SOUTHWEST CHAPTER

AMERICAN COLLEGE OF SPORTS MEDICINE

2008 ANNUAL MEETING

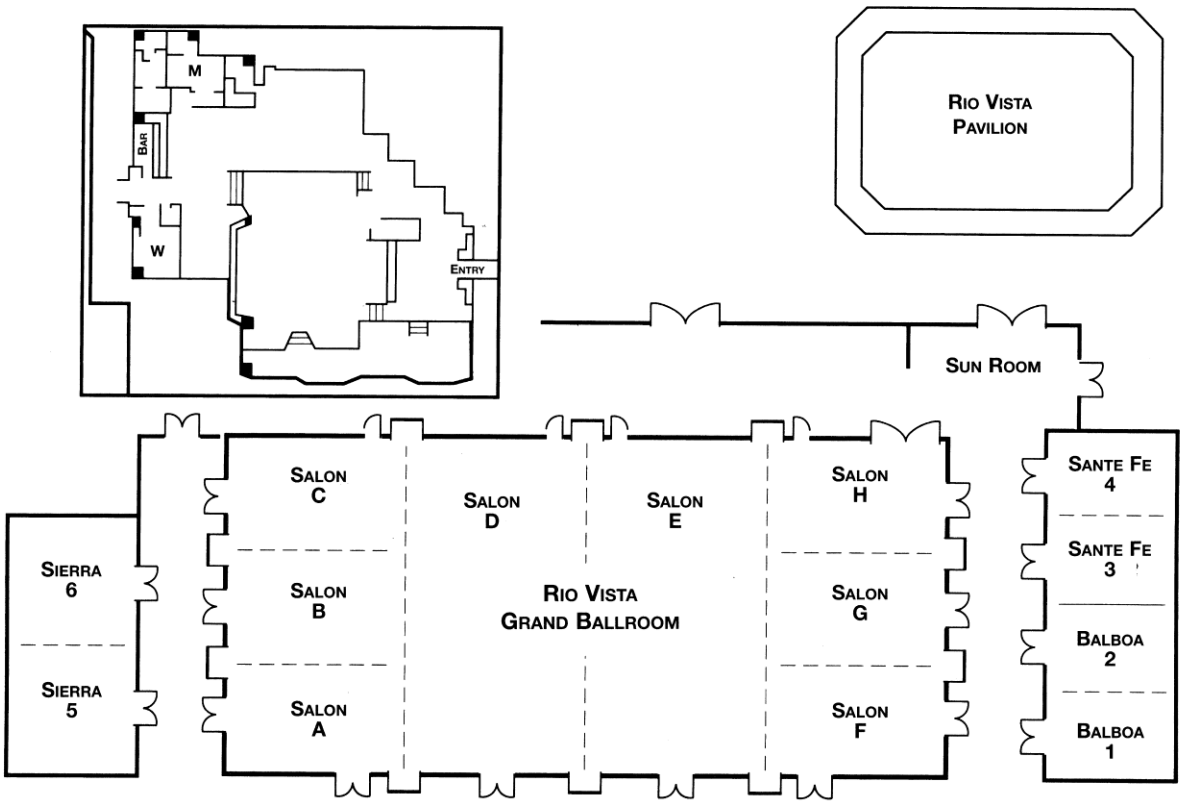
November 14-15, 2008

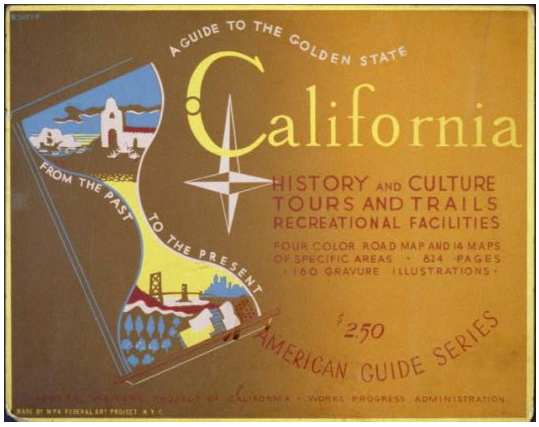
Marriott Mission Valley
San Diego, California

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

Marriott Mission Valley

Meeting and Banquet Facilities





Welcome to the

28th Annual Meeting

of the

Southwest Regional Chapter

of the

AMERICAN COLLEGE of SPORTS MEDICINE SM

November 14-15, 2008

Marriott Mission Valley
San Diego, 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, 14 NOVEMBER 2008

Registration **Rio Vista Grand Ballroom Foyer** **7:30 am – 4:00 pm**

Concurrent Colloquia **8:00 am – 9:20 am**

Acute Caffeine Ingestion and Exercise Performance **Salon A**
Todd A. Astorino, Ph.D., California State University, San Marcos

Too Much Exericse? Biomechanics of Walking the Injury Tight Rope **Salon B**
Janet Dufek, Ph.D., FACSM, University of Nevada, Las Vegas

Symposium **8:00 am – 9:15 am** **Sierra 5/6**

Physical Activity, Obesity and Chronic Disease

Moderator: Christian Roberts, Ph.D., FACSM, University of California, Los Angeles

8:00 – 8:40 ***Lifestyle Intervention and Chronic Disease: What are We "Weighting" For?***
Christian Roberts, Ph.D., FACSM, University of California, Los Angeles

8:40 – 9:15 ***What Component of the Energy Balance Equation Produces Obesity During Inactivity? A Comparison Study in Mice***
Frank W. Booth, Ph.D., FACSM, University of Missouri, Columbia

General Session **10:00 am – 11:30 am** **Salon D/E**

Moderator: Barbara Ainsworth, Ph.D., FACSM, President, SWACSM

SWACSM Recognition Award

Preview of Meeting: Barbara Ainsworth, Ph.D., FACSM
Arizona State University

D.B. Dill Lecture

Physiology of Performance: What Do We "Really" Know?
Melinda Millard-Stafford., Ph.D., FACSM
President, American College of Sports Medicine
Georgia Institute of Technology

LUNCH **11:30 AM - 1:00 PM**

Symposium **1:15 pm – 3:45 pm** **Salon E**

Together We Can Improve Health: An Integrated, Multidisciplinary Approach to Type 2 Diabetes Mellitus

Moderator: Sandra Hoffmann, M.D., FACSM, Idaho State University

1:15 – 1:45 ***The Pathophysiology of Diabetes: What's Happening in the Laboratory***
Ben Yaspelkis, Ph.D., FACSM California State University, Northridge

1:45 – 2:15 ***The Medical Approach to Diagnosis and Treatment of Type 2 Diabetes: Why Shouldn't We Just Prescribe Drugs?***
Sandra Hoffmann, M.D., FACSM, Idaho State University

2:15 – 2:45 ***Type 2 Diabetes: What's Food Got to Do With It?***
Laura Kruskall, Ph.D., FACSM, University of Nevada, Las Vegas

2:45 – 3:15 ***The Role of the Exercise Physiologist in the Prevention and Treatment of Type 2 Diabetes***
Larry Verity, Ph.D., FACSM, San Diego State University

3:15 – 3:45 ***Exercise Intervention in Obese Youth and Youth with Type 2 Diabetes***
Sara Michaliszyn, Ph.D., University of Arizona

Symposium **1:15 pm – 2:45 pm** **Salon A/B**

Female Athlete Triad Revisited

Moderator: Jeanne Nichols, Ph.D., FACSM, San Diego State University

1:15 – 1:45 ***The ACSM Female Athlete Triad Position Stand: An Overview***
Aurelia Nattiv, M.D., FACSM, University of California, Los Angeles

1:45 – 2:15 ***The Female Athlete Triad Among Adolescents: The Importance of Evaluating Younger Athletes***
Michelle T. Barrack, M.S., University California, Davis

2:15 – 2:45 ***Association Between Triad Components and Injury in Athletic and Military Recruit Populations***
Mitchell J. Rauh, Ph.D., PT, FACSM, Rocky Mountain University of Health Professions

FRIDAY, 14 NOVEMBER 2008, continued

Colloquium **1:15 pm – 2:30 pm** **Sierra 5/6**

From Science to the Bedside: Working in Applied Sport Science

Krista G. Austin, Ph.D., United States Olympic Training Center, Colorado Springs

Student Research Award **3:00 pm – 4:00 pm** **Salon A/B**

Moderator: Steven Hawkins, Ph.D., FACSM, California Lutheran University

3:00 **Estrogen Receptor Coregulators in Human Skeletal Muscle Cells: Alterations in Gene Expression by Estradiol and SERM Treatments**
Christina M. Dieli-Conwright[1] Tanya M. Spektor[2] Judd C. Rice[2] E. Todd Schroeder[1]
[1]Division of Biokinesiology and Physical Therapy, Clinical Exercise Research Center, [2]Department of Biochemistry and Molecular Biology, USC/Norris Comprehensive Cancer Center, University of Southern California

3:15 **Maximal Inspiratory Pressure as an Alternative Means of Evaluating Inspiratory Muscle Fatigue**
Allison C. Carlo, Dr. Richard Coast, Lisa M. Strongoli
Department of Biology, Northern Arizona University

3:30 **Reliability and Validity of a Single-Stage Submaximal Treadmill Walking Protocol in Healthy, Middle-Aged Women**
Melanie Mitros MS[1], Kelley Pettee PhD[2], Pamela Swan PhD, FACSM[1]
[1] Department of Exercise and Wellness, Arizona State University, Mesa, AZ.
[2] Department of Health Promotion, Social & Behavioral Health, University of Nebraska Medical Center, Omaha, NE

3:45 **Neuromuscular and Perceptual Aspects of Eccentric Muscle Damage and Recovery**
Elmer, S., Hall, K., Peters, S., & Martin, J. FASCM
Neuromuscular Function Lab, Department of Exercise and Sport Science, University of Utah

FRIDAY, 14 NOVEMBER 2008, continued

Colloquium **3:00 pm – 4:15 pm** **Salon E**

Gatorade Sports Science Institute Special Session

Mechanism of Disuse Muscle Atrophy
Scott K. Powers, Ph.D., FACSM, University of Florida

SOCIAL EVENT **4:30 -7:00 PM** **Rio Vista Pavilion**

Poster Presentations

Graduate School Fair

No Host Wine/ Cheese Reception

SATURDAY, 15 NOVEMBER 2008

Registration **Rio Vista Grand Ballroom Foyer** **7:30 am - 11:00 am**

Concurrent Colloquia **8:00 am – 9:30 am**

What Next? Career Paths in Health and Fitness **Sierra 5/6**

Fabio Camana, M.S., American Council on Exercise, President, Genesis Wellness Group

If "Exercise is Medicine", Physical Education in the Pill Not Taken **Salon F/G**
Thomas McKenzie, Ph.D., FACSM, San Diego State University

Biomechanics of Human Muscles Measured During Hand Surgery **Balboa 1/2**
Richard L. Lieber, Ph.D., FACSM, University of California, San Diego

Concurrent Colloquia **9:45 am – 11:15 am**

Resistance Training: Theory and Application **Salon F/G**
David Ohton, San Diego State University

Update of ACSM Certification Programs **Sierra 5/6**
Richard T. Cotton, American College of Sports Medicine

Symposium **9:45 am – 11:15 am**

Exercise and the Lung: New Developments **Balboa 1/2**

Moderator: Sue R. Hopkins, Ph.D., University of California, San Diego

9:45 – 10:15 ***Exercise, Hypoxia, and Pulmonary Edema***
Sue R. Hopkins, Ph.D., University of California, San Diego

10:15 – 10:45 ***Does (Lung) Size Matter***
Mark Olfert, Ph.D., University of California, San Diego

10:45 – 11:15 ***Premature Birth and Bronchopulmonary Dysplasia***
Andy T. Lovering, Ph.D., University of Oregon

SATURDAY, 15 NOVEMBER 2008, continued

General Session and Luncheon **11:30 – 1:30**
Salon A/B/C/D/E

Moderator: Barbara Ainsworth, Ph.D., President, SWACSM
Arizona State University

Student Awards
Recognition of Host School: San Francisco State University
Business Meeting

Founders Lecture

The Biological Basis to Fear Physical Inactivity
Frank W. Booth, Ph.D., FACSM
University of Missouri, Columbia

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

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AMERICAN COLLEGE of SPORTS MEDICINE
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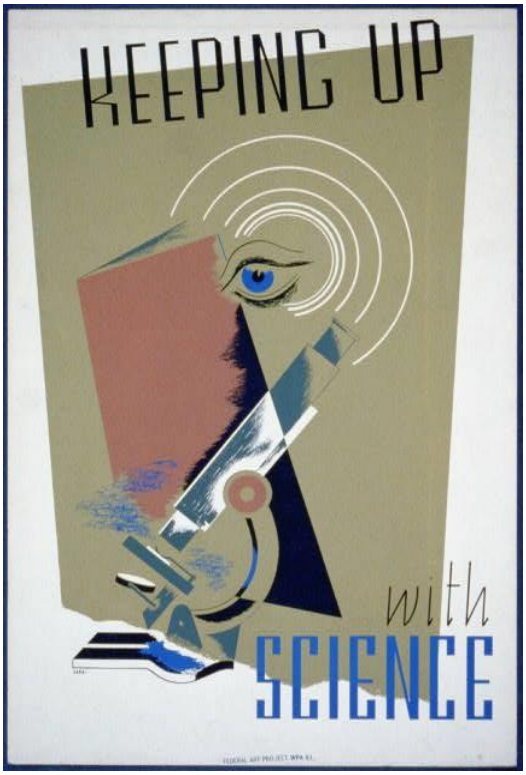
Member-at-Large	Michele LeBlanc, Ph.D.
Member-at-Large	Felicia Greer, Ph.D.
Regional Chapter Representative	Marialice Kern, Ph.D., FACSM
Student Representative	Haim Mamane
Newsletter Editor	J. Richard Coast, Ph.D., FACSM.
Founders	Gene Adams, Ph.D., FACSM Robert Conlee, Ph.D., FACSM Robert Bielen, M.D. Janet Lunn, M.A. James McIlwain, M.S. Marge Murphy, Ph.D. Gary Adams, Ph.D. (deceased)

2008 SWACSM

Annual Meeting

ABSTRACTS

Student Research Award
Poster Presentations



STUDENT RESEARCH AWARD

1. ESTROGEN RECEPTOR COREGULATORS IN HUMAN SKELETAL MUSCLE CELLS: ALTERATIONS IN GENE EXPRESSION BY ESTRADIOL AND SERM TREATMENTS

Christina M. Dieli-Conwright[1] Tanya M. Spektor[2] Judd C. Rice[2] E. Todd Schroeder[1]
[1]Division of Biokinesiology and Physical Therapy, Clinical Exercise Research Center,
[2]Department of Biochemistry and Molecular Biology, USC/Norris Comprehensive Cancer Center, University of Southern California, Los Angeles, California

The functional importance of hormone replacement therapy (HRT) has gained significant recognition for estrogen (estradiol) replacement in postmenopausal women. More recently, Selective Estrogen Receptor Modulators (SERMs) have been developed as an alternative to traditional HRT due to their ability to act selectively on various tissues. Although estradiol has been implicated in the attenuation of skeletal muscle damage, it is unclear how estradiol and SERMs alter estrogen receptor (ER) activity in skeletal muscle. Thus, we investigated the influence of estradiol and SERMs (tamoxifen and raloxifene) on the expression of ER coregulators (SRC and SMRT) in human skeletal muscle (hSKM) cells. . Consistent with our hypothesis, the present study demonstrates that mRNA expression of SRC increased and SMRT decreased with all 3 drug treatments in both MCF7 and hSKM cells ($p< 0.05$). Importantly, we also show differences in gene expression of MyoD and GLUT4 in hSKM cells ($p < 0.05$), indicating possible effects of estradiol and SERMs on hypertrophic and metabolic pathways in human skeletal muscle. These findings are novel and important in that they provide the first evidence showing that estradiol and SERMs affect ER activity in skeletal muscle by activating the receptor, to potentially prevent sarcopenia and promote muscle growth in postmenopausal women using these forms of hormone replacement therapy.

