail Half Marathon from 2012-2015. Velocity differences between males and females were determined for the top 10 finishers as a group across age, and by finishing place. Differences between age category and between genders were determined through ANOVA with significance accepted at $p<0.05$. **Results:** There were significantly greater female finishers in every age category (20-29 yr $p=0.04$, 30-39 yr $p=0.016$, 40-49 yr $p=0.006$) until 50-59 yr ($p=0.496$), and more males in the oldest category (60-69 yr $p=0.03$). A significant difference for running velocity was present between genders at each age category ($p<0.0001$). The fastest female trail running velocity (20-29 yr) was equal to males in the 40-49 yr age category. Sex difference in trail running velocity was consistent (~13%) among all age categories with exception of the oldest group (33%, $p=0.0001$). Sex difference in trail running velocity was not affected by finishing place. **Conclusion:** These data indicate that the widening gap in sex differences observed in road races are ameliorated in a trail running environment that has a larger number of female participants, and requires technical navigation of routes.

110. WEARING AN INFLATABLE VEST ALTERS TRUNK ANGLE AND MUSCLE ACTIVATION WHILE PADDLING A SURFBOARD

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Purpose: Low back pain is a commonly reported problem among recreational surfers. Some individuals report that wearing a vest with an inflatable bladder that alters trunk angle may help to alleviate pain. The purpose of this study was to determine whether such a vest has an effect on muscle activation and extension of the lower back while paddling a surfboard. **Methods:** Twelve recreational surfers completed 12 paddling trials at 1.1 m/s in a fresh water swim flume on both a shortboard and a longboard on two separate days. Three conditions of no vest, vest uninflated, and vest inflated were presented to participants in random order on each day. Surface EMG and trunk angle were acquired via wireless sensors placed over the right *erector spinae*, mid-*trapezius*, upper *trapezius*, and *latissimus dorsi*. **Results:** Wearing the inflated vest affected muscle activation: *erector spinae* and mid-*trapezius* demonstrated a significant decrease in activation relative to wearing no vest (12 and 18% decrease respectively, $p<0.05$). Trunk extension was also significantly reduced during the inflated vest condition (10-12% reduction, $p<0.05$). Results were similar for both the short and longboard, though this effect was greater while paddling the larger board. **Conclusion:** Wearing a vest with a properly inflated bladder between the surfer's sternum and surfboard deck can alter trunk extension and muscle activity while paddling. These results may have implications for reducing low back pain in surfers.

111. FORE-AFT DISTRIBUTION OF VOLUME IN A SHORT SURFBOARD DOES NOT AFFECT BOARD MOTION, DRAG FORCE, AND METABOLIC EFFICIENCY WHILE PADDLING

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Purpose: Surfboard volume and shape has a significant effect on human performance while riding waves but little is known regarding the impact of these variables on paddling, where surfers spend a majority of their time. The purpose of this study was to determine whether changing the distribution of volume will alter paddling mechanics and efficiency if surfers are allowed to self-select their prone position on a surfboard. **Methods:** Twenty recreational surfers paddled 3 different surfboards in a freshwater swim flume at 1.1m/s while measurements of drag force, board motion, body position, heart rate, and oxygen use were acquired. All boards shared the same volume and gross dimensions, but the center of volume was placed in a different location along the fore/aft axis of each board. All participants were blinded regarding the distribution of surfboard volume and boards were paddled in random order. **Results:** Significant differences were noted in the surfers' self-selected, prone position while paddling the three surfboards ($p=0.026$). Conversely, no statistical difference was noted in drag force ($p=0.629$), board angle and accelerations ($p=0.489$–0.951), heart rate ($p=0.604$), or oxygen use ($p=0.765$). **Conclusion:** These data suggest that when overall surfboard volume and gross dimensions are fixed, the distribution of volume or "foil" has little impact on the efficiency of paddling a short surfboard in recreational athletes. Further, surfers will self-select their prone position with great precision in order to maintain consistent metabolic efficiency and surfboard motion while paddling.

112. RELATIONSHIP BETWEEN UPPER & LOWER EXTREMITY RANGE OF MOTION AND CLUB HEAD VELOCITY IN COLLEGIATE GOLFERS.

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Purpose: An effective golf swing requires good flexibility to achieve optimal performance. However, little research has been conducted on the relationship between upper and lower extremity range of motion (ROM) and club head velocity in collegiate athletes. The purpose of this study was to evaluate the relationship between range of motion and club head velocity in NCAA Division 1 female golfers. **Method:** Seven female collegiate golfers (age: 20.71 ± .76 yrs, height: 163.82 ± 5.34 cm, mass: 63 ± 4.17 kg, golf experience: 12.86 ± .38 years) participate in this study. ROM data of the upper and lower extremity were collected using a goniometer includes: Thomas test, Ober's test, modify Ober's test, hamstring 90/90, hip internal and external rotation, shoulder internal and external rotation, and trunk rotation. Flightscope ball tracking system was used to obtain club head velocity at impact. Individual athletes performed five golf swings and average club head velocity were collected. **Results:** Overall, no significant correlations were found between the athlete's ROM and club head velocity. The closest significant found was between left hip internal rotation and club head velocity ($R = -0.662$, $P = 0.053$). **Conclusion:** This study showed that there was no relationship between ROM and club speed velocity. However, this study was limited by the number of participants (n=7). Further studies are required to analyze range of motion and other golf performance variables.

113. EXPRESSION OF THE FATTY ACID TRANSPORT PROTEIN CD36 IS REVEALED USING CANINE ANTIBODIES IN BROWN BEAR CARDIAC MUSCLE

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Purpose: In overweight human models, lipid accumulation is characterized by increased amounts of circulating insulin and has been shown to be significantly related to insulin resistance (IR). However, brown bears during the fall hyperphagic season increase body fat without exhibiting the typical inflammation or increased circulating insulin characteristic of IR. Analyzing the expression of the fatty acid transporter protein CD36 may increase our understanding of lipid metabolism and the pathogenesis of insulin resistance. Given the scarcity of antibodies raised against bear proteins, the purpose of this study was to (1) optimize Western Blot conditions for bear tissue by comparing the expression of CD36 using antibodies raised against rodent CD36 protein with antibodies raised against the CD36 protein of dogs, a closer genetic relative of the brown bear, and (2) measure the expression of CD36 in cardiac muscle of brown bears during the summer and winter seasons. We hypothesized that CD36 expression will be lower in hibernating than pre-hibernating cardiac muscle. **Methods:** Cardiac muscle (n=4) was collected during the summer and winter periods from brown bears at the Bear Center at Washington State University. Western Blots were performed on cardiac muscle using rodent or canine CD36 antibodies. Membrane stripping and GAPDH antibodies were used to assess protein loading. **Results:** Loading controls demonstrated linearity and stripping prior to GAPDH expression showed that loading was not different between wells. Rodent antibodies showed excessive background which was significantly diminished by the use of canine antibodies. CD36 expression did not change between summer and hibernation in brown bear cardiac muscle. **Conclusion:** The expression of CD36 was not changed between seasons. Future studies should include more samples and focus on determining whether hibernation affects the translocation of CD36 to the plasma membrane.

115. DESIGNING THE OPTIMAL SUSPENSION TRAINING CIRCUIT

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Purpose. Benefits of circuit training have been developed and researched for many years; however, to our knowledge, there is no peer-reviewed research regarding energy expenditure when integrating a Suspension Training® device into a circuit protocol. The purpose of this study was to determine the energy expenditure for two circuit-style Suspension Training (ST) protocols using different work intervals. **Methods**. Two work-to-rest ratios (45:15-sec, 30:15-sec; Long Work (LW) and Short Work (SW), respectively) were employed for a circuit-style ST protocol in trained males (n =12) and females (n = 12), ages 19-28 yrs. Energy expenditure (EE) was determined via indirect calorimetry using 15-sec averaging. In order to match total work time, the LW protocol was performed twice and SW protocol was performed three times (12-min total exercise). Variables analyzed were EE, O_2 consumption (VO_2), heart rate (HR), total repetitions (TR), and rating of perceived exertion (RPE). Protocol comparisons were made using ANOVA with repeated measures (SPSS v22; $p \leq .05$) for all variables. **Results**. Total EE was greater in the SW compared to the LW protocol (138 ±31 kcal vs. 122 ±31 kcal, $p < .05$), as was TR (416 ±68 reps vs. 383 ±85 reps, $p < .05$), and RPE (15 ±2 vs. 17 ±2), respectively. Percent-VO_{2max} for the LW and SW protocols were 45% and 50%, respectively. There was no significant difference between average-EE between the LW and SW protocols. **Conclusion:** Based on %VO_{2max}, both the SW and LW protocols met ACSM guidelines for maintenance of aerobic capacity (40 – <60% VO_2R) and both protocols elicited high EE given the short exercise time.

114. GREENSPACE IN ELEMENTARY SCHOOL PLAYGROUNDS MAY HAVE A LONG-TERM IMPACT ON PHYSICAL ACTIVITY PARTICIPATION

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Background: Previous research reveals that active children are more likely to become active adults. Additionally, studies show that a greater percentage of elementary school students are engaged in moderate-vigorous physical activity (MVPA) in grassy areas compared to hardscape areas. **Purpose:** The purpose of this study was to examine how college students' PA participation and fitness levels are affected by their past elementary school playground designs. **Methods:** A total of 127 students from a small liberal arts institution completed an online survey with questions related to elementary school playground design and current PA behavior. A subset of 44 students also completed cardiovascular and muscular fitness as well as motor skill assessments. Google Earth PRO was used to measure the area devoted to greenspace, hardscape, and playground structures in the elementary schools at the time of attendance. Multiple linear regression analysis was used to determine the relationship between PA and previously identified independent variables as well as elementary playground design. **Results:** Vigorous PA was predicted by parental marital status, outdoor exercise frequency, and NCAA sport participation ($F(3,103) = 6.017$, $p = .001$; $R^2 = .149$). Moderate PA was predicted by parental marital status, outdoor exercise frequency and elementary greenspace area ($F(3,86) = 5.041$, $p = .003$; $R^2 = .150$). All fitness test scores were predicted by sex, frequency of outdoor exercise, and/or NCAA sport participation ($p<0.05$). **Conclusions:** Results suggest that although sport participation and outdoor exercise are important predictors of vigorous PA and fitness levels, the more greenspace available in elementary school playgrounds may play a role in moderate intensity PA participation in college. This study is limited by the lack of consistency in playground feature visibility in Google Earth PRO satellite images. Future studies should assess the influence of playground design on PA levels at different ages throughout the lifespan.

116. THE EFFECT OF UNIVERSITY WORKSITE WALKING PROGRAMS ON PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR AMONG EMPLOYEES

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The Centers for Disease Control report that 79% of Americans are not meeting weekly physical activity requirements, increasing the risk of many lifestyle related disease. Due to the many benefits of regular physical activity, university worksites are increasingly offering physical activity programming to encourage employees to be more active throughout the workday. **Purpose:** The purpose of this study was to evaluate the effects of a university sponsored walking program on physical activity amount and sedentary behavior in employees who participated versus those who did not participate. **Methods:** The research was a matched pair design. The study group (n=33) participated in the Workplace Walkoff Challenge (WWC), a six week walking competition held at a small, California university. The control group (n=17) did not participate in the WWC. The International Physical Activity Questionnaire (IPAQ) was utilized to collect vigorous, moderate, and walking MET-Mins^{-1} per week, and sitting hours during weekdays. Participants also wore an Omron® brand pedometer and reported weekly steps. To assess these variables, dependent t-tests were performed. **Results:** For the participant group, there were significant increases in vigorous (p=.05), moderate (p=.05), and walking (p=.02) MET-Mins^{-1} per week. There were significant increases in steps from baseline to the last week of the competition (p.01).There were no significant changes in sitting hours per day (p=.39) for WWC participants. For the control group, There were no significant differences in vigorous (p=.18), moderate (p=.35), walking (p=.46) MET-Mins^{-1} per week for non-participants. There were also no significant increases in steps from baseline to end of competition (p=.24). There were no significant changes in sitting hours per week day (p=.50) for non-participants. **Conclusion:** A six week worksite walking program may be effective in increasing physical activity amount among employees, despite no change in sit time while at the worksite.

117. DO TRAINING MASKS ENHANCE OXYGEN UTILIZATION CAPACITY

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Purpose: High-altitude or oxygen-limited training has received a lot of attention as a way to increase oxygen utilization capacity. Due to the impracticalities involved in traveling to high altitudes, endurance athletes and coaches have employed methods of simulating high-altitude (low-oxygen) conditions as an effective alternative. Some low-oxygen devices may not be available to all due to prohibitive cost or inconvenience. A recent simple alternative is altitude-simulating masks. However, the effectiveness of these masks is in question. This research looks at the effect of masked training on VO2 max and hematocrit levels. **Methods:** 14 subjects participated in a 6-week interval-training protocol. Subjects were brought into the lab to test their VO2 max, hematocrit, and lactate response. Half of the subjects were then given a Training Mask and asked to complete 3 workouts per week at intensities in the range of 60%-85% of each individual's VO2max. The control group was given the same task of working out 3 times a week without a mask. Both groups were retested after 6 weeks of training. **Results:** After completing six weeks of training with a Training Mask, our training group's VO2max, hematocrit, and lactate response were not different than the control group. **Conclusion:** The conditions of this study and the results it provided do not lend support for use of the Training Mask for increasing an athlete's performance.

119. THE EFFECTS OF PRE-EXERCISE PROTEIN VS. CARBOHYDRATE CONSUMPTION ON ENERGY EXPENDITURE AFTER HIGH-VOLUME RESISTANCE EXERCISE

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During the recovery period following a bout of resistance exercise, oxygen consumption remains elevated for a variable timeframe, reflecting an acute enhancement in resting energy expenditure. What remains uncertain is whether pre-exercise nutrient consumption further promotes these acute metabolic responses to a bout of resistance exercise and if the type of nutrient influences these effects. **Purpose:** Therefore, the objective of this study was to determine, in college-age, resistance trained male subjects, the extent by which pre-exercise supplementation of whey protein or carbohydrate modulates metabolic and substrate oxidation rates following a bout of high-volume, total body resistance exercise. **Methods:** In a randomized, placebo controlled, cross-over study, healthy, resistance trained male (n=10) subjects initially underwent baseline testing for resting energy expenditure and maximum strength. Subjects were familiarized with the resistance exercise protocol during the subsequent visit. Afterwards, across 3 separate subsequent visits, subjects consumed whey protein (PRO), carbohydrate (CHO), or no nutrients (CON) prior to a bout of high-volume resistance exercise. After exercise, subjects were tested for energy expenditure (EE), oxygen consumption (VO_2), respiratory exchange ratio (RER), and heart rate (HR). **Results:** PRO (+23.5%; p=0.003), CHO (+12.8%; p=0.001), and CON (+9.5%; p=0.005) increased EE from resting baseline with concomitant changes to VO_2, RER, and HR. PRO (p=0.019) and CHO (p=0.003) demonstrated equivalently greater post-exercise EE than CON. Post-exercise VO_2 was significantly greater in PRO vs. CON (p=0.034) while CHO did not differ from PRO or CON. **Conclusion:** Overall, nutrient consumption prior to resistance exercise may augment the post-exercise elevation in EE. Consumption of whey protein pre-exercise may enhance excess post-resistance exercise oxygen consumption (i.e EPOC) to a greater extent than carbohydrate intake.

