SOUTHWEST CHAPTER

AMERICAN COLLEGE OF SPORTS MEDICINE

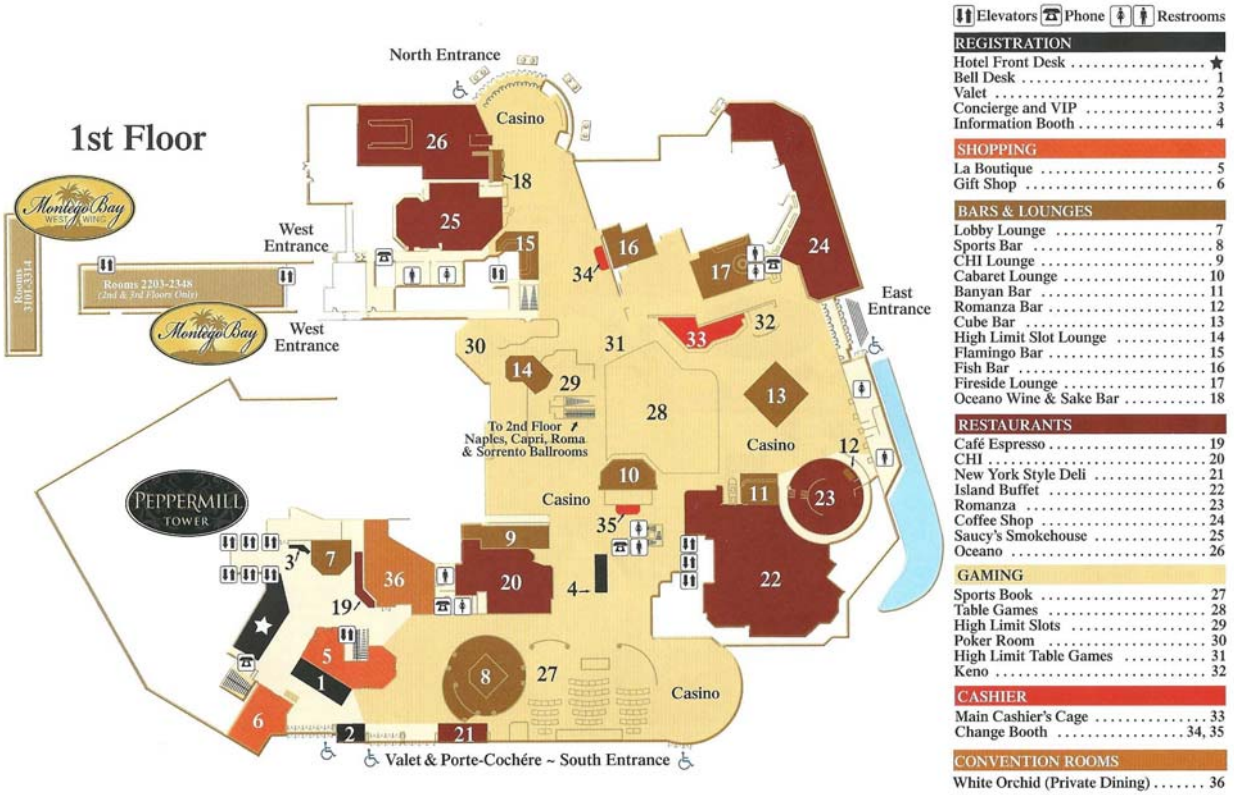
2011 ANNUAL MEETING

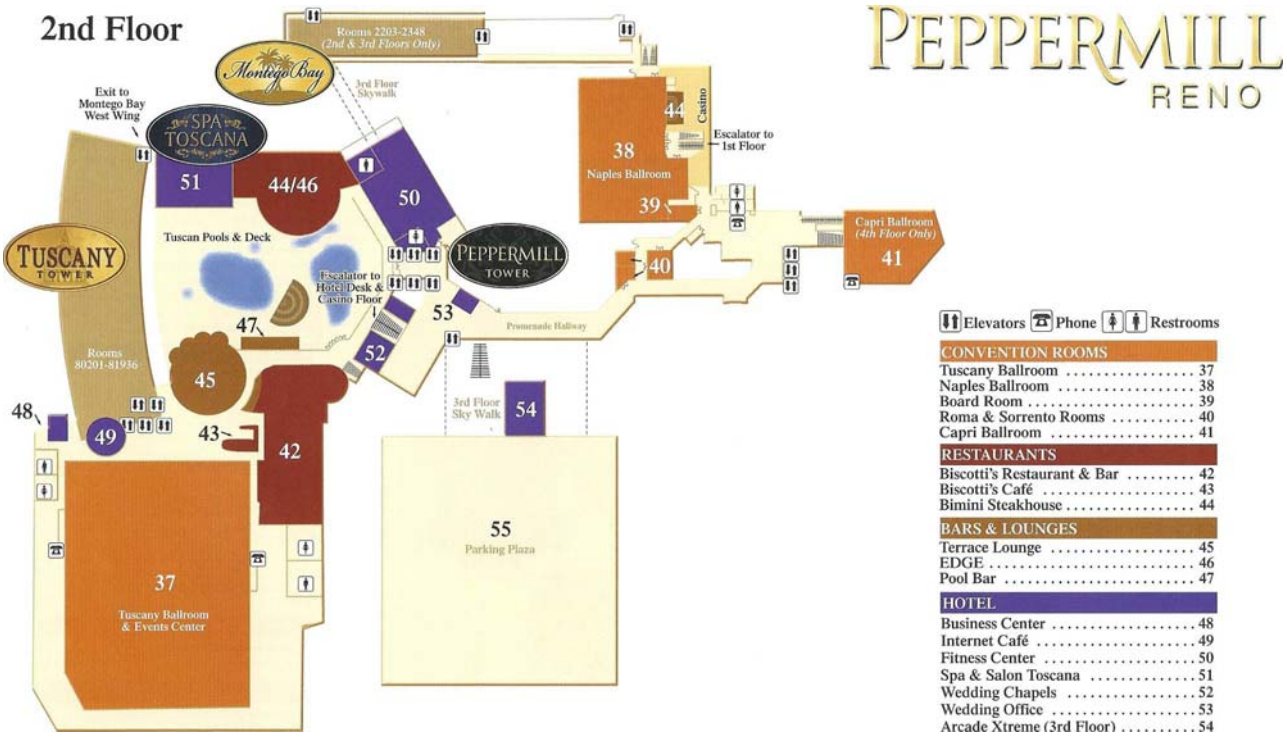
October 21-22, 2011

Peppermill Resort Spa Casino
Reno, Nevada

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

Peppermill Resort Spa Casino





Welcome to the

31st Annual Meeting

of the

Southwest Regional Chapter

of the

AMERICAN COLLEGE of SPORTS MEDICINE SM

October 21-22, 2011

Peppermill Resort Spa Casino
Reno, Nevada

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

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

FRIDAY, 21 OCTOBER 2011

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

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

Interactive Gaming and ACSM Exercise Guidelines **Naples 2**

Interactive Gaming: Physiological Relevant or Just Fun?
Tony Santo, Ph.D., University of Nevada, Las Vegas

Energy Expenditure While Playing Exergames
Nicholas Klug, M.S., California State University, San Bernardino

Exergames as Scientific Tools: Applications (and Limitations)
Janet Dufek, Ph.D., University of Nevada, Las Vegas

The Myth of 110%: Limitations to Human Performance **Naples 3**

Bill Whiting, Ph.D., California State University, Northridge

Lacrosse – New Look at an Old Sport **Naples 4**

John Mercer, Ph.D., University of Nevada, Las Vegas
Jason Nielson, M.D., Children's Bone & Spine Surgery, Henderson, Nevada

General Session **9:45 am – 11:45 am** **Naples 6-7**

Moderator: Mike Hogan, Ph.D., FACSM, President, SWACSM

SWACSM Recognition Award
Presenter:

Preview of Meeting: John Mercer, Ph.D., FACSM
University of Nevada, Las Vegas

D.B. Dill Lecture

The American Fitness Index: It Takes a Community to Create an Active Society

Barbara Ainsworth, Ph.D., FACSM
President, American College of Sports Medicine
Arizona State University

LUNCH **11:45 AM - 1:15 PM**

FRIDAY, 21 OCTOBER 2011, continued

Concurrent Colloquia 1:30 pm – 2:45 pm

Exercise and Regulation of Appetite: Implications for Body Weight Control — **Naples 4**

Todd Hogobian, Ph.D., California Polytechnic University, San Luis Obispo

Skeletal Muscle Fatigue and Mitochondrial Activation During Repetitive Contractions in Isolated Myofibers — **Naples 3**

Leo Nogueria, Ph.D., University of California, San Diego

Fueling Athletes for Endurance — **Naples 2**

Joe Dibble, RD, CSCS, Sierra Strength and Speed, Reno, NV

Concurrent Symposia 3:00 pm – 4:30 pm

The Relationship of Body Composition, Energy, and Impact Loading on Bone — **Naples 1**

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

3:00 - 3:20 ***The Relationship Between Muscle Density and Bone Density in Prepubescent and Pubescent Girls***
Scott Going, Ph.D., University of Arizona

3:20 – 3:40 ***The Importance of Impact Loading on Bone Density Across the Life Span***
Kara Witzke, Ph.D., California State University, San Marcos

3:40 – 4:00 ***The Relationship Between Energy Availability and Bone Metabolism in Adolescent Ffemale Endurance Athletes***
Michelle Barrack, California State University, San Marcos

4:00 – 4:20 ***Does the Load Imparted on Bone by Dance Differ in Traditional and Non-traditional Dance Training?***
Victoria Jaque, Ph.D., California State University, Northridge.