3. RELIABILITY AND VALIDITY OF A SINGLE-STAGE SUBMAXIMAL TREADMILL WALKING PROTOCOL IN HEALTHY, MIDDLE-AGED WOMEN

Melanie Mitros MS[1], Kelley Pettee PhD[2], Pamela Swan PhD, FACSM[1]
[1] Department of Exercise and Wellness, Arizona State University, Mesa, AZ.
[2] Department of Health Promotion, Social & Behavioral Health, University of Nebraska Medical Center, Omaha, NE

INTRODUCTION: Submaximal prediction equations provide a time and cost-effective method for estimating cardiorespiratory fitness. **PURPOSE:** To evaluate a single-stage Ebbeling submaximal treadmill walking protocol in healthy, middle-aged women. **METHODS:** The evaluation of Physical Activity measures in middle-aged Women (PAW) study is a cross-sectional study designed to determine the accuracy of 6 PA measures. The reliability and validity of the submaximal treadmill test was examined in 66 women [51.6 (4.8) yrs]. Participants were screened for cardiovascular risk and classified as moderate risk (MOD) or low risk (LOW) according to American College of Sports Medicine and American Heart Association criteria. VO2 max was estimated in all participants with a prediction equation that included: age, steady state heart rate (HR), and walking speed (miles per hour) (TEST 1). One week later, the submaximal test was repeated (RE-TEST) on MOD risk women while LOW risk women completed a maximal treadmill test (modified Balke protocol) using open circuit indirect calorimetry. Data were excluded for subjects that were taking blood pressure medications (n=10 for submaximal and 1 for maximal treadmill test) and for those that did not meet ACSM criteria for achievement of maxVO_2 (n=4). **RESULTS:** Mean (SD) estimated VO2max from TEST 1 (n=56) was 31.5 (3.4) ml/kg min^{-1} and 33.3 (3.2) ml/kg min^{-1} at RETEST (n=30). Measured max VO_2 (n=22) was 27.8 (6.4) ml/kg min^{-1}. Interclass correlation coefficients (ICC) between estimated VO_2max values (n=30) was 0.95 (95% CI: 0.89, 0.98), which suggests excellent reproducibility. Estimated VO_2max was positively associated with measured VO_2max [n=22 ρ=0.452; p=0.04)]. **CONCLUSION:** The Ebbeling protocol was shown to be reliable and associated with measured VO_2max in healthy, middle-aged women. These findings support the utility of the Ebbeling protocol to estimate VO_2max in health, middle-aged women.
Supported by 2007 ACSM Paffenbarger-Blair award to Dr. K. Pettee.

2. MAXIMAL INSPIRATORY PRESSURE AS AN ALTERNATIVE MEANS OF EVALUATING INSPIRATORY MUSCLE FATIGUE

Allison C. Carlo, Dr. Richard Coast, Lisa M. Strongoli
Department of Biology, Northern Arizona University

Maximal inspiratory pressure (MIP) is used to evaluate strength and/or fatigue of the inspiratory muscles. MIP being a voluntary maneuver, though, there is disagreement as to its validity. The measurement of transdiaphragmatic pressure (P_{di}) during bilateral phrenic nerve stimulation (BPNS) is an objective method of evaluating fatigue of the diaphragm. It, though, is technically difficult and unpleasant for the subject. The purpose of this study was to determine whether MIP and BPNS P_{di} yielded similar results following a fatiguing ventilatory task. The MIP, as well as the P_{di} and electromyographic (EMG) waves resulting from the electrical stimulation of the diaphragm in five subjects were recorded at the beginning, middle, and end of a series of breathing trials designed to cause fatigue within 4-8 trials. P_{di} was calculated from the difference between esophageal and gastric pressures during stimulation at twitch, 10, and 20 Hz. Following the pre measurement, the subjects performed two bouts of loaded hyperpnea before the middle recordings were obtained. MIPs were recorded at the end of each bout of ventilation. When MIPs indicated at least a 15% decrease in pressure, the final BPNS stimulation was performed. Statistical analysis indicated that while there was not a significant difference in MIPs between the pre and mid trials, there was a significant decrease between the pre and post MIPs. Similarly, there was no significant difference in BPNS P_{di} between the pre and mid trials at any frequency, while there was a significant difference between the pre and post trials. The amplitude of the EMG recording was not different between trials, indicating that the stimulus was similar across trials. Collectively, these findings suggest that MIP is a less-invasive and simpler method of measure inspiratory muscle strength and fatigue than BPNS P_{di}, and should provide similar qualitative results when evaluating fatigue.

4. NEUROMUSCULAR AND PERCEPTUAL ASPECTS OF ECCENTRIC MUSCLE DAMAGE AND RECOVERY

Elmer, S., Hall, K., Peters, S., & Martin, J. FASCM
Neuromuscular Function Lab, Department of Exercise and Sport Science, The University of Utah, Salt Lake City, UT

Strength loss following damaging eccentric exercise (E_{dam}) has been widely studied but changes in functional (power) and perceptual (perceived exertion and mood states) responses have received less attention. The purposes of this investigation were to quantify neuromuscular function during E_{dam} and to evaluate recovery of maximal power (P_{max}), muscle soreness (SOR), rating of perceived exertion (RPE), and mood states. Eleven trained cyclists (age: 30±8 yrs) performed eccentric cycling (-69±5kJ) with their right leg (damage) and concentric cycling (70±5 kJ) with their left leg (control). Single-leg P_{max} was assessed with inertial-load cycling and biomechanical joint powers at the ankle, knee, and hip were determined using inverse dynamic techniques. SOR associated with a squat movement was measured using a visual analog scale. RPE during a standardized submaximal cycling task was assessed with a Borg scale, and mood states were quantified using a profile of mood states questionnaire. Measures were evaluated at six time points (baseline, 0, 24, 48, 72, 96hr post). Dependent variables were assessed using repeated measures ANOVA procedures. The knee absorbed more work (68%) during E_{dam} than the ankle, hip, and upper body (7%, 19%, and 6%, respectively). Compared to baseline, P_{max} decreased (0-72hr), SOR increased (0-96hr), and RPE increased (0-48hr) in the damaged leg only. No alterations were observed in relative joint powers. Mood state vigor decreased (0-24hr) and total mood disturbance increased (0-24hr). These results indicate that participants absorbed the majority of work during E_{dam} with eccentric knee extension. Following E_{dam} relative contributions of joint powers remained unchanged despite substantial reductions in P_{max}. Even though participants were sore for several days they were able to perform challenging submaximal exercise. Finally, mood states disturbances did not influence responses associated with the control leg indicating previous associations of mood and performance may have been associative but not causative.
Supported by Gatorade Sports Science Institute

POSTER PRESENTATIONS

1. EMG ANALYSIS OF AN ACTUAL AND VIRTUAL GOLF SWING USING THE NINTENDO WII

Aarestad, L.M.[1,2] and Nessler, J.A.[1,3]
[1]Department of Kinesiology, California State University, San Marcos;
[2]School of Nursing, California State University, San Marcos;
[3]Department of Kinesiology and Health Promotion, California State Polytechnic University, Pomona

Interactive gaming systems have made several recent advances in quality and cost effectiveness, prompting investigation of their potential application in rehabilitation, training, and exercise. In each case, it is preferable for activity elicited by the system to approximate activity during actual performance of the skill. The purpose of this study was to compare the EMG activity of select muscles during performance of an actual golf swing and the performance of a virtual golf swing using the Nintendo Wii. Five right hand dominant, male subjects (age 22.8±1.3) with moderate golf experience performed each of the following types of swing: full swing with an actual 7-iron, full swing with the gaming controller, and quick wrist swing of the gaming controller. Muscle activity was recorded via surface EMG from the forearm flexor group, forearm extensor group, anterior *Deltoid*, *Latissimus Dorsi*, *E. Spinae*, *Rectus Femoris*, Medial Hamstrings, and Medial *Gastrocnemius* on the right side of the subject. The type of swing performed resulted in significant differences in muscle activity in several of the muscle tested (multivariate repeated measures ANOVA, $p<0.001$). Specifically, there was a trend for forearm muscle activation to be different for both instances where the actual club was replaced by the gaming remote (individual paired t-test range: $p = 0.016$-.133, Bonferoni adjusted alpha = .006). However, lower extremity muscle activation was not significantly different when the actual swing was compared to the full virtual swing (mean difference in RMS activity = 8.0±43.5%, mean $p = 0.503$). The similarity in muscle activity suggests that that this type of gaming system might be useful for lower extremity rehabilitation and training. Though these results provide a preliminary indication of the potential for interactive gaming systems, further research with additional activities, populations, and systems will be necessary to evaluate their full application and utility.

2. VALIDATION OF MULTIPLE ACTIVITY MONITORS TO ASSESS STEP COUNTS IN PRESCHOOL CHILDREN

Abraham, T.L.[1], Washington, T.L.[1], Tudor-Locke, C., FACSM[1, 2]
[1]Walking Research Laboratory, Arizona State University, Mesa, AZ
[2]Walking Behavior Laboratory, Pennington Biomedical Research Center, Baton Rouge, LA

Introduction: Measurement of physical activity (PA) in preschool children (i.e., 2-5 years of age) is challenging. The purpose of this study was to compare step outputs from multiple activity monitors worn concurrently against a direct observation criterion. **Methods:** Participants (males=9, females=9; aged 3.7±0.6 years; BMI=16.0±2.0) wore the ActiGraph (AG) and Actical (AC) accelerometers and the Yamax SW-200 (YAM) pedometer concurrently for 1 hour while being observed by a researcher rating the activities using the Children's Activity Rating Scale (CARS). A Spearman rank order correlation was performed between steps counts from AG, AC, and YAM and physical activity scores observed from the CARS. RMANOVA with post-hoc pairwise comparisons was used to determine convergent validity between mean steps detected by the AG, AC and YAM. **Results:** The mean steps detected were 1507±605, 1152±576, and 2155±872, by the AG, AC, and YAM, respectively. The mean CARS rating per minute was 2.2±0.2 (possible range 1-5). There was a significant correlation between the summary mean CARS score and steps detected by the AG ($r=.80$, $p<.001$), YAM and ($r=.88$, $p<.001$) and the AC ($r=.68$, $p=.004$). There was a statistically significant difference in mean steps detected by the monitors ($F(2) = 64.054$, $p<.001$); the differences existed between all instruments (i.e., the AG and YAM, AG and AC, YAM and AC). Compared to the YAM, the AG detected (Δ range = 57 - 1259) fewer steps and the AC detected (Δ range = 227 - 1810) fewer steps. **Conclusions:** There is a moderate to strong, positive relationship between steps and the CARS activity rating, although at least two of the monitors were significantly different from each other in detecting steps. The concurrent administration of these multiple and diverse instruments generates new understanding of PA behavior in preschool children and its assessment in an understudied yet critical population.

3. RELATIONSHIP OF BMI TO MAXIMAL UPPER AND LOWER BODY STRENGTH IN ELDERLY COPD PATIENTS

Jeffrey L. Alexander, PhD & Melissa J. Benton, PhD, RN, CSN
Department of Interdisciplinary Health Sciences, Human Movement Program, A.T. Still University

BMI is positively associated with overall muscular strength in healthy adults. However, little is known regarding the relationship between body mass index (BMI) and muscular strength in elderly individuals with chronic illness, such as chronic obstructive pulmonary disease (COPD). Therefore, the purpose of this study was to determine the relationship of BMI to upper and lower body strength in COPD patients enrolled in pulmonary rehabilitation (PR). A total of twenty elderly (age = 69 ± 9.0 years) men (n=14) and women (n=6) participated in the current study. Height and weight were measured without shoes using a HealthOMeter® balance beam scale. Maximal upper and lower body strength was assessed via one repetition maximum (1RM) testing using lying incline chest press and seated leg press, respectively. In order to avoid potential influences on strength, all measurements were obtained prior to beginning PR. Participants were found to be mildly overweight (BMI = 26.6 ± 1.2 kg/m^2) with maximal upper and lower body strength of 68 ± 6 lbs and 227 ± 18 lbs, respectively. After controlling for potential confounders, age and gender, maximal lower body strength was strongly and positively associated with BMI ($r=0.63$; $p = .009$); whereas, surprisingly, maximal upper body strength was not correlated with BMI ($r=0.11$, $p = .68$). Although in healthy adults BMI is positively related to overall strength, this relationship was not found to be consistent in elderly COPD patients. Respiratory impairment, which characterizes this population, may have more of a profound influence on upper body strength than typically seen in healthy adults. Further research is warranted to determine the influence of respiratory impairment on upper and lower body strength. However, based on these data, BMI should not be considered an accurate predictor of upper body strength in elderly men and women with COPD.

4. THE EFFECTS OF RETRO-LOCOMOTION ON BALANCE IN YOUNG AND OLDER ADULTS: A PILOT STUDY

Aldridge, J. M., G. Melcher, J. A. Mercer FACSM, J. S. Dufek FACSM
Biomechanics Laboratory, Department of Kinesiology and Nutrition Sciences, University of Nevada, Las Vegas, Las Vegas, NV

It is known that balance is compromised with aging as is evidenced by increased falls for the elderly. The purpose of this investigation was to examine the effects of a retro-locomotion training protocol on static balance for two age groups. Healthy young adults (n=4; 21±1.41 yrs; 66.98±4.05 kg; 173.67±1.91 cm) and healthy older adults (n=4; 71.5±8.43 yrs; 70.40±11.79 kg; 170.18±13.28 cm) volunteered to participate in a training session tri-weekly for 4 weeks. Each session entailed walking backwards on either a treadmill or over ground for 10-15 minutes at preferred speed. Subjects also participated in 3 laboratory testing sessions that took place prior to the training session (pre-), after 2 weeks (mid-), and at the completion of the 4-week training (post-). Timing lights attached to a multi-function timer/counter were used to measure over ground retro-locomotion velocity (OGRV). A balance platform (Bertec Balance Check Screener) was used to measure static balance and performance was quantified with balance scores. Five balance tests were conducted: 1) normal stance, eyes open (NS-EO), 2) normal stance, eyes closed (NS-EC), 3) perturbed stance, eyes open (PS-EO), 4) perturbed stance, eyes closed (PS-EC), and 5) limit of stability (LOS). A mixed model factorial ANOVA identified significant between-group differences for PS-EC ($F=7.850$, $p=.031$), PS-EO ($F=13.921$, $p=.01$), and LOS ($F=8.117$, $p=.029$). Independent t-tests identified significant differences between groups for PS-EO at pre- ($t=3.027$, $p=.023$) and post-testing ($t=5.970$, $p=.003$), and LOS at mid- ($t=3.058$, $p=.045$) and post-testing ($t=3.277$, $p=.017$). Dependent t-tests suggested trends toward balance score improvements in the older adult group for PS-EC pre- to mid-testing ($t= -2.434$, $p=.093$) and PS-EO mid- to post-testing ($t=2.927$, $p=.061$). A one-way repeated measures ANOVA identified significant OGRV increase among all subjects ($F=8.144$, $p=.005$). These preliminary data suggest that proprioceptive function decreases with age, and balance may improve after retro-locomotion training.

5. EFFECT OF SODIUM BICARBONATE ON HIGH-INTENSITY ROWING-ERGOMETER PERFORMANCE IN FEMALE COLLEGIATE ROWERS

Aloia, C. Derek W. Marks
Human Performance Laboratory, Department of Kinesiology, Saint Mary's College of California

This study examined the ergogenic effect of sodium bicarbonate ($NaHCO_3$) on high-intensity rowing performance. Five healthy female NCAA Division I collegiate rowers (21± 1.58 years, 76.36± 11.22 kg, and 175.80± 7.36 cm) volunteered for the study. All five subjects were made aware of the procedures, risks, and benefits before signing an informed consent. Subjects performed two tests in a random, double-blind fashion in two consecutive weeks. Standardized pre-test guidelines were followed by the subjects both weeks, and no exercise was done the day prior to both tests. Two days prior to each test, subjects received either sodium bicarbonate or a placebo (NaCl). The treatments were taken in five doses, four throughout the day prior to testing, and the fifth dose taken 90-120 minutes prior to testing. $NaHCO_3$ was administered in four doses of 0.15g/kg body weight, and the fifth dose of 0.10g/kg; NaCl was administered in four doses of 0.05g/kg, and the fifth dose of 0.02g/kg. Doses were administered in five 12-ounce bottles of water. Blood samples were taken two days prior to each exercise test (baseline), immediately prior to the exercise test (pre-test), and immediately after the exercise test (post-test). Results indicated that while on the $NaHCO_3$ trial, subjects were able to row 2km significantly faster than while on the placebo ($p < 0.05$). Following the exercise test, pH values dropped significantly for both the $NaHCO_3$ and placebo; however, they were not significantly different from each other. Bicarbonate levels rose significantly following consumption of $NaHCO_3$ in pre-test data, and in post-test data bicarbonate levels were significantly higher in $NaHCO_3$ treatments vs. placebo. Consumption of $NaHCO_3$ resulted in a significantly higher base excess than consumption of NaCl. The placebo group experienced a greater decrease in base excess following the exercise test.