118. DIFFERENCES IN AFFECT AMONG INDIVIDUALS WITH EATING DISORDERS AND EXERCISE DEPENDENCE

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Purpose: Previous research has identified affect regulation as a common underlying factor in eating disorders and exercise dependence development. Specifically, negative affect regulation may have some similarities in exercise dependence and binge/purge frequencies in individuals with eating disorders. However, these findings were observed in clinical samples. There's a need to examine if similar associations exist in population-based samples. The purpose of this study was to examine differences in affect among individuals with eating disorders and exercise dependence in a population-based sample. We hypothesized that there will be differences in affect among individuals with exercise dependence and eating disorders. **Method:** Participants were 880 individuals [M age = 28.46(10.13); 63.92% female; 66.90% Caucasian; M Body Mass Index = 27.29(6.34)] that completed Leisure-time Exercise Questionnaire (LTEQ), Exercise Dependence Scale (EDS), Eating Disorders Examination-Questionnaire (EDE-Q), and Positive And Negative Affect Schedule as part of a larger study. Participants were grouped as: Regular Exercisers (LTEQ>24), Primary Exercise Dependence (EDS>77 and EDE-Q<2.98), Secondary Exercise Dependence (EDS>77 and EDE-Q>2.99) and Eating Disorder only (EDE-Q $\geq$2.99 and EXD<77). ANOVAs were used to examine group differences in positive affect (PA) and negative affect (NA) scores. **Results:** Significant differences were found among PA scores [F(3,837)=8.94, p<.01]. Tukey post hoc revealed the Primary group reported higher scores than Secondary (p<.01) or Regular Exercisers (p=.04), Secondary higher than Eating Disorder (p<.01), and Regular Exercisers higher than Eating Disorders (p<.01). Significant differences were observed in NA scores [F(3,844)=34.80, p<.01], with Secondary (p<.01) and Eating Disorder (p<.01) groups reported more NA. **Conclusion:** Differences in positive and negative affect observed in our study may indicate affect regulation in eating disorders and exercise dependence. Our population-based sample may also inform exercise professionals on what to look for in athletes that are suffering from negative mood, eating disorder or exercise dependence symptoms, and create interventions for these disorders.

120. LEG STRENGTH AND TRANSITION STEP PREFERENCE DURING STAIR DESCENT IN ELDERLY SUBJECTS

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Purpose: Past research has found that falls on stairs account for 10% of fatal fall accidents in elderly adults (Startzell et al., 2000). The purpose of this study was to determine if there is a link between knee joint muscle strength and transition step preference in stair descent in elderly subjects. Additionally, peak joint power values were compared between preferred and non-preferred lead legs. **Methods:** Individuals 65 years and older (age = 75.5±7.6 years) were recruited for the study (17 females, 15 males). Stair descent was completed on a set of three standard sized stairs with right and left leg leading (order randomized). Motion capture data was recorded using 6 Vicon Vantage V5 cameras (120 Hz) and two Kistler force plates (1200 Hz). Data was analyzed using Nexus 2.3. After all stair trials were complete, subjects were asked to identify which was their preferred lead leg for stair descent. Knee muscle strength was determined by a Biodex System 3 isokinetic dynamometer at 180º/s and at 60º/s. **Results:** The peak knee extensor torque was significantly different for the stronger leg when compared to the weaker leg (103.4±38.5 Nm vs. 94.0±37.8 Nm; p < 0.001). However, there was not a difference in the strength of the preferred lead leg when compared to the non-preferred lead leg strength (101.2±37.9 Nm vs. 101.3±38.8 Nm). The preferred leg was the stronger leg for 50% of the subjects and 12.5% of the subjects did not have a preferred lead leg. There was no difference in peak joint power values during stance between descents using their preferred versus non-preferred lead leg. **Conclusions:** Lead leg preference does not appear to be linked to leg strength. Further studies should focus on the role of balance and other neurological factors.

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121. INFLUENCE OF VELOTRON SPROCKET SIZE ON WINGATE ANAEROBIC TEST

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Purpose: Compare an 85-tooth versus the standard 62-tooth front sprocket for power outputs during a Wingate test using a Velotron electromagnetically-braked cycle ergometer. **Methods**: Power-trained males (n = 20, 24.6 ± 4.5 years) randomly performed the Wingate test with two sizes of front sprocket. Trials were performed at least 48 hours apart. Peak power (PP), mean power (MP), fatigue index (FI), peak rpm, and mean rpm were recorded. **Results**: On average, PP was not significantly different (p = 0.10) between trials (62-tooth = 1111 ± 187 W vs. 85-tooth = 1188 ± 103 W). However, MP and mean rpm were significantly greater (p < 0.01) for the 85-tooth trial (869 ± 114 W and 131 ± 16 rpm) compared to the test using the 62- tooth sprocket (673 ± 136 W and 102 ± 24 rpm). FI was reduced during the 85-tooth trial (49.9 ± 9.1% vs. 61.6 ± 8.8%; p < 0.01). No significant correlation relationships were found for any of the variables. **Conclusion**: The 85-tooth sprocket could have created a ceiling effect for attaining peak rpm, resulting in little variability among participants for this trial, especially for PP. The two options for front sprockets on Velotron cycle ergometers should not be interchangeably used with the Wingate test software.

122. THE RELATIONSHIP BETWEEN SEDENTARY BEHAVIOR AND FUNCTIONAL ABILITY AMONG OLDER ADULTS

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Purpose: Sedentary behavior (SB) is associated with the loss of functional ability and increased disability in activities of daily living among older adults, independent of physical activity (Gianoudis et al, 2015). Few studies have examined relationships between patterns of SB and functional ability in this population. This study examined associations between the number and length of sedentary bouts and breaks and functional ability in community-dwelling older adults. **Methods:** Study participants were recruited via convenience sampling from a multicomponent exercise program for older adults. Functional ability was assessed using the Senior Fitness Test (SFT). Sedentary behavior and physical activity were assessed via accelerometry over 7 consecutive days. Linear regression models were used to examine associations between the average daily number and length of sedentary bouts and breaks in SB and performance on the SFT, adjusting for wear time. Sedentary bouts were defined as <100 counts per minute (cpm) and sedentary breaks were defined as >100 cpm, both for 10 consecutive minutes. **Results:** Twenty-five participants (19 female; 6 male; age = 73.5±6.9) were enrolled, with valid accelerometer data available for 21/25 participants. Significant associations were found between daily sedentary bouts (β = 0.608, r^2 = .277; *p*<.01), average bout length (β = 0.655, r^2 = .345; *p*<.01), and sedentary breaks (β = 0.609, r^2=.276; *p*<.01) and time to complete the 8-Foot up and Go (8UG) test. No other significant associations were found. **Conclusion:** Frequent and prolonged bouts of SB were associated with slower performance on the 8UG, reflecting poorer dynamic balance and agility. These findings highlight the need for interventions to reduce SB in all older adults in order to attenuate declines in functional ability that could potentially lead to the loss of independence. The unexpected direction of the association between sedentary breaks and time on the 8UG warrants further exploration.

123. INTER-LIMB COMPARISON OF VERTICAL GROUND REACTION FORCE CHARACTERISTICS DURING RUNNING IN INDIVIDUALS WITH ACL RECONSTRUCTION

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Purpose: Anterior cruciate ligament reconstruction (ACLR) increases the risk for knee osteoarthritis due to compromised gait biomechanics. There has been much research on walking, indicating an increased rate of loading in the injured compared to uninjured limb, but limited data are available on running. The purpose of this study is to compare loading characteristics during running between the injured and uninjured limb of individuals with unilateral ACLR. **Methods**: Twenty individuals with unilateral ACLR participated in this study (15 female; 10 Patellar Tendon; 7 Hamstring Tendon; 3 Allograft; age=22.3±3.29 years; height=1.73±0.09 m; mass=71.8±15.3 kg; time since ACL injury=44.9±22.8 months). Participants completed five running trials per limb at a self-selected pace while ground reaction force characteristics were evaluated using a force plate (Peak Impact Force (PIF), Average Loading Rate (ALR), and Instantaneous Loading Rate (ILR)). PIF, ALR, and ILR were normalized to body weight (BW) for analysis, and paired samples t-tests were used to compare PIF, ALR, and ILR between the injured and uninjured limb. **Results**: PIF was significantly greater in the injured compared to the uninjured limb (1.83±0.48, vs. 1.65±0.44 BW, p=0.001). ILR was significantly greater in the injured compared to the uninjured limb (88.79±19.00 vs. 77.21±19.48 BW/s, p<0.001). ALR did not differ between injured and uninjured limbs (63.11±28.49 vs. 58.67±25.72 BW/s, p=0.303) **Conclusions**: Our findings suggests that the injured limb experiences higher PIF and ILR compared to uninjured limbs during running in individuals with ACLR. Higher loading rates in individuals with ACLR may influence cartilage degradation, and should be considered a factor for knee osteoarthritis prevention.

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124. THE EFFECTIVENESS OF OOLONG TEA AS A PRE-WORK IN AEROBIC EXERCISE.

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Due to the increase in consumption of pre-workout supplements there is a growing interesting in this field. Developing or discovering natural substances that can be used as a pre-work are beneficial to the human body and aid in improving physical fitness. This study sought to investigate if tea consumption before engaging in aerobic exercise can enhance aerobic performance. Twelve subjects consumed either oolong tea, in which contained 18.2g of caffeine or a placebo (a decaffeinated chamomile tea) one hour before testing. The test was conducted with the use of a Velotron bike and participants were instructed to cycle a total of twelve miles. There were no significant differences between placebo (14.7 ±0.43 min) and tea consumption (10.1 ±0.43 min). While statistically similar, the increased performance (31% decrease in time) after tea consumption represents a meaningful, real world, difference. Oolong tea consumption could provide aerobic benefit for some individuals.

125. RELATIONSHIP BETWEEN BODY FAT AND SELECTED GAIT PARAMETERS

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Background: Over the years obesity has become a widespread pandemic that has affected many people. Obese persons experience difficulty ambulating and conducting daily activities. While body mass indexing is typically used to identify obese individuals' percent body fat was preferred for this study because body mass index presents as an inaccurate obesity classification (Shah, 2012). It has been proposed that as percent body fat increases joint mechanics of the hip, knee, and ankle will increase as well on all three planes. **Methods**: 54 participants (24 male, 30 female; Avg Height:170.9±9.2 cm, Avg Weight: 74.4±18.8 kg) walked across Bertec force plates (Bertec, Inc, Columbus, OH) 10 times. Kinematic data were collected and normalized to body weight and collected with Vicon Nexus 2.3 (Vicon, Inc., Oxford, UK) and processed through Visual 3D software (5.0, C-Motion, Inc., Germantown, MD, USA). Reflective markers were placed at bony landmarks of the lower extremities. Body composition was measured using a Bod Pod (Cosmed USE, Inc., Chicago, IL). **Results**: Pearson correlation coefficients were produced to investigate relationship between percent body fat and selected variables. The data reveals a significant relationship between percent body fat and stride width (r^2 = 0.368) as well as peak ankle plantar flexion moment (r^2=0.373) (p=0.032 and *p*=0.005 respectively). **Discussion**: Based on this data, step width and peak plantar flexor moments were increased with increased body fat percentage, suggesting that persons with a larger percent body fat require more force to propel themselves forward to toe off. Strengthening plantar flexors may allow those with high percent body fat to ambulate and perform other daily tasks efficiently. Further research is needed to examine non-normalized data to show practical effects. Additionally, with primarily active individuals in the current study, a comparison to more sedentary individuals is needed.

127. CONSISTENCY AND LOADING PATTERNS BETWEEN RUBBER BANDS AND VULCANIZED RUBBER BANDS

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Purpose: Rubber resistance bands are used frequently to induce variable-loading schemes in strength and conditioning. The purpose of this study was to examine the differences in loading patterns and consistencies between purported higher-quality vulcanized rubber and regular rubber bands acquired online through Elite FTS. **Methods**: Regular rubber bands (*n*=20) and vulcanized bands (*n*=20) were compared across a spectrum of four similar widths (1.27, 2.86, 4.45, 6.25 cm). Five bands from each width were stretched in 5 centimeter increments from a resting position of 100 centimeters, to twice resting length (200 cm). Tensile resistance was measured using a load cell integrated with a digital controller (DBBP-500 and SVS 2000; Kistler-Morse; Spartanburg, SC). Tension reliability testing was performed on each band on non-consecutive days producing intraclass correlation coefficients (ICC) between 0.929-0.999 with a grand mean ICC across all repeated measures of 0.979. Reliability of cross-sectional areas measured for stiffness was completed on a sample of bands for thickness and width producing an ICC of 0.963 and 0.999 respectively. **Results**: Statistical differences were observed for mean stiffness in all widths except for 4.45 cm. There was no statistical interaction effect for band type by width observed in mean resistance at twice resting length except for the highest width (40.0 ± 2.8 kg vs. 44.5 ± 0.6 kg) (*p*<0.001). The absolute range of loading (in kilograms) at twice resting length was significantly higher (*p*=0.008) in vulcanized bands (1.3 ± 0.7 kg vs. 8.8 ± 5.5 kg). The range of loading expressed as a percentage was significantly higher (*p*=0.021) in vulcanized bands (8.8 ± 4.9% vs. 15.7±3.9%). **Conclusions**: While vulcanized bands were stiffer and displayed greater variability, there were no differences in resistance at twice resting length seen between band types except at the greatest width.

126. ROLE OF THE CYTOKINE IP-10 IN SKELETAL MUSCLE REGENERATION

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Purpose: Chemokines are known to play an important role in muscle repair. The cytokine IP-10 has recently been found to increase in skeletal muscle following exercise-induced damage. IP-10 is a chemoattractant for immune cells, which are known to facilitate muscle regeneration. In this study we hypothesized that IP-10 plays a significant role in the regeneration of damaged muscle. **Methods**: To test this hypothesis, we induced a muscle injury in the tibialis anterior (TA) of wild type (WT) and IP-10 knockout ($IP\text{-}10^{-/-}$) mice via cardiotoxin injection. Saline was injected into the contralateral muscle as a control. TA muscles were assessed for markers of regeneration at 2, 7, and 14-days post injury (DPI) by measuring both functional and histological variables. **Results:** Muscle injury resulted in a significant (p<0.001) loss in absolute force of mice from both genotypes at 2 (WT=46.7±15.9% of control, $IP\text{-}10^{-/-}$=44±9.4% of control) and 7 (WT=65% of control, $IP\text{-}10^{-/-}$= 66±15.9% of control) DPI, which recovered to control levels by 14 DPI. There were no significant differences in absolute force between genotypes. The injury also induced histological markers of regeneration at 7 and 14 DPI relative to the control muscle, including: decreased cross-sectional area of regenerating muscle fibers, and an increased number of myofibers expressing embryonic myosin heavy chain. However, there were no significant differences between genotypes for any marker of regeneration. **Conclusion:** IP-10 does not appear be necessary for normal muscle regeneration following injury. Because IP-10 binds a receptor shared by three other chemokines, it is possible that these chemokines may have compensated for the lack of IP-10 in our model.