FRIDAY, 21 OCTOBER 2011, continued

Concurrent Symposia **3:00 pm – 4:30 pm**

Cycling: Pedal to the Metal? **Naples 5**

Moderator: Jim Martin, Ph.D., University of Utah

3:00 – 3:45 ***Human Pedaling Data: Sometimes You Get What You Expect, Sometimes You Don't***
Jim Martin, Ph.D., University of Utah

3:45 – 4:30 ***Musculoskeletal Modeling and Forward Dynamic Simulations of Pedaling***
Maury Hull, Ph.D., University of California, Davis

SOCIAL EVENT

EDGE **4:30 -7:00 PM**

Poster Presentations

Graduate School Fair

No Host Wine/Cheese Reception

SPECIAL EVENT

Naples 6-7 **6:00 -7:30 PM**

Student Jeopardy Bowl

Student Research Award 7:30 pm – 9:00 pm Naples 6-7

Moderator: Linda Wilkin, Ph.D., California State University, San Bernardino

7:30 **Up-regulation of oxidative capacity by genetic manipulation uncovers the central role of AKT signaling in the regulation of fatty acid oxidation in skeletal muscle cells**
S. Constantinescu, University of Southern California

7:45 **The effect of a 45-minute exercise session on neural responses to pictures of food in normal-weight and obese women: an eeg study**
B. Hanlon, Brigham Young University

8:00 **Modulation of fuel selection at the mitochondrial matrix**
Sarah Kuzmiak, Arizona State University

8:15 **Assessment of activity patterns using multiple accelerometer epochs**
Nathanael Meckes, Arizona State University

8:30 **Experimentally induced anterior knee pain immediately reduces involuntary and voluntary quadriceps activation**
Jihong Park, Brigham Young University

8:45 **The effects of caffeinated "energy shots" on distance running performance**
Matthew Schubert, California State University - Chico

SATURDAY, 22 OCTOBER 2011

Registration **Ballroom Foyer** **7:30 am - 11:00 am**

Concurrent Colloquia **8:00 am – 9:15 am**

Cardio + Resistance Training + H_2O = Underwater Treadmill Running **Naples 1**

Matt Silvers, Ph.D., Eastern Washington University

Alpine Ski Mechanics: Energy, Force, and Performance **Naples 2**

Gerry Smith, Ph.D., Utah State University

Training Tips: Achy Knees and Hips – Modifying the Exercise Prescription for OA – the Most Common Joint Disorder **Naples 3**

Robyn Stuhr, M.A., ACSM-RCEP, University of California San Diego Medical Center

Concurrent Colloquia **9:30 am – 10:45 am**

Gatorade Sports Sciences Institute

Exercise is Medicine: Understanding and Utilizing the Health Benefits of Physical Activity **Naples 4**

Robert Sallis, M.D., Kaiser Permanente, Los Angeles, California

Biomechanics of the Throwing Shoulder: Injury Prevention and Performance Enhancement Through Proper Pitching Mechanics **Naples 3**

Rafael Escarmilla, Ph.D., Andrews-Paulos Research and Education Institute

SATURDAY, 22 OCTOBER 2011, continued

General Session **11:00 – 12:30** **Naples 6-7**

Moderator: Mike Hogan, Ph.D., FACSM, President, SWACSM
University of California, San Diego

Student Awards

Recognition of Host School:
California Polytechnic University, San Luis Obispo

Business Meeting

Founders Lecture

Does Skeletal Muscle Possess the Right Stuff to Enable Space Exploration?

Ken Baldwin, Ph.D.
University of California, Irvine

SOUTHWEST ACSM RECOGNITION AWARD

1982	D.B. Dill
1983	Albert Behnke
1984	Steve Horvath
1985	Fred Kasch
1986	John Boyer
1987	Herbert de Vries
1988	Charles Tipton
1989	G. Lawrence Rarick
1990	Lawrence Morehouse
1991	William Haskell
1992	Ralph Paffenbarger
1993	Franklin Henry
1994	George Brooks
1995	James Skinner
1996	Christine Wells
1997	Lawrence Golding
1998	Ken Baldwin
1999	Robert Conlee
2000	Gail Butterfield
2001	R. James Barnard
2002	Gene Adams
2003	Vivian Heyward
2004	Fred Roby
2005	Marta Van Loan
2006	Jack Wilmore
2007	Larry Verity
2008	Steven Loy
2009	Lorraine Turcotte
2010	William Beam
2011	Priscilla MacRae

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2011 SWACSM

Annual Meeting

ABSTRACTS

Student Research Award
Poster Presentations

STUDENT RESEARCH AWARD

1. UP-REGULATION OF OXIDATIVE CAPACITY BY GENETIC MANIPULATION UNCOVERS THE CENTRAL ROLE OF AKT SIGNALING IN THE REGULATION OF FATTY ACID OXIDATION IN SKELETAL MUSCLE CELLS

Constantinescu,S., Turcotte, L.P.
Department of Biological Sciences, University of Southern California, Los Angeles, CA

Receptor Interacting Protein 140 (RIP140) is a well-known negative regulator of oxidative capacity and prior data from our lab has shown that low expression of this transcription factor increases insulin-mediated FA oxidation in skeletal muscle cells. To provide mechanistic insights for this metabolic shift, we measured the effects of low RIP140 expression on the mRNA and protein expression of proteins and signaling intermediates implicated in the regulation of FA oxidation (COX4, PGC-1α, (FAT)/CD36, FATP1, CPT1, MCAD, AKT, PKC-ζ). L6 myotubes were treated with siRNA sequences for either RIP140 (RIP140) or a negative control (control) and incubated with insulin. Treatment with RIP140 siRNA sequences significantly (P<0.05) reduced RIP140 mRNA (47%) and protein (54%) content and significantly (P<0.05) increased COX4 (98%) and PGC-1α (77%) mRNA expression indicating that, as expected, oxidative capacity was increased in RIP140 siRNA-treated cells. Down-regulation of RIP140 increased (P<0.05) FATP1 (317%), (FAT)/CD36 (51%) and CPT1 (84%) mRNA expression but unexpectedly decreased (P<0.05) MCAD mRNA expression (34%). Interestingly, at the protein level, RIP140 down-regulation did not affect (P>0.05) protein content of CPT1 and FATP1 but it decreased (P<0.05) total (38%) and plasma membrane (50%) (FAT)/CD36 protein content. Down-regulation of RIP140 decreased AKT^{Ser473} (23%) and PKC-$\zeta^{Thr403/410}$ (56%) phosphorylation but did not affect AKT^{Thr308} phosphorylation. Our data suggest that the high rates of insulin-mediated FA oxidation that accompany low RIP140 expression are mediated by a reduction in AKT and PKC-ζ signaling.