6. PREDICTORS OF BONE MINERAL CONTENT, DENSITY, AND STRENGTH IN YOUNG WOMEN

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Reduced bone mineral density (BMD), bone mineral content (BMC), and femoral bone strength index (FSI) increases risk for osteoporotic fracture with age. Khosla et al (1996) showed lean mass (LM) to be the best predictor of whole body and hip BMC and BMD in premenopausal women (average age 35 y), but they did not include a measure of femoral bone strength, (a measure that includes femur BMD and geometry) which may be a better indicator of fracture risk than either BMD or BMC alone. This study determinedthe best predictors of BMC and BMD of the whole body and femoral neck, and femoral bone strength (FSI), using FM, LM, height and age as predictors, in a sample of young, college-aged women. We hypothesized that LMwould be the most robust predictor of all variables, given the strong relationship between muscular strength and bone. Whole body and proximal femur bone scans were performed on 22 women aged 18-30 years (mean 23.2±3.1y; 64.4±15.2 kg; 165.5±7.5 cm) using DXA (GE Prodigy Advance). Stepwise regression analyses showedthe best predictors of whole body BMC were height, FM, and age (R^2=0.75, p<0.001), and only age predicted whole body BMD (R^2=0.42, p<0.001). Femoral neck BMC was best predicted by height (R^2=0.25, p=0.018) and no variables predicted femoral neck BMD. Interestingly, FSI was the only dependent variable best predicted by LM (and height; R^2=0.46, p<0.003). In younger premenopausal women, LM was only important in the prediction of FSI, unlike other studies that have shown LM to be a robust predictor of BMD and BMC. This may be because women don't reach peak LM until the 30's or 40's, and peak bone mass until the late 20's. If FSI is indeed a better indicator of risk for fracture, however, it's worth investigating whether improving LM produces higher FSI.

7. PREDICTED VERSUS MEASURED THORACIC GAS VOLUME FOR THE BOD POD® AIR DISPLACEMENT PLETHYSMOGRAPHY SYSTEM

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When using the Bod Pod® air displacement plethysmograph, it is faster and easier to obtain an estimate of body fat percentage (%BF) from a predicted thoracic gas volume (PTGV) than a measured thoracic gas volume (MTGV). The purpose of this study was to determine if there is a difference between PTGV and MTGV and to what extent such a difference would affect body composition values. PTGV and MTGV were compared in 113 university freshmen (56 males, 57 females). The correlation between the predicted and measured values was only moderate (r = 0.60, P < .01), and the mean difference between PTGV (3.61 ± .47 L) and MTGV (3.74 ± .79 L) was significant (P = .03). This 130 mL difference in TGV corresponds to a difference in body volume of only about 50 mL resulting in a body density difference of 0.00081 $g \cdot cc^{-1}$ and a %BF difference of only about 0.4% BF. However, analysis of individual scores revealed a difference of more than ± 500 mL between PTGV and MTGV in 42.5% of the sample (SEE = 634 mL, TE = 642 mL) as well as a systematic bias (r = 0.56, P < .01). A 634 mL error in TGV results in a difference in %BF of about 1.8% BF. In conclusion, there is a significant difference between PTGV and MTGV when using the Bod Pod® air displacement plethysmography system. The likely effect of this difference in TGV estimation on body composition parameters such as %BF is small; however, it could be physiologically meaningful in some subjects. It is recommended to use the MTGV feature of the Bod Pod® when a high degree of accuracy is needed.

8. ARE COLLEGE STUDENTS MEETING THE DIETARY REFERENCE INTAKES FOR NUTRIENTS RELATED TO BONE HEALTH?

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College students are notorious for having poor nutritional behaviors. Bone is a living organ that continually undergoes growth and repair. Four years of poor dietary habits could impact bone health. Students who live on and off campus face different challenges in obtaining healthy amounts of the bone nutrients. **Purpose**: As part of a resistance training intervention targeted to improve bone health, we examined several of the classic bone nutrients to determine if college students were meeting their recommended daily intakes (DRI). Nutrients investigated include: protein, vitamins A, D, and C, calcium, phosphorus, and magnesium. Comparisons were also made for students living on and off campus to evaluate whether one group was more successful at meeting their needs. **Methods**: We recruited 14 men and 15 women ages 18 to 22. Each filled out two, 1-day diet records over the course of the fall semester. Food Processor (SQL Version 10.2.3) was then used to analyze nutrient intake. The results for the two occasions were averaged and compared to the DRIs for each individual. T-tests were used to evaluate differences in nutrient intake for students living on and off campus. **Results**: While most nutrients were consumed adequately, magnesium and vitamin D intakes did not meet the DRI. The mean consumption for magnesium was 45% of the DRI, while vitamin D was consumed at 65% of recommended. Students living on or off campus showed negligible differences in nutrient intake (p>.05 for all nutrients). **Conclusion**: We conclude that most college students are receiving adequate amounts of vitamins A and C, Ca, and P but are inadequate in Vitamin D and Mg. Inadequate consumption of vitamin D may not be a concern if exposure to ultraviolet light is sufficient. Findings could be strengthened by examining a larger sample size.

9. JOINT POWER-VELOCITY RELATIONSHIPS DURING MAXIMAL CYCLING

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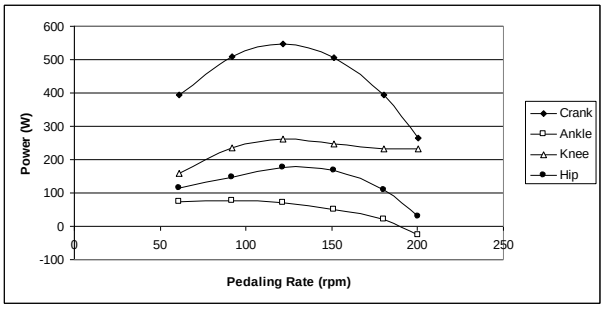
Muscles with a variety of architectures, fiber types, and muscle-tendon moment arms span the ankle, knee, and hip joints. Consequently, these joint exhibit unique power-velocity relationships with maximum joint powers occurring at different joint angular velocities (Lanza, Towse, Caldwell, Wigmore, & Kent-Braun, 2003; Andersen et al., 2005; Blazevich & Jenkins, 2002). However, these relationships are typically determined from single joint movements. In contrast, cycling is a coordinated multi-joint task and maximal cycling is commonly used to evaluate human power output and power-velocity relationships (Sargeant, Hoinville, & Young, 1981; Davies & Young, 1983; McCartney, Heigenhauser, & Jones, 1983; Vandewalle, Peres, Heller, & Monod, 1985). While knowledge of joint specific power production during maximal cycling might prove very useful, to date investigators who use maximal cycling as a model have only reported net muscular power delivered to the pedals or cranks. Eight trained cyclists participated and performed three-second maximal sprints at six different pedaling rates (60, 90, 120, 150, 180, and 200rpm) on a bicycle ergometer. The ergometer controlled pedaling rate and recorded kinetic and kinematic data to be used in inverse dynamic calculations (Elftman, 1939) to determine power vs. pedaling rate relationships for the ankle, knee, and hip joints, and total power delivered to the crank. The results indicate that power production at each joint is unique and follows different power vs. pedaling rate curves as shown in Figure 1. Additionally, the knee contributed most to total power applied to the crank followed by the hip and ankle at all pedaling rates. Total power applied to crank followed the trend of previously published results. This exploratory data may be the first to show these unique relationships during maximal cycling and may be used in the future to enhance performance and to better understand joint biomechanics in a variety of populations.



11. RELIABILITY AND VALIDITY OF HAND-HELD BIA TO ESTIMATE BODY FAT OF COLLEGIATE AMERICAN FOOTBALL PLAYERS

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Hand-held bioelectrical impedance analysis (BIA) was developed in the late 1990s. It is a fast, easy, and economical method for estimating body fat. However, hand-held BIA has not yet been validated for athletes. The purpose of this study was to validate the athlete setting/equation on a hand-held BIA (Omron HBF-306) for NCAA Div. 1-A football players (N = 67, age = 20.5 ± 1.8 y, BMI = 30.2 ± 5.1 $kg \cdot m^{-2}$). The average body fat percentage (%BF) from two trials of the hand-held BIA was compared to the %BF estimated from air displacement plethysmography (Bod Pod®). The Omron HBF-306 was highly reliable (r = 1.00) with a %BF difference of 0.008% BF between the two trials. The %BF estimated from the hand-held BIA and the Bod Pod® were significantly correlated (r = 0.93, P < .01), and on average, there was not a significant difference (P > .05) in %BF between the two methods (BIA = 16.9 ± 5.7%; Bod Pod = 17.2 ± 9.6%). However, analysis of the residual scores reveals a significant bias for the Omron HBF-306 (r = -0.84, P < .01); the leaner an individual the greater the overestimation of %BF, and the fatter the individual the greater the underestimation of %BF. In some cases the residual scores were large; 53.7% of the sample were under- or over-predicted by more than 3.5% BF (*SEE* = 3.5% BF; *TE* = 4.7% BF). In conclusion, the average %BF of the sample was accurately predicted by the hand-held BIA, but there was a systematic bias and in many individual cases large errors.

10. PHYSIOLOGICAL CHANGES ACROSS A 3 MONTH SPRINT RACING SEASON IN MASTER LEVEL ROWERS

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PURPOSE: The aim of this study was to determine the physiological and performance changes in response to 3 months of specific training for sprint racing (1000 meter course) in master level rowers. METHODS: On three occasions over a 3 month period, nine male rowers (44.9 ± 1.7 yrs, 184.3 ± 2.4 cm) participated in a maximal effort, graded exercise test on the rowing ergometer. Blood lactate concentration, heart rate, oxygen consumption (VO_2) and rating of perceived exertion were recorded at each three minute stage, during a 30 second rest period, throughout the exercise test and at 3 and 6 minutes of an active recovery. Body composition, maximal vertical jump, core strength, hamstring flexibility and the profile of mood states questionnaire (POMS) were also measured at baseline and 3 months of training. Additionally, a 2000m performance test was performed 1 day apart from the graded exercise testing. RESULTS: Three months of sprint training resulted in a decrease ($p < 0.05$) in body fat, fat mass and waist circumference and an increase in fat free mass (72.5 ± 3.8 vs. 73.5 ± 3.7 kg) and thigh circumference. The 3-month training program did not change vertical jump, core strength, peak [lactate], [lactate] during recovery, VO_{2peak} or 2000m performance, but did improve hamstring flexibility. After 3 months of training the athletes were able to produce more power at lactate threshold (1 mmol/L above baseline) (218 ± 9.5 vs. 243 ± 12.1 watts), at 4 mmol/L of lactate (245 ± 11.2 vs. 262 ± 16.4 watts) and at the onset of blood lactate accumulation (OBLA) (274 ± 12.2 vs. 299 ± 14.7 watts). CONCLUSIONS: Three months of sprint training resulted in increased fat free mass, hamstring flexibility and power at lactate threshold, 4 mmol/L of lactate and at OBLA in master level rowers.

12. KNOWLEDGE OF PERSONAL ENERGY REQUIREMENTS IN COLLEGE STUDENTS

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This study explored whether university students enrolled in health science classes were able to estimate their energy requirements within a range of calories equal to predicted Estimated Energy Requirements (EER) ± two standard deviations. The self-administered long version of the International Physical Activity Questionnaire (IPAQ) and a participant survey were given to a convenience sample (N=155) of 63 male and 92 female undergraduate students (19-23 years) with subsequent measurements of height, weight and body fat percentage. The surveys produced participants' self-reported anthropometric data, perceived estimated energy requirements, and status of prior college level nutrition education. Results from the IPAQ yielded metabolic equivalents which were converted to physical activity coefficients for use in the objectively calculated EER equation. Comparisons were made between self estimated vs. calculated energy requirements, as well as self-reported vs. measured heights and weights. The participants' mean BMI was 24.3 ± 4.6, with 5.8% classified as unhealthy low (<18.5) and 34.2% classified as either overweight (25-29.9) or obese (>30). The mean physical activity level (PAL) was 1.8 ± .5, reflecting an active lifestyle, with 30% classified as sedentary. Students estimated their EER at a mean of 2085 calories, significantly underestimating their calculated EER by a mean of 700 calories (p<.001), and they estimated their basal energy expenditures (BEE) at a mean of 985 calories, significantly underestimating their calculated BEE by a mean of 590 calories (p<.001). Female students were better able to estimate energy requirements as compared to their male counterparts, 43.5% vs. 19%, χ^2 (1) = 10.011, p=.002. These preliminary findings suggest that college students are not aware of the amount of energy in calories required to maintain their personal state of energy balance, and further assessment of this topic could provide a better understanding to assist people in the achievement and maintenance of healthy weight.

13. GENDER DIFFERENCES IN BONE ACCRUAL WITH HIGH INTENSITY RESISTANCE TRAINING

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In the United States, 10 million people are estimated to have osteoporosis of, which 8 million are women and 2 million are men. One proposed mechanism of prevention is to identify factors that lead to the development of greater peak bone mass values. We therefore conducted a 24 week progressive, high intensity resistance training exercise program consisting of male (n=10, age=19.75±0.4 yrs, BMI=22.93±0.6) and female (n=10, age=20.13±0.4 yrs, BMI=22.75±0.6) participants with no significant differences at baseline for age, height, and weight. Participants were selected from a group of healthy, recreationally active college students, who exhibited no previous medical contraindications to exercise. Participants trained 3 days a week performing 2-15 repetitions to failure for a variety of exercises chosen to stress the spine and hip (squats, stiff-legged deadlifts, etc.). Regional specific bone mineral density (BMD) and bone mineral content (BMC) were measured with dual x-ray absorptiometry (Hologic; Waltham, MA) at baseline and at 24 weeks. The BMD of males demonstrated a more significant ($p<.05$) increase than females at the lateral, anterior-posterior (AP) spine, and femoral neck (7.2% vs. 1.5%, 2.27% vs. -0.88%, 4.2% vs. -0.57%, for male and females respectively). Male BMC also showed a more significant increase than female BMC at the lateral spine and femoral neck (13.8% vs. 1.89%, 2.31% vs. -1.25%, respectively). Based on the data collected from our study, high intensity resistance training may positively manipulate BMD and BMC on males to a greater extent in the healthy, active, collegiate population. However, the results from our study suggest that females did not have a significant change in bone accrual at the conclusion of the resistance training program. This could be caused by a delayed skeletal maturity in males as well as a difference in dietary intake between males and females.

15. CALORIC EXPENDITURE DURING SELECTED JUDO TECHINIQUES

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Judo athletes compete in weight categories and often use a variety of methods, including drills of specific Judo techniques, to lose weight before a competition. This study investigated caloric expenditure during two of these Judo techniques. This information may help Judo athletes understand caloric expenditure during practice and weight loss strategies before a competition. **Methods:** Six male Judo athletes from the San José State University Judo team were divided into two groups (linear and circular technique groups) based on body weight. Each athlete performed either a linear or circular throwing drill as quickly as possible for 30 s. After 30 s, athletes rested for 2 min, then repeated for a total of 3 repetitions of the drill. Oxygen consumption (VO_2) was measured with every breath using the Oxycon Mobile wireless ergospirometry system and averaged over 30 s. Heart rates (HR) were also averaged over 30 s. **Results:** The overall caloric expenditure during drill and rest periods was approximately 9.5 Kcal/min (9.64 and 9.48 Kcal/min for the linear and circular technique groups, respectively). The mean VO_2 in the linear technique group (21.35 $mL \cdot kg^{-1} \cdot min^{-1}$) was 22% lower than in the circular technique group (27.35 $mL \cdot kg^{-1} \cdot min^{-1}$). Most athletes had higher VO_2 and HR values in the first 30 s of rest compared to the 30 s performing the drill. **Conclusion:** The present study was the first to measure breath-by-breath oxygen consumption and caloric expenditure while performing two specific Judo techniques. The measurement of oxygen consumption will help Judo athletes understand caloric expenditure during practice and promote safe weight loss for competition. Based on these results, Judo athletes expend approximately 570 Kcals/hr when performing linear and circular throwing drills.

14. ENERGY EXPENDITURE COMPARISON BETWEEN WALKING AND RUNNING

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The purpose of this study was to examine the difference in energy expenditure (EE) of college aged students walking one mile and running one mile and to examine post exercise EE compared with EE at rest. Fifteen males and fifteen females volunteered to participate. The average age was 21.90±2.52 years, the average height was 168.89±11.20 cm, the average weight was 71.01±17.30 kg, the average BMI was 24.57±3.89 kg/m^2, and the average VO_{2max} was 41.51±6.31 ml/kg/min. The average of all VO_{2max} falls into the 52nd percentile according to the Aerobics Center Longitudinal Study data from 1970 to 2002. Total EE to walk one mile at 3 mph was 89.04±18.68 kcals and the total EE to run one mile at 6 mph was 112.58±24.06 kcals. Total net EE to walk one mile was 65.23±13.09 kcals and the net EE to run one mile was 100.13±21.38 kcals. Average resting EE before the walk was 1.14±0.29 kcals/min and post walk EE was 1.47±0.36 kcals/min. Average resting EE before the run was 1.20±0.30 kcals/min and post run EE was 2.07±0.37 kcals/min. EE remained elevated above rest following the one mile walk and run. Post EE for the one mile run is higher than post EE for the one mile walk. In conclusion, running and walking at 6 mph and 3 mph respectively are both easily accessible and inexpensive methods of caloric expenditure. The results of this study suggest that running one mile expends more calories than walking one mile and that post exercise EE is higher following a one mile run compared with a one mile walk. The participants in this study were of average fitness level and are likely representative of the typical college aged student.