128. EFFECT OF LOCOMOTOR TRAINING ON MUSCLE MITOCHONDRIAL OXYGEN UTILIZATION IN SPINAL CORD INJURY

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Debilitating spinal cord injury (SCI) results in sensorimotor dysfunction below the area of injury. Activity-based therapies that target spinal locomotor networks have been associated with improvements in walking ability with varying levels of success after SCI. Typical regimens of locomotor training emphasize repeated, full-body, load-bearing exercise of moderate intensity. Thus, in addition to promoting recovery of sensorimotor function, this type of training can also provide benefits to health, including improved cardiometabolic function. **Purpose**: To investigate the role of skeletal muscle mitochondria in the beneficial effect of locomotor training on cardiometabolic health. We hypothesize that training elicits pronounced improvements in mitochondrial oxidative capacity (MOC) and overall cardiometabolic health. **Methods**: Able-bodied and SCI participants performed a protocol using near infrared spectroscopy (Oxymon MkIII, Artinis) and repeated arterial occlusions to determine rate constants indicative of skeletal muscle MOC. In order to complete the MOC protocol, arterial blood flow to the gastrocnemius and quadriceps muscles were occluded using a rapid-inflation cuff system (E20 Hokanson) after electrical muscle stimulation (DS7AH Digitimer) to exhaust local oxygenation. Slopes of recovery were used to calculate the time constant to indicate the speed of recovery after stimulation. The time constants correspond to the mitochondrial activity in the muscles of interest. **Results:** We found that time constant values were reproducible within subjects and can be used to differentiate variability in fitness across participants. All able-bodied participants had MOC rate constants >1.5 min^{-1} in both gastrocnemius and quadriceps muscles, indicating normal mitochondrial function. Evidence of impaired mitochondrial function was observed in SCI rate constants of <1.5 min^{-1}. **Conclusion:** Preliminary data are promising in determining methods to assess the role of training on mitochondrial capacity that takes place in parallel with recovery of neuromuscular function and overall cardiometabolic health.

129. MEASURES OF MUSCLE FUNCTION AS RELATED TO BONE STRENGTH

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Purpose: Osteoporosis is a leading cause of fracture and morbidity in older populations (Colon-Emeric & Saag, 2006). An effective strategy in minimizing the risk of osteoporosis is an active lifestyle in adolescence (Turner, 2004). Muscle forces acting on bone during activity lead to bone strain and, thus, structural adaptations of the bone (Robling, 2009). The purpose of this study is to investigate the relationship between common muscle function tests (1 rep max/body weight, relative grip strength, peak power) and bone strength variables in a healthy college-age population. **Methods:** Twenty participants from CSU East Bay, 9 females and 11 males (age (yrs) 23.4 +/- 2.5, height (m) 1.7 +/- 0.1, body fat % 20.8 +/- 9.6) performed a relative grip strength test using a hand dynamometer, a one repetition maximum (1 RM) on a leg press machine and a vertical jump test using the Vertec. Peak power was then calculated from vertical jump height. Moment of inertia (J), cortical area (Ct.Ar.), volumetric bone mineral density (vBMD), and strength-strain index (SSI) were measured using peripheral Quantitative Computed Tomography (pQCT) to determine bone strength at the 50% tibia site. **Results:** 1 RM/BW and relative grip strength were not significantly correlated with bone strength parameters. Peak power resulted in significant, positive correlations with J (R^2=0.6089, p=0.008), Ct.Ar. (R^2=0.6030, p=0.008), and SSI (R^2=0.5948, p=0.009). Peak power resulted in a significant, but negative relationship with vBMD (R^2=0.7080, p=0.002). **Conclusion:** Our findings suggest peak power is a significant surrogate measure of bone strength in a healthy college-age population. Although vBMD had a negative relationship with peak power, this finding is possibly due to low numbers of participants at this stage. This study is important because health professionals and physical educators can use peak power as a practical and non-invasive method of measuring bone strength and health.

131. THE EFFECTS OF SELF-SELECTED MUSIC AS A DIVERTING ACTIVITY BETWEEN TWO BOUTS OF FATIGUING ISOKINETIC LEG EXTENSIONS

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PURPOSE: To investigate the effects of listening to music as a diverting recovery intervention on peak torque and percent torque decline. **METHODS**: Thirty-nine recreationally trained college-aged men (n = 18; 22.3 ± 2.7 years; 177.6 ± 8.8 cm; 80.7 ± 10.0 kg) and women (n = 21; 22.2 ± 1.7 years; 162.2 ± 5.2 cm; 62.6 ± 9.9 kg) performed 4 experimental visits consisting of 2 bouts of 50 maximal isokinetic leg extensions at $180^{o} \cdot s^{-1}$. Between each bout of maximal exercise, 2 minutes of recovery involving one of the 4 interventions (no music, white noise, self-selected slow tempo music, and self-selected fast tempo music) was completed. Torque values were collected during the pre-intervention and post-intervention maximal isokinetic strength tests. Percent torque decline was calculated for both the first and second set of 50 repetitions using the following formula: % Torque decline = [(peak torque - minimal torque) ÷ peak torque)] × 100. **RESULTS**: There were no significant (p > 0.05) 3-way interactions for peak torque or percent torque decline. There was a significant 2-way (time × sex) interaction (p< 0.05) for peak torque. The decrease in peak torque from the pre-intervention test to the post-intervention test was significantly greater for men (pre = 138.1 ± 3.68 Nm; post = 127.4 ± 3.2 Nm) than for women (pre = 84.7 ± 3.4 Nm; post = 80.4 ± 2.9 Nm), regardless of intervention. There was a significant main effect (p< 0.05) for percent torque decline, where the torque decline was greater for the post-intervention test (45.8 ± 1.2%) than the pre-intervention test (43.2 ± 1.3%), regardless of intervention or sex. There were no significant interactions for main effects involving diverting conditions (p > 0.05). **CONCLUSION**: These findings indicate listening to self-selected music, slow or fast tempo, was not an effective diverting activity.

130. NO EVIDENCE OF PACING BETWEEN A THIRTY REPETITION AND FIFTY REPETITION FATIGUE TEST

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INTRODUCTION: The classic Thorstensson test has been frequently used as a non-invasive way to provide an estimate of fast-twitch fiber type percentage, in turn providing a way to examine fatigability. In order to calculate fatigability in the Thorstensson test, 50 repetitions are performed and the average of the first 3 and last 3 repetitions are compared. Recent research suggests that when performing a single test, peak isokinetic torque to rep 30 (P30) may potentially correlate with peak isokinetic torque to rep 50 (P50). However, when performed separately, subjects may give greater effort in the shorter P30 test than the P50. **PURPOSE:** To determine torque (Nm) and fatigue rate between P30 and P50 by examining peak torque and 5 rep torque intervals of the P30 and the first thirty maximal knee extensions of the P50. **METHODS:** Nine subjects (6 male, 3 female) (age= 23.78 ±1.79 y, mass = 76.39 18.58 kg, height = 172.56 ± 8.93 cm) performed two tests on a Biodex isokinetic dynamometer in random order consisting of either the P50 or the P30 at 180 d/s. **RESULTS:** A 2 x 7 (condition x repetitions) ANOVA determined there was no significant interaction but there was a main effect for repetitions where torque at each subsequent 5 reps was less than the previous. Isokinetic peak torque for the P30 test was 214.08± 63.38Nm and for P50 it was 215.90 ± 59.26Nm. Torque at every firth rep in P30 was R5 = 190.8 ± 53.89Nm, R10 = 164.21± 48.64Nm, R15= 142.7± 38.9Nm, R20= 121.81± 26.70Nm, R25 = 101.51 ± 25.69Nm, R30= 82.86 ± 24.69Nm. Torque for every firth rep up to rep thirty in P50 was R5= 187.06 ± 46.54Nm, R10= 155.71 ± 37.05Nm, R15= 136.27 ± 31.16Nm, R20= 113.94 ± 22.23Nm, R25= 96.70 ± 32.51Nm, R30= 93.10 ± 18.20Nm. The fatigue slopes showed a non-significant trend (P=0.17) in decline rate (Nm/rep) with less decline in P50 (P30 = 4.37 ± 1.71 vs P50 = 4.09 ± 1.80). **CONCLUSION:** When comparing P30 to the first 30 maximal knee extensions in P50, torque showed a similar fatigue decline rate. It appears there was no pacing in either test, albeit decline rate was slightly greater in P50. Since there were no significant differences between tests, P30 can potentially be used as an alternative to the P50 test.

132. COMPARISON OF KETTLEBELL JUMP SQUATS VS KETTLEBELL SWINGS ON THE VERTICAL JUMP

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Purpose: It is not known whether kettlebell movements can achieve a PAP effect. The purpose of this study was to investigate the PAP effect of kettlebell swings versus kettlebell jump squats on countermovement jump performance. **Methods**: The participants in this study were 7 female Division 1 basketball players (age=19.14±1.86y, height=172.21±10.46cm, mass=70.56±7.25kg). A kettlebell weighing 20% of the participant's body mass was used for the conditioning activities, kettlebell swings (KBS) or kettlebell jump squats (KBJ). Three visits were completed, one for each condition: control, KBS, KBJ. Participants completed 3 pre CMJs, then proceeded to the conditioning activity consisting of 10 repetitions (2x5 with 1 minute rest between sets) then 3 minutes of rest before performing 3 post CMJs. **Results**: ANOVA indicated no significant interactions or main effects for any variable of CMJ performance. There were no significant differences in peak power for KBS (pre 3861.15±650.67W vs post 3884.60±606.84W) or KBJ (pre 3816.90±470.31W vs post 3862.34±446.17W). Also, CMJ impulse was not different for KBJ (pre 189.15±10.46Ns vs post 191.92±10.35Ns) or KBS (pre 190.62±19.80Ns vs post 193.47±19.65Ns). **Conclusion**: These findings demonstrate that neither KBS or KBJ produced a PAP effect. Load, rest periods, or volume adjustments are needed in future research in PAP with kettlebells.

133. LEG DOMINANCE INFLUENCES LANDING STRATEGY AND IS CORRELATED WITH FIBER-TYPE COMPOSITION

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Asymmetrical function caused by leg dominance may hinder performance or promote injury. No study has addressed this issue by simultaneously examining biomechanical and physiological determinants of human performance. **PURPOSE**: To investigate the relationship between leg dominance, muscle fiber type composition, and jumping performance in resistance-trained men. **METHODS**: Fourteen men (age=24.1±2.6yrs; height=181.6±6.6cm; mass=87.8±10.9kg) answered a leg dominance questionnaire (preferred leg to kick a ball) and received muscle biopsies of their vastus lateralis in their dominant (D) and non-dominant leg (ND). Participants performed depth jumps (30cm) onto two independent force plates (one foot per force plate). Participants alternated the leg they stepped off the box with. Individual muscle fibers (107.8±34.3 per leg, per person) were isolated and sodium dodecyl sulfate polyacrylamide gel electrophoresis was used to identify their myosin heavy chain (MHC) fiber type (MHCI, MHCI/IIa, MHCIIa, MHCIIa/IIx, or MHCIIx). **RESULTS:** A 2x2 repeated measure ANOVA revealed a significant interaction between landing foot and step-off foot (f=11.99, p=0.004). The ND landing leg produced a significantly higher rate of force absorption (RFA) compared to D landing leg (p=0.03) when stepping off with ND. The RFA in ND landing leg (when stepping off with ND) was negatively correlated (p=0.029, r=-0.581) with the percentage of any of fibers containing any MHCI isoform (i.e., MHCI+MHCI/IIa). ND contained significantly (t (df=13)=3.27, p=0.006) fewer fibers with any MHCI isoform (34.1%±14.1) than D (42.1%±14.6). **CONCLUSIONS:** This suggests the preferred kicking leg is not the preferred limb to absorb landing force. The greater abundance of the more powerful MHCIIa muscle fibers in the preferred force absorbing leg provides a partial physiological explanation for the observed asymmetry. These data contribute unique insight into how biomechanical and physiological factors integrate to produce human movement.

135. BODY WEIGHT SUPPORT TRAINING MODULATES MUSCLE NF-KB P65 EXPRESSION-INDUCED BY SPINAL CORD INJURY

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Purpose: To improve the efficacy of exercise rehabilitation following traumatic spinal cord injury (SCI), a better understand of muscle-associated cellular signaling is imperative. The transcription factor NF-kB is a “master controller” of the inflammatory pathway with P65 being the main subunit. Thus we hypothesized that P65 is expressed in muscle of SCI rodents and that body weight supported treadmill training (BWSTT) modulates P65-related signaling cascade. **Methods**: A low-thoracic spinal cord contusion was performed on 16 Sprague Dawley rats and 8 were trained 5 days/week for 4 weeks. Proteins were extracted from soleus (Sol), gastrocnemius (GM), tibialis anterior (TA), and extensor digitorum longus (EDL) muscles. Immunoblot analysis for total NF-κB p65, and IKB-□ was performed. Equal amounts of protein were analyzed by 4 to 12% SDS-polyacrylamide gel electrophoresis. Following transfer (TransBlot Turbo, Bio Rad), membranes were blocked in 5% milk and incubated overnight at 4°C with a primary antibody (p65, and IκB, Santa Cruz Biotechnology, Santa Cruz, CA). Following incubation with a peroxidaseconjugated secondary antibody, bands were visualized by ECL, imaged and densitometry was determined (QuantityOne, Versadoc Bio-Rad). **Results:** P65 was strongly expressed in all muscles of untrained animals. Training significantly decreased P65 only in TA muscles (P<.05). P65 inhibitor IkB-β expression increased in EDL, and GM muscles (P<.05) and decreased in Sol (P<.05) following training. The ratio of P65:IkB-β significantly increased for Sol and decreased for EDL, GM, and TA for the trained group (p<.05). **Conclusion:** P65 was expressed in all muscles of SCI rodents. The BWSTT modulation of P65 expression seems to be related to IκB interaction and is muscle-dependent.

134. ZUM UP: BUILDING A HEATHIER COMMUNITY THROUGH ZUMBA DANCE

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Approximately 70% of Ontario residents are Hispanic, with 98% of children eligible for free lunch, and 67% of the population classified as overweight or obese. The goal of this project was to increase physical activity and healthy food consumption among women living in Ontario through free Zumba dance classes offered in local community centers. The purpose of this study was to examine the effects of 8 weeks of Zumba dance, 1 hour twice a week, on physical and behavioral measures in 30 women (primarily Hispanic), between the ages of 30 and 59. We hypothesized that all measures would improve after participation in Zumba classes, and that mood would improve after completing one 60 minute Zumba class. The physical measures included weight, waist circumference, lower body power (# of sit-to-stands in 30 sec) and mobility (timed-up-and-go, TUG). The behavioral measures included self-efficacy in walking 1 mile, lifting 10 pounds, number of fruit/vegetables and sugar beverages consumed, and mood before and after a Zumba class. There was a significant increase in lower body power (M_1=20.7, M_2=23.4; t (29) = -3.05, p = 0.002). Other measures of physical function tended to improve but did not reach significance at $p \leq 0.05$. There was a significant increase in self-efficacy (confidence in walking 1mile (M_1=72.2, M_2=85.3; t (29) =-3.0, p = 0.003) as well as mood before/after the Zumba class (M_1=2.4, M_2=4.9; t (29) = -11.06, p = 0.000). Other measures of behavioral function did not change significantly. These results support the hypothesis that 8 weeks of participation in Zumba dance improved physical and behavioral function in Hispanic women.