2. THE EFFECT OF A 45-MINUTE EXERCISE SESSION ON NEURAL RESPONSES TO PICTURES OF FOOD IN NORMAL-WEIGHT AND OBESE WOMEN: AN EEG STUDY

B Hanlon, J Roberts, M Larson, BW Bailey, JD LeCheminant, FACSM
Brigham Young University

Purpose: This study examined the effect of acute exercise on neural responses to pictures of food in normal-weight and obese women. Strong neural responses to pictures of food may be an index of food motivation. Participants of both groups were matched (except for BMI) and conditions (exercise vs. non-exercise) were randomized and counter-balanced. **Methods:** Fifteen normal-weight (31.6±9.6 y; 22.6±1.3 kg/m^2) and 15 obese (32.5±9.5 y; 34.3±5.1 kg/m^2) women completed an exercise and non-exercise day, each performed on the same day of the week. During the exercise condition, each participant completed an early morning (8-9am) exercise session on a motor-driven treadmill at 3.8 mph and 0% grade for 45 continuous minutes. During the non-exercise condition, participants were tested for body composition between 8-9am. Each participant was immediately tested for food motivation following both conditions. To test for food motivation, participants were shown a continuous stream of pictures of food and flowers (control) matched for picture intensity while neural activity was monitored, via EEG. Data were analyzed using a 2-group x 2-exercise condition x 2-picture type repeated measures analysis of covariance on event-related potential (ERP) amplitudes. **Results:** For both groups under both conditions, ERP amplitude was higher and latency was lower for food pictures compared to flower pictures. There was not a significant group*condition*picture type interaction (P>0.05). However, when the normal-weight and obese women were combined, there was a significant condition*picture type interaction for late positive potential (F=4.62, P=0.04) with participants showing less neurological response to food pictures following a 45-minute exercise bout. **Discussion:** The sample of women studied did not show neurological differences in response to pictures of food based upon BMI. However, exercise decreased neurological responses to food, which may indicate lower food motivation.

3. MODULATION OF FUEL SELECTION AT THE MITOCHONDRIAL MATRIX

Sarah Kuzmiak and Wayne T. Willis
Arizona State University School of Life Sciences

Mammals increasingly rely on carbohydrates (CHO) as exercise intensity increases, with exhaustion coinciding with whole body CHO depletion, flying birds appear to be the ultimate endurance athletes as they oxidize almost exclusively fatty acids for fuel. This investigation examined the extent to which interactions at the mitochondrial matrix could account for these differences when saturating fuels were supplied. We isolated MITO from sparrow pectoralis and rat hind limb muscles and incubated for ~10 min using the creatine kinase energetic clamp at 3 values of ΔG_{ATP} to illicit 3 different respirations rates. Substrates provided were pyruvate (P), malate (M), glutamate (G), and palmitoyl carnitine (PC), alone and in combination. O_2 consumption (J_o) was measured continuously and P, M, 2-oxoglutarate, and aspartate were assayed in acid-stopped aliquots sampled at the beginning and end of each incubation. The proportionality of the ΔG_{ATP}: J_o was determined for each fuel. The flux through electron-harvesting reactions was estimated and the proportion each fuel contributed to flux was then determined. Within each species, all fuel combinations produced similar ΔG_{ATP}: J_o relationships, with the exception of PC+M in the rat, which resulted in a slope 7-fold lower than that with P+M. The addition of G or PC to sparrow MITO oxidizing P+M decreased P utilization 76±6% and 77±5%, respectively, whereas these additions resulted in 36±10% and 45±8% reductions in the rat. Sparrow MITO P oxidation accounted for less than 25% of J_o when PC or G were added, with PC accounting for 50-73% across energy states. In rat MITO, P and G contributed 58-70% to oxygen consumption, with PC oxidation accounting for a mere 3-36% as energy state increased. Mitochondrial fuel selection mirrored that of the whole body; indicating that fuel selection, at least in part, can be modulated at the level of the mitochondrial matrix when multiple substrates are present at saturating levels. As high a high oxidation-reduction potential has been linked to a suppression of PC oxidation, we suggest a high electron transport chain conductance relative to dehydrogenase activity observed in avian compared to mammalian MITO may result in a lower redox potential and contribute to the ability of fatty acids to be oxidized.

4. ASSESSMENT OF ACTIVITY PATTERNS USING MULTIPLE ACCELEROMETER EPOCHS

Nathanael Meckes, Stephen D Herrmann, Barbara Ainsworth FACSM
Arizona State University School of Nutrition and Health Promotion

Purpose: To examine differences in the time spent in sedentary behaviors and in physical activity (PA) using four accelerometer epoch lengths. **Methods:** 10 adults (6 males, 4 females) wore four ActiGraph GT3X accelerometers on an elastic belt with two accelerometers over each anterior superior iliac spine of the hip. Each accelerometer was randomly assigned to record at different epoch lengths (1-second, 5-seconds, 15-seconds, and 60-seconds) for seven days to assess average weekly time spent in sedentary-, light-, moderate-, and vigorous-intensity PA levels. Modified Mathews' and Freedson' cut-points were used to assess PA and sedentary behaviors for each epoch, respectively. A repeated measure ANOVA was used to assess differences in time by epoch and intensity level.
Results: Significant differences were found in the weekly minutes spent in the sedentary (p<.0001) and light-intensity (p<.0001) categories. There were no significant differences in moderate and vigorous categories (p>.05).

	Minutes/week for Each Intensity				
Epoch Length	Total Time	Sedentary	Light	Moderate	Vigorous
1 Second	5883.3	5103.6[ac]	484.7[ad]	259.0	36.0
5 Second	5894.2	4838.0 [ad]	792.0 [ad]	220.8	23.6
15 Second	5861.7	4547.1 [b]	1080.9 [b]	216.1	18.0
60 Second	5853.8	4113.6	1578.3	156.7	17.2

a - significantly different from 60-second epoch at p < .0001
b – significantly different from 60-second epoch at p <.01
c – significantly different from 15-second epoch at p <.0001
d – significantly different from 15-second epoch at p <.05

Conclusion: By changing the epoch length, differences of 990 minutes in sedentary behaviors and 1,094 minutes in light-intensity activity were observed between the 1-second and 60-second epochs. Selection of epoch length should be taken into account when characterizing time spent in sedentary behaviors and lighter intensity PA.

5. EXPERIMENTALLY INDUCED ANTERIOR KNEE PAIN IMMEDIATELY REDUCES INVOLUNTARY AND VOLUNTARY QUADRICEPS ACTIVATION

Jihong Park, Adam C. Squires, David H. Chinn, J. Ty Hopkins (FACSM)
Department of Exercise Sciences, Human Performance Research Center, Brigham Young University, Provo, UT

Purpose: To examine the immediate effects of experimentally induced anterior knee pain on involuntary and voluntary quadriceps activation. **Methods:** A 3X3 randomised controlled laboratory study with repeated measures was used. Thirteen, neurologically sound volunteers (age: 21.9 ± 3.2 year, height: 1.7 ± 3.1 m, mass: 76.6 ± 10.1 kg) underwent three different conditions (pain, sham, and control). The vastus medialis peak Hoffmann reflex normalized by the peak Motor response (H:M ratio) was used to measure involuntary quadriceps activation. Quadriceps central activation ratio (CAR) using maximal isometric knee extension torque (Nm) was calculated to assess voluntary quadriceps activation. Measurements were recorded at precondition (baseline), condition (immediate post injection), and 20min-postcondition. To induce anterior knee pain and sham condition, 5% sodium chloride and 0.9% sodium chloride (total volume of 1.0 ml for each condition), respectively, were injected into the infrapatellar fat pad on the dominant leg. No injection was performed for the control condition. The visual analogue scale was measured every two minutes throughout the data collection. **Results:** Our pain model increased perceived pain immediately after the 5% hypertonic saline injection and pain lasted for 12 minutes on average ($F_{40,743}$=16.85, P<0.0001). During the pain condition subjects showed a 12% decrease in H:M ratio ($F_{2,59}$=8.64, P<0.001), a 34% decrease in maximal isometric knee extension torque ($F_{2,59}$=5.89, P=0.005), and a 5% decrease in CAR ($F_{2,59}$=3.83, P=0.03). **Conclusions:** Our data showed that joint pain may be an independent factor to alter function of the muscles surrounding the painful joint. Both involuntary and voluntary inhibitory pathways may play a role in an immediate reduction of muscle activation. Since quadriceps activation deficiency may accelerate the degenerative process, pain should be controlled in the acute stage of a joint injury.

6. THE EFFECTS OF CAFFEINATED "ENERGY SHOTS" ON DISTANCE RUNNING PERFORMANCE

Matthew M. Schubert
Department of Kinesiology, CSU Chico

Researchers have long investigated the effects of caffeine in various forms on exercise and sports performance. An emerging trend in athletics is the consumption of energy drinks. An even newer group of supplements now emerging are "energy shots", which tend to be small, concentrated energy drinks with similar ingredients but without sugar. Runners competing in events < 1 hour in duration generally avoid supplements prior to or during competition due to fear of gastrointestinal disturbances. Due to their compact size, availability, price, and convenience, energy shots may prove to be a viable pre-competition supplement for shorter-distance runners.