16. ASSESSMENT OF CAROTID INTIMA-MEDIA THICKNESS, DIETARY INTAKE AND CARDIOVASCULAR PHENOTYPES IN ADOLESCENTS: RELATION TO METABOLIC SYNDROME

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We assessed the association of carotid intima-media thickness (cIMT) with metabolic syndrome (MS), dietary intake and other cardiovascular phenotypes in adolescents using nonparametric exploratory analysis. 249 adolescents from three high-schools in Central California, Arvin (primarily Hispanic high-school N=119, 16.1±0.9 yrs), Highland (primarily Caucasian N=94, 15.7±1.2 yrs), and Bakersfield Adventist Academy (primarily 7th Day Adventist (7DA) N=33, 17.0±1.3 yrs) were assessed for cIMT, total cholesterol, high-density lipoprotein (HDL), low-density lipoprotein (LDL), triglycerides, uric acid, blood glucose, systolic and diastolic blood pressure (SBP and DBP), body mass index (BMI), and food frequency questionnaire based dietary intake. Significance was set to $\alpha \leq 0.01$. Compared to 7DA, Hispanics and Caucasians exhibited higher LDL and BMI percentile, while 7DA and Caucasians exhibited lower uric acid and fasting glucose levels than Hispanics. Both Hispanics and Caucasians consumed more protein, meat and dietary cholesterol and less dairy products; Hispanics consumed fewer fruit/vegetables than 7DA. In all subjects, BMI percentile was positively correlated with total cholesterol (rho=0.28), LDL (rho=0.34), uric acid (rho=0.31), triglycerides (rho=0.37), SBP percentile (rho=0.33), DBP percentile (rho=0.30) (all $p<0.0001$), and glucose (rho=0.18, $p<0.004$), and negatively correlated with HDL percentile (rho=-0.31, $p<0.0001$). Uric acid correlated with total fat intake (rho=0.25), dietary cholesterol (rho=0.35) and meat consumption (rho=0.33) (all $p<0.001$). cIMT was only weakly correlated with SBP percentile (rho=0.20, $p<0.01$) and uric acid (rho=0.20, $p<0.003$). No other dietary factors correlated with any other phenotypic measure. Despite no significant differences in the high-school frequency of MS risk factors, 58.6% of adolescents had ≥1 MS risk factor. Adolescents with MS exhibited higher uric acid levels compared to those without MS ($p<0.007$). A majority of adolescents presented MS risk factors independent of ethnicity or a purportedly healthier lifestyle. The uric acid association with cIMT, BMI percentile, MS and dietary factors suggest its potentially heightened importance for adolescent cardiovascular health.

17. EFFECT OF STRETCHING , WALKING, OR DOING NOTHING, ON ONE-LEG HOP AND STAIR RUN PERFORMANCE AFTER INDUCED MUSCLE SORENESS

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Delayed onset muscle soreness (DOMS) is predominantly observed with eccentric exercise, and the increased soreness and pain resulting from such exercise may hinder exercise performance. Interventions to reduce soreness might result in decreasing DOMS, and could maintain or enhance exercise performance. This study's objective was to acutely induce muscle soreness, and then evaluate how one-leg hop (HOP) and stair run (RUN) performance were affected by stretching (STR), walking (WAL), or doing nothing (DON). 20 subjects (10 males, 10 females) partipated in the study (20.2±1.3 yr, 68.2±7.1 kg, 172.6±7.4± cm) and completed each of the three conditions in a randomized order with 2 weeks between each condition. Following random assignment to STR, WAL, or DON, subjects completed a 20 min step test to induce DOMS (15 step/min) on a bench set at 110% of their mid-patellar height. Soreness was rated using a visual analog scale (VAS). Four lower extremity STR were performed using ACSM recommendations, an eight min self-selected walk for the WAL condition, and eight min seated rest for the DON condition. A two-way ANOVA for repeated measure conditions (3), and days (4), was performed on the dependent measures. Muscle soreness was significantly elevated compared to pre-stepping on the three days after stepping, peaking on day 2, but it was not different between conditions (~ 280% increase, $p<0.0001$ for all 3 conditions). There were no significant interactions for HOP-Right, $F(6, 141) = 0.30$, $p = 0.94$, HOP-Left, $F(6, 141) = 0.90$, $p = 0.50$, or RUN $F(6, 141) = 0.63$, $p = 0.70$, indicating that condition did not signficantly affect any of the measures of exercise performance. We conclude that 8 min for each of three days of stretching, walking, or doing nothing, did not change the elevated perception of muscle soreness, or alter exercise performance.

18. DIFFERENCES IN FEMORAL STRENGTH INDEX BETWEEN DANCERS AND NON-DANCERS

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Femur strength index (FSI) is a calculation of femoral strength based on bone mineral density (BMD) and geometric properties of the hip. BMD is a measure of bone density and predicts fracture risk, but may not fully describe risk for fracture, as it does not take into account the geometric properties of the bone. We were interested in whether certain athletic groups are more protected against fracture merely due to the geometry of their femoral necks. The purpose of this study was to examine differences in FSI and hip BMD in dancers and non-dancers. In the present study, BMD and FSI were measured using dual energy X-ray absorptiometry (DXA; GE Lunar Prodigy Advance). BMD of the following regions of the femur were obtained: neck, upper neck, lower neck, Ward's triangle, greater trochanter, shaft, and overall mean. Subjects included 10 young women; five competitive dancers (age = 20.16±1.25 yr) who danced 8 hr per week for the last 5 yr, and five controls (age = 22.62±0.31 yr) that had not participated in impact-related recreational activities for the past 5 yr. Data were analyzed using an independent t-test. Mean femoral neck BMD in dancers (1.12±0.03 g/cm^2) was similar to that of non-dancers (1.10±0.09 g/cm^2). A trend toward higher FSI in dancers (1.76$\pm$0.36) versus non-dancers (1.44$\pm$0.24) was revealed; however, this difference was not significantly different between groups, $(t(8) = 1.66)$, $p=0.14$. Our findings were interesting because structural differences between dancers and non-dancers may produce stronger hips in dancers despite BMD values similar to non-dancers. Future research is warranted in a larger sample to reveal potentially true differences in FSI across groups.

19. KNEE FLEXION AND EXTENSION MUSCLE ACTIVITY DURING RUNNING AT SIMULATED MICROGRAVITY: A PILOT STUDY

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Instrumentation presently exists to reduce body weight (BW) during running (e.g., Alter-G, G-Trainer). It has been reported that active peak ground reaction forces (GRFs) are reduced as BW is reduced (Grabowski and Kram, JAB, 2008). However, it is not clear whether or not lower extremity muscle activity while running is influenced by reductions of BW. It seems reasonable to expect that muscle activity would be lower with reductions of BW if GRFs are lower. However, there might also be changes in running kinematics that result in similar activation of key muscles. Therefore, the purpose of this study was to determine if knee flexor and extensor muscle activity is influenced by 1) magnitude of BW and 2) intensity of exercise. Subjects (n=5, 26.4±10.6 yo; 71±14.18 kg, 176 ± 15.4 cm) completed two minutes of running at 100, 90, 75 and 60% of BW at Rating of Perceived Exertion (RPE) levels of 11 (fairly light), 13 (somewhat hard) & 15 (hard). Electromyography (EMG) electrodes were placed on the belly of the rectus femoris (RF) and biceps femoris (BF). Data were collected (1000 Hz) during the final 30 seconds of the 2 minute run. EMG data were reduced by removing any zero offset, full wave rectifying, and then averaging across 30 seconds. Dependent variables (average RF and BF muscle activity) were analyzed using a 3 (RPE: 11,13,15) x 4 (BW: 100, 90, 75, 60%) repeated measures analysis of variance. Neither muscle was influenced by the interaction of BW and RPE ($p>0.05$). RF and BF muscle activity increased across RPE levels ($p<0.05$) but were not different between BW conditions ($p>0.05$). The results contradict our hypothesis that muscle activity will decrease with decreased BW. Further research is needed to examine running kinematics during simulated microgravity running.

20. REGULAR EXERCISE AND CHANGES IN PHYSICAL FITNESS LEVELS AMONG MIDDLE-AGED WOMEN DURING 10 YEARS

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The purpose of this study was to investigate the effects of a 10-year exercise program on the changes in physical fitness levels among middle-aged women. Previously sedentary women (N = 15; initial age = 35-55 years) participated in an exercise research program offered at a university for 10 consecutive years. The program consisted of a daily exercise class (4-5 days/week) and yearly physical fitness testing. The exercise class was 45 min in duration and consisted of: warm-up, calisthenics, aerobic activity, and cool-down. The fitness testing batteries included: the 3-min step test and maximum physical working capacity test for cardiorespiratory fitness, the bench press test and sit-up test for muscular fitness, skinfold measurements for body composition, and the sit-and-reach test for flexibility. Physical fitness levels in all fitness components significantly improved during the study ($p < .05$). The largest improvements were observed during the first year of participating in the exercise program, and slow, gradual improvements continued afterward. The improvements plateaued after a few years of starting the program, but the participants maintained their improved fitness levels during the study despite aging 10 years. The study demonstrated the long-term effects of regular exercise on maintaining optimal physical fitness levels among middle-aged women.

21. EFFICACY OF RETRO LOCOMOTION AS A MODALITY FOR THE REDUCTION OF LOW BACK PAIN IN ATHLETES

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Low back pain (LBP) is a frequent problem for athletes and has been reported in up to 75% of young athletes (Lief et al, 1990). The purpose of this study was to examine the efficacy of retro locomotion as a modality for reduction of LBP in athletes. Healthy non-athletes (n=5, 21.6±1.5 yrs, 168.1±7.0cm, 63.0±0.6kg) and NCAA Division I athletes (n=5, 21.2±5.1yrs, 172.8±7.3cm, 68.5±7.7kg) currently experiencing LBP volunteered to participate. Subjects were instrumented with a uniaxial accelerometer secured to the distal anterior surface of the right tibia and another to the midpoint of the forehead. A biaxial electrogoniometer was externally secured to the low back. Participants walked backward at preferred velocity (Vel) on a treadmill and data were obtained (1000 Hz) for 45 seconds during minute six of the walk. LBP subjects also self-reported level of pain (P). An intervention of 3 weeks of backward walking on a treadmill for 15 minutes/day, 3 days/week was followed with post-testing (per pre-test). Pre-post dependent variables included low back sagittal (sROM) and coronal (cROM) range of motion, shock attenuation (SA), stride length (SL), stride rate (SR), Vel and P. Results of a correlated t-test identified a significant decrease ($p<0.05$) in P for the LBP group following the intervention. Results of a mixed model Group x Time ANOVA ($\alpha = 0.05$) identified no significant interactions ($p>0.05$) across all dependent variables. Significant ($p<0.05$) group differences were observed for sROM, cROM, SL, SR and Vel and significant time differences for SL, SR and Vel. A follow-up examination of back kinematics for the LBP group indicated that sROM (3.85 deg) and cROM (5.06 deg) increased for four out of five LBP subjects. Individual kinematic responses and a significant reduction in P suggest backward walking may be beneficial as a method to reduce LBP in athletes.

23. USING VIBRATION TO IMPROVE BALANCE CONTROL

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The effects of vibration on human postural sway are not well understood. The purpose of this research was to determine the effect of unilateral Achilles' tendon vibration on postural sway. Subjects quietly stood on a force platform (Accusway, ATMI) with their eyes closed while their right Achilles' tendon was vibrated (Brüel & Kjaer Minishaker 4810). An OFF-ON-OFF experimental paradigm was used: one minute no vibration followed by one minute vibration, followed by four minutes rest, and then one minute with no vibration. The frequency of the vibration was 130 Hz and the peak-to-peak amplitude was 1 mm. Center of pressure (COP) data was digitized at 200 Hz and then re-sampled at 100 Hz. For all six (6) subjects the path length made by the fluctuations of the COP increased with vibration (57 ± 9 cm versus 88 ± 14 cm) and the ellipse enclosing 95% of the fluctuations decreased compared to quiet standing without vibration (7.0 ± 4.2 cm^2 versus 2.9 ± 0.3 cm^2). Thus the fluctuations in COP were faster when the vibration was applied. In contrast, the area and path length of the COP fluctuations were not affected by the frequency of the vibration (no significant difference between 130 Hz and 40 Hz, 70 Hz, 100 Hz, 200 Hz, and 300 Hz), the performance of mental tasks concurrently, or when a 200 micron amplitude vibration was used. It is concluded that the stabilizing effects of vibration on postural sway are likely related to the mechanical effect of the vibration itself. Supported by National Science Foundation (NSF-0617072).

22. IMPAIRED CATECHOLAMINE RESPONSE TO EXERCISE IN AMENORRHEIC ATHLETES

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Background: Studies have found an array of endocrine-metabolic disturbances related to energy deprivation in women with hypothalamic amenorrhea. Purpose: This study examined the stress hormone response to exercise in six amenorrheic (AM) and six eumenorrheic (EU) athletes, matched by age (30.3 ± 2.1 years) and training volume (38.2 ± 2.6 miles/week). Methods: Subjects performed a maximal running test, followed by a 30min recovery and a sub maximal running test, with 4 min stages at 60, 70 and 80% and 15 min at 85% of VO_{2peak}. Blood was drawn after each stage to measure glucose, lactate, epinephrine (E), norepinephrine (NE), and cortisol concentrations. Results: VO_{2peak} was lower in AM compared to EU (64.9 ± 2.4 and 69.9 ± 2.1 ml/kg LBM/min), although maximal running speed was not significantly different. [NE] was lower in AM than EU at 70, 80, 85% of VO_{2peak} and at VO_{2peak} (3626.1 ± 271.4 and 7450.4 ± 581.5 pg/mL). Peak [E] was lower in AM compared to EU(402.3 ± 63.1 and 1315.3 ± 290.6 pg/mL). Peak [lactate] was reduced in AM compared to EU (6.7 ± 0.9 and 9.5 ±1.2 mM), but [cortisol] was slightly higher in AM at rest, VO_{2peak} and 60%, missing significance at rest ($p=0.068$). Conclusion: Our results indicate a lower peak oxygen consumption and a blunted catecholamine response to intense exercise in amenorrheic athletes. Even though many amenorrheic athletes compete at elite levels, these differences could possibly result in decreased exercise performance compared to normally menstruating athletes.

24. THE ASSOCIATION BETWEEN BONE DENSITY AND DIET QUALITY AMONG OLDER WOMEN

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Purpose. Osteoporosis is a public health threat to adults, particularly to women aged 55 and older. The purpose of this analysis was to determine the association between bone density and dietary quality among older women. **Methods.** Healthy, free-living, post-menopausal older women (66 yrs ± 6, BMI 24.0 kg/m^2 ± 4.3, n=22) completed 7-day weighed food records and a DEXA scan (QDR-2000 x-ray bone densitometer). Food records were analyzed using Food Processor, version 7.11. The food records were assessed for diet quality using the Healthy Eating Index (2005). This method of evaluation establishes a score, ranging from zero to 100, based on 10 dietary criteria, with lower scores indicating poor diet quality. HEI measures compliance with the recommended dietary guidelines set forth by the U.S. Department of Agriculture. Partial correlations were computed, controlling for age and BMI, using SPSS 15.0. **Results.** Ninety-five percent of the participants did not meet the recommended AI of 1200 mg for calcium (785 mg ± 222). General dietary quality, however, was comparable to reported national dietary quality. We did not find a relationship between any bone density measure and total HEI score or any component HEI score. However, there were significant ($p<0.05$) correlations between femoral neck T-score (r=.50), trochanteric T-score (r=.47), inter-trochanteric T-score (r=.45) and milk HEI score. Interestingly, for the women who reported using a calcium supplement (n=12), calcium supplementation was not significantly correlated to bone density but was inversely correlated to milk HEI score. **Conclusion.** In this study, consumption of milk and milk products, as determined through HEI, was significantly associated with bone density, while other categories of diet quality were not. However, calcium supplementation was not associated with bone health. All older women should engage in lifestyle behaviors, such as improving dietary consumption of calcium, that are protective of bone.