136. CAFFEINE’S EFFECTS ON AN UPPER BODY RESISTANCE EXERCISE STRENGTH WORKOUT

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Purpose: The purpose of this study was to examine the effects of caffeine on an upper body resistance training strength workout using the barbell bench press. **Methods:** Fifteen men ($M \pm SD$, age: 23.1 ± 1.9 years; body mass: 89.1 ± 13.9 kg; height: 175 ± 6.1 cm), volunteered for three laboratory visits. During visit one, 1RM values were determined. For visit two, subjects consumed either 800 mg caffeine, or a placebo. Subjects then completed three sets of the barbell bench press to failure at 80% 1RM. Visit three was the same as visit two; however, participants consumed the opposite treatment as visit two. **Results:** Participants completed significantly more average repetitions per set for the barbell bench press in the caffeine condition (4.80 ± 2.66) compared to the placebo condition (4.42 ± 2.56). **Conclusion:** These results suggest that caffeine has a positive ergogenic effect on upper body strength workout performance.

137. THE PHYSIOLOGICAL AND PSYCHOLOGICAL EFFECTS OF A PRE EXERCISE AMINO ACID SUPPLEMENT

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Purpose: The research literature suggests that branched-chain amino acid (BCAA) supplementation may be beneficial for many different modes of exercise. Thus, the purpose of this study is to determine if a pre-exercise amino acid supplement improves performance of a 5 mile time trial test and to assess whether there are changes in cognition. **Methods:** Eight recreationally active male college students were recruited for this repeated measures design study. Participants consumed either a commercially available BCAA supplement or placebo (CON) 15 minutes prior to performing a Wingate test, followed by a brief break and then a 5 mile time trial test. Blood samples were collected before, during and after exercise to measure glucose, lactate and insulin levels. The Go/No Go and Stroop test were used to assess cognition before and after exercise. **Results:** There were no significant performance differences between BCAA and CON treatments for either the Wingate or time trial test. Furthermore, blood glucose, lactate and plasma insulin levels were similar at each time point for both treatments. Lastly, participants performed equally well on the cognitive tests both before and after exercise. **Conclusion:** Under these testing conditions BCAA supplementation does not appear beneficial for 5 mile time trial performance, on physiological markers or cognition. However, the effects of BCAA supplements under different conditions warrants further investigation.

139. EXPLORATION OF EFFECTS OF A SIX-WEEK EXERCISE PROGRAM ON SENIOR CITIZENS' WELLBEING

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Purpose: The number of senior citizens has been rapidly increasing around the world (World Health Organization, 2015). Under such circumstances, regular exercise can play a significant role in contributing to their healthy aging such as developing and maintaining functional capacities (American College of Sports Medicine, 2015). The main purpose of this study was to describe changes in senior exercisers' multidimensional self-concept through a six-week exercise program. **Method:** Nine participants (six females and three males) ranging in age from 63 to 77 years (M = 68.6) participated in the exercise program. The short version of the Physical Self Description Questionnaire (PSDQ-S: Marsh, Martin, & Jackson, 2010) was utilized to measure participants' multidimensional self-concept at the first day (Pre) and the last day (Post) of the program. Health screenings (e.g., Health History and Activity Questionnaire) were conducted prior to the exercise session. Senior Fitness Test (Rikli & Jones, 2001) was administered to assess participants' physical fitness at the beginning and the end of the program and divide the participants into groups of two or three based on their fitness levels. Exercise protocols were tailored to accomplish each participant's goals such as improving physical strengths, flexibility, balance, and aerobic capacity. **Results:** Descriptive statistics and Cronbach's alphas (ranged from .72 to .98) were computed for 11 subscales of the questionnaire: Health, Coordination, Activity, Body Fat, Sport, Global Physical, Appearance, Strength, Flexibility, Endurance, and Global Esteem. Paired sample t-tests revealed a significant increase between Pre (M=3.83, SD=1.42) and Post (M=4.17, SD=1.44) in Activity subscale [t (8) = -4.00, p <.01]. **Conclusion:** Results indicated that the six-week exercise program may support increased participants' physical self description about activity. Future research should add physiological variables to the physical self description questionnaire, as well as qualitative data analysis to support an efficacy of the exercise program.

138. WEIGHT CUTTING AND PROFESSIONAL MIXED-MARTIAL ARTISTS: HOW MUCH ARE THEY LOSING AND IN WHAT TIME FRAME?

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Introduction: Like other combat sports, mixed martial arts has different weight fighting classes. Current peer-reviewed literature includes various individual sports that compose mixed martial arts (MMA) including boxing, judo, and wrestling; however there is limited evidence on mixed marital artists. Thus, the purpose of this study was to investigate the weight cutting habits and duration of weight cutting with professional MMA athletes. Methods: N=56 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 percentage of frequency of responses calculated using IBM Analytics, SPSS v24. Results: Most fighters, regardless of weight class, reported cutting at least 6 lbs for a fight where the most frequent response indicated an average weight cut of 21-25 lbs (n=16). Fighters within the lightweight class (~155 lbs) fluctuated across the board for average weight cut. The majority of fighters start cutting weight 4-6 weeks prior to weigh in (45.5%), with others beginning to cut weight even up to 8 weeks prior to weigh in (18.8%). Although they may begin cutting weight weeks in advance of a fight, they lose the most amount of weight 1 week prior (45%) or 48 hours prior (21.8%) to their upcoming fight. Conclusion: Professional mixed martial artists report cutting the most amount of weight for a fight 1 week prior to competition including a large decrease in body weight occurring 48 hours prior to a fight.

140. THE RELATIONSHIP BETWEEN BILATERAL ASYMMETRIES AND EXPLOSIVE LOWER-BODY PERFORMANCE

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Introduction: Bilateral symmetry of the lower extremities may be a critical component of lower-body explosive performance. Therefore, the purpose of this investigation was to determine the relationship between bilateral asymmetry and explosive lower-body performance. **Methods:** Forty-five recreationally trained males and females (age, 23.04 ± 2.36 y; height, 166.45 ± 24.40 cm; mass, 73.86 ± 13.33 kg) volunteered to participate in this study. Day one (familiarization), participants filled out an informed consent and physical activity readiness questionnaire followed by familiarization of vertical jump, sprinting, and isokinetic torque protocols. Day two (testing), participants performed a dynamic warm-up followed by 3 countermovement vertical jumps utilizing the Vertec and force plates to obtain maximum vertical jump height and peak force. Maximal vertical jump height of the three trials was used for analysis. Participants performed 3 trials with 2-min rest between trials during a 40-yard sprint where the timing gates were positioned at 20 and 40 yards. Fastest times were used from the three trials for analysis. Isokinetic torque was assessed with the Biodex System 4 Isokinetic dynamometer to measure concentric isokinetic torque of both hamstrings and quadriceps, with 5 repetitions on each leg. The maximum isokinetic torque from each leg was used for analysis and bilateral quadriceps (BQ%) and hamstrings (BH%) percent differences were calculated and used for analysis. Pearson's r correlations were conducted to analyze the relationship between hamstring and quadriceps percent differences and lower body explosive performance variables. **Results:** There was no significant ($p>0.05$) correlation between BQ% and BH% and all performance variables. **Discussion:** No relationship was observed between bilateral asymmetry and any lower body explosive performance in this particular population. The lack of a relationship may be due to the type of participants that were involved in the investigation; since they were recreationally trained there may be varied training experience.

141. HEAVY EPISODIC DRINKING AND SKELETAL HEALTH IN YOUNG ADULTS

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Osteoporosis, currently affecting approximately 54 million Americans, is diagnosed when bone deposition does not occur and or resorption is increased, which ultimately leads to weak and brittle bones. One way to reduce the risk of developing osteoporosis is building optimal bone mineral density (BMD) during years of growth and, thus, achieve a high peak bone mass (PBM). While a surplus of data has documented the negative effects of excessive alcohol consumption on BMD among older adults, it is unknown whether excessive drinking earlier in life negatively affects BMD or interferes with achievement of PBM. **PURPOSE:** This study addresses the lack of research concerning the potential effects of heavy episodic drinking (HED) on BMD in adolescents. HED, defined as 4 or more consecutive drinks for females and 5 or more for males, is prevalent in this population and could influence bone health. **METHODS:** 175 full-time first or second year college students (87 females and 88 males) completed the 2014 Block Food Frequency Questionnaire to assess calcium intake, a physical activity questionnaire to assess MET-hours/week of physical activity, and an extensive alcohol use history which estimated lifetime HED frequency. Further, dual energy x-ray absorptiometry (Hologic, Discovery A) measured BMD of the lumbar spine and lean mass of the whole body. **RESULTS:** Sex-stratified linear regression models controlling for participants' calcium intake, lean body mass, and physical activity revealed lumbar spine BMD to be significantly lower among students who reported lifetime HED frequency in the 80th percentile or above for their sex. **CONCLUSION:** These cross-sectional findings suggest that lower BMD may be yet another serious negative outcome of HED among college students. Future research should examine the influence of frequent HED on longitudinal changes in BMD and PBM in this population.

142. FOOD CONSUMPTION AFTER MODERATE AND VIGOROUS EXERCISE IN WOMEN: A RANDOMIZED CROSSOVER TRIAL

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Purpose: This study examined the effect of different intensities of acute exercise on post-exercise energy intake in women. Methods: This crossover study utilized treatment conditions that were randomized and counter-balanced. Fifty-two adult women, 18-29 years, were compared under three separate conditions: no exercise, 45 min of moderate-intensity exercise at 3.9 METs and 22.5 min of vigorous-intensity exercise at 7.8 METs. Each experimental conditions occurred on separate days one week apart. Participants presented to the lab 1 hour after consuming a breakfast shake that contained 10% of their total daily energy requirements. Post-exercise food intake was measured during an ad libitum snack offered at the end of each condition. Food was weighed before and after the eating period to determine how much food was consumed. Snack foods used for the study were: apples, carrots, beef jerky, granola bars, chocolate chip cookies, fruit snacks, chips, and M&M's. Participants were instructed to help themselves to as much food as they desired until they felt comfortably satisfied. Results: Energy, carbohydrate and fat intake did not differ between conditions. However, protein consumption was slightly higher in the exercise conditions. In addition, even though energy intake did not differ among exercise conditions, low-energy dense foods were consumed at higher rates compared to high-energy dense foods after the vigorous ($P = 0.0005$) and moderate exercise condition ($P = 0.02$) compared to the non-exercise condition. Conclusion: The results of this study demonstrate that an acute bout of moderate or vigorous exercise does not alter total energy intake 45 to 60 minutes after exercise. There does seems to be an increased consumption of low energy dense foods after exercise compared to the non-exercise day. One reason for the increased intake of low energy dense foods may be due to the higher water content of the foods.

143. THE EFFECTS OF ACUTE BILATERAL AND UNILATERAL SET PROTOCOLS ON MUSCLE POWER AND RATE OF FORCE DEVELOPMENT

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Purpose: Postactivation potentiation (PAP) is used to improve the force generating capacity of skeletal muscles. However, no studies have examined if there is a difference in PAP response when comparing a unilateral versus a bilateral conditioning exercise. This is important because differences exist in muscle activation when comparing unilateral and bilateral exercises. This difference plays a role in the apparent strength difference between unilateral and bilateral exercise, called "the bilateral deficit" (BLD). Therefore, the purpose of this investigation was to determine if a unilateral exercise would cause a different PAP response compared to a bilateral exercise. **Methods**: Ten recreationally trained males participated (mean ± SD; age = 21.9 ± 2.1 yrs; body mass = 83.3 ± 10.5 kg; height = 1.8 ± 0.1 m; BMI = 25.8 ± 3.2; percent body fat = 14.8 ± 3.5%). Following a familiarization period and baseline strength testing (5 rep maximum [5RM] for unilateral and bilateral squat), in a randomized repeated measures design, all subjects completed 3 trials: unilateral, bilateral and control. Each trial consisted of a conditioning activity (4 reps at the 5RM load) followed by a maximal voluntary isometric leg extension contraction (60° knee extension) 7 minutes after finishing the conditioning activity. **Results**: Neither conditioning activity (unilateral or bilateral squat) resulted in an increased peak torque value expressed in absolute or relative values as compared to control ($P>0.05$). Interestingly, following both conditioning activities, there was a statistically significant increased time to reach half peak torque compared with the control trials ($P <0.05$). **Conclusion**: Our results demonstrated that neither conditioning activity (unilateral or bilateral squat) prior to a maximal voluntary isometric contraction caused a PAP response. However, both conditioning activities appeared to cause residual fatigue. Future investigations should expand the time domain to further explore the PAP response.

144. FUNCTIONAL COMPARISONS IN THE QUADRICEPS MUSCLE BETWEEN YOUNG AND OLD SUBJECTS FOLLOWING AN ECCENTRIC BOUT OF MUSCLE DAMAGING EXERCISE

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Purpose: Human skeletal muscle is capable of robust regeneration following damage. However, characteristics associated with skeletal muscle function and recovery begin the gradual life-long decline at around 30 years old. The hallmark signs of aging skeletal muscle are a decrease in muscle mass, and a reduced capacity for generating force, yet the functional changes between young and old subjects following muscle damaging exercise is less understood. The purpose of this study was to employ a muscle damaging protocol using high-force lengthening contractions (LC) and examine the functional characteristics between young and old subjects during recovery. **Methods:** Thirteen young (22.7 ± 2.25 y) and 8 old (70.9 ± 7.5 y) participants completed 300 lengthening contractions. Soreness was assessed using a visual analog scale prior to exercise and at 24 and 72 hour's post exercise. An isokinetic test was performed to determine peak torque, and average power at four different time points (pre exercise and immediately, 24 hours, and 72 hours post exercise). **Results:** Both groups demonstrated a similar increase in soreness at 24 and 72 hours post exercise ($p<0.05$). Additionally, all subjects experienced a marked decrease in their functional measures following exercise ($p<0.05$). As expected, young subjects showed significantly higher absolute values in each of the functional measures compared to old at the pre exercise time point, yet unexpectedly, the young subjects showed a significantly higher percentage of torque (53.6 ± 5.19 vs 34.5 ± 7%), and power (57.4 ± 23 vs 34.4 ± 19%) loss compared to old subjects. Indicating a preservation of muscle function in old subjects following voluntary muscle damaging exercise. **Conclusion:** These data demonstrate increased functional sensitivity in young compared to old muscle following damaging exercise, and help establish future direction in identifying potential molecular alterations with aging that impact muscle function and recovery.

145. EXAMINING THE EFFECTS OF BODY WEIGHT SUPPORT AND SPEED ON PHYSIOLOGICAL MEASURES AND LOWER EXTREMITY MUSCLE ACTIVITY

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Purpose: The purpose of this study was to determine if body weight support or speed influences specific physiological and biomechanical parameters while running at a preferred pace, or variations of preferred pace. **Methods:** Nine participants (age: 28.56±7.88 years, height: 1.68±0.08 m, mass: 65.70±7.64 kg) who were running a minimum of 10 miles per week (14.67±4.92 miles) were recruited for participation. After determining preferred running speed at each body weight support condition (no support, 10%, and 20% support), participants were instrumented with four Delsys EMG leads, a PCB one-dimensional accelerometer, and a K4B2 portable metabolic gas analysis system to measure muscle activity, tibial acceleration, and metabolic variables at points throughout each condition. Participants were asked to run a total of nine conditions, running with no body weight support, 10% support, and 20% support at a preferred running pace, as well as +10% and -10% of that preferred speed. Average muscle activity, average tibial acceleration, and average VO_2 and VCO_2 values were determined for each condition. **Results:** None of the dependent variables were influenced by the interaction of speed and body weight support ($p>0.05$). EMG of the four lower extremity muscles was not influenced independently by body weight support ($p>0.05$) or speed ($p>0.05$). VO_2 was influenced by body weight support ($p<0.001$), as well as speed ($p<0.001$). Tibial acceleration was not influenced by body weight support ($p>0.05$) but was influenced by speed ($p<0.05$). **Conclusion:** It is concluded that oxygen consumption was affected by both body weight support and speed; yet, lower extremity muscle activity was not. It should be understood that although it may be possible to achieve similar levels of muscle activation while running at 10% and 20% support, the metabolic demand is continually less and less as body weight support is added.