Six trained male runners completed a 3-way randomized, single-blinded, placebo-controlled crossover research design. All participants completed three trials, each with two ounces (59 mL) of a different treatment [placebo (PLA; 0 mg caffeine), Guayakí Yerba Maté Organic Energy Shot™ (YM; 140 mg caffeine), or Red Bull Energy Shot™ (RB; 80 mg caffeine)] 45 minutes before exercise and separated by a minimum of 5 days. During each trial, subjects ran a self-paced 5-kilometer time trial on a motorized treadmill. The results of this study found no significant differences in performance with energy shot ingestion compared to placebo (Mean ± SD: PLA=1046.7 ± 74.8 s; YM=1071.7 ± 95.2 s; RB=1053.2 ± 60.8 s; $p>0.05$). Therefore, it can be implied that, at the dosages used in this study, energy shot ingestion did not improve high-intensity (~96% VO_2 max), moderate duration (< 20 minutes) running performance in trained runners in a laboratory setting. Though further research is warranted, these findings provide no evidence to recommend energy shots as potential ergogenic aids for trained runners and their coaches.

POSTER PRESENTATIONS

1. PRELIMINARY INSPECTION OF MUSCLE ACTIVITY DURING A LACROSSE SHOT

Agnelli, C., McClellan, J., Tarno, J., Nielson, J., Mercer, J.A. FACSM
Department of Kinesiology and Nutrition Sciences, University of Nevada, Las Vegas

During a lacrosse shot, the player grips the stick such that one arm is the top arm and the other the bottom. Players who shoot left and right handed switch top and bottom hands. There is lack of research on muscle activity during shooting. Therefore, the purpose of this study was to describe upper extremity muscle activity patterns during shooting right and left handed. Subjects (n=5; 1.7±0.1 m; 70.4±10.4 kg; 16.6±0.5 y) were experienced high school lacrosse players. The dominant arm was instrumented with electromyography (EMG) leads to measure muscle activity of the flexor carpi radialis (FCR), extensor carpi radialis (ECR), biceps brachii (BB), triceps brachii (TB), anterior deltoid (AD), and latisimus dorsi (LD). An electrogoniometer was secured to record top arm elbow flexion/extension. Subjects shot with maximal velocity and were allowed to take approach steps to shoot. Five shots were taken right handed then 5 left handed so that EMG data were collected while the arm was either the top or bottom arm. All data were collected at 1000 Hz and EMG data band passed filtered (20-50 Hz). Elbow flexion/extension velocity was calculated and maximum extension velocity identified as a point approximating ball release. Data were extracted 0.5 s before and after this point. Ensemble patterns were generated for each subject and correlation coefficients calculated between top and bottom arm patterns per muscle. Correlation coefficients for muscles between top and bottom arm were low (AD 0.11(0.07; LD 0.27(0.15; FCR 0.20(0.24; ECR 0.39(0.24; BB 0.26(0.12; TB 0.20(0.31). There was substantial variability in muscle activity patterns between subjects even though elbow kinematic patterns were similar (r=0.81(0.18) suggesting level of skill and/or experience likely influence muscle patterns. Upper extremity muscles are activated differently when the arm is either the top or bottom arm when shooting.

3. THE EFFECTS OF AN EXERCISE PROGRAM ON AEROBIC FITNESS IN WOMEN RECEIVING CHEMOTHERAPY FOR BREAST CANCER

Sadeeka Al-Majid[1], Jared W. Coburn[1], FACSM, and Lori D. Wilson[2]
[1]School of Nursing and Department of Kinesiology, California State University, Fullerton
[2]Department of Kinesiology, California State University, Long Beach

Purpose: The purpose of the present study was to investigate the effects of an aerobic exercise program on VO_{2max} in women receiving chemotherapy for breast cancer. Previous research and anecdotal evidence has indicated that chemotherapy can have negative effects on the ability to perform activities of daily living as well as more challenging forms of physical activity. **Methods:** Fourteen women volunteered to participate and were randomly assigned to control (C) or exercise (E) groups. Participants assigned to the exercise group performed aerobic exercise 2-3 times per week for 12-16 weeks. In addition, all participants came to the exercise physiology laboratory four times (approximately four to six weeks between visits) during the course of the study. During these laboratory visits, participants performed incremental tests on a motorized treadmill for the determination of VO_{2max}. **Results:** The results indicated there were significant decreases in VO_{2max} in the C group ($p < 0.05$), and that there were no changes in VO_{2max} in the E group ($p > 0.05$). **Conclusion:** These findings suggest that performing an aerobic exercise program can prevent the decrease in aerobic fitness typically associated with chemotherapy treatments in women with breast cancer.

2. THE RELATIONSHIP BETWEEN OBJECTIVELY MEASURED SLEEP AND ADIPOSITY IN COLLEGE WOMEN

Matthew D. Allen, Marshall D. Hill, James D. LeCheminant, Bruce W. Bailey
Exercise Science Department, Brigham Young University

Objective: Over the past several decades, the prevalence of obesity has risen at an alarming rate. One of the critical times for developing excess body weight is during the college years. The reason for this weight gain is not completely clear, but one factor that has not been well examined is the role of sleep. The purpose of this study is to examine the relationship between sleep and adiposity in 199 college women.
Methods: The study was cross-sectional. Participants were recruited from October 2009 to August 2011 from a Mountain West University. Participants wore an accelerometer for seven consecutive nights to assess sleep duration and quality. Participants also kept a sleep log to verify sleep time. Height and weight were assessed following a three-hour fast and in a standard one-piece swimsuit. Body composition was assessed using the BOD POD.
Results: The women in the study slept an average of 7.41 ± 0.82 hours per night. There was a negative relationship between total minutes in bed and BMI; this correlation was strengthened when controlling for average number of awakenings per night ($P \leq 0.05$). It was also found that percent body fat was trending in the same direction as BMI, but was not significant ($P = 0.07$). There was a 72% reduction in the odds of being overweight for those who slept more than 6.5 hours per night ($P \leq 0.05$).
Conclusions: Total sleep time is related to BMI in college women; this relationship was strengthened when controlling for number of awakening per night. More than 6.5 hours of sleep per night seems to be a reasonable recommendation for sleep time in college women and is related with the lowest BMIs.

4. **DIETARY FIBER DOES NOT ATTENUATE POSTPRANDIAL GLYCEMIC RESPONSES FOLLOWING A HIGH-CARBOHYDRATE MEAL ADULTS AND CHILDREN**

Siddhartha Angadi1, Nathan Weltman2, Art Weltman3, Jessica Rodriguez3, Jim Patrie4, Glenn Gaesser1
1Healthy Lifestyles Research Center, Arizona State University, 2Sanford School of Medicine, University of South Dakota, 3General Clinical Research Center, University of Virginia Health System,4 Department of Public Health Sciences, University of Virginia

Purpose: We examined the effects of dietary fiber (mostly insoluble) on postprandial blood glucose and insulin responses in youth, adults and seniors.
Methods: To assess the effect of dietary fiber on postprandial glycemia, 10 youth (ages 10-17), 12 adults (ages 19-63), and 13 seniors (ages 65-75) completed two meal trials on separate days, following an overnight fast. The high-carbohydrate, low-fiber (HCLF) meal contained = 95.7 g carbohydrate, 11.4 g fat, 16.7 g protein, and 3.0 g fiber. The high-carbohydrate, high-fiber (HCHF) meal contained 103.7 g carbohydrate, 12.2 g fat, 21.8 g protein, and 19.3 g fiber (mainly from All-Bran cereal). Blood was drawn at baseline and hourly for 4 hours following meal ingestion. Linear contrasts of ANOVA least-squares means were constructed to evaluate differences in postprandial glucose and insulin.
Results: Four-hour blood glucose area under the curve (AUC; $mg \cdot dl^{-1} \cdot hour^{-4}$) following both meals was not significantly different ($p>0.05$) in youth (HCLF= 390 ± 36, HCHF = 400 ± 22), adults (HCLF = 409 ± 59, HCHF = 406 ± 52) and seniors (HCLF = 426 ± 52, HCHF = 430 ± 61). No significant differences between peak postprandial glucose were noted across all 3 age groups. Similarly 4-hour plasma insulin AUC ($uIU \cdot ml^{-1} \cdot hour^{-4}$) following both meals was not significantly different in youth (HCLF = 97 ± 46, HCHF = 119 ± 47), adults (HCLF = 147 ± 113, HCHF = 139 ± 93) and seniors (HCLF = 170 ± 124, HCHF = 129 ± 72). No significant differences between peak postprandial insulin were noted across all 3 age groups
Conclusions: The addition of dietary fiber (primarily insoluble) to a high-carbohydrate meal failed to attenuate the postprandial glucose and insulin responses in children and young and older adults.