25. ASSESSING PERSON-ENVIRONMENT INTERACTION USING THE MOVEMENT AND ACTIVITY IN PHYSICAL SPACE (MAPS) SCORE IN ORTHOPEDIC KNEE PATIENTS

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The purpose of this study was to determine the validity and reliability of the Movement and Activity in Physical Space (MAPS) score. MAPS is a quantifiable functional outcome measure that incorporates physical activity data from accelerometers and environmental factors evaluated through GPS to assess person-environment interaction. Sixteen participants (age = 28.9±12.0 years) were matched into two groups; post-surgical knee (n=8; <7 days after surgery = 4.1±2.8 days) and non-surgical control (n=8). Step count (volume - $MAPS_v$) and activity count (intensity - $MAPS_i$) were obtained using accelerometry. Travel and activity locations were recorded using GPS. Participants wore Atigraph accelerometers and LandAirSea GPS receivers on their waist for three days, one week and two months following knee surgery. Step counts and GPS data were combined to produce a $MAPS_v$ score. Activity count and GPS data were combined to produce a $MAPS_i$ score. MAPS scores were compared with the five subscales of the Knee Injury and Osteoarthritis Outcome Score (KOOS), a self-report functional knee scale. The reliability for MAPS scores over three days was acceptable (ICC[1, 1] = .84 - .89). $MAPS_v$ was correlated with all KOOS subscales. $MAPS_i$ was correlated with all of the KOOS subscales except pain (r = .48; p = 0.06). There were significant group differences for $MAPS_v$ ($t_{9.9}$ = -3.60; p = .007; post-surgical = 14.2 ± 9.7, control = 57.3 ± 32.5) and $MAPS_i$ ($t_{10.8}$ = -3.22; p = .013; post-surgical = 480 ± 344, control = 2143 ± 1419) immediately following surgery. At two months, there was a significant time-group interaction for $MAPS_v$, F (1, 12) = 4.60, p = .05, but not for $MAPS_i$, F (1, 12) = 3.42, p = .09. The results provide known-group difference, reliability, and convergent validity evidence for the use of MAPS as a functional outcome measure.

26. COMPARISON OF CALCANEAL ULTRASOUND IN PRE-PUBESCENT COMPETITIVE JUMP ROPERS AND INACTIVE AGE MATCHED CONTROLS

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Osteoporosis is thought of as a pediatric disease with geriatric consequences. Understanding the role that participating in jump rope plays in developing bone strength may aid in preventing osteoporosis in older adults. Post-pubertal jump rope participation is known to enhance Os Calcis Stiffness Index (OCSI), a measure of bone strength and quality. The effects of pre-pubertal jump rope participation are unknown. This cross-sectional study compared differences in OCSI in 9-12 year old competitive jump ropers (JR, N = 18) and age-matched normally active (NA, N = 18) girls. Right and left heel OCSI (Achilles Insight), height, weight, percent body fat (BIA), and self reported Tanner Sex Stage were measured. No significant differences were noted in mean height, weight, fat free mass or Tanner Stage (breast = 1.85 $\pm$ .8; pubic hair = 1.65 $\pm$ .7) between groups. Mean age (11.4 $\pm$ .8; 10.4 $\pm$ 1.0 yrs), fat percent (11.7 $\pm$ 6.4; 21.2 $\pm$ 8.6%) and fat mass (9.6 $\pm$ 6.8; 18.1 $\pm$ 10.0 lbs) were significantly different (p<0.01) between JR and NA respectively. Right (NA = 91.0 $\pm$ 15.6; JR = 86.7 $\pm$ 11.2 (p = 0.35;) and left (NA = 90.2 $\pm$ 15.1; JR = 92.6 $\pm$ 15.6 (p= 0.64)) OCSI values were not significantly different between groups. However, significant (p < 0.01) OCSI differences between groups were apparent after correcting for fat mass. These data suggest that competitive jump rope participation reduces fat mass while maintaining and/or enhancing bone stiffness in young, low Tanner Stage girls. An interaction may likely exist between pubertal status and exercise participation, but the critical window of opportunity when bone is particularly responsive to weight bearing activity is still unknown. Girls are encouraged to continue high intensity activity such as jump rope to maximize bone quality while minimizing body fat.

27. GENDER DIFFERENCES IN BONE MINERAL DENSITY OF COLLEGE AGED STUDENTS

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The purpose of this study was to examine gender differences in bone mineral density (BMD) of college aged students 18-35 years of age. A total of 42 males and 72 females (mean age 23.40±3.67 years) participated. Whole body BMD, lean body mass (LBM), and fat body mass (FBM) were measured using dual energy x-ray absorptiometry. Weight was assessed using a physician's scale and height was assessed using a stadiometer. A 24-hour dietary recall was used to assess nutritional status. A 7- day activity recall was used to assess the level of physical activity. BMD of females correlated with LBM, FBM, height, and weight, while the BMD of males correlated with LBM, height, weight, total kcals, and calcium intake. BMD of females correlated with LBM at r=.537, weight at r=.598 and height at r=.326. BMD of males correlated with LBM at r=.658, weight at r=.442 and height at r=.519. The difference in BMD of males and females when controlling for LBM, FM, height, and weight resulted in a p=0.085. To the best of our knowledge this is the first study that has compared BMD of college aged males and females. Weight and LBM strongly correlated with BMD for females, while height and LBM strongly correlated with BMD for males. There was a stronger association of LBM and BMD for males than females. In addition, males had higher BMD than females. Also, there were two nutritional variables (total kcals and calcium intake) that correlated for males and not for females. The results would suggest that if females increased their LBM they would potentially increase their BMD.

28. EFFECT OF POTENTIATING EXERCISE VOLUME ON VERTICAL JUMP HEIGHT AND VELOCITY

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The enhancement of muscle performance associated with postactivation potentiation (PAP) makes the potentiating exercise a viable warm-up. However, the potentiating stimulus conditions maximizing benefits need to be determined. Limited research has investigated manipulations in potentiating exercise volume on vertical jump performance. Therefore, the purpose of this study was to investigate the effect of back squat volume on vertical jump (VJ) height and velocity. Eleven males (age 24.73 ± 2.10 y, height 176.95 ± 8.17 cm, body mass 90.85 ± 12.36 kg) completed 5 testing sessions. Day 1 consisted of maximum VJ testing in a test-retest fashion (3 VJ, 5 min seated rest, 3 VJ) without a potentiating exercise intervention (control condition) followed by 1RM back squat testing. Days 2 to 5 required subjects to perform the same jumping protocol with a back squat intervention (3 VJ, experimental condition, 5 min seated rest, 3 VJ) using a load of 85% 1RM at the following volume assignments: 1) 1x2 2) 1x3 3) 1x4, or 4) 1x5. Subjects performed experimental order in a randomized fashion. All vertical jumps were performed using a countermovement with arm swing on a force platform and with a Vertec device to determine jump height. Peak velocity and take-off velocity were derived from vertical ground reaction force data. Peak VJ height increased significantly (p<0.05) following the 1x4 condition only. Pre-test and post-test measures of peak velocity and take-off velocity were not significantly different across conditions. The increase in peak VJ height following the 1x4 condition suggests this volume provides the appropriate degree of stimulus for recreationally trained males. The lack of statistical significance for velocity measures could be attributed to sample size, variability in the data, or some other unspecified measurement issue.

29. FOREARM VASOACTIVE FUNCTION IN ARM- AND LEG-TRAINED ATHLETES

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Exercise training may attenuate acute sympathetic vasoconstriction during exercise (sympatholysis). However, sympathetic vasoconstriction may be greater in the exercising arms of leg-trained athletes, suggesting that training effects are local and not systemic. We hypothesized a) that forearm blood flow and vascular conductance (VC) would increase more in arm-trained athletes (rock climbers) during dynamic handgrip exercise, and b) that the sympatholytic response of the forearm would be greater (smaller reduction in VC) during exercise performed with a strong sympathetic stimulus in arm- vs. leg-trained athletes (runners). Nineteen men (6 rock-climbers, 6 runners, 7 controls), aged 20 - 30 participated in this study. Brachial arterial blood flow (Doppler ultrasound), blood pressure, heart rate and VC were measured at rest, during a cold pressor test (CPT) and during dynamic submaximal hand-grip exercise with and without a CPT. Statistical comparisons were performed with ANOVA. Age, height and weight were not different between groups, however forearm volume was smaller in runners. Forearm blood flow and VC increased more in rock climbers than runners during exercise ($P < 0.05$). Forearm blood flow and VC decreased more in climbers and controls than runners during a CPT ($P < 0.05$). When a CPT was applied during steady state exercise, VC was greater in climbers vs. runners at all time points ($P < 0.05$), but relative changes in forearm blood flow and VC were not different between groups ($P = 0.41$). In summary, the increase in forearm VC in response to exercise and the decrease in forearm VC during acute sympathetic activation are greater in arm-trained athletes. In contrast, training appears to have no effect on the relative reduction in VC caused by acute sympathetic stimulation during exercise. These findings suggest that the vascular bed of trained muscle is more responsive to sympathetic vasoconstriction and exercise hyperemia.

30. EFFECTS OF RESISTANCE TRAINING USING ELASTIC BANDS IN CONBINATION WITH FREE WEIGHTS ON PEAK KNEE EXTENSOR TORQUE AT VARIOUS SPEEDS

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Elastic bands in addition to free weights have become more common in training routines. Bands work to increase resistance throughout the repetition. The purpose was to determine if the use of bands in addition to free weights is more effective in increasing strength at high speeds than traditional weight training. Three groups of students (males=14, females=15; age=19.79±1.32 yrs, ht=169.46±10.71 cm, wt=66.76±11.18 kg) were tested at baseline and after 24-weeks of training. No differences were seen at baseline for ht, wt, and age between groups. The control group (CON, n=9) did not participate in any training; free weight group (FW, n=10) trained with free weights only, and the elastic band group (EB, n=10) trained with bands and free weights. Participants trained their lower body musculature 2 days a week performing 2-15 repetitions to failure with the EB utilizing bands on squats and dead lifts only. FW and EB followed the same training schedule in all aspects other than the use of bands and the speed of each repetition as the EB was instructed to exert maximal concentric torque on band exercises and the free weight group lifted with a three second eccentric and a two second concentric guideline. EB knee extension peak torque was greater than CON at speeds of 330 (20.3% vs. 3.0%, p=.052), 270 (13.6% vs. -2.5%, p=.006), and 210 degrees/second (12.7% vs. -0.9%, p=.017). The FW was greater than CON at 150 (7.3% vs. -7.0%, p=.033) and 90 degrees/second (5.7% vs. -8.9%, p=.015). This suggests that elastic band training might be more effective than free weight training at higher speeds for the development of extension torque. Elastic band training will likely benefit power athletes more than traditional free weight training due to the actions performed in the gym reflecting greater sport specificity.

31. DOES A RETRO WALKING TRAINING PROGRAM INFLUENCE KINETIC AND KINEMATIC GAIT PARAMETERS FOR HEALTHY INDIVIDUALS?

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Retro walking is an activity that is lacking sufficient data regarding its effect on kinetic and kinematic parameters of gait. The purpose of the study was to determine what effects a backward walking training program had on selected kinetic and kinematic parameters of gait for healthy individuals. Male and female subjects (n=5; age=21.80±1.48 yrs; height=173.87±12.62 cm; mass=60.86±8.36 kg) were recruited for the study. After granting consent, subjects were asked to warm up walking backward on a treadmill and their preferred velocity (PV) was determined. A biaxial electrogoniometer (1000Hz) was attached across T12-S2 on the back to measure the sagittal range of motion (sROM) and coronal range of motion (cROM) during each stride. A uniaxial accelerometer (1000Hz) was attached to the distal tibia and middle of the forehead to measure peak leg impact acceleration (LgPk) and peak head acceleration (HgPk) during the support phase. Subjects then walked backward on a treadmill for 10 minutes with 10 strides of data obtained at minutes 1, 3, 6 and 9.The training program followed and consisted of 3 weeks of walking backward on a treadmill 3 times/week for 10-15 minutes per session, freely choosing PV. Upon completion of the intervention, subjects were post-tested following pre-test procedures. Six dependent variables: shock attenuation (SA=([1-HdPk/LgPk]x100), stride length(SL), stride rate (SR), PV, cROM and sROM were evaluated using correlated t-tests (α=0.05). Results indicated significant increases in SL (p=0.0274) and PV (p=0.0231) following retro training. Examination of individual results identified trends for 80% of the subjects of increased cROM and sROM. In addition, 60% of the subjects increased SA following the intervention. Kinetic parameters showed greater variability between subjects compared to kinematic parameters. Results suggest that retro training can result in increased PV and SL. Increased range of motion of the low back is suggested, which may be beneficial for rehabilitation.

32. IS THERE SHORT TERM ADAPTATION TO A NOVEL LOCOMOTOR TASK?

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Determining the appropriate time to collect data without inducing fatigue is a challenging task. The purpose of this study was to determine the accommodation time necessary to obtain stable data during performance of a novel locomotor task. Healthy young adults (n=5; 21.2±1.6yr; 1.68±0.07m; 63.06±10.66kg) volunteered and reported to the laboratory for a testing session. Uniaxial accelerometers (1000Hz) secured bilaterally on the left distal tibia and forehead were implemented to measure shock attenuation (SA) where SA=[1-(Head Peak/Leg Peak)×100]. A biaxial electrogoniometer (1000Hz) was implemented to obtain sagittal range of motion (sROM) and coronal range of motion (cROM) of the lumbopelvic region (T12-S2) across strides. Subjects were instructed to walk backward on a treadmill for ten minutes at a preferred pace. Data were collected during minutes 1, 3, 6, and 9 of the 10 minute walk. Stride length (SL), stride rate (SR), and preferred retro locomotion velocity (RV) were also calculated. A one-way, four-level (time), Repeated Measures ANOVA identified significant differences ($p \leq 0.05$) between collection times for SL (p=0.043) and sROM (p=0.041). Follow-up pairwise comparisons identified a significant difference in sROM between minute 1 and minute 3 and a difference in SL between minute 1 and minute 6 and minute 1 and minute 9. There were no significant differences for cROM (p=0.208), SA (p=0.560), or SR (p=0.214). Accommodation time necessary to obtain stable data while performing a novel locomotor task appears to be greater than three minutes. This is reflected by significant stride parameter changes during minute 1 and minute 3 versus latter times in the data collection session. These results suggest, one should allow participants to perform for at least three minutes prior to data collection, in order to allow for adaptation and to mitigate potential learning effects associated with a novel locomotor task.

33. DOES WALKING, STRETCHING, OR SITTING, AFTER INDUCED ACUTE MUSCLE SORENESS, AFFECT MUSCLE SORENESS AND LOWER BODY FLEXIBILITY IN YOUNG

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The current ACSM recommendations for flexibility training are based on purported benefits of improved range of motion (ROM) for enhanced muscular performance, decreased muscle soreness and reduced risk of injury. The purpose of this study was to induce acute muscle soreness, and measure lowerlimb flexibility following conditions of walking (WAL), stretching (STR), or sitting (SIT). Twenty college students (10 males, 10 females) participated in the study (20.2±1.3 yr, 68.2±7.1 kg, 172.6 ± 7.4± cm) completing each condition in a randomized order with 2 weeks between conditions. Subjects completed a 20 min step test to induce muscle soreness (15 steps/min) on a bench set at 110% of mid-patellar height. Muscle soreness, using a visual analog scale, was recorded immediately before the stepping and 24, 48, and 72 hours later. The STR condition required four lower extremity stretches using ACSM recommendations (8 min total), the WAL condition required 8 minutes of flat walking, and SIT required 8 minutes of seated rest. A two-way ANOVA for repeated measure,conditions (3) and days (4), was performed for each dependent measure, p≤.05. Muscle soreness was significantly elevated on Days 1,2,3 compared to pre-stepping values (~ 280% increase for each condition) but there were no differences between conditions. There was no significant interactive effect of condition/day for any dependent measure (sit-and-reach, right and left knee flexion, or right and left ankle dorsiflexion ROM). However, there was a significant main effect for days on all measures of ROM, except sit-and-reach, indicating that the subjects had less ROM at the knee and ankle on Days 1,2,3 compared to the pre-stepping condition ($p \leq 0.05$). In this study, none of the conditions were effective in reducing muscle soreness. In addition, the conditions did not differentially affect lower limb flexibility during the 3 days following muscle soreness.