147. IMPROVEMENTS IN QUALITY OF LIFE FOLLOWING A SPEED-BASED GROUP EXERCISE PROGRAM

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Purpose: Various types of exercise interventions have shown improvements in physical function in older adults. Of equal importance is the effect of exercise on improvements in health perceptions as they relate to quality of life. Group based exercise strategies have been reported to improve mental and social well-being. **Methods:** Fifteen older adults participated in an eight week speed-based group exercise program (2 days per week) that included components of endurance, strength, flexibility, and balance. Perceived health was assessed with the short form 36 (SF-36) survey. The SF-36 is a valid and reliable tool that assesses individual perceptions of health in the following areas: physical functioning, social functioning, role limitations due to physical problems, role limitations due to emotional problems, mental health, energy and vitality, pain, and general perception of overall health. **Results:** The different areas assessed with the SF-36 can be grouped in to two primary categories: physical and mental health. Paired samples t-tests showed improvements in physical health ($t_{(14)}$=-2.17, p=.05) and the total SF-36 score ($t_{(14)}$=-2.85, p<.05) after the group exercise program. While the mental health scores improved, they did not reach the level of significance ($t_{(14)}$=-2.10, p=.057). **Conclusions:** A limitation of this analysis is that the SF-36 survey was only completed by the participants once during the control period prior to beginning the exercise program. Therefore, results from this study may support the use of group exercise to improve perceived health in older adults.

146. PEAK HEART RATE DURING THE 6-MINUTE WALK TEST RELATIONSHIP PREDICTS COGNITIVE FUNCTION IN HEALTHY OLDER ADULTS

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Purpose: Quality of life for older adults depends on maintaining cognitive and physical health (Ortman et al., 2014). Cardiovascular health, as assessed in the submaximal 6-minute walk test (6MWT), correlates with cognition, but the precise relationship has not yet been defined in older adults (Murray & Russoniello, 2012). Here, we tested the relationship between cardiovascular health, measured in the 6MWT, and cognitive performance in healthy, ethnically diverse older adults. **Methods:** In this cross-sectional study, 90 participants (69 female, 21 male), ages 60-95 years (75 $\pm$ 9.5 yrs.; mean $\pm$ SD), were recruited from the local area. Cognitive performance was assessed using the Modified Mini-Mental State Test (3MS), Trailmaking tests A and B, and Animal Naming test. Based on the 3MS scores, the population was cognitively healthy (92.5 $\pm$ 7.7). Physical measures included 6MWT active and recovery heart rate, distance walked, anthropometric data, peak hand-grip strength, and surveys including Physical Activity Scale for Elderly (PASE) and Perceived Stress Scale (PSS). Forward stepwise multiple regression analyses were used to evaluate the contribution of 6MWT performance and physical measures to cognitive performance. **Results:** Controlling for age and race, peak heart rate recorded during the 6MWT (6MWT HR_{PEAK}) significantly predicted performance on 3MS (R^2 =0.462, p<0.001), and Trailmaking A (R^2 =0.328, p<0.001) and B tests (R^2 =0.379, p<0.001). Neither sex, body mass index, 6MWT distance, peak handgrip strength, heart rate recovery, or PSS contributed significantly to the predictive models for these tests. Controlling for age and education level, the PASE was found to significantly predict animal naming test performance (R^2 =0.309, p<0.001). **Conclusion:** Our results suggest that peak exercise intensity in the 6MWT positively correlates with executive function, and self-reported physical activity levels with verbal fluency.

148. AFFECTS OF EXTERNAL CUEING ON HIP KINEMATICS DURING A CUTTING MANEUVER IN FEMALE SOCCER ATHELTES

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Context: It is well documented that deficiencies in hip strength and range of motion (ROM) can lead to higher rates of injury at the knee in female athletes. As the majority of knee injuries occur during a plant and cut movement, determining if differences at the hip with the use of varying cues may alter the way training occurs for athletes in hip stabilization and strength.
Purpose: The purpose of this study was to examine the differences in hip kinematics and kinetics using a kinesthetic, verbal and visual cue during a two-step cutting maneuver.
Methods: 20 females (mean age 21.9 ± 3.3 yr, height 1.68 ± .3 m; mass 68.2 ± 8.2 kg) participated in this study. 48 reflective markers were attached to specific anatomical bony landmarks with cluster plates on both the thigh and shaft. The subjects used a two-step approach to the force plates and cut at a 60 degree angle. The same cutting task was performed under each condition. Whole body kinematics during the cutting trials were recorded using a 12 camera motion capture system (Qualisys, Gothenburg, Sweden) sampling at 200Hz. Ground reaction forces (GRF) during the cuts were obtained using a strain gauge force (Bertec, Columbus OH, model FP6090) sampling at 1000 Hz. **Results:** A repeated measures ANOVA revealed significant omnibus F test Hip Flexion ROM, ($F(3,54) = 5.994$, $p = 0.019$). There were no significant differences in hip flexion peak or hip flexion at contact between cues. GRF and moments were not significant. **Conclusion:** The results of this study suggest that differences can be seen at the hip in ROM, with the use of differing cueing techniques. Decreasing the hip ROM can help stabilized the hip during dynamic movement, which may alter the risk for injury at the knee.

149. HUNGER GAMES: THE EFFECTS OF ALTERNATE DAY FASTING ON FOOD INTAKE, BODY WEIGHT, AND LEPTIN AND GHRELIN IN RATS

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Recently, alternate-day fasting (ADF) has grown in popularity as an alternative diet method for improving health and controlling food intake. Leptin and ghrelin are two hormones implicated in the regulation of food intake and body weight, however their response to ADF is unclear. **PURPOSE:** To determine whether a compensatory increase in food intake occurs following a day of fasting, and to determine whether leptin and/or ghrelin levels change in response to ADF compared with *ad libitum* feeding. **METHODS:** Male Wistar rats of similar age and weights were randomly assigned to the ADF group (n=7) or a control group (n=7). The ADF group had alternating 24-hour "fasting days" (limited to 3-5g of regular chow) and "feeding days" (ad libitum food) for 30 days. The control group had food ad libitum for the same 30 days. Food intake for each animal was recorded daily, and body weight was measured weekly. 600µl blood was taken from the tail of each rat at the end of day 1, day 2, day 29, and day 30, to measure hormone levels after fasting and feeding days before and after the ADF intervention trial. Leptin and ghrelin levels were determined by radioimmunoassay. **RESULTS:** Food intake by ADF rats was increased by 20% on ad libitum feeding days (p=.047), however ADF rats had decreased weight gain compared to the control group (290±18.77g vs 355±23.33g; p<.001). Total percent body fat was significantly higher in the ADF group (19.9±3.41% vs 15.6±2.09%; p=.015). Diet had no significant effect on leptin and ghrelin levels. **CONCLUSION:** Results of this study indicate that food intake on feeding days did not sufficiently increase to offset the calorie deficit incurred on fasting days. Despite a decrease in weight gain, percent body fat increased in the ADF group.

151. CARDIORESPIRATORY FITNESS (VO_2MAX) IS NOT RELATED TO DIETARY INDUCED THERMOGENESIS AMONG WOMEN

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PURPOSE: Dietary induced thermogenesis (DIT) is the increase in energy expenditure required to metabolize ingested energy nutrients. A curvilinear relationship has been reported among men, with moderately fit men exhibiting higher DIT rates compared to unfit and highly fit men (Poehlman, 1989, 1991). Moderately fit women also have a greater DIT response than sedentary women (Taylor, 2002). The purpose of this study was to determine the extent and nature of the relationship between cardiorespiratory fitness (VO_2max) and DIT among women. Results could impact nutritional strategies among female athletes and those interested in monitoring energy expenditure. **METHODS:** Participants were pre-menopausal women (n=33, age=26.1±8.6) with no metabolic conditions or activity limitations. Two testing sessions were scheduled. BodPod measures of body composition and a maximal graded exercise test to determine VO_2max were completed during the first session. The second session began early morning with a 45-minute measure of resting metabolic rate (RMR). A commercial, liquid meal (45% CHO, 40% protein, 15% fat) standardized to the participant's lean mass was then consumed (10 kcal•kg^{-1} lean mass). DIT was measured at 30 minute intervals for 3 hours following consumption of the liquid meal. RMR and DIT were measured using an indirect calorimetry system. Metabolic testing was done during the follicular phase of the reproductive cycle for each participant. **RESULTS:** VO_2max measures for participants ranged from 28.8 – 66.0 ml•kg^{-1} •min^{-1}. VO_2max was positively related to RMR (r=0.60, p=0.001) and inversely related to body composition (r=-0.65, p=0.001). However, regression analysis indicated there was no relationship between VO_2max and DIT at any point during the post-prandial period for any model proposed even when controlling for body composition measures. Total DIT and DIT for each 30-minute post-prandial interval was most closely related to lean mass (r=0.79, p=0.001). **CONCLUSION:** When the meal is standardized to the lean mass of the individual, the rate of DIT is similar across a broad range of cardiorespiratory fitness levels. VO_2max does not impact the total energy required or the rate at which a meal is metabolized among pre-menopausal women.

150. PREDICTION OF CARDIORESPIRATORY FITNESS FROM MAXIMAL ANAEROBIC CAPACITY IN YOUNG ADULTS: A PILOT STUDY

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Purpose: Incremental treadmill VO_2max protocols are often accepted as the superior method of cardiorespiratory fitness assessment. During these protocols energy production pathways switch from primarily aerobic to anaerobic by the point of VO_2max attainment. Similarly the commonly accepted method of anaerobic capacity assessment, the Wingate cycle test, stresses anaerobic energy pathways. Based on the energy systems utilized at the point of VO_2max attainment and during a Wingate protocol a potential relationship may exist facilitating the prediction of VO_2max from Wingate results. To date, it is unknown whether anaerobic power from a 30 second Wingate can successfully predict VO_2max. The purpose of this study was to correlate anaerobic power with VO_2max. **Methods:** Participants (N=12) completed an incremental treadmill VO_2max protocol and 30 second Wingate on non-consecutive days. Aerobic variables of absolute VO_2max (A-VO_2max) and relative VO_2max (R-VO_2max) were collected, and anaerobic variables of peak power (PP), mean power (MP), and fatigue index (FI), were recorded. All data were analyzed using Pearson product moment correlation to determine relationships between aerobic and anaerobic variables and significance was accepted at the p≤0.05 level. **Results:** A-VO_2max was significantly correlated with PP and MP (r=0.899, p<0.001; r=0.835, p=0.001) respectively. There was no significant relationship between A-VO_2max and FI. R-VO_2max was not significantly correlated with any anaerobic variables. Linear regression analysis of PP and A-VO_2max revealed R^2=0.808 and prediction equation $\hat{Y}$=1.499+0.004X. **Conclusion:** These results indicate PP is the best single predictor of A-VO_2max and the prediction equation developed from these variables produces the most accurate estimations of VO_2max from anaerobic power in healthy young adults.

152. PLAYING TIME AND DISTANCE COVERED AS MEASURES OF INJURY RISK IN THE NATIONAL BASKETBALL ASSOCIATION

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Purpose: Injury prevention plays a critical role in the National Basketball Association (NBA). One of the risk factors for injuries in the NBA that has been recently speculated is playing time. This preliminary study aimed to determine the cutoff scores of playing time, along with distance covered, that distinguishes between injured players and uninjured players in the NBA. **Methods**: The present study analyzed data of injuries sustained by NBA players, along with their playing time and distance covered, during the 2013-14 regular season. The variables of interest included: injury occurrence for each player, minutes played per game by each player (MIN/G), and distance in miles covered per game by each player (DIST/G). The receiver operating characteristic (ROC) curve analysis was performed to determine the cutoff scores of MIN/G and DIST/G that would distinguish between injured players and uninjured players among all players in the season and among those players with ≥ 2,000 total minutes in the season. **Results**: The study identified a total of 484 players in the database of the 2013-14 NBA regular season, and 265 of them were reported to have sustained injuries during the season. There were 122 players who had played ≥ 2,000 total minutes during the season, with 95 of them sustaining injuries during the season. The cutoff scores of MIN/G and DIST/G that distinguished between injured players and uninjured players were 20.1 minutes and 1.24 miles, respectively, when including all players. These values were 31.8 minutes and 2.15 miles for players with ≥ 2,000 total minutes. **Conclusion**: MIN/G may be used as a measure of injury risk for NBA players, and DIST/G provides similar but no additional information. Further research is needed to validate these findings by including more data and accounting for more variables.

153. ENERGY EXPENDITURE DURING RECREATIONAL MOUNTAIN BIKE TRAIL RIDING DOES NOT DIFFER BASED ON WHEEL SIZE (26 INCH VS 29 INCH)

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PURPOSE: Mountain bikes with 26-inch wheels (26ers) were the industry standard for decades. More recently, bikes with 29-inch wheels (29ers) have gained popularity. Steyn and Warnich (2014) reported that 29ers had less rolling resistance in sand compared to 26ers, with little difference on rock or asphalt surfaces. Previous cross-sectional research indicated 9.4% lower energy expenditure during recreational trail riding on 29ers compared to 26ers (Taylor, 2016). As a follow-up, this study incorporated repeated measures to compare energy expenditure during trail riding on 26ers versus 29ers. Results would further clarify the relationship between energy expenditure and wheel size. **METHODS:** An experienced female, mountain biker (49 yrs, 170 cm, 68 kg), completed 14 rides over a 6.68 km multi-surface trail. Seven rides were completed on the 29er and seven on the 26er with 3 to 4 rides completed each session in random order. There were at least 24 hours between sessions. Bicycles were Rocky Mountain Element full suspension mountain bikes matched for mass, tire pressure, shock pressure, and rider position. The rider was fitted with a heartrate monitor and K4b2 portable gas analyzer system. GPS was used to measure distance and speed during each segment of each ride. Heart rate was recorded and energy expenditure of each ride determined by measuring oxygen consumption. **RESULTS:** Total time was lower on the 29er compared to the 26er (30.4±1.3 vs 29.4±0.9 min, p=0.05), with faster speeds on the 29er (13.7±0.5 vs 13.2±0.5 km•hr^{-1}, p=0.04). Work rates represented by rate of oxygen consumption, heart rate and energy expenditure measures were similar across all rides. **CONCLUSION:** At similar work rates, there was a mechanical advantage on the 29er mountain bike allowing for 3.3% faster ride times and 3.6% faster speed. Post-hoc analysis indicated that all differences occurred during the downhill segments of the course supporting the claim that 29ers may "roll over" obstacles more easily with less rolling resistance. Mountain bikers trying to select a bike appropriate for the conditions they most commonly encounter may benefit from these results.