5. INTER-TESTER RELIABILITY OF THE VARIFIT ACCU-PIN SCANNER

Judd Asay; A. Wayne Johnson; Sarah T. Ridge; Ulrike H. Mitchell ; Iain Hunter; Jordan Petersen; Tyson Olson; Emily Krebs
Department of Exercise Sciences, College of Life Sciences, Brigham Young University

Purpose: This study investigated inter-rater reliability using the VariFit Accu-Pin scanner (a device developed to provide a semi-weight bearing and full weight bearing 3-D image of the foot plantar surface).
Methods: Four operators measured the foot median arch height of 23 individuals in sitting semi-weight bearing and standing full weight bearing using the VariFit Accu-Pin scanner. To assess the semi-weighting arch height, operators positioned the participant's right foot in a neutral resting position atop the Accu-Pin matrix with the knee in a ninety degree angle. The operator depressed the right foot into the pin matrix by applying an inferior force on the dorsum of the foot and knee simultaneously to create a detailed 3-D model of the foot. After an impression was made in the matrix, the foot was removed and the Accu-Pin matrix was scanned by the VariFit device according to user guidelines. Participants placed their foot back into their impression while in the seated position and were then instructed to stand up. They squatted three times to produce the weight bearing model of their foot. The new impression was again scanned. The same procedure was repeated using the left foot. A second operator repeated this protocol on the same person ten minutes later. Each of the operators' results was then compared using the intra-class correlation coefficient (ICC) (SPSS v18).
Results: The average ICCs were .87 and .89 in the semi-weight bearing relaxed foot and weight bearing foot, respectively.
Discussion/conclusion: Good inter-rater reliability was found for the VariFit device. The VariFit can be used to reliably assess arch height measured by different trained individuals. Inconsistent results obtained between operators can be diminished by standardizing the techniques used while following protocol, such as, foot position and magnitude and direction of force applied onto the foot.

7. CALORIC EXPENDITURE ESTIMATES USING A HR MONITOR OR A BODYBUGG ARE AFFECTED BY AGE AND SEX

Tanden Bell, Kalli Brueck and Julie Taylor
Physical Education and Human Performance Dept. Southern Utah University

Introduction: Individuals interested in weight management can benefit from the ability to accurately measure caloric expenditure. Numerous devices have been developed to meet this need. Two of these devices were tested in this research; the BodyBugg (Bodymedia, Pittsburg, PA) and the RS400 Heart Rate Monitor (Polar Electro Inc. Lake Success, NY). Our purpose was to determine if age or sex of the wearer affected the accuracy of these two devices.
Methods: Twelve men and twelve women, equally split among two different age groups (18-30yrs) and (40-60yrs), were recruited for this study. Following approval by the IRB of Southern Utah University, participants completed informed consents and were apparently healthy as evidenced by their health histories. Each participant was set up with a BodyBugg, HR Monitor and a face mask to collect expired gasses. They then completed 24 minutes of sub maximal (60% - 70% max HR) treadmill exercise, Following the exercise bout, caloric expenditure from the BodyBugg and HR Monitor were recorded and compared to our criterion measurement of caloric expenditure: indirect calorimetery measured from oxygen consumption and RER (VCO_2/VO_2) levels. Statistical significance was set at $p< 0.05$.
Results: Overall, the BodyBugg overestimated caloric expenditure by 10%. Among younger participants, paired t-tests indicated that both the BodyBugg and HR monitors overestimated caloric expenditure by about 9.3% ($p=0.04$) and 11.6% ($p=0.01$) respectively. When participants were grouped by age and sex, the BodyBugg overestimated caloric expenditure by 13% among younger men ($p=0.08$). There were no differences between older and younger women.
Conclusion: Although the BodyBugg did over estimate caloric expenditure, age had no effect on the measurements provided during treadmill walking. Among women and older men, there does not appear to be any advantage of one device over the other. However, younger men may see more accurate caloric expenditure estimates using a HR monitor.

6.. NO EFFECT OF FITNESS LEVEL ON ERGOGENIC EFFECTS OF CAFFEINE

Todd A. Astorino,[1] Trisha Cottrell,[1] Andrea Talhami Lozano,[2] Kylan Aburto-Pratt,[1] Jessica Duhon[3]Department of Kinesiology, CSU, San Marcos,[1] Tufts University,[2] San Diego State University[3]

Background: The primary aim of this study was to compare the ergogenic effects of caffeine on cycling performance in endurance-trained and recreationally-active participants. **Methods:** Endurance-trained ($n = 9$, $VO_2max = 57.5 \pm 3.9$ mL/kg/min) and active ($n = 8$, $VO_2max = 46.5 \pm 6.3$ mL/kg/min) participants initially completed two familiarization trials separated by at least 48 h. Over the next three trials, they completed a 10 km cycling time trial preceded by ingestion of drinks containing caffeine (5 mg/kg over 2 d) or placebo. Treatments were ingested using a single-blind, crossover design, and participants were deceived as to the content of all drinks. During exercise, heart rate (HR), rating of perceived exertion (RPE), and time were recorded every 1.6 km. Repeated measures analysis of variance was used to assess differences in cycling time, HR, and RPE between treatments, with fitness level used as a between-subjects variable. **Results:** Caffeine increased ($p < 0.05$) cycling performance by 0.3 – 1.9 % versus placebo, with no effect ($p > 0.05$) of fitness level. Magnitude of performance improvement in both caffeine trials (-0.21 and -0.23 min, respectively) was similar versus placebo. Compared to placeco, exercise HR was higher ($p < 0.05$) with caffeine, although RPE was similar ($p > 0.05$) across treatments.
Conclusions: Data reveal that discrepancies in fitness level do not alter magnitude of the ergogenic effect of caffeine on cycling performance in active participants.

8. ACCURACY OF SENSEWEAR ARMBAND IN ESTIMATING ENERGY EXPENDITURE IN YOUNG AND OLDER ADULTS DURING A CONTROLLED EXERCISE TRIAL

Dharini Bhammar, Brandon Sawyer, Siddhartha Angadi, Glenn Gaesser
Healthy Lifestyles Research Center, Exercise and Wellness Program, School of Health Promotion and Nutrition, Arizona State University.

Purpose: The SenseWear Armband (SWA) is an activity monitor designed to estimate energy expenditure (EE) for facilitation of physical activity and weight goals. The aim of this study was to validate the SWA for assessment of EE during exercise in adults.
Methods: Thirteen males aged 63 ± 3.5 years (BMI: 28.8 ± 1.4 kg/m2) and seventeen females aged 55 ± 4.1 years (BMI: 27.2 ± 1.5 kg/m^2) underwent 90 minutes of activities including walking, cycling, arm cranking, and simulated activities of daily living. Each activity lasted 8 minutes with a 4-minute seated rest period in between activities. EE was measured by indirect calorimetry using the Oxycon Mobile ™ (OM) and by the SWA. Paired t-tests, Intraclass correlation coefficients (ICC) and Bland Altman plots were used for statistical analysis.
Results: EE values by SWA and OM were moderately correlated ($r = 0.692$, $p < 0.01$). The SWA significantly overestimated total energy expenditure (TEE) as compared to the OM (335 ± 15 kcal vs 245 ± 12 kcal, $p < 0.01$). Bland Altman analysis showed wide limits of agreement of TEE (Mean: 90 kcal, 95% CI: 4 – 176 kcal) over the 90-minute session. During the steady-state (minutes 4 to 7), ICC analysis between OM and SWA found high reliability for walking at 4mph (.965) and jogging at 5mph (0.972) and moderate reliability for walking at 2, 2.5 and 3 mph (0.749, 0.792 and 0.738, respectively). Lower reliability estimates were seen for cycling (0.482), arm cranking (0.458), sweeping (0.446), and loading and unloading groceries (0.569).
Conclusions: The SWA did not provide valid results of EE across a variety of low- and moderate-intensity activities. It is especially unreliable for activities with minimal accelerometer output such as stationary cycling. It is however, reliable for estimating EE during high-intensity ambulatory activities.