35. THE EFFECT OF ECCENTRIC VS. CONCENTRIC TREADMILL EXERCISE ON MUSCLE FUNCTION

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Eccentric exercise is thought to be more effective at stimulating muscle function than concentric exercise. Typical methods for examining eccentric loading utilize specialized equipment not available to most people. **Purpose**: To examine the effects of eccentric (downhill) vs. concentric (uphill) treadmill walking on muscle function. **Methods**: Sixteen previously sedentary subjects (age 52.0±5.5 years) were randomized to either downhill (DH) or uphill (UH) training. Subjects were tested for submaximal exercise HR and BP, muscle strength, muscle power, and gait pre- and post-training. For training, subjects walked on a treadmill (3.0 mph) at 10% downhill or uphill grade three times a week for six weeks. An initial duration of 20 min progressed to 45 min by week six. Group data were analyzed by dependent sample t-tests ($p < 0.05$). **Results**: Both groups showed a decrease in exercise systolic BP (144.6±15.4 to 132.1±12.4 mm Hg and 140.3±18.2 to 131.9±9.2 mm Hg for the DH and UH groups, respectively) ($p < 0.05$). Maximal strength values increased for both groups (338.8±96.8 to 418.8±117.0 lbs and 414.5±117.6 to 440.0± 108.2 lbs for the DH and UH groups, respectively) ($p < 0.05$). Only the UH group exhibited changes in lower extremity power values. Maximum power generated at 60% 1RM increased from 486.8±208.8 to 571.3± 152.1 W ($p < 0.05$) as did the maximum power at 120 lbs (368.1±151.8 to 437.7± 109.6 W) ($p < 0.05$). Gait did not change significantly in either group. **Conclusions**: Eccentric treadmill exercise was not more effective than concentric treadmill walking at producing changes in skeletal muscle function. Both training paradigms did produce significant gains in muscle strength, however. Interestingly, aerobic fitness did not measurably change in these subjects. These results may reflect the modest training stimulus presented to these subjects by walking at 3.0 mph, which was a limitation of the equipment available.
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34. INTERPERSONAL SYNCHRONIZATION DURING GAIT IS AFFECTED BY ALTERATIONS IN SENSORY INPUT

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Individuals walking side by side frequently exhibit unintentional synchronization of stepping, yet little is known regarding the physiological mechanisms that underlie this behavior. The purpose of this study was to quantify the relationship between the availability of sensory feedback and unintentional synchronization of stepping during treadmill walking. Twenty seven pairs of subjects (age = 22.48±1.78, height = 1.72±0.09 m) stepped on side by side treadmills at 2.0 km/hr. Each pair of subjects completed seven, 30 second trials in which sensory feedback regarding their partner was either restricted by wearing earplugs and/or blinders, or enhanced by wearing a specialized mechanical couple that connected subjects at the waist via spring. An optical motion capture system was used to track a total of 4 reflective markers placed on the heels of each subject. These data were then analyzed to find periods of frequency locking and relative phase angle (i.e. difference between current state in the gait cycle) between subjects. Altering sensory information appeared to affect both the relative phase angle between subjects and the amount of step frequency locking, but these differences were not statistically significant. There was however a trend for the amount of frequency locking to be reduced when both visual and auditory input were restricted when compared to the normal condition (36.9±37.3 vs 43.4±45.0%, p=0.173), but no difference when restriction of sound was compared to restriction of peripheral vision (42.2±42.4 vs 45.5±41.0%, p =0.409). Further, the least amount of variance in relative phase angle between subjects was found when enhanced tactile input was provided, and the greatest amount of variance was found when both vision and sound were restricted. These data suggest that alterations in sensory information can affect unintentional, interpersonal synchronization, but this behavior is robust to minor changes in sensory feedback pathways related to gait.

36. HARMONICA THERAPY AS AN ADJUNCT TO PULMONARY REHABILITATION: CLINICAL, PSYCHOLOGICAL, AND FUNCTIONAL OUTCOMES AMONG PARTICIPATING CHRONIC LUNG DISEASE PATIENTS

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Recently, harmonica playing has emerged as a novel therapy for chronic lung disease (CLD) patients. A myriad of anecdotal reports have been offered, yet the effectiveness of this therapy has not been objectively measured. Therefore, the purpose of the current project was to examine the effect harmonica therapy has on various physiological, psychological, and functional outcomes among CLD patients enrolled in pulmonary rehabilitation (PR). Twenty-three participants (males = 9, females = 14; age 70 ± 2.0; FEV1 predicted 42.4% ± 2.1%) were recruited from the Banner Heart Hospital PR program in Mesa, Arizona. The participants were randomly assigned into one of two groups, the traditional PR program (C; n = 12) or the traditional PR program plus harmonica therapy (HT; n = 11). Exercise conditioning was conducted twice a week for eight to ten weeks or a total of 16 sessions for all participants. Patients randomized into the HT group were provided a harmonica and one-on-one instruction by a member of the PR staff. The patient was given practice exercises to be performed for at least 5 minutes, but not to exceed 20 minutes twice per day, five days per week. Written instructions were provided and a harmonica playing journal in which patients recorded when and how long the harmonica was played. No significant differences among clinical, psychological, or functional outcome measures were found between groups except for body mass index which significantly declined ($p = .057$) among the HT group (29.2 ± 1.9 to 28.9 ± 1.9) compared to the control group (28.3 ± 1.8 to 28.5 ± 1.8). The mechanism for this slight, yet significant drop in BMI among the HT group is unknown. Nonetheless, according to this study, harmonica playing does not significantly impact the clinical, psychological, or functional status of CLD patients enrolled in PR.

37. COMPARISON OF BODY COMPOSITION MEASUREMENT METHODS IN FEMALE SOCCER PLAYERS

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Optimal body size is important for peak performance in sport. Assessment of body composition provides the coach and athlete with insight into the optimal body weight for performance in a given sport. Laboratory techniques for determining body composition are often not available to coaches and athletes because of the complex equipment required for the assessment. Consequently, several techniques have been developed which are more suited to use in the field. However, the accuracy of these techniques has not been fully established in an athletic population. The purpose of this study was to compare commonly used techniques for determining body composition against densitometry to determine their accuracy in a specific athletic population. Subjects were 18 members of a division I university women's soccer team. Body composition was determined by dual-energy X-ray absorptiometry (DEXA), air plethysmography (BodPod), bioelectrical impedance analysis (BIA), near infrared reactance, ultrasound, and skinfold fat thickness (3, 4, and 7 site), and compared with the results obtained by densitometry (hydrostatic weighing). Correlations (r^2) between densitometry and the other techniques were

DEXA	BodPod	BIA	Near IR	Ultrasound	SF 3 site	SF 4 site	SF 7 site
.85	.68	.08	.35	.48	.85	.88	.37

These results suggest that measures of skinfold thickness, either 3 site (triceps, abdomen, suprailiac) or 4 site (triceps, abdomen, suprailiac, thigh), assuming a competent administrator, provide the most accurate field technique for assessing body composition. Despite the ease of measurement provided by the other field techniques, the accuracy of such techniques is questionable in this population.

38. ACUTE EFFECTS OF CAFFEINE ON STRENGTH AND ANAEROBIC CAPABILITIES IN COLLEGE AGE MALES

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A broad knowledge base exists regarding caffeine's ergogenic effects on aerobic activities. However, limited and often conflicting research has been conducted on caffeine's effects on anaerobic activities. The purpose of this study was to examine the effects of caffeine on strength and anaerobic capabilities. Fifteen male volunteers (23.33 +/- 2.19) came to the laboratory three times (>48 hours between visits). During visit 1 maximal isometric and isokinetic (0, 60, 180, 300°·s^{-1}) leg extension strength (MVIC, PT) and rate of force development (RFD) were determined. Electromyographic (EMG) and mechanomyographic (MMG) signals were collected from the vastus lateralis during this testing. In addition, subjects performed the Wingate Anaerobic Test (WAT) for the determination of peak power (PP), mean power (MP), and fatigue percentage (FP). During visit 2 subjects ingested a lemonade drink either with (6mg/kg) or without caffeine. After 1 hour subjects performed the same testing as visit 1. Visit 3 was identical to visit 2, but the drink not ingested during visit 2 was administered. On visits 2 and 3 subjects relaxed quietly for an hour prior to testing. Following isometric and isokinetic testing, participants had a 15 minute break and then performed 1 WAT. The results indicated that there were no significant differences for strength, RFD, PP, MP, or FP between caffeine, no caffeine, and control visits.
In addition, there were no significant differences in EMG or MMG amplitude (RMS) and mean power frequency (MPF), with the exception of significantly greater MMG RMS and MPF values at (300°·s^{-1}) compared to the other tested velocities. The lack of changes in strength, RFD, and anaerobic power, as well as the lack of consistent differences in EMG and MMG measures, suggested that caffeine had no effect on neuromuscular function.

39. EQUIVALENT ELEVATIONS IN BONE MINERAL DENSITY FROM DAILY VS. TRIWEEKLY RESISTANCE TRAINING IN MATURATING RATS

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The purpose of this study was to examine the efficacy of daily resistance training (6 days/wk) vs. triweekly resistance training (3 days/wk) for enhancing bone remodeling and bone mineral density (BMD) in growing male rats. The total volume of work performed between the two resistance training programs were equivalent by design. Twenty-seven male rats were randomly divided into Control (Con, n=9), 3 days/wk resistance trained group (3RT, n=9), and 6 days/wk resistance trained group (6RT, n=9). The 3RT and 6RT groups were conditioned to climb a vertical ladder with weights appended to their tail for a total of 6 wks. All exercised animals initially carried 30% of their body weight (BW) and progressed to 150% BW by wk 6. All exercised animals were sacrificed 48 hrs after the last training bout. Serum osteocalcin (OC), urinary deoxypyridinoline (DPD) adjusted by creatinine, tibial BMD (using dual energy x-ray absorptiometry), and bone strength (via 3-point bending tests) were determined in all groups. Left tibial BMD was significantly greater for 3RT (0.242 ± 0.004 g/cm^2) and 6RT (0.244 ± 0.004 g/cm^2) when compared to Con (0.226 ± 0.003 g/cm^2). Further, OC (in ng/ml) was significantly greater for 3RT (75.8 ± 4.4) and 6RT (73.5 ± 3.8) compared to Con (53.4 ± 2.4). In contrast, the adjusted DPD (DPD in nmol/L divided by creatinine in mmol/L) was not significantly different between Con (108.8 ± 38.3), 3RT (102.5 ± 17.7) or 6RT (110.9 ± 30.9) groups. Bone strength (force to failure in Newtons) was significantly greater for 3RT (133.7 ± 11.3) and 6RT (141.3 ± 6.9) compared to Con (87.1 ± 4.8). There was no significant difference in BMD, serum OC, or bone strength between 3RT and 6RT groups. The results indicate that both resistance training programs were equally effective in stimulating an osteogenic response that culminates in significant elevations in BMD and bone strength during maturation in rats.

40. SELF-CONFIDENCE AS A MEDIATOR OF ANXIETY LEVEL AND INTERPRETATION IN FIGURE SKATERS

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The purpose of this study is to examine the role of self-confidence as a mediator of competitive state anxiety intensity and competitive state anxiety interpretation (facilitative vs. debilitative) in youth figure skaters. Male and female skaters (n = 68) 10-18 years of age (Mean = 13.47, Standard Deviation = 2.195) from six figure skating clubs in California and Michigan completed a demographic questionnaire, the Competitive State Anxiety Inventory-2C (CSAI-2C) (Martens, Vealey, & Burton, 1990) and an anxiety interpretation scale (Jones & Swain, 1992), at either their home or their training venues. All responses were anonymous. Linear regression analysis using the Barron & Kenney (1986) steps was used to test the mediating effects of self-confidence on anxiety intensity and anxiety interpretation. For cognitive anxiety, there was a statistically significant negative relationship between intensity and direction ($p < .001$; $R^2 = 0.3$), and a statistically significant negative relationship between self-confidence and anxiety intensity ($p < .001$; $R^2 = 0.22$). However, when anxiety intensity and self-confidence were regressed on anxiety interpretation, only anxiety intensity was significant ($p < .001$), arguing against mediation. For somatic anxiety there was a statistically significant negative relationship between intensity and direction ($p < .05$; $R^2 = .08$), and no statistical significance between self-confidence and anxiety intensity ($p = .087$, $R^2 = .04$). However, when somatic anxiety intensity and self-confidence were regressed on somatic anxiety interpretation, no statistical significance was found ($p = .048, .231$), respectively. These findings revealed that self-confidence does not appear to mediate (completely or partially) the relationship between anxiety intensity and anxiety interpretation. Further research should attempt to examine the role of self-confidence in relationships between pre competition state anxiety and performance.

41. PHYSIOLOGICAL VARIABLES AND MOUTHGUARD USE IN FEMALES DURING EXERCISE

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One of the main complaints of mouthguard use is difficulty breathing and an increased perception of exercise difficulty. This study investigated the effects of mouthguard use on physiological variables in females using a self-adapted mouthguard made for females and a universal self-adapted mouthguard. Eleven subjects performed a total of three maximal cycle ergometer tests with each mouthguard and with no mouthguard. Heart rate (HR), rating of perceived exertion (RPE), oxygen consumption (VO_2), minute ventilation (V_E), and respiratory exchange ratio (RER) were measured during each workload and at the end of each test. HR, RPE, and VO_2 increased for each mouthguard across power levels, but were not significantly different at any given power level. There was a significant interaction for V_E and RER. V_E and RER increased more from 110W to max with the no mouthguard condition than for either mouthguard. However, there was no significant difference in V_E or RER at any given power level between mouthguard conditions. The results of the study indicated that the universal self-adapted mouthguard and female-specific self-adapted mouthguard did not affect the physiological variables of HR, RPR, V_E, VO_2, and RER at any given power level during submaximal and maximal exercise in females. There were no differences between mouthguards despite the fact that one was made specifically for females and the other was for universal use by both males and females. The current study did not confirm a hindrance in ventilation with mouthguard use at any given power level. The conflicting results in the current study and prior studies suggest there may be some psychological bearing on perceived ventilation with the use of a mouthguard, that the types of mouthguards used in these studies had differential effects on ventilation, or some other unidentified mechanism.

42. FREE PLAY OF ACTIVE VIDEO GAMES FOR CHILDREN AND THE INTENSITY

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Childhood obesity has been linked to time playing sedentary video games; however, there has been some movement to get children to switch from inactive to active video games. The purpose of this study was to examine if children were given the opportunity to play a wide variety of active video games for 45 minutes, how long they would play and at what intensity. Height and weight were measured for 39 children (8.6±1.9 years of age) with a BMI of 21.8±6.6 kg/m^2. For analysis, BMI was used to classify participants into three groups according to CDC Guidelines (2002): "Healthy", "At risk for Overweight", and "Overweight". Participants were allotted a 45 minute time slot, one day per week to play any active video game while wearing heart rate (HR) monitors. If the participants arrived after the designated starting time, less time was available to play. Once the allotted time expired, the total time of activity and the average HR during the activity were recorded. Data were collected over a 7 week period. The average HR for all participants was 131.5±10.9 bpm. The average time spent playing the games was 33.0±5.3 min. According to an ANOVA, no significant relationship between HR or duration of activity and BMI classification existed. As might have been predicted, the length of active time correlated with a higher HR, $r=0.486$ ($p<0.01$). In conclusion, when the children had free access to the active video games, those who spent more time playing had a higher average HR. In addition, the presence of overweight as determined by BMI classification does not appear to impact the amount of time individuals played the games or the HR of the participants.

43. COMPARING TWO DEVICES OF SUSPENDED TREADMILL WALKING FOR POST-INJURY REHABILITATION

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In rehabilitation from sports injuries, treadmill walking with body weight support is widely used to reduce weight bearing on lower extremities. Body unloading is achieved by many devices, including a waist-high chamber with increased pressure inside, called Lower Body Positive Pressure (LBPP) chamber, or a harness system (a standard system for unloading the lower body). Three gait parameters (cadence, normalized stride length, and duty factor), heart rate, and comfort level were determined in 10 healthy volunteers using the LBPP chamber and a harness (LiteGait) system. Subjects walked at three body weight conditions (100%, 66%, and 33% BW) and three Froude numbers (*Fr*). The Froude number can be referred to as a dimensionless speed which quantitatively combines loads and the subject's leg length to determine the treadmill speed. We used Froude numbers instead of absolute treadmill speeds based on the hypothesis that normal gait patterns are retained during unloaded exercise. Froude numbers were chosen to investigate slow walking (*Fr* = 0.09), comfortable walking (*Fr* = 0.25), and walk-run transition (*Fr* = 0.5). We found that all gait parameters decreased significantly by reducing loading, which was true for both devices. Contrary to our hypothesis, these new findings indicate that during unloading, normal gait patterns are not maintained by either device, even though we included Froude numbers. In comparing LBPP to harness supported unloaded walking, we could not find any difference in gait parameters. However, we documented that during unloaded LBPP ambulation, heart rate is significantly reduced compared to suspended harness walking. Furthermore, we found that walking inside the LBPP chamber was significantly more comfortable than unloaded harness walking, which was especially true with reduced loading and increased speed. The observed discomfort during unloaded harness walking probably relates to high local stresses beneath the pelvis as reported by the subjects.