155. ACCURACY DECREASES STICK VELOCITY IN COLLEGIATE LACROSSE PLAYERS

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PURPOSE: Lacrosse involves repeated shots. However, not much is known regarding the accuracy-velocity relationship. Therefore, the purpose of this study was to examine the effect of accuracy on stick velocity during a lacrosse shot. **METHODS:** Subjects were 24 collegiate lacrosse players (13 females, age= 21.00± 1.77 yrs, height= 163.54 ± 6.81 cm, mass= 64.72±10.15kg)
(11 males, age= 20.54± 2.38 yrs, height= 177.81± 7.58 cm, mass= 81.08 ±9.73 kg) who completed a standardized warm-up before performing 2 trials of 3 conditions which were dry swing, target, and no target. Participants wore full gear and were all right-handed. They were familiarized with the velocity apparatus placed 2.7 meters from the goal's center. Their right heel was marked, designating the starting point for all shots. Velocity was measured using an apparatus with infrared sensors, and analyzed via LabVIEW software. **RESULTS:** A 2x3 (sex x condition) mixed factor ANOVA revealed no interaction. However, there were significant (P<0.05) main effects for sex and condition. For sex, men (34.35±1.38 mph) shot faster than women (25.28±1.26 mph). For condition, there was no significant difference between dry swing (36.64±0.99 mph) and no target (34.70±1.30 mph) however, both were significantly faster than target (28.52±1.03 mph). **CONCLUSION:** Lacrosse requires athletes to be both fast and accurate with their stick, yet attempting to be accurate results in a loss of velocity. This could be due to a greater neuromuscular requirement when trying to precisely hit a target.

154. NO POTENTIATING EFFECT OF WEIGHTED DEPTH JUMPS ON VERTICAL JUMP HEIGHT IN RECREATIONAL & CLUB FEMALE VOLLEYBALL PLAYERS

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PURPOSE: Vertical jumping is a critical component in volleyball competition. The use of post-activation potentiation (PAP) is a popular means of enhancing vertical jump performance. Common protocols to elicit PAP include use of a heavy resistance exercise, which is not practical in a competition setting. A different approach, without the use of heavy equipment, is through weighted depth jumps. To determine the effect of varying intensities of weighted depth jumps on bodyweight (BW) countermovement vertical jump (CMVJ) height. **METHODS:** Ten recreational and eight club female volleyball players (age=22.89±3.23y; ht=168.83±5.44cm; mass=67.56±13.25kg) attended 5 sessions separated by 24 hrs. They performed the same dynamic warm-up (20m of walking knee hugs, walking lunges and Frankenstein's) before every session. On session one, they performed 3 control BW CMVJ with arm swing on an AMTI force plate. They then performed 5 BW (0%) depth jumps, rested for 2min then performed 3 post BW CMVJ. On sessions 2-5, they performed 5 depth jumps with a weighted vest under one of four experimental conditions in random order; 5%, 10%, 15% or 20% BW with 15s rest between jumps, then 2min rest and finally 3 post BW CMVJ. Depth jump box height was 30cm for all conditions. **RESULTS:** A 1x6 repeated measures ANOVA demonstrated no differences in post BW CMVJ height between recreational and club volleyball players or conditions (bodyweight-46.74±9.20cm, 0%-46.77±8.89cm, 5%-46.92±8.80cm, 10%-46.81±8.49cm, 15%-46.78±8.20cm, 20%-47.10±9.09cm). **CONCLUSIONS:** Varying intensities of weighted depth jumps did not improve post BW CMVJ height. These results suggest that recreational and club female volleyball players should not use this protocol to elicit acute increases in CMVJ performance. Club volleyball players did not have a consistent training schedule, which could have affected their training status. PAP has been shown to be greater in trained individuals. Therefore, trained female volleyball players should be investigated using varying intensities of weighted depth jumps on CMVJ.

156. THE EFFECT OF IP-10 ON THE DIFFERENTIATION OF HUMAN PRIMARY MYOBLASTS

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Interferon gamma-induced protein 10 (IP-10) is an immune cell chemoattractant cytokine, which has been shown to increase in concentration within human skeletal muscle in the days following exercise-induced damage. We have previously presented support for a direct role of IP-10 in the proliferation and differentiation of C_2C_{12} myotubes. **Purpose:** To determine the extent to which IP-10 directly influences differentiation in human primary myoblasts (HPM). **Methods:** HPMs were treated with IP-10 concentrations of 10 pg/ml, 100 pg/ml, 10 ng/ml, or 100 ng/ml for a period of 24 hrs. Differentiation was quantified as myosin heavy chain (MHC) positive area. **Results:** IP-10 treatment shows a positive dose-response relationship with differentiation in concentrations up to 10 ng/ml. Between concentrations of 10 pg/ml and 10 ng/ml, a doubling of the IP-10 concentration is associated with 2.1 x 10^4 μm^2 increase in mean MHC positive area ($p < 0.0001$, 95% CI: 1.3 x 10^4 to 2.8 x 10^4 μm^2). This effect does not appear to persist with concentrations above 10 ng/ml, as there is no difference ($p= 0.2539$) in differentiation between the 10 ng/ml and 100 ng/ml treatments (4.14 x 10^5 ± 7.7 x 10^4 and 3.55 x 10^5 ± 1.3 x 10^5 μm^2, respectively). **Conclusion:** IP-10 mediates differentiation in HPM *in vitro*. With the consideration that myoblast differentiation precedes cell fusion into regenerating fibers these data provide evidence that IP-10 may play a role in the muscle repair process. These findings support a more direct role for IP-10 in the regenerative process of human skeletal muscle, in addition to its function as an immune cell chemoattractant cytokine.

157. SEX DIFFERENCES IN THE OPTIMAL INTENSITY FOR CYCLE ERGOMETER VERIFICATION OF VO_{2MAX}

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Using a verification phase test (VP) following a graded exercise test has been shown to be superior to secondary criteria to determine a "true" VO_{2max}. It has not been determined if a sex difference in the optimal intensity for cycle ergometry VP testing exists. 31 participants (16 females, age: 21±1.5 yrs, BMI: 23.2±3.3 kg/m^2; 15 males, age: 22±1.5 yrs, BMI: 24.5± 2.2 kg/m^2) completed a ramp VO_{2max} test, then on 4 subsequent days, in random order, completed VP tests at 80, 90, 100, and 105% of the peak wattage achieved during the initial ramp test. The VO_{2max} values for each test (Ramp, 80, 90, 100, and 105%) for women were 2.36±0.35, 2.29±0.03, 2.34±0.33, 2.35±0.32, 2.32±0.32 L/min and for men were 3.65±0.66, 3.67±0.71, 3.67±0.67, 3.55±0.51, 3.49±0.48 L/min. For males VO_{2max} at 105% was significantly lower than Ramp (P=0.02), 80% (P <0.01), 90% (P=0.02). There was also a trend for VO_{2max} at 80% to be higher than 100% (P=0.08). Females showed no significant differences between VO_{2max} values for any VP or Ramp test. 10 of the 16 female subjects had their highest VO_{2max} during the 100 or 105% VP, while 12 of 15 male subjects had their highest from a submaximal VP. When comparing all VPs a trend for sex x test interaction (P =0.08) was observed. Submaximal VP intensities of 80% and 90% of max wattage achieved on the ramp test produce the highest VO_{2max} values in males. In females the maximal and supramaximal intensities most frequently produced the highest VO_{2max} values whereas the 80% led to excessive time to exhaustion (9.23±4.99 min). In order to obtain the highest VO_{2max} values in the most optimal test time we recommend using 90% of max wattage in males and 100 or 105% of max wattage in females.

159. ASSOCIATION BETWEEN QUADRICEPS FUNCTION AND FEMORAL CARTILAGE THICKNESS IN INDIVIDUALS WITH ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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Purpose: To (1) determine the relationship between quadriceps function and femoral cartilage morphology in individuals with anterior cruciate ligament reconstruction (ACLR), and (2) to compare quadriceps function and femoral cartilage morphology between injured and uninjured limbs. **Methods**: Quadriceps function and femoral cartilage was assessed with unilateral ACLR in 20 subjects (women=15, age= 22.3±3.3years, time since ACLR=44.9±32.8 months). Quadriceps function was assessed using peak isometric knee extension torque (PT) and rate of torque development (RTD) at 45 degrees of knee flexion, and peak isokinetic knee extensor torque at 60, 180 and 240°/sec. Femoral cartilage morphology (area and thickness) were obtained via ultrasound imaging at 140° of knee flexion. Partial correlations were used to evaluate the associations between indices of quadriceps function, and cartilage area and thickness accounting for time since reconstruction. Paired samples t-test were used to evaluate interlimb differences. **Results**: The injured limb had lesser isometric peak torque (2.56±0.42 vs. 2.75±0.30 Nm/kg, p=0.042), isometric rate of torque development (38.12±13.27 vs. 47.81±17.99 Nm/sec/Kg, p=0.032), and isokinetic peak knee extensor torque at 60°/sec (2.38±0.54 vs. 2.80±0.63 Nm/kg, p=0.004) compared to the uninjured limb. No differences were found in isokinetic peak torque at 180 or 240°/sec. After accounting for time since ACLR, a positive association was found between isometric peak torque and medial femoral cartilage thickness (r=0.406, p=0.042). **Conclusion**: In summary, the ACLR limbs had deficits in quadriceps function. We found a moderate association between isometric peak torque and medial femoral cartilage thickness. Our results suggest that restoring quadriceps strength may hasten femoral cartilage thinning following ACLR.

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158. DOES THE EXTERNAL FOCUSING EFFECT APPLY TO LESS COMPLEX MOTOR SKILLS? THE INFLUENCE OF ATTENTIONAL FOCUS CUEING ON JUMP-AND-REACH PERFORMANCE

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Movement cueing involves the provision of verbal instructions to performers prior to movement execution. Research literature examining attentional focus cueing has clearly documented the performance advantages of adopting an external focus (e.g., focusing on the center of a basketball hoop) over an internal focus (e.g., focusing on flicking the wrist; Al-Abood et al., 2002; Wulf et al., 1999; Zachry et al., 2005). Most commonly, deviation from a target has been employed as the measure of objective success, across a variety of specialized sport skills (for a review, see Wulf, 2013). Consistent with this body of research, it is reasonable to hypothesize that when cueing individuals performing a vertical jump-and-reach task, an external focusing cue would lead to superior task performance compared to an internal focusing cue. Preliminary research has provided support for this assertion (i.e., Wulf & Dufek, 2009; Wulf et al., 2007); however, these preliminary quasi-experiments employed relatively small sample sizes (i.e., *n*s = 8-12 participants). **Purpose:** The current experiment examined the effect of attentional focus cueing on performance of a vertical jump-and-reach task. **Methods:** Sixty-five college-aged participants were randomly assigned to one of three cueing conditions: control (*n* = 21), external focus (*n* = 22), or internal focus (*n* = 22). A Vertec™ measurement device was used to measure jump height. **Results:** Results demonstrated similar jump-and-reach performances between the external- ($M_{external}$ = 19.97in.; *SD* = 5.38) and internal-focus groups ($M_{internal}$ = 18.91in.; *SD* = 5.31; *p* > 0.05), as well as similar performances between the external focus and control groups ($M_{control}$ = 21.55in.; *SD* = 4.88;*p* > 0.05). **Conclusions:** These findings question the applicability of the external focusing effect on the performance of less complex motor skills, however, other possible explanations for the current results and future research suggestions are also offered.

160. A RANDOMIZED CONTROLLED TRIAL OF RIBOFLAVIN FOR ENHANCEMENT OF ULTRAMATAHON RECOVERY

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Purpose: During participation in ultramarathon running, the onset of muscle damage and the accompanying pain can be experienced long before the completion of a race. This study sought to determine if an acute ingestion of riboflavin mitigates muscle pain and soreness during and after the completion of a 161-km ultramarathon. Additionally, we sought to determine if riboflavin could help improve functional recovery after the race. **Methods:** In this randomized, doubled-blind placebo-controlled study, 44 participants of the 2016 Western States Endurance Run were randomized to receive either 100mg riboflavin or 95mg of maltodextrin and 5mg of 10% β-carotene placebo capsules, immediately before the start and 90-km into the race. Muscle pain and soreness was determined by a 10-point Likert scale before, during and immediately after the race and in the 10 days following the race. Subjects also completed 400 meter runs at maximal speed on post-race days 3, 5 and 10. **Results**: 32 subjects (18 in riboflavin group, 14 in placebo group) completed the study. Muscle pain and soreness was found to significantly lower (p=.043) during and immediately after the race for the riboflavin group. By post-race day 10, both groups showed muscle pain and soreness levels had returned to pre-race levels. In addition, 400 meter run times were significantly faster (p=<.05) for the riboflavin group on post-race day 3 and 5. **Conclusion:** This study provides preliminary evidence that riboflavin supplementation may attenuate muscle pain and soreness during and immediately after completion of strenuous exercise. Furthermore, supplementing with riboflavin before and during prolonged endurance exercise may provide additional benefits in recovery.

This study was supported by the Western States Foundation.

161. RELATIONSHIP BETWEEN FOOT STRIKE AND RUNNING ECONOMY AT SUBMAXIMAL SPEEDS

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Purpose: To investigate if a relationship exists between foot strike and running economy. **Methods**: Participants (M=5, F=5; 33.5±6.67 years; 1.69±0.04 m; 72.02±8.24 kg; 19.46±6.56 %Body Fat) were recreational runners (24.3±11.71 miles/week) free of injury. All participants completed two sessions. Session 1 included a body composition test (InBody Bioimpedance) and a maximal effort graded exercise treadmill test (VO_2 max). Within 7 days, participants returned to complete 3 sub maximal effort speeds: 1) self-selected speed, 2) 80%, and 3) 90% of ventilatory threshold (VT). VT speed was determined from Session 1. To calculate VT, the ventilator equivalents (VE/VO_2 and VE/VCO_2) where plotted versus time. The identified VT corresponded to the graphical increase in VE/VCO_2, which is the location in the change in the linear slope of the VE/VCO_2. The VO_2 corresponding with VT was then used to solve for speed using: Speed = (VO_2 - 3.5)/0.2 (ACSM). VO_2 and 3D kinematics were measured for 3 minutes following established steady state VO_2. For all conditions, natural foot strike patterns were quantified by measuring the angle the sole of the foot made at ground contact. A Pearson Correlation Coefficient and significance value quantified the correlation between foot strike pattern and Running Economy (RE) which was the average VO_2 during steady state. **Results**: No significant correlation (self-selected speed: 0.392, VT 90%: -0.277 and VT 80%: -0.498) existed between foot strike and RE for any of the submaximal speeds. **Conclusion**: Foot strike does not appear to influence the energetic cost of running. It may be that self-selected foot strike patterns are compatible with most efficient running style.

162. A SPEED-BASED GROUP EXERCISE PROGRAM IMPROVES PHYSICAL AND COGNITIVE FUNCTION IN OLDER ADULTS

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Purpose: Slow movement is a serious problem among older adults, with negative consequences related to fall prevention, independent living, and quality of life. Current exercise recommendations from the National Institutes on Aging (NIA Go4Life) include cardiovascular endurance, strength, flexibility, balance training. While these are prudent, they neglect the potential benefits of speed based exercises that target the central nervous system correlates of muscular quickness. A growing body of literature supports the safe use of high speed exercise in older adults to improve functional ability. The purpose of this project was to combine recommendations from the NIA Go4Life program with speed to improve physical function in older adults. **Methods:** Fifteen older adults participated in two baseline tests during the control period of the exercise intervention. The intervention included an eight week speed-based exercise program (2 days per week) that included components of endurance, strength, flexibility, and balance. **Results:** No differences were observed in functional measurements between the first and second baseline tests ($p>.05$). There were, however, improvements in the following tests upon completion of the eight week program: simple and choice reaction time, 10 meter walk and number of steps taken, timed up and go, and nine hole peg test ($p<.05$). Functional reach and grip strength did not change. **Conclusions:** Results from this study support the addition of speed-based exercises to improve physical function and cognitive function in older adults.