9. RANGE OF MOTION IS NOT RELATED TO POWER OUTPUT IN TRAINED CYCLISTS

Bradley, R., Donkin, J., Martinez, R., Quintana, R., and Parker, D.
The Irvin Faria Exercise Physiology Research Laboratory
California State University, Sacramento, CA

Introduction Stretching routines are common warm-up and cool-down exercise procedures. However, acute bouts of static stretching have been shown to decrease explosive force production. These findings suggest that individuals with a high range of motion (ROM) would have impaired power production. **Purpose** The purpose of this investigation is to examine the relationship between ROM and power production. **Methods** Seven (female n=1) trained cyclists (VO_{2max}: 62.1±7.1 ml/kg/min, BMI: 22.1±1.3, Age: 32±8 yrs) served as subjects for this investigation. Each volunteer first underwent a graded exercise test (GXT) on a cycle ergometer beginning at 70W (female = 50W) and increasing at a rate of 35W/min (female 25W/min) to determine maximal aerobic power (Wmax). Following the GXT, volunteers were assessed for ROM using a goniometer. Measurements were taken for the hip flexor (HF), hip extensor (HE), knee flexor (KF), knee extensor (KE) and plantar flexor (PF) muscles. Following the ROM assessment, volunteers completed a Wingate test to determine peak power (WPP). Relationships between ROM and power outputs were assessed with a Pearson's r correlation coefficient. **Results** There was no significant relationship between any of the muscle groups and either Wmax or WPP ($p>0.05$). However, a trend was observed between PF ROM and Wmax ($r=0.62$ $p=0.14$), as well as WPP ($r=0.62$ $p=0.13$). **Conclusion** ROM does not have a significant relationship with power production in trained cyclists. However, the trend for a relationship in the PF muscle group warrants further investigation with a wider range of subjects and a larger sample.

10. DIFFERENCES IN IMPACT FORCES BETWEEN TENNIS SHOES, MINIMALIST SHOES AND BARE FEET

Vanessa L. Cazas, James J. Tufano, Joe LaPorta, Kevin Shishido, Leah Truong, Lee. E. Brown, FACSM
Centerfor Sport Performance, Department of Kinesiology, California State University, Fullerton

Training with minimalist shoes is a popular new trend. The purpose of this study was to investigate the differences in impact forces between various shoes. Twenty-seven recreationally trained females (23±2.2 yrs, 162.94±7.37 cm, and 62.02±8.79 kg) participated in this study. Following a 5-minute cycling warm-up at a self-selected cadence, each subject completed a series of three vertical jumps (VJ) and three box drops (BD) in random order while wearing one of three different types of footwear: normal tennis shoes (TS), minimalist shoes (MS; Fila Skele-toes) or bare feet (BF). All vertical jumps were performed on a force plate in a counter-movement fashion with hands placed on the hips. All box drops were performed from a plyometric box of 45.72cm height. Ground reaction forces (GRF) were directly measured at 1000Hz using an AMTI force plate and vertical jump height (VJH) was estimated using the time-in-the-air equation of projectile motion. Repeated measures ANOVA showed no significant ($p>0.05$) differences for VJ impact forces between TS (mean: 2509.78 N, SD: 744.08), MS (mean: 2564.28 N, SD: 837.17) or BF (mean: 2591.66 N, SD: 813.19). There were also no significant ($p>0.05$) differences in the DB impact forces between TS (mean: 2927.64 N, SD: 921.99), MS (mean: 3099.96 N, SD: 1092.99) or BF (mean: 3147.07 N, SD: 1101.20). Results showed that impact forces were greater in the box drop impact than in the vertical jump. VJH (means: TS: 22.95cm, MS: 22.19cm and BM: 22.51cm) was less than DB height, resulting in greater impact forces. Traditionally, tennis shoes are designed to absorb impact forces. Yet, energy absorbed was not significantly different between conditions. Based on these results the type of shoe one selects to train will not affect impact forces.

11. WITHIN AND BETWEEN SESSION RELIABILITY OF THE MAXIMAL VOLUNTARY KNEE EXTENSION TORQUE AND ACTIVATION

*David H. Chinn, *Jihong Park, *Adam Squires, †Dennis L. Eggett, *J. Ty Hopkins (FACSM)
*Department of Exercise Sciences, Human Performance Research Center, †Department of Statistics, Brigham Young University

Calculation of central activation ratio (CAR) has been widely used to assess central activation failure. To date no data exist regarding the intersession reliability of this measurement. **Purpose:** To report within and between session reliability of quadriceps maximal voluntary knee extension torque and activation. **Methods:** Thirteen, neurologically sound volunteers (9 males and 4 females, age: 21.9±3.2 year, height: 1.7±3.1 m, mass: 76.6±10.1 kg) underwent three testing sessions with 48 hours between sessions. To obtain the measurements, subjects performed maximal voluntary isometric contraction (MVIC) of the quadriceps with the knee locked at 90° flexion and the hip at 85°. Once the MVIC reached a plateau, an electrical stimulation (100 pulses/s, 600 μs pulse duration, 10 train in 100ms duration, 125V with peak output current 450mA) was manually delivered and transmitted directly to the quadriceps via stimulating electrodes. This stimulation caused a transient increase of torque by recruiting any remaining muscle fibers or maximizing the firing frequency of the quadriceps. CAR was calculated by dividing the MVIC torque by the sum of the torque generated by the MVIC and the superimposed burst (SIB) technique (CAR = MVIC torque / MVIC+SIB torque). Subjects performed three trials in each session. Intraclass correlation coefficient (ICC) within a session and between sessions were calculated using maximal MVIC torques and CAR values. **Results:** We found strong reliability in MVIC both within ($ICC_{(1,1)}=0.96$, $ICC_{(2,1)}=0.97$) and between session ($ICC_{(1,1)}=0.91$). CAR had moderate to weak reliability within a session($ICC_{(1,1)}=0.78$, $ICC_{(2,1)}=0.67$) and weak in between session ($ICC_{(1,1)}=0.63$). **Conclusions:** Based on our data, maximal quadriceps MVIC torque is very reliable both within and between measurement sessions. CAR had lower reliability within a session and between sessions compared with MVIC.

12. THE EFFECT OF 2 WEEKS OF NIGHT EATING RESTRICTION: A RANDOMIZED AND COUNTER-BALANCED STUDY

E Christenson, BW Bailey, LA Tucker, FACSM, JD LeCheminant, FACSM
Department of Exercise Sciences, Brigham Young University

Purpose: This study examined the effects of two weeks of night eating restriction on energy intake and body weight in young adult men. **Methods:** Eleven college-aged men were randomized to two weeks of normal eating (NE) and two weeks of night eating restriction (NER) in a counter-balanced fashion. There was a one week wash-out period between conditions. During NE, participants were asked to consume their normal diet, ad libitum. During NER, participants were asked to avoid all eating or kcal consumption from 7pm-6am but there were no restrictions on type or amount of food/beverage consumed. To assess diet, participants were asked to complete three randomly assigned dietary recalls during each week of the study. The National Cancer Institute's Automated Self-administered 24-hour Dietary Recall (ASA24) was used to collect and analyze energy and macronutrient intake. Body weight was measured using a digital scale before and after each condition (NE and NER). **Results:** During NE, participants consumed 2,497 ± 514 kcal/d and during NER 2,115 ± 269 kcal/d ($F=7.89$; $P=0.019$). Dietary fat intake during NE was 105 ± 27 g/d and during NER was 86 ± 15 g/d ($F=7.05$; $P=0.024$). There were no differences between the two conditions in carbohydrate, protein, alcohol, or fiber intake ($P>0.05$). Body weight change during NE was 0.73 ± 0.93 and during NER was -0.19 ± 0.87 ($F=7.60$; $P=0.020$). **Discussion:** Restricting energy intake after 7pm may result in lower energy intake and potentially better short-term weight management than not limiting night eating. The difference in energy intake primarily resulted from lower fat intake during NER.