44. THE EFFECT OF HYPOXIC MANIPULATION ON SEA-LEVEL PERFORMANCE: A META-ANALYSIS

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In the past decades there has been a gaining interest in hypoxic manipulation (HM) (i.e. altitude training, live high + train low (LH+TL) etc.) for improvement in sea-level performance. The efficacy of HM has been conflicting. A method of resolving the equivocal nature of HM data on sea-level exercise performance is through the use of meta-analysis. The purpose of this meta-analysis was to identify the effects of HM versus normoxic training on sea-level performance. An online database and the reference lists of peer-reviewed journal articles were used to find pertinent journal articles. There were a total of 74 journal articles found, of which 32 met our criteria for inclusion and 16 of the 32 were reviewed for this preliminary study. The journal articles included in the meta-analysis had to meet the following 1) used a control group in their design and 2) reported means and standard deviations with their results. The dependent variable was exercise performance and was defined as time trial performance, peak power during a GXT, or total work capacity. The independent variable was HM and included traditional altitude training, LH+TL, live low + train high and intermittent hypoxic exposure. There were a total of 43 extracted data points (n = 20 control and n = 23 HM). Effect size (ES) was calculated using Cohen's d: ES**=** (posttest mean-pretest mean)/pretest SD. ES was corrected for small sample bias. A t-test was used to determine the difference between the mean ES for the control and the HM. Results indicated a statistically higher ES in the HM group ($p = .05$). Mean ES for the control and HM where ES = .29 and .50, respectively. The results of this study support the theory that HM can improve sea-level performance.

45. USE OF SELF-PERCEIVED FITNESS LEVEL TO MEASURE OBJECTIVE FITNESS IN MALE AND FEMALE MARINE CORPS RECRUITS

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The accurate assessment of fitness levels of incoming recruits has become a serious concern for the US Marine Corps. Low fitness levels have contributed to numerous adverse outcomes, including increased military health care costs, high injury rates, and attrition. Simple and inexpensive self-report questionnaires have been used previously to estimate the fitness levels of incoming Marine Corp recruits, but none have been evaluated for validity. **Purpose:** The objectives of the present study were 1) to assess whether a high level of perceived fitness as reported on a questionnaire was associated with high actual levels of fitness among Marine Corps recruits, and 2) to determine whether the relationship of self-perceived and actual fitness level differed between male and female recruits. **Methods:** A total of 815 male and 637 female Marine Corps recruits from San Diego, California, and Parris Island, South Carolina participated in the study. Participants completed a self-report questionnaire highlighting self-perceived fitness level and health history immediately upon arrival at basic training. They also completed a 1.5-mile run which served as a measure of actual fitness. After adjusting for age and BMI, self-perception of physical fitness level was significantly associated with objective fitness level. Recruits who perceived themselves at a low fitness level were twice as likely to have a slower time on the 1.5 mile run (low fitness level) than those who perceived themselves as having a high fitness level (odds ratio [OR], 2.1; 95% confidence interval, [CI], 1.5, 2.8). Male recruits were slightly less accurate in their self-perception of low fitness level than female recruits (OR, 1.8, 95% CI, 1.2, 2.7; and OR, 2.4, 95% CI, 1.6, 3.7, respectively. **Conclusions:** These findings suggest self-perception of fitness level obtained from a simple questionnaire may be a suitable proxy measure of actual fitness for Marine Corps recruits.

47. A SCORING SYSTEM TO AID IN THE INTERPRETATION OF CARDIOPULMONARY TEST RESULTS

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Cardiopulmonary analysis during graded exercise testing (CPX) is commonly used to diagnose illness and determine physical working capacity. Given the number of variables generated during CPX it can be difficult to provide concise and meaningful interpretations for health personnel unfamiliar with its use. We proposed to develop a scoring system yielding a composite score describing physiological function and working capacity using results from a CPX. The purpose is to provide a single score that accurately describes performance. Methods: CPX results from a group of women with chronic fatigue syndrome (n=21) and age-, gender- and weight-matched sedentary controls (n=20) were employed to develop the scoring system. To be included each subject had to reach ACSM criteria for maximal effort. Peak values for oxygen consumption, heart rate and ventilation were compared with predicted values. An individual who achieved at least 85% of their predicted value corresponded with 5 points, and one point was subtracted for each 10% decline in achieved values. One point was subtracted for each 10% decline in achieved values. A full 5 point value for oxygen consumption at anaerobic threshold was at least 40% of predicted peak and a point was deducted if the achieved value was 10% lower. The resulting composite score was out of 25 points. Results: Sixteen out of 20 control subjects achieved at least 85% of their predicted max and a full 25 point score, the other 4 scored 24. The number of chronic fatigue syndrome patients achieving their corresponding score was as follows: 5=25, 4=24, 4=23, 2=22, 1=21, 1=20, 1=18, 1=14 and 1=13. Conclusions: The scoring system as employed can be used to describe performance compared with age- and gender-predicted values. Using a pathological condition the scoring system is useful in describing the reduction in physical performance but has a shortcoming in accurately describing performance that is greater than the predicted values.

46. EFFECTS OF DIFFERENT LANDING CONDITIONS ON VERTICAL IMPACT FORCES

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Introduction: Impact loading has been shown to be an effective means to stimulate bone adaptation. Very few studies have investigated in vivo bone loading characteristics of impact. **Purpose:** To determine how vertical impact forces are affected by different landing strategies. **Methods:** Sixteen subjects aged 18-25 years with no previous landing training were recruited. Three different landing strategies were randomly assigned on three different days; natural (N), hard (H), and soft (S) landing. Subjects stepped off of boxes at 26cm (Low) and 56cm high (High) with and without shoes in each of the three conditions onto two Kistler force plates set at 600 Hz. Shoes, instructions, and defined "good landings" were standardized. Five good trials were collected for each condition. Peak vertical ground reaction force (maxFz) and rate of maximum force development (RFD) were normalized for body weight (BW) and are given for a single leg. All results were analyzed for the stepping side leg using a repeated measures factorial design with $p < 0.05$. **Results**: Most measures were influenced by strategy and height, but not shoes. MaxFz differed by strategy (3.2 ± 0.2, 4.0 ± 0.2 and 1.9 ± 0.1 for N, H, and S, respectively) by shoes (2.9 ± 0.1 and 3.1 ± 0.1 for shoes and no shoes, respectively) and by height (2.6 ± 0.1 and 3.4 ± 0.1 for Low and High, respectively) ($p<0.05$). The time to the maximum Fz differed by strategy (0.05 ± 0.002, 0.04 ± 0.004 and 0.06 ± 0.004 s for N, H, and S, respectively), by height (0.06 ± 0.002 and 0.04 ± 0.002 s for Low and High, respectively), and illustrated an interaction between the two ($p < 0.05$). The downward phase time showed differences based on strategy and on height ($p<0.05$). There was also an interaction between strategy and height ($p < 0.05$). RFD showed differences based on strategy and height ($p<0.05$). **Conclusions:** The various landing conditions clearly illustrated an effective manner in which large magnitude forces can be applied to the lower extremity. Additionally, the rate of this force development is quite large and thus, training involving these landings could be a useful tool for bone adaptation.
Research supported by Swenson Science Research Fellowship Program

48. BARRIERS TO EXERCISE DURING PREGNANCY: IS FEAR A FACTOR?

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The American College of Obstetricians and Gynecologists' (ACOG) recommendation for exercise during pregnancy mirrors that made by the ACSM for all healthy adults; at least 30 min of moderate exercise on most or all days of the week. Nonetheless, pregnant women participate in less leisure-time physical activity than do non-pregnant women (Evenson et al., 2004; Petersen et al., 2005). In fact, one third (34.5%) of pregnant women in 2000 were completely sedentary (Evenson et al., 2004). The purpose of this study was to identify barriers to exercise that are specific to pregnancy. We hypothesized that concern exercise may imperil the fetus remains a barrier. A 21 item survey was administered at a community health center in Flagstaff, Arizona. To date, 11 subjects 20-29 years old have been surveyed. Three were in the third trimester of pregnancy, seven were in the second, and one was in the first. All subjects were regularly active (at least 1-2 times per week) prior to the pregnancy. Although all subjects remained active during pregnancy, the number reporting at least 3 exercise sessions per week declined from 7 to 4, and the average intensity of exercise declined from 3.4 to 2.6 on a 5 point scale. None of the subjects reported receiving assistance from their obstetrician in forming an exercise plan. When ascribing reasons for not exercising more during pregnancy, fatigue and other responsibilities were the most highly rated (both 4.4 on a 5 point scale). Fear of starting contractions and fear of hurting the baby were also highly rated reasons, averaging 4.1 and 3.9 (out of 5), respectively. Currently, the data support the hypothesis that fear of putting the pregnancy at risk contributes to a reduction in physical activity during pregnancy. Obstetricians and other health care providers have the potential to allay these fears.

49. EFFECT OF CHRONIC L-ARGININE SUPPLEMENTATION ON OXYGEN UPTAKE AND VENTILATORY THRESHOLD IN TRAINED CYCLISTS

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Recently, L-arginine has been studied as a potential ergogenic aid. The majority of investigations on L-arginine supplementation have been conducted on special populations with limited research examining its effects on healthy subjects during sports performance. The purpose of this study was to examine the effect of chronic oral supplementation of L-arginine during a graded exercise test in trained male cyclists. Eighteen volunteers were randomly assigned to one of two groups in a double-blind design: L-arginine supplementation (4 weeks at 12 grams·day^{-1}) or placebo (cornstarch). During each graded exercise test VO_{2max} and ventilatory threshold (VT) were measured. A baseline test was conducted after which pre-packed supplements (12g·d^{-1}) were given to the subjects to ingest for four weeks. Following the supplementation period subjects then reported back to the lab for another graded exercise test at which time identical measures were taken. VO_{2max} was not significantly increased ($p > 0.05$) following the 4 weeks of L-arginine supplementation. No significant increase ($p > 0.05$) in VT was found following the supplementation protocol. To our knowledge, this is the first to study the ergogenic effects of arginine on trained cyclists. This study adds to the body of literature which suggests that supplementing with arginine does not have an ergogenic effect on endurance exercise.

50. BILATERAL DEFICIT DURING MAXIMAL POWER CYCLING

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Bilateral deficit (BD) has been widely studied, but little data exists applying BD to a cycling model. BD is reportedly evident in adolescents and children performing Wingate anaerobic tests, but cyclists performing isometric exercise reportedly do not exhibit BD. The purpose of this investigation was to determine if active adults demonstrate BD during a maximal power output inertial-load cycling test. Five adult male participants (age: 22 ± 3 years; mass: 74.4 ± 4.4kg.) performed one bilateral and two unilateral maximal inertial-load tests on a modified Monark ergometer. Power was measured across a range of pedaling rates in a 3-4 second test. A 9.9 kg counterweight was bolted to the opposite pedal crank to facilitate smooth, realistic pedaling during unilateral testing. Participants were given sufficient time to practice and become accustomed to the equipment and protocol, then warmed up for five minutes prior to each different test on a standard ergometer. Left, right and double leg testing were presented in random order. The average power from two trials of each test was used for analysis. A paired t-test showed that in each participant, the power from the sum of the unilateral right and left leg tests (1244 ± 39 watts) was significantly greater than the power from the bilateral test (1157 ± 60 watts). This indicates that BD is evident during cycling. These findings support previous research reporting the existence of BD in adolescents and children during cycling. Although our results indicate BD, it is possible that the participants used the resting leg to transfer power across the hip muscles. Future research with biomechanical techniques could confirm or refute this transfer of power. Further research could use this model to compare evidence of BD in athletes of different sport training and background.

51. SINGLE-LEG CYCLING, A BIOMECHANICAL EVALUATION

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Single and double-leg cycling have been used in therapeutic and training settings. The benefits of single-leg training may be compromised because single- and double-leg cycling are biomechanically different. Specifically, during normal double-leg cycling the gravitational forces acting on each leg are essentially balanced by the contralateral limb and thus do not require active leg flexion. Conversely, single leg cycling requires active leg flexion to lift the leg. Recently, we devised a counterweighted cycling crank that may facilitate single-leg cycling with similar biomechanics to normal double leg cycling. The purpose of this study was to determine the optimal counterweight to facilitate single-leg cycling with biomechanics similar to normal bilateral cycling. Following warm up (5 min), three trained cyclists (age: 33 +/- 4 years) performed 105 second trials (single leg and double leg) on a cycle ergometer equipped with a force and position sensing pedal. Single-leg protocol was repeated four times (with counterweights of 10, 20, 25 and 30 lbs). Trials were performed at 60rpm with increased power every 15 seconds (50, 100, 150, 200, 250, and 300 watts for double-leg and half of those powers for single-leg). Pedal forces were recorded for each power condition and averaged every 6 degrees of crank rotation. Differences between single and double-leg cycling for each 6 degree interval were determined. Sum of squared differences for each condition were used to evaluate optimal counterweight. Sum of squared difference varied among the counterweights evaluated and reached a minimum at 20 lbs. For our current sample population, 20lb counterweight produced the closest approximation to double leg cycling. Single-leg cycling may be a beneficial training and rehabilitation modality and determining the optimal counterweight is an important first step towards that end.

52. RELATIONSHIPS BETWEEN RATE OF FORCE DEVELOPMENT, RATE OF VELOCITY DEVELOPMENT, PEAK VELOCITY, AND GROUND REACTION FORCE

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Explosive movements are widely used in many sports. The purpose of this study was to evaluate the relationships between rate of force development (RFD), high pull peak velocity, rate of velocity development (RVD) and ground reaction force (GRF). Twenty-nine male kinesiology students participated in this study (age, 24.68 ± 5.05 years, height, 177.07 ± 8.42 cm, body mass, 79.40 ± 16.10 kg). Participants attended two sessions separated by a 48 hour rest period. Visit 1: Participants performed 3 maximal isometric pulls for the determination of RFD. Visit 2: Participants performed 3 repetitions of a dynamic high pull at 30% of maximal isometric pull to determine RVD and peak velocity, followed by 3 countermovement vertical jumps to determine GRF. A one minute rest period between repetitions was allotted for the dynamic high pulls and a 15 second rest period between repetitions of the vertical jump. Pearson *r* correlations were used to determine relationships between variables. The results of this study showed significant ($p < 0.05$) correlations between GRF and RFD (r = 0.67), GRF and high pull peak velocity (r = 0.38), and RVD and RFD (r = 0.37). These results support that 1) GRF is related to one's ability to produce force quickly under isometric conditions and the ability to produce peak velocity during high pulls and 2) the rates at which velocity and force are developed are significantly related.

53. PHYSICAL ACTIVITY DURING PREGNANCY, WEIGHT GAIN, AND BIRTH WEIGHT: A 2008 META-ANALYSIS

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Objective: To estimate the association of physical activity (PA) intensity and gestational weight gain with birth weight using meta-analysis. *Methods:* A literature search, manuscript screening, and data extraction were performed. Effect size (Cohen's *d*), 95% confidence intervals and standard error (SE*d*) were calculated to express the size of the effect of PA during pregnancy on the birth weight relative to the observed variability in the study. Studies were stratified by PA intensity and gestational weight gain, a pooled standardized mean difference (SMD) and test for heterogeneity were calculated. *Results:* Published studies up to May 2008 provided 26 comparisons between physically active and sedentary pregnant women during pregnancy. Absolute differences in baby's birth weight (between physically active and sedentary women during pregnancy) ranged from –509 to +254 g. Moderate intensity PA was not related to birth weight (SMD_{Mod}= –0.01; *P*=0.40). Vigorous intensity PA results were too disparate to compare (SMD_{Vig}= –1.10; *P<0*.01). When gestational weight gain was similar between physically active and sedentary women, birth weight was also similar (SMD_{GWG1}= 0.08; *P*=0.12). *Conclusions*: Birth weight is similar following moderate intensity PA and sedentary pregnancy. Gestational weight gain may offset birth weight differences between vigorous intensity PA and sedentary women during pregnancy.

54. INFLUENCE OF TRAINING STATUS AND VARIED BACK SQUAT VOLUME ON VERTICAL JUMP IMPULSE

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Warm-ups comprised of heavy bouts of resistance training acutely increase the intrinsic mechanical properties of muscle and thus muscle performance. This increased performance is a phenomenon known as postactivation potentiation. Postactivation potentiation can enhance muscle performance in powerful movements. However, its effect on individuals of varied relative strength levels is not fully understood. Impulse measures a change in momentum, and an increase in impulse can enhance vertical jump performance. The purpose of this investigation was to assess the effect of varied volume sets of heavy back squat on impulse during vertical jumping between two groups differentiated by relative strength. Eleven males with at least one year of back squat experience completed five testing sessions. The first session (control) assessed subjects' baseline measures for impulse (during the vertical jump) and 1RM back squat. Testing sessions 2-5 were conducted in a test-retest fashion with the incorporation of a randomly assigned experimental condition (3 maximal vertical jumps, experimental condition, 5 minutes of passive rest, 3 maximal vertical jumps). Four experimental conditions required subjects to perform the back squat using a load of 85% 1RM under varying volumes (Condition 2: 1 x 2; Condition 3: 1 x 3; Condition 4: 1 x 4; Condition 5: 1 x 5). Subjects were placed into one of two groups (Group 1 n=6: Relative 1RM < mean Relative 1RM; Group 2 n=5: Relative 1RM > mean Relative 1RM) according to their relative 1RM (absolute 1RM/body mass). Results revealed no significant difference in impulse between groups. However, a significant decrease ($p<0.05$) in impulse from pre- to post- vertical jumps for the control, condition 2, and 4 was observed. In conclusion, postactivation potentiation as induced by the experimental conditions proved ineffective at increasing impulse in the vertical jump.

55. THE PHYSIOLOGY OF ASCENDING TO THE HIGHEST POINT IN THE WESTERN HEMISPHERE: A REAL-TIME CASE STUDY

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Argentina's Mt. Aconcagua (6962 m, 22,841') is the highest point in the Western Hemisphere. Real-time physiological measurements are rarely observed during ascents to such high altitudes. A 41-year old male with previous high-altitude mountaineering experience was measured for minute-by-minute heart rate (115.5 ± 32.2; 60-154 beats·min^{-1}), respiration rate (25.2 ± 9.1; 2-42 breaths·min^{-1}), skin temperature (26.9 ± 6.7; 11.7-36.1 °C), and core temperature (37.5 ± 0.4; 36.9-38.7 °C) data collection from a 5800 m high camp to the 6962 m summit and return (1240 min of data: 417 min rest/sleep; 643 min ascent; 180 min descent). All of these variables were significantly (*P* < .01) correlated (r = -.54 to .92). Resting heart rate (RHR) and arterial oxygen saturation (%O_2-sat) were measured daily (18 d). RHR ranged from 56 beats·min^{-1} (2865 m) to 88 beats·min^{-1} (5800 m) in the camps while %O_2-sat dropped from 95% to 65%. Heart rate and %O_2-sat on the summit were 123 beats·min^{-1} and 60%, respectively. Body mass (BM), body fat percentage (%BF), and blood chemistry were measured a week before and a week after the expedition. Although BM (65.8 kg to 63.7 kg) and %BF (15.5% to 12.1%) were both substantially reduced 10 days post-summit, there were no noticeable changes in blood chemistry (Hgb 15.6 g/dL to 15.4 g/dL; Hct 46.4% to 45.7%; RBC 5.09 to 4.95 million·µL^{-1}).
Acknowledgments: Mini Mitter Respironics (equipment); USU Student Wellness Center (blood draws); Luis Gonzalo and Dennis Wasserman (climbing partners)

56. EFFECT OF CREATINE LOADING WITH ACUTE CAFFEINE INGESTION ON UPPER AND LOWER BODY MUSCULAR STRENGTH AND NEUROMUSCULAR FUNCTION

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Purpose: Ten resistance-trained subjects participated in an investigation aimed to examine the impact of creatine loading with acute caffeine ingestion (CC) on upper and lower body muscular strength (MS) and the associated neuromuscular function (NF) versus a placebo treatment (PL). **Methods:** MS was determined from the number of repetitions completed in the supine bench press (SBP) and barbell back squat (BBS) with a load equivalent to 87.5% of a previously predicted 1 repetition maximum (RM). NF during the SBP and BBS sets was evaluated from surface electromyographic (EMG) records obtained from the right long head of the triceps brachii (TRI) and right pectoralis major (PM) muscles (for SBP), and the right vastus lateralis (VL) and right gluteus maximus (GM) muscles (for BBS). Median power frequency (MedPF), mean power frequency (MeanPF), and EMG signal amplitude scores (IEMG) were derived and analyzed utilizing Paired Sample T-tests. **Results:** No significant differences ($p < 0.05$) were found in the number of repetitions completed [SBP, CC: 4.72 (±1.25), PL: 4.00 (±1.44); BBS, CC: 8.49 (±5.28), PL: 5.66 (±2.07)], MedPF, MeanPF, and IEMG scores between CC and PL treatments. **Conclusions:** CC supplementation does not seem to significantly affect upper and lower body muscular performance, as well as the frequency, type, and magnitude of motor unit activation during periods of short-term, high intensity resistance exercise.

57. FREE CITY BUS TRAVEL AND ITS EFFECTS ON ARIZONA STATE UNIVERSITY CAMPUS COMMUTING BEHAVIORS

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Research focused on walking to and from transit services (e.g., bus and light rail) may provide insight into strategies for increasing physical activity. **Purpose:** To describe changes in bus usage with changes in subsidized travel (i.e., free university bus pass; U Pass). **Methods:** The data were derived from transportation surveys conducted in 2004 (prior to program) through 2006 for Arizona State University (ASU) Tempe employees and students. There were 8,131 respondents in 2004, 8,523 in 2005 and 8,729 in 2006 for a total of 25,383 respondents. Statistical models were developed to quantify the changes in bus usage over time expressed as percent of all commuting trips. Contingency table analysis was used to test independence of the extent of monthly program usage (0; 1-7; 8 -14; 15-21; and ≥22 days) and program year (a surrogate for presence of the program). **Results:** Employees and students increased bus usage following implementation of the U Pass program in July 2005. In 2004, bus trips were 3.2% of all trips and in 2006 bus trips increased to 4.3%; a 1.1% increase. There was a 1.5% increase in those who took the bus 1 to 7 days/week in 2006 and a 1.7%, 1.9%, and 1.1% increase for the remaining categories of usage days. Bus use and program year were not independent ($p < .00001$). **Conclusions:** More ASU employees and students used busses as a result of the U Pass program. A subsidized bus pass program may help promote active forms of transport. Results from this study may contribute to health impact studies (HIA) that evaluate the impact of proposed public transit systems on physical activity levels, and thereby may influence choices made by policymakers and transportation planners.

59. CARDIORESPIRATORY AND BODY COMPOSITION RESPONSES TO A WATER EXERCISE PROGRAM FOR ATHLETES

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PURPOSE: The purpose of this study was to determine the effectiveness of a water-based exercise program on improving cardiovascular fitness and body composition of land-based competitive athletes during off-season training. METHODS: Twenty-nine healthy, competitive athletes (aged 23.7 $\pm$ 6.5 years) were recruited to either a water exercise (WE, n= 14), or control (C, n=15) group. The WE group trained a minimum of 3 times per week, for 90 minutes each session, performing aquatic aerobic activities, resistance exercises, and stretching. WE activities included shallow, deep and underwater running, jumping, cadence work, interval sets, and shallow-water cycling. The control group maintained land-based, off-season training and recorded all fitness activity. The duration of the program was 9 weeks. Body composition and cardiovascular measurements were obtained at the beginning and at the end of the training period. RESULTS: After 9 weeks of training, two-sample *t* test revealed that all measures improved body significantly ($p<0.05$) for the WE group compared to the C group. Body weight decreased (1.0 $\pm$ 2.6 kg, vs -0.7 $\pm$ 5.9 kg); percent body fat decreased (1.22 $\pm$ 0.9, vs -0.37 $\pm$ 1.8) and lean body mass increased (0.12 $\pm$ 3.5 kg vs -0.71 $\pm$ 3.4 kg), respectively. Maximal responses for $V0_{2max}$ (5.7 $\pm$ 1.5 ml/kg min vs 0.9 $\pm$ 4.1 ml/kg min) were significantly higher ($p \leq 0.001$), for the WE group compared to the control group, respectively. No injuries were reported during the program. CONCLUSION: This water exercise program conducted in the off-season resulted in improvements in body composition and cardiovascular fitness for a variety of competitive land-based athletes. Water exercise appears to be a promising training option for healthy competitive athletes to safely and significantly improve fitness.

58. IS ANAEROBIC POWER RELATED TO ATTAINMENT OF VO_2MAX?

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The purpose of this study was to determine if anaerobic power is related to VO_2max attainment in recreationally-active men and women. Fifteen subjects (8 men and 7 women, mean age, height, mass, and VO_2max = 23.3±1.1 yr, 174.7±7.9 cm, 66.9±10.3 kg, and 42.9±1.4 mL/kg/min, respectively) initially completed the Wingate Test. At least 24 h later, subjects completed incremental cycle ergometry followed by 10 min of active recovery, then performed a verification protocol at a supramaximal workload. This test was performed at a workload one stage above the last completed stage during the incremental test. During exercise, gas exchange data were obtained every 15 s. VO_2max was defined as a change in VO_2 (ΔVO_2) $\leq$ 2.1 mL/kg/min. A paired t-test was used to examine differences in VO_2max between tests, and Pearson product moment correlation was used to describe the relationship between ΔVO_2 at VO_2max and Wingate-derived variables. Peak/mean power and fatigue index were equal to 9.4±1.1 W/kg, 7.0±0.8 W/kg, and 51.4±6.3 %, respectively. There was no association ($p>0.05$) between ΔVO_2 (1.7±1.6 mL/kg/min) and mean ($r(14) = -0.10$) or peak power ($r(14) = -0.24$). There was a significant correlation between fatigue index and ΔVO_2, $r(14) = -0.67$, $p<0.05$, suggesting that a higher fatigue index may elicit a smaller ΔVO_2. There was no difference ($p>0.05$) in mean VO_2max between the incremental (42.9± 1.36 mL/kg/min) and supramaximal trial (42.7±1.18 mL/kg/min). VCO_2 and RER were higher ($p<0.05$) during the incremental test (3.42±0.15 L/min and 1.19±0.08) compared to the supramaximal protocol (3.12±0.14 L/min and 1.10±0.07). Results suggest that neither peak nor mean power from the Wingate test are related to ability to reveal a 'true' VO_2max during the latter stages of incremental exercise, although fatiguability may be a mediating factor. Additional investigation is needed to further elucidate the VO_2 plateau phenomenon.

60. THE EFFECT OF RETRO LOCOMOTION ON FLEXIBILITY OF THE LOW BACK AND HAMSTRINGS

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Low back pain (LBP) is a serious health problem in America affecting over 80% of the population (NIH, 2006) and is often characterized by a lack of flexibility of the low back and hamstrings. The purpose of the study was to explore whether retro locomotion can be an effective means to increase flexibility of the low back and hamstrings, ultimately decreasing LBP. Ten healthy female adults (29.9±10.0 yrs; 165.1±8.2 cm; 68.53±18.4 kg) presenting without LBP within the past four months volunteered to participate. The pre-test consisted of participants first warming up with a 2-5 minute forward walk at a personally comfortable velocity followed by three trials of the YMCA Sit-and-Reach Test to measure low back and hamstrings flexibility. Next, a biaxial electrogoniometer (Biometrics, model SG 150) was secured externally to the low back vertically spanning T12-S2. Participants then walked backward on a treadmill at their preferred velocity for 10-15 minutes. Low back motion data from the electrogoniometer (1000 Hz) was obtained for 20 sec during the sixth minute of the walk capturing 10 complete walking strides. Following the pre-test, participants completed four weeks of backward walking on a treadmill or over ground for 10-15 minutes/day, four days/week, at the participant's chosen velocity. After completing the intervention, a post-test session which duplicated pre-test procedures was conducted. Four dependent variables (DVs) were identified including max sit-and-reach score (SR), walking velocity (Vel) and average sagittal (sROM) and coronal (cROM) range of motion (cROM) of the low back across 10 walking strides. Pre-post differences were evaluated with correlated t-tests ($\alpha = 0.05$). Results identified statistically greater post-test SR ($p<0.001$) and Vel ($p<0.001$) values with no differences observed for sROM ($p=0.289$) or bROM ($p=0.320$). Results suggest that retro locomotion may be a practical means to improve flexibility of the low back and hamstrings while low back range of motion may not be similarly influenced.

61. EFFECT OF CAFFEINE INGESTION ON RESISTANCE TRAINING PERFORMANCE

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The purpose of this study was to examine the effect of caffeine (CAF) ingestion on intense resistance training performance. Fourteen resistance-trained men (mean ± SE age and body mass = 21.1 ± 2.2 yr and 87.8 ± 15.4 kg) who were regular CAF consumers (218.2 ± 21.8 mg/day) participated in the study. A randomized, double-blind, crossover design was used. They completed four sets of four exercises (barbell bench press, seated leg press, lat row, and shoulder press) to fatigue at 75 – 80 % one-repetition maximum. A two minute recovery was allotted between sets and exercises. Seven days apart, anhydrous CAF (6 mg/kg body weight) and placebo (dimethylcellulose) housed in identical capsules were ingested with water 1 h pre-exercise. Two-way analysis of variance with repeated measures was used to examine differences in muscular performance across number of repetitions, exercises, and treatment. A paired t-test was used to assess differences in total weight lifted between treatments. Results revealed no difference ($p > 0.05$) in number of repetitions completed for bench press, lat row, or shoulder press with caffeine versus placebo. Number of repetitions completed in sets 1 (15.7 ± 1.8 vs. 14.1 ± 1.6) and 2 (13.1 ± 1.4 vs.11.6 ± 0.9) of leg press was significantly higher ($p < 0.05$) with caffeine compared to placebo. Total weight lifted across all four sets was similar ($p > 0.05$) with caffeine (22,409.5 ± 1,008.4 kg) versus placebo (21,185.7 ± 1,244.2 kg). Number of repetitions for all exercises significantly decreased ($p < 0.05$) from set 1 to set 4. Any benefit of acute caffeine ingestion to enhance intense resistance training performance appears to be limited to intense lower body exercise, although the magnitude of improvement was small.

62. THE EFFECTIVENESS OF A SIMPLE TRAINING PROGRAM FOR REDUCING FALL RISK IN THE ELDERLY IN A GROUP AND INDEPENDENT HOME SETTINGS

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Previous research found that a simple exercise training program led to increased balance, mobility and lower extremity strength when delivered individually in-home. It is unlikely that this delivery method on-site is either realistic or affordable. **Purpose:** To determine if a simple training program delivered in group or independent settings is effective in reducing fall risk. **Methods:** Twenty-nine subjects, 65 years or older (X = 82.4±4.8 years) who were not involved in an exercise program, were recruited. Nineteen senior residence dwellers participated in the group program (GP) while 10 subjects who lived in their own homes did the in-home independent program (IP). Postural sway, mobility and isotonic lower extremity strength were measured in the laboratory. Both groups participated in the training program two times a week for a period of six weeks. The GP was led by two of the investigators. Training consisted of lower extremity exercises focusing on balance and strength development using elastic bands. Post testing of the subjects occurred after six weeks. **Results:** The training program was completed by 80% and 40% of the GP and IP subjects, respectively. The GP subjects improved mobility time (12.7± 8.6 to 11.2±7.8 s) ($p < 0.05$) and increased lower extremity strength values (195.1±47.8 to 240.3±62.0 lbs) ($p<0.05$). The GP subjects decreased their mediolateral sway distance (90.4± 23.7 to 80.2±18.5 cm) ($p < 0.05$), but had no changes in the anteroposterior direction. Apparent changes in mobility, strength and postural sway in the IP group were not statistically significant, likely due to the small sample. **Conclusions:** The simple training program proved to be effective in increasing mobility, lower extremity strength and balance in the GP subjects. Greater adherence was seen with the GP, possibly due to the more formal structure, group encouragement and leader expectations. In either case, however, we can conclude that when fully participated, this training program was effective in improving variables associated with fall risk when given in various manners.

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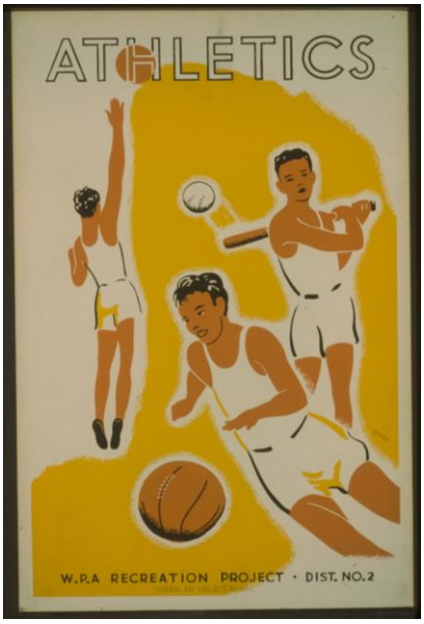

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