163. RELIABILITY AND COMPARISON OF MEASUREMENTS OF THE TIBIALIS POSTERIOR CROSS-SECTIONAL AREA VIA ULTRASOUND IMAGING

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Purpose: The tibialis posterior is a key muscle in controlling the medial longitudinal arch. Being able to assess the strength, activity and size of the muscle is crucial in understanding its role in controlling the functions of the foot. Difficulties exist in directly imaging this muscle due to the depth of its origin within the leg. This study's purpose was to evaluate techniques used to image the TP muscle size using ultrasound. **Methods:** 10 legs of healthy college students were imaged via ultrasound (12ML probe, GE Logiq P6) and the cross-sectional area and thickness of the TP was recorded. To measure the TP the probe was held at the 30% and then the 50% point from the knee joint line to the inferior tip of the lateral malleolus. Subjects inverted their foot and videos of the contraction cycle were recorded. 2 separate still-shots of the muscle at rest were saved from the recorded videos to make size measurements. This process was performed on both anterior and posterior sides of the leg. To assess reliability intraclass correlation coefficients (ICC) were calculated. A correlation was performed to compare anterior to posterior measurements. **Results:** Excellent reliability was seen when comparing repeated measurements for anterior and posterior area and thickness measurements at the 30% point (ICC>0.96). There was a strong significant correlation between anterior and posterior measurements at the 30% mark ($r=0.91$, $p<0.001$). There was a non-significant weak correlation between anterior and posterior measurements at the 50% ($r=0.31$, $p=0.19$). **Conclusion:** Repeated measurements showed excellent reliability. At the 30% point, the anterior and posterior measurements were highly correlated, thus either position could be used to image the TP. The anterior view, at the 50% should generally not be used because portions of the TP were often hidden behind bone which decreased accuracy of the measurement.

164. EXAMINING TEMPERAMENT IN EXERCISE DEPENDENCE AND EATING DISORDERS

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Purpose: Exercise dependence can lead to negative health effects which can outweigh the benefits of exercise. Previous research in Olympic athletes and clinical samples of eating disorder patients revealed differences in temperament styles may predict exercise dependence and its association with eating disorders. The purpose of our study was to examine these associations in a population-based sample. We hypothesized that individuals with eating disorders will be associated with behavioral inhibition temperament with possibilities of emotional effects, and individuals with exercise dependence will be associated with behavioral activation temperament, with a motive to achieve a desired goal.
Method: Participants were 880 individuals [M age = 28.46(10.13); 63.92% female; 66.90% Caucasian; M Body Mass Index = 27.29(6.34)] that completed the Leisure-time Exercise Questionnaire (LTEQ), Exercise Dependence Scale(EDS), Eating Disorders Examination-Questionnaire (EDE-Q), and Behavioral Inhibition/Behavioral Activation Scales (BIS/BAS) as part of a larger online survey study. Participants were grouped as: Regular Exercisers (LTEQ>24), Primary Exercise Dependence (EDS>77 and EDE-Q<2.98), Secondary Exercise Dependence (EDS>77 and EDE-Q>2.99) and Eating Disorder only (EDE-Q $\geq$2.99 and EXD<77). ANOVAs were used to examine group differences in BIS/BAS scores and BAS subscales. **Results:** Significant differences were found among BIS scores [$F(3,841)=27.13$, $p<.01$]. Tukey post hoc revealed the Primary group reported higher scores than Eating Disorder ($p=.04$) or Regular Exercisers ($p=.02$), Secondary higher than Eating Disorder ($p<.01$), and Regular Exercisers greater than Eating Disorders ($p<.01$). Overall BAS scores were not significantly different. However, significant differences were observed in BAS Reward subscale scores [$F(3,854)=4.76$, $p<.01$].
Conclusion: Our results partially confirmed previous research in clinical populations. Compared to previous studies, this research generalized results to a larger sample. These results offer some insight into eating disorders and exercise dependence by suggesting treatment should focus on differences in temperament based on severity or stage of development of these disorders.

165. TARGET POSITION DECREASES VELOCITY IN COLLEGIATE LACROSSE PLAYERS

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PURPOSE: Lacrosse involves repeated shots. However, not much is known of the accuracy-velocity relationship. Therefore the purpose is to examine the effect of accuracy measures on stick velocity during a lacrosse shot. **METHODS:** Subjects were 24 collegiate lacrosse players (13 females, age= 21.00± 1.77 yrs, height= 163.54 ± 6.81 cm, mass= 64.72±10.15kg)
(11 males, age= 20.54± 2.38 yrs, height= 177.81± 7.58 cm, mass= 81.08 ±9.73 kg) completed a standardized warm-up before performing 2 trials per condition. Participants were required to wear full gear. All participants were right-handed. They were familiarized with the velocity apparatus, 2.7 meters from the goal's center their right heel was marked, designating the starting point. Velocity was measured using a wooden apparatus with sensors, and analyzed via Lab View. **RESULTS:** Mixed factor ANOVA revealed no interaction of sex x condition. However, there was a main effect for condition ($p<0.01$). Target 1 (25.98±1.25 mph) was not significantly different than target 2 (27.55±1.50 mph, $p=0.19$), but target 1 was significantly slower than target 3 (28.63±1.31 mph, $p<0.01$), target 4 (29.23±1.00 mph, $p<0.01$), target 5 (29.33±1.25 mph, $p=0.02$), target 6 (29.12±0.94 mph, $p=0.02$), target 7 (29.08±1.04 mph, $p=0.01$), target 8 (28.73±1.46 mph, $p=0.01$), and target 9 (28.99±1.35 mph, $p<0.01$). **CONCLUSION:** Target positioning plays a role in velocity. Cross-body shots were significantly slower. The acute angle required to shoot cross-body is greater on the left-hand side for a right-handed player, thus potentially more difficult.

167. PSYCHOLOGICAL RESPONSES TO VARIOUS REGIMES OF HIGH INTENSITY INTERVAL TRAINING (HIIT) VERSUS MODERATE INTENSITY CONTINUOUS EXERCISE (MICT)

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ABSTRACT:
Background: Lack of motivation and time are cited as major reasons why many Americans do not perform physical activity. Previous studies report that enhanced mood as measured by changes in affect may increase exercise adherence (Ekkekakis, 2011; Williams et al. 2008). High intensity interval training (HIIT) elicits similar physiological adaptations as moderate intensity continuous exercise (MICT) but with lower exercise volume. Recently, Jung et al. (2014) showed that low-volume HIIT elicits similar enjoyment versus MICT despite being more aversive; however, minimal data examined affectual responses to various HIIT regimes including sprint interval training (SIT). **Purpose:** To compare psychological responses between various modes of HIIT regimes and MICT. **Methods:** Active adults (ten men and nine women, age = 24±3.3 yr) initially performed a VO_2 max test to determine workload for subsequent sessions on the cycle ergometer, whose order was randomized. Sprint interval training (SIT) consisted of six 20s bouts of all-out cycling at 140% of maximum watts (Wmax). Low-volume HIIT ($HIIT_{LV}$) consisted of eight 60s bouts at 85% Wmax. High-volume HIIT ($HIIT_{HV}$) consisted of six 120s bouts at 70% Wmax. MICT consisted of 25 min at 40% Wmax. Affect, rating of perceived exertion (0-10 RPE), and physical activity enjoyment (PACES) were measured continuously. **Results:** PACES was similar across regimes ($P>0.05$). Affect declined during exercise ($P<0.05$) but there was no difference across regimes ($P>0.05$). RPE was significantly lower ($P<0.05$) for MICT at 50, 75, and 100% of session duration versus HIIT/SIT, with no difference between these regimens. VO_2 was significantly higher for HIIT/SIT ($P<0.05$) versus MICT at all time points. **Discussion:** Despite a higher VO_2 and RPE in HIIT/SIT versus MICT, PACES was similar across regimes. Findings demonstrate that HIIT and SIT are as enjoyable and are not more aversive compared to prolonged aerobic exercise.

166. THE EFFECT OF SMALL PERTURBATIONS IN RUNNING VELOCITY ON MEASURES OF COORDINATION VARIABILITY

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Background: Running is a common activity that has been extensively studied. Many studies have analyzed performance measures and injury etiology of running using discrete metric analyses, such as joint angles or moments. Traditional analyses provide meaningful information on movement patterns, yet are unable to quantify the underlying mechanisms contributing to overall movement. More recently, alternative analyses, such as evaluating coordination variability (CV), have been presented to assess movement organization. Velocity is often varied within a runner's training regimen and is commonly manipulated and constrained in the laboratory. Research has yet to evaluate how CV is affected by these deviations in running velocity. **Purpose:** This study aimed to determine whether small deviations from preferred velocity led to changes in CV. **Methods:** Nine healthy runners (age 22 ± 2 years) were recruited from the Las Vegas community. Kinematic and kinetic analyses were performed while participants ran at 85%, 90%, 95%, 100%, 105%, 110%, and 115% of their preferred velocity. Movement coordination variability was calculated for the segment couples of thigh-shank and shank-foot during early, mid, and late stance using a modified vector coding technique. CV values were averaged across trials and compared between conditions using repeated measures ANOVA. **Results:** No statistically significant differences in CV were found for any of the couplings of interest during any phases or stance between the seven velocity conditions. **Conclusion:** Small perturbations in running velocity from preferred do not influence CV of thigh-shank and shank-foot couplings during stance phase. It is possible that larger deviations from preferred velocity would result in changes, and this effect has been shown in previous research. However, the goal of this project was to assess how slight changes, such as what would be seen in day-to-day training or from constraints in the laboratory, would influence CV.

168. "MY CONFIDENCE AS A RESEARCHER HAS GROWN": EXPERIENTIAL LEARNING IN GRADUATE KINESIOLOGY STUDIES

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Background: Often times a graduate student's first experience with research is conducting their thesis, which typically occurs after completing their coursework. **Purpose:** The purpose of this study was to give graduate students the opportunity to carry out and understand all aspects of a research study through hands-on experience in a classroom setting. Students' set objectives were to: feel confident they can successfully complete a research project individually, promote and challenge their own personal growth in all aspects of the project, and create something that impacts the community. **Procedure:** 17 kinesiology graduate students developed an original research question, sought and received IRB approval, and recruited, collected, and analyzed data from participants. Students' perceived achievement of outlined objectives were measured through open-ended prompts and qualitative interviews. **Results:** Themes from student evaluations included increased student confidence in conducting research, personal growth, and improved teamwork. Challenges faced included poor communication and role clarity. Initially, few students believed the project would have an impact on the community, and as the project progressed, this number increased. **Lessons Learned**: The classroom-based graduate research project allowed students to gain confidence in their research abilities for their future thesis project, while also improving teamwork skills. It is important to develop effective communication strategies, and define student roles. Define community impact goals early on in project. **Conclusion:** In addition to satisfying the course requirements, students created their own unique scholarship and better prepared themselves for a successful thesis. Graduate students can benefit from experiential learning afforded through a guided research process. This strategy may be beneficial for first year graduate students in kinesiology to prepare them early on for their theses.

169. DO UVU FITNESS CLASSES MEET ACSM'S EXERCISE RECOMMENDATIONS

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Purpose: The obesity crisis facing the American population is well documented. The
American College of Sports Medicine (ACSM) recommends individuals exercise for 30 minutes five days a week at moderate intensity. **Methods:** To determine if college activity-based courses meet this requirement, physical activity was monitored in 78 students during their class activity period. The students were men and women between the ages of 18-35. Actigraph GTX9 accelerometers were used to obtain caloric expenditure, time spent in sedentary, light, and moderate intensity zones. **Results:** Only 3 out of the 8 fitness courses measured provided students with the recommended amount of physical activity according to the ACSM. **Conclusion:** While college activity courses are a good supplement to an individual's physical activity regimen, many courses should not be considered sufficient to provide all the exercise a student needs.

170. SEX DIFFERENCES IN BILATERAL AND UNILATERAL ASYMMETRIES IN RECREATIONALLY TRAINED INDIVIDUALS

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Introduction: Limb asymmetry can negatively impact various exercise and sport performance outcomes, but whether the level of asymmetry between men and women is different remain less examined. Therefore, the purpose of the investigation was to determine sex differences in bilateral and unilateral asymmetries in recreationally trained individuals. **Methods**: Forty-five males (n = 24) and females (n = 21) volunteered for the study. Participants signed an IRB approved informed consent, physical activity readiness questionnaire, and a health history questionnaire, followed by measuring age, weight, and height. Participants were instructed to perform 5 maximal repetitions of knee flexion and extensions on each leg at an angular velocity of 60°/s. Percent differences were calculated for bilateral and unilateral asymmetries, bilateral quad percent difference (BQ%), bilateral hamstring percent difference (BH%), unilateral right leg percent difference (UR%) and unilateral left leg percent difference (UL%). Independent t-tests were used to analyze sex differences between all variables. Additionally, independent t-tests were used to analyze sex differences between age, height, and weight. **Results**: There were no significant ($p>0.05$) differences between recreationally trained males and females for BQ% (M= 9.89 ± 5.95%; F= 7.26 ± 5.69%), BH% (M= 6.97 ± 5.97%; F= 10.02 ± 10.88%), UR% (M= 50.28 ± 6.86%; F= 46.65 ± 11.28%), and UL% (M= 50.19 ± 7.71; F= 50.13 ± 10.85%). There was no significant ($p>0.05$) difference between sex for age and height, however there was a significant ($p<0.05$) difference for weight. **Discussion**: Sex appears to have no significant effect on bilateral and unilateral asymmetries despite several different known physiological aspects. This could be due to the fact that our subject population was recreationally trained individuals, which can represent multitude of sports, workouts and training programs. Future research should investigate sex differences in sport-specific athletes.

171. MECHANICAL EFFICIENCY DURING REPEATED ATTEMPTS OF INDOOR ROCK CLIMBING

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Rock climbing is characterized by repeated short bouts of high-intensity climbs requiring upper body strength and muscular endurance. There is an inverse relationship between work rate and mechanical efficiency and it is hypothesized that mechanical efficiency would decrease from the first to the last climb during a series of repeated climbs. **Purpose:** To determine mechanical efficiency of repeated rock climbing attempts at a self-selected speed. **Methods:** Twenty-four experienced climbers volunteered to participate in this study (ages 18-40 years, 20 males, 4 females, at least one year of recreational climbing experience). Participants climbed up and down a vertical route (30 feet) on an indoor climbing wall at a self-selected pace for ten minutes. VO2 was continuously measured during the upward portion of the climb using a portable COSMED device. Work was calculated from height climbed and body mass. **Results:** Four climbers' data were discarded due to incomplete data. From the remaining twenty subjects, there was no significant difference in mechanical efficiency from the first climb (M=18.4%, SD=11.3%) to the last climb (17.8%, SD=11.0%); $t(20)=0.89$, $p=0.19$. **Conclusions:** The recreational climbers did not experience a significant decrease in mechanical efficiency. It was thought that fatigue would result in decreased mechanical efficiency due to an increased work rate from continuous climbing action. One possible explanation is the repeated attempts resulted in a learned effect causing the subjects to become more familiar with the route. The familiarity of the route likely led to improved technique and possibly offset the impact of fatigue on mechanical efficiency. Future studies should consider investigating the difference in mechanical efficiency on repeated climbs of varying routes.