13. EFFECT OF A 45-MINUTE EXERCISE SESSION ON TOTAL ACTIVITY IN NORMAL-WEIGHT AND OBESE WOMEN

T Clark, B Hanlon, J Roberts, BW Bailey, M Larson, JD LeCheminant, FACSM
Exercise Sciences Department, Brigham Young University

Purpose: The purpose of this study was to compare total physical activity level in normal-weight and obese women under two separate conditions (an acute bout of exercise; non-exercise). This study used a matched subject design (except for BMI) with treatment conditions randomized and counter-balanced. **Methods:** Seventeen normal-weight (31.4±9.2 y, 22.8±1.3 kg/m^2) and 17 obese (32.9±9.0 y, 34.0±4.9 kg/m^2) women completed testing for both conditions. During the exercise condition, participants completed an early morning (8-9am) exercise session on a motor-driven treadmill at 3.8 mph and 0% grade for 45 continuous minutes. Each participant was fitted with an accelerometer immediately prior to the exercise session and wore it continuously for the following 24-hours. There were no instructions or limitations on subsequent activities. During the non-exercise session participants wore an accelerometer on the same day of the week (1 week later), for the same 24-hour period, but did not complete a supervised exercise session and received no instructions or limitations on physical activities. **Results:** For both the normal-weight and obese women, the exercise condition resulted in significantly more total physical activity (accelerometer counts), moderate-intensity activity, vigorous-intensity activity (min), moderate-to-vigorous intensity activity (MVPA) min, and less sedentary time (min) ($P<0.05$) than the non-exercise condition. There was a significant group*condition interaction for MVPA ($F=4.48$; $P=0.043$) with the obese women showing less MVPA on the exercise day than the normal-weight group. **Discussion:** A supervised and planned exercise bout dramatically increases total physical activity in normal-weight and obese women compared to a day without planned exercise. The normal-weight women spontaneously obtained more MVPA on the exercise day than the obese women.

14. LEGAL AND SCIENTIFIC VALIDITY OF TESTS FOR DISABILITY EVALUATION IN INDIVIDUALS WITH CHRONIC FATIGUE SYNDROME: A SYSTEMATIC REVIEW

Matthew T. Council, Emily M. Schmit, Margaret E. Ciccolella, Todd E. Davenport
Sport Sciences, University of the Pacific

Chronic fatigue syndrome (CFS) affects at least 4 million individuals in the United States. Symptoms of CFS often limit the ability to work, so claims for disability benefits are common in this population. Legal decisions regarding claims for disability benefits are made on the basis of objective measures of physical capability, including functional capacity evaluation (FCE) and maximal cardiopulmonary exercise testing (CPETmax). FCE is the most common test upon which to base legal decisions regarding the physical capability to work. FCE involves a clinician's assessments of a patient's ability and effort during a standardized set of physical tasks. CPETmax involves objective measurements of cardiovascular, pulmonary, and metabolic responses to physical activity, as well as physical effort during the task.

This project involved a systematic review of scientific and legal evidence regarding the validity of FCE and CPETmax to determine the ability to work in individuals with CFS. A systematic review of the scientific literature was conducted using Pubmed, CINAHL, Cochrane Database of Systematic Reviews, and PeDRO; scientific evidence was then graded using Sackett's Levels of Biomedical Evidence. The legal literature was searched using LexisNexis. No evidence for scientific validity, reliability, and sensitivity to change was found for FCE in individuals with CFS, while low-level scientific evidence was found to support differences in CPETmax measurements in individuals with CFS compared to control subjects. Case law was found that documented legal decisions regarding the physical capability to work in individuals with CFS that was involved either FCE or CPETmax. No discernible pattern of legal decision-making could be ascertained based on test. Legal decision-making based on CPETmax often involved an incomplete analysis of the data presented. Additional scientific and legal work is necessary to determine the potential role for CPETmax in determining the physical capacity to perform work in individuals with CFS.

15. OUTCOMES OF HIGH-INTENSITY ANAEROBIC TRAINING DURING PREGNANCY

Dewalt, H. and Perkins, C.D.
Sports Medicine, Natural Sciences, Pepperdine University

Recently there is growing attention in research on anaerobic exercise during pregnancy. Studies that have evaluated anaerobic exercise during pregnancy have been limited to training intensities equivalent to muscular endurance. To date, there are no scientific studies that have evaluated high-intensity anaerobic training (strength and power) during pregnancy. **Purpose**: To investigate variables and outcomes associated with performance of high-intensity anaerobic training during pregnancy. **Methods**: Two women who voluntarily continued high-intensity training (CrossFit training) during pregnancy provided detailed exercise logs and completed a questionnaire. Variables measured included exercise volume and intensity, Rating of Perceived Exertion (RPE), qualitative responses regarding specific exercises performed, and birth outcomes (gestational age, birth weight, Apgar score). **Results**: A typical CrossFit workout completed by the subjects was ~3 and 5 times the exercise volume and intensity of the current recommendations during pregnancy, respectively. The women performed these workouts between 1.2±1.4 and 4.8±1.2 days per week throughout pregnancy and RPE ranged from 11-18). Gestational age (GA=41-42 wks) and birth weight (BW=3007 and 3362 g) were within normal ranges. Some exercises had to be modified in order to accommodate for morphological changes in abdominal size. Both women perform Olympic lifts without modification or scaling throughout pregnancy, and both set personal records in specific lifts. The women returned to exercise training 1.7 and 2.7 wks after delivery. **Conclusion**s: In these two case-studies, performance of high-intensity anaerobic training during pregnancy did not negatively affect birth outcome. We cannot determine whether the personal records set by each woman was a result of the progression of training or if physiological changes that accompany pregnancy (e.g., hormones) may offer added benefits in strength training. This is the first study to formally investigate this type of training during pregnancy. Given that these are case-study reports, the results should be applied cautiously all pregnant women.

16. PRE-EXERCISE STRETCHING HAS NO EFFECT ON TIME TO COMPLETION OF A 576KJ TIME TRIAL.

Donkin, J., Polin, M., Bradley, R., Martinez, R., Quintana, R., Parker, D.
IE Faria Exercise Physiology Research Laboratory, California State University Sacramento

Current research on pre-exercise stretching in cycling shows a decrease in performance. However, most of these studies have only investigated short-term bout of cycling. **Purpose.** The purpose of this study was to determine the effect of pre-exercise stretching on cycling time trial (TT) performance when compared to an active warm-up and no warm-up. **Methods.** Seven male and female cyclists volunteered to participate in this study (n=1 female, age = 32 ± 8 years, BMI = 22.1 ± 1.3 cm, VO_2max = 62.1 ± 7.8 mL/Kg/min). After baseline testing to determine VO_{2max} and maximal aerobic power (Wmax), subjects completed 3 different warm-up protocols (Stretch = S, Warm-up = WU, No Stretch = NS) prior to a cycling bout of 576 kJ (~20 km). During each TT VO_2, HR, and RPE were recorded every 144 kJ (~5Km). Order was determined using Latin squares and athletes were given 48 hours of rest between trials to prevent soreness. A two-way ANOVA with repeated measures was used to assess changes in the study **Results.** No significant difference was found in time to completion (S= 41.34 min ± 7.66, WU =41.31 min ± 7.61, NS = 40.92 min ± 7.18, p= 0.99) for the three trials. Similarly, VO_2 was also found to have no significant difference between trials (p=0.98) or over time (p=0.61). HR and RPE were not significantly different between trials (p=0.75, 0.78), but increased significantly over time (p=0.01, 0.00) **Conclusion.** The results of this study suggest that static stretching prior to a 576 kJ TT cycling bout will have no significant effect on performance.

17. THE BIOMECHANICS OF PIROUETTES IN ELITE FEMALE DANCERS

Chelsea Duncan and Stuart Rugg
Occidental College Department of Kinesiology

The purpose of this experiment was two-fold: 1) to analyze the initiation, turn and landing phases of a pirouette across classical ballet and jazz styles, and 2) to examine the effect of altering the anterior/posterior width of the feet in pirouette preparation on subject perceived exertion. The subjects were eight elite female dancers, average age of 20 years (±1.41), average height of 65.19 inches (±1.87), and average weight of 126.87 pounds (±16.88). Subjects were asked to complete a single *en dehors* pirouette, with four different foot placements and rate perceived exertion (RPE) based on the Modified Borg Scale (0-10). Video recording was performed using a Sony HDR-HC9 camcorder mounted on a Bogen 3021 tripod. Videos were analyzed using Dartfish 5.5 Pro-Suite software. For single ballet pirouettes, subjects spent 39% in the initiation phase, 23% in the turn phase, and 38% in the landing phase. This was similar in the single parallel jazz pirouette with subjects spending 40% in the Initiation, 28% in the turn, and 32% in the landing. The freely chosen preparation width had the greatest pirouette landing success rate with an average RPE of only 0.5. At the widest preparation width, landing success rate dropped by 12.5% and the average RPE increased to 4.21. In addition, a pirouette preparation width that was freely chosen was the most comfortable, and was associated with the highest successful pirouette-landing rate.

18. URINE COLOR AND ITS RELATION TO MOOD IN ATHLETES, RECREATIONAL EXERCISERS, AND NON-EXERCISERS

Carolyn L.V. Ellis, Nicole E. Moyen, Caitlin A. Jennings, Nicholas A. Arciniaga, Erin J. Griffith, Andrea B. DuBois, Daniela A. Rubin, Lenny D. Wiersma, Daniel A. Judelson FACSM
Center for Sport Performance, Department of Kinesiology, California State University, Fullerton

Despite profound effects of hypohydration on important characteristics such as mood, little research documents the hydration state of healthy, free-living adults. Given the important influence of exercise-induced sweating on total body water, habitual physical activity might modify typical fluid balance. Therefore, the purposes of this study were to examine the free-living hydration state of a large adult sample, how fluid balance related to mood, and if habitual exercise influenced these relationships. Hydration status was examined in 231 males and 264 females (age = 21 ± 4 y) from three exercise classifications: collegiate varsity athletes (ATH, n = 101), recreational exercisers (REC, n = 221), and non-exercisers (NON, n = 173). Investigators assigned exercise status based on team membership and/or the Godin Leisure-Time Exercise Questionnaire. Participants completed the Brunel Mood Scale and provided a urine sample. Urine color (U_{col}) was measured using an eight point color chart, ranging from very pale yellow (1) to brownish green (8). 53.2% of all subjects displayed U_{col} indicative of hypohydration (all participants U_{col} = 4 ± 2). No significant differences existed in U_{col} between exercise categories or genders. Males, females, NON, and REC each showed no significant relationships between U_{col} and Anger, Confusion, Depression, Fatigue, Tension, or Vigour. For ATH, U_{col} significantly related to Fatigue (r = 0.232), but no other mood descriptors. Male NON, male REC, male ATH, female NON, and female REC displayed no significant relationships between U_{col} and any mood descriptor. Female ATH, however, demonstrated a significant relationship between U_{col} and Fatigue (r = 0.286). In conclusion, many free-living individuals appeared to be hypohydrated. A detectable relationship exists between hydration status and fatigue in female athletes that was not present in other females or males.

19. A NEW METHOD FOR DETERMINING EXERCISE INTENSITY TO MEET CARDIOVASCULAR NEEDS

R. Garner, J. Gengler, B. Lym, J. Rindlisbacher, C. Robertson, N. Schreher and D. Eli Lankford
Dept. of Exercise and Sports Science, Brigham Young University-Idaho

INTRODUCTION: The purpose of the study was to determine whether work at lactate threshold (LT) or ventilatory threshold (VT) is optimal for improvements in cardiovascular fitness. ***METHODS:*** 27 college-aged students (7 females, 20 males) participated in the study. Subjects were separated into groups based on fitness levels, sedentary (SED), average (AVG) and fit (FIT). Subjects participated in a graded exercise test (GXT) to determine LT followed by a VO_2max test. VO_2 at LT was used to determine work rate for a final run where time to exhaustion (TTE) was recorded. ***RESULTS:*** No differences (p = 0.079) in TTE were found between groups SED, AVG, and FIT, therefore all groups were combined for further analysis. TTE = 33.96 ± 10.97 min; HR at LT =167.77 ± 9.12 bpm; RPE at LT:= 13.19 ± 1.36; VO_2max = 53.35 ± 7.67 ml/kg/min^{-1}; VO2 at LT = 39.46 ± 6.02; ml/kg/min^{-1} .Percent VO_2max at LT = 74.04 ± 5.26% TTE was not related to VO_{2max} (p=0.9; r = -0.009). Additionally, TTE was not related to VO_2at LT (p = 0.24; r= .06). The study determined no correlation between TTE and fitness level measured as both VO_{2max}, and VO_2 at LT. ***DISCUSSION:*** General guidelines typically recommend between 30-60 min of exercise most days of the week. Other guidelines use RPE, % VO2max, or HR to determine exercise intensity. The varying recommendations can cause confusion as to proper exercise prescription. We found that by exercising at LT, total exercise time fell within the recommended guidelines of the ACSM and the CDC for both duration and intensity. ***CONCLUSION:*** Exercise at LT or VT fell within the recommended guidelines for duration of exercise regardless of fitness level. We recommend using LT or VT as the guideline for determining exercise intensity.

20. TIMED GET-UP-AND-GO TEST: A COMPARISON OF THE 3 METER AND 10 METER TESTS

Krystyna Gonzalez, Samantha Johnson, Rebecca Ellis, Maria Kosma, Robert Wood
New Mexico State University Department of Human Performance Dance and Recreation, Georgia State University, Department of Kinesiology and Health, Louisiana State University, Department of Kinesiology

The Comprehensive Falls Risk Screening Instrument (CFRSI) is a valid method to assess the falls risk in older adults, and identifies risk factors in several domains including: history, physical function, medications, vision, and home environment as well as a total falls risk score. One of the elements of the CFRSI is the 10-meter expanded timed get-up-and-go (ETGUG). Purpose: To examine the utility of the 3-meter timed get-up-and-go (TGUG) test for inclusion in the CFRSI by comparing it to the ETGUG. By establishing the utility of the TGUG we can offer a version of the CFRSI that can be administered in a home or in a physician's office. Methods: Twenty-three independent-living older adults with a three-year history of falls (mean age= 73.9) and twelve with no history of falling in the last three years (mean age= 72.5), completed all elements of the CFRSI and the 3-meter TGUG. Linear regression was employed to derive a prediction equation for the ETGUG based on the TGUG. Repeated measures ANOVA was used to derive an intraclass correlation coefficient between ETGUG times and predicted ETGUG times. Results: Fallers: TGUG= 10.67 sec., ETGUG= 21.57 sec., history= 58.7, physical= 30.2, medication= 46, vision=38, environment= 32.5, and average total CFRSI score= 41.1. Non-fallers: TGUG= 8.73 sec., ETGUG= 18.12 sec., history= 15.7, physical= 22.6, medication= 39.3, vision= 33.4, environment= 28.3, and average total CFRSI score= 28. Linear regression reveals a strong correlation between TGUG and ETGUG scores ($y = 1.95x + 0.83$; $R^2 = 0.96$). The intraclass correlation between TGUG and ETGUG scores (ICC=0.98) demonstrates good agreement between the measures. Conclusion: These data suggest that the TGUG can be used as a surrogate for the ETGUG in the CFRSI screening instrument. This allows the CFRSI to be performed at home or in physician offices where space is limited.

21. THE EFFECT OF DIFFERENT WARM UP TECHNIQUES ON 50-YARD SWIMMING SPRINT TIMES

Angela Harter, Cheyenne Coffman, Seamus Alger, Donald Diboll
Fresno Pacific University, School of Natural Sciences, Division of Kinesiology

The purpose of this study was to test the effect of swimming, dryland, and yoga warm-ups on 50 yard swimming times. Ten male and twelve female college swimmers were randomly given three different warm-ups followed by a 50-yard sprint. Each athlete was given a chance to rest and the procedure was repeated so each athlete performed each warm-up. The times for each warm-up condition were averaged and a 2x3 ANOVA with repeated measures was used to analyze the data. There was no significant difference between the three warm-up methods (p=.488). These results suggest that any of these warm-up methods are effective. This is beneficial given that access to a pool for warming up prior to competition is often not available.

22. ASSOCIATION OF NUTRITION AND PHYSICAL ACTIVITY ON SARCOPENIA AND OSTEOPENIA IN THE ELDERLY

Emily Hanth, Kelly, Louise A.
Department of Exercise Science, California Lutheran University

BACKGROUND: With advancing age there are significant changes in body composition such as increased body fat, gradual lose of muscle mass and function (sarcopenia) and deterioration of bone (osteopenia). Research shows that a healthy diet and participating in physical activity may be the key to slowing down the process of aging, but research is conflicting. **PURPOSE:** To investigate the relationship of dietary intake, nutritional status, physical activity on sarcopenia and osteopenia in the elderly. **METHODS:** 165 men and women (mean age 73.99±6.54 years) were recruited to