172. RELATIONSHIP BETWEEN RELATIVE STRENGTH AND SPRINT POTENTIATION FOLLOWING SLED TOWING

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INTRODUCTION: Sled towing is a popular method of overload training for many field sport athletes. Postactivation potentiation (PAP) occurs when subsequent muscle performance is enhanced following a preload stimulus. Previous cycling research has shown a correlation between strength level and sprint speed potentiation where stronger athletes tend to require a shorter rest period compared to those not as strong. However, no research has investigated the influence of strength with regards to sled towing as a preload stimulus for sprinting. **PURPOSE:** To investigate the relationship between acute sprint speed PAP with different rest periods following sled towing and strength. **METHODS:** Ten male field sport athletes (age= 23.00± 2.79 yrs, height= 177.45± 6.34 cm, mass =82.52± 8.79 kg) performed an isometric mid-thigh pull on a force plate while standing in a power position. Their peak force was divided by bodyweight to calculate relative strength (47.99±6.96 N/kg; range from 35.35 N/kg to 59.00 N/kg). A standardized warm-up was conducted prior to the sled tow. After 5 minutes rest, subjects were attached to a waist harness and towed a sled equal to 30% of their bodyweight for 30 meters with maximal effort. Subjects then walked back to the start line and rested for a randomized rest period (2, 4, 6, 8, or 12 mins). A maximal effort bodyweight sprint followed each rest period. The best potentiated sprint for each subject was used for analysis in order to individualize optimal recovery periods. **RESULTS:** Each subject's individual rest period potentiation was used for analysis. A Pearson's correlation analysis demonstrated a negative relationship (r= -0.57) between relative strength and sprint time potentiation. **CONCLUSIONS:** Optimal rest periods following a PAP stimulus are affected by an athlete's relative strength. Stronger individuals may potentially require less time to potentiate sprint performance following a sled towing preload stimulus.

173. SUBJECTIVE RATINGS OF HUNGER, THIRST, ENGERY LEVEL, AND STOMACH DISCOMFORT AFTER MODERATE AND VIGOROUS EXERCISE IN WOMEN: A RANDOMIZED CROSSOVER TRIAL

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Purpose: This study examined the effect of different intensities of acute exercise on subjective measures of hunger, thirst, and energy level in women. Methods: This crossover study utilized treatment conditions that were randomized and counter-balanced. Fifty-two adult women, 18-29 years, were compared under three separate conditions: no exercise, 45 min of moderate-intensity exercise at 3.9 METs and 22.5 min of vigorous-intensity exercise at 7.8 METs. Participants presented to the lab 1 hour after consuming a breakfast shake that contained 10% of their total daily energy requirements. Subjective ratings of appetite, thirst and energy levels were measured before and immediately after each condition using a visual analog scale (VAS). Results: Findings from the VAS indicate the moderate exercise session resulted in significantly higher ratings of hunger when compared to the non-exercise (P = 0.04) and vigorous exercise condition (P = 0.0046). There was also a significant condition (no exercise, moderate exercise or vigorous exercise) by period (pre or post-exercise) interaction found in post-exercise ratings of hunger (P = 0.018). The moderate exercise condition reported higher levels of hunger after exercise (P = 0.0002). In addition, findings from the VAS also indicate energy for the moderate exercise condition increased post-exercise (P = 0.006) and was higher than either the non-exercise (P = 0.011) or the vigorous exercise condition (P = 0.017). Ratings of thirst after the moderate exercise condition were higher than the non-exercise condition and lower than the vigorous exercise condition (P < 0.001). There was no difference between conditions for stomach discomfort. Conclusion: The results of this study demonstrate that an acute bout of moderate exercise may increase subjective hunger and overall energy. However, there was no difference in hunger or energy level after vigorous exercise compared to the pre-exercise or non-exercise conditions.

174. COMPARISON OF THE ACUTE AND CHRONIC EXERCISE RESPONSE IN OBESE AND LEAN PREHYPERTENSIVE

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PURPOSE: The purpose of this study was to assess whether body phenotype influence blood pressure (BP) response following acute and chronic exercise. **METHODS**: Obese (body mass index (BMI) > 30 kg/m^2) and normal weight (BMI < 25 kg/m^2) men with pre-hypertension (PHTN) (systolic BP (SBP) 120 - 139 or diastolic BP (DBP) 80 - 89 mm Hg) were asked to participate in a two phase trial. Phase 1 assessed differences in post exercise hypotension between groups in response to an acute exercise bout. Phase 2 consisted of a two-week aerobic exercise intervention at 65-70% of heart rate (HR) max on a cycle ergometer. Primary outcome measures were; brachial BP, central BP, cardiac output (CO), and systemic vascular resistance (SVR) measured acutely after one exercise session and following the two-week training. **RESULTS:** There were no baseline resting brachial BP, central BP, age, or VO_2 peak differences between groups (all P 0.05). At rest, obese had greater CO compared to lean (6.3±1 vs 4.7±1 L/min, P=0.005) and decreased SVR compared to lean (1218±263 vs 1606±444 Dyn.s/cm^5, P=0.003). Lean saw a 3 mmHg reduction on both brachial and central SBP (P<0.05) in response to acute exercise, while obese witnessed a significant 4 mmHg increased brachial and 3 mmHg increased central SBP (P<0.05). SVR decreased at a greater rate following acute exercise in lean PHTN compared to obese PHTN. Training evoked a 4 mmHg reduction in brachial SBP and 3 mmHg reduction for central SBP for lean PHTN with no change in obese PHTN. BP reduction in response to training was accompanied by reductions in SVR within lean, while obese experienced increased SVR following training. **CONCLUSION**: Body phenotype plays a significant role in relation to the efficacy of aerobic exercise on BP reduction.

175. PREDICTION OF MECHANICAL EFFICIENCY FROM BODY FAT PERCENTAGE AND YEARS OF EXPERIENCE IN MALE AND FEMALE ROCK CLIMBERS

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It is well known that biological systems have low mechanical efficiency. Rock climbing requires both upper and lower body strength and endurance. **Purpose:** The purpose of this study was to determine if there is a relationship between mechanical efficiency (ME) and body fat percentage in rock climbers. The secondary aspect was to determine if years of experience affected mechanical efficiency. **Methods:** 10 experienced rock climbers (7 males, 3 females) mean age of 25 ± 5.8 years volunteered to participate in the study. Each participant climbed up a 30 ft. indoor vertical rock climbing wall at a self-selected pace. VO_2 was analyzed at rest and during the climb using a portable COSMED device. Body fat percentage (BP%) and body mass was measured using a Rice Lake D1000 Body Composition Analyzer scale and years of climbing was self-reported. Participants were separated in two groups based on whether they fell above or below the median BF%. Males and female participants were also analyzed independently. Correlation and independent t-tests were ran using Microsoft Excel 2016. **Results:** A negative correlation (-0.37) was found between ME and body fat percentage. No significant difference in ME between groups (p= 0.0855). No significance was found between ME and years of experience. There was significant difference in ME between males and females although there was a significant difference in BF% between the males and females (p= 0.00698). **Conclusion:** Individuals with higher BF% tend to have lower ME but no difference was shown between males and females ME even though the females had significantly higher BF%. Previous studies have shown that training state also affects ME and years of experience may not suggest training state.

176. COMPARISON OF MECHANICAL EFFICIENCIES FROM STEADY STATE AND RAPID SPEED ROCK CLIMBS

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Purpose: To determine if there is a difference in mechanical efficiency between a steady state and rapid-speed rock climb. **Methods**: Ten experienced climbers volunteered to participate in this study (ages 18-40 years, 7 males, 3 females, at least one year of recreational climbing experience). Participants climbed up and down a vertical route (30 feet) on a rock-climbing wall at a self-selected pace for ten minutes. They then climbed the same vertical route as fast as they could for as many times as they achieved in the 10 minutes of the self-selected climb. VO2 was measured at rest and then continuously during the climb using a portable COSMED device. Mechanical efficiency of each participant was calculated for both the steady state and rapid speed climbs, and then compared using a paired T-test on Microsoft Excel 2016. **Results:** There was no significant difference in mechanical efficiency from the steady state climb and the rapid speed climb (p=0.4211). **Conclusions:** The rock climbers did not experience a significant change in mechanical efficiency between the steady state climb and the rapid speed climb. Future studies should consider using a counterbalance system for assigning climbing order.

177. THE ROLE OF THE MIDFOOT AND ANKLE IN DROP LANDINGS

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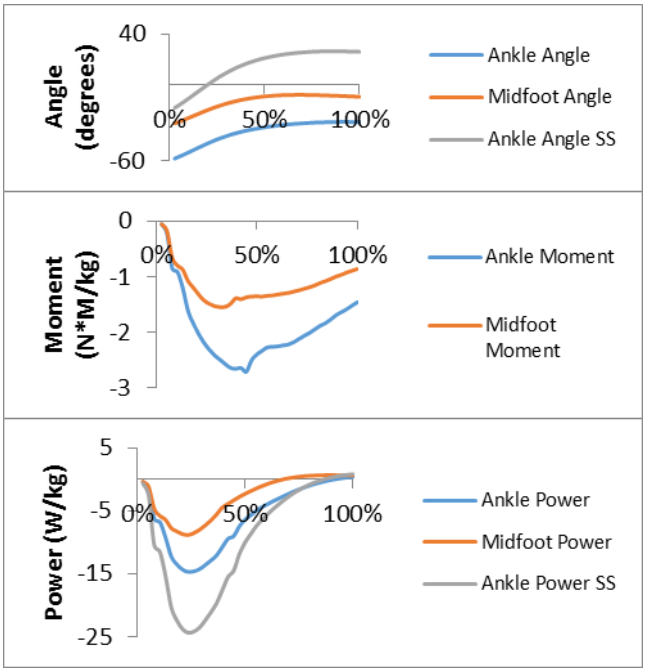
Purpose: The purpose of this study was to investigate the role of the midfoot and ankle in energy absorption during drop landing and contrast ankle kinetics between a single and multi-segment foot model. **Methods:** Twelve female collegiate athletes (gymnasts/cheerleaders) [age: 20.5±1.4 years, height: 162.1±5.4 cm, weight: 58.2±6.1 kg] volunteered to participate in the drop landings. 28 reflective markers were attached to the skin of the subjects' dominant landing leg according to a customized multi-segment foot model modified from Bruening et al. A static trial was captured before landing trials. The subjects then hung from wooden rings 40 cm above the floor. This measurement was taken using a ruler and measured from the force plate to the plantar aspect of the heel directly in line with the lateral malleolus. Subjects completed at least three successful drop landing trials with the forefoot landing on one plate and the rearfoot on the other plate. A successful trial constituted a natural landing where the navicular and cuboid markers align with the split between the two forces plates resulting in a rearfoot and forefoot impact on separate plates.
Results: Descriptive statistics for extracted metrics.

	Hip	Knee	Ankle SS	Ankle	Midfoot
Work (J/kg)	-1.24±0.67	-1.24±0.27	-1.05±0.28	-0.63±0.21	-0.42±0.17
ROM (deg)	35.78±13.46	44.89±8.06	40.45±8.81	24.61±7.29	21.88±7.50
Peak Power (W/kg)	-46.14±15.92	-22.91±4.54	-18.46±3.97	-10.55±3.04	-8.80±2.77

Figure 2: Ankle, midfoot, and single segment ankle (SS) angles, moments, and powers.



Discussion: This study shows that the midfoot plays a substantial role in impact absorption during drop landings and presents methods that can be used in future studies. The addition of multi-segment foot kinetics may provide additional insight when applied to pathologies and sports movements.

178. THE ASSOCIATION BETWEEN SPINAL NEURON EXCITABILITY OF THE SOLEUS AND FOOT STRIKE PATTERN IN COMPETITIVE AND RECREATIONAL RUNNERS

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Purpose: The etiology of running related injuries is multifactorial and may be related to foot strike pattern (FSP). The Hoffmann Reflex (H-reflex) provides an estimate of reflexive contributions to force production that may influence FSP. The purpose of this investigation was to examine the relationship between FSP and the H-reflex of the soleus and to compare the amplitude of the H:M ratio between rear-foot (RF) and forefoot (FF) striking patterns. **Methods:** 21 healthy adults (11 male, 9 female; age 23.95±2.38 years; height 1.74±0.08 m; mass 68.03±10.87 kg) participated in this study. H-reflexes and maximal muscle responses (M-wave) of the soleus were recorded to estimate excitability of the alpha motorneuron pool within the spinal cord using surface electromyography in the dominant limb. The H-reflex was normalized to the M-wave for analysis. FSP was obtained using foot strike index (FSI) acquired from force plate data and a 3D motion capture system, and 8 RF, 3 midfoot (MF) and 10 FF runners were identified. Pearson correlation was used to evaluate the association between H:M ratio and FSI, and an independent samples t-test was used to compare FF and RF runners. **Results:** There was no correlation between the FSI and the H:M ratio ($r=0.15$, $p=0.538$). However, there was a significant difference ($t_{15}=-2.275$, $p=0.038$) in the H:M ratio for FF strikers (H:M=0.383±0.112) compared to RF strikers (H:M=0.544±0.177). **Conclusions:** There was no relationship between FSI and the H:M ratio, but interestingly, FF strikers had lower reflexive activity in the soleus of the dominant leg compared to RF strikers. Further studies involving examination of corticomotor spinal excitability, muscle volume, muscle thickness, cross-sectional area and force production of the triceps surae and tibialis anterior will be necessary to establish a greater understanding of the determinants of foot strike pattern.

179. INTER-LIMB COMPARISON OF VASTUS LATERALIS ARCHITECTURE AND GEOMETRY IN INDIVIDUALS WITH UNILATERAL ACL RECONSTRUCTION

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Purpose: Individuals with anterior cruciate ligament reconstruction (ACLR) demonstrate knee extensor strength deficits in their injured limb. These strength deficits are largely thought to be neuromuscular. However, there is paucity in the literature in regards to muscle architecture following reconstruction, which may also influence muscle force production. The purpose of this study was to examine the differences between injured (IL) and non-injured limb (NIL) vastus lateralis (VL) architecture in individuals with unilateral ACLR. **Methods:** VL muscle architecture was measured in 20 individuals (22.3±3.3 yrs., 1.73±0.1 m., 71.8±15.3 kg.) with unilateral ACLR via ultrasound imaging. Paired samples T-tests were used to compare cross sectional area (CSA; mm^2), muscle thickness (MT; mm), subcutaneous fat thickness (SFT; mm), muscle fascicle length (MFL; mm), and pennation angle (PA; °). **Results:** The IL had significantly lesser CSA (IL=2271.9±554.2 mm^2, UIL=2392.7±565.4 mm^2, $p=0.023$), but greater SFT (IL=8.4±3.6 mm, UIL=7.7±2.6 mm, $p=.027$) compared to the UIL. No significant differences were found in VL MT (I=21.1±3.3, NI=21.7±4.1 mm, $p=.414$), VL MFL (I=48.2±6.1 mm, NI=50±6.2 mm, $p=.238$), or VL PA (I=21.7±2.7°, NI=22.4±3.4°, $p=.402$) between IL and UIL. **Conclusion:** The results of the study indicate that the IL has lesser VL CSA and greater SFT compared to the UIL in individuals with unilateral ACLR. Therefore, deficits in quadriceps strength in individuals with ACLR are likely due to muscle atrophy and lesser CSA, rather than changes in muscle architecture. Greater SFT in the injured compared to uninjured limb may indicate that intramuscular fat may also contribute to quadriceps strength deficits.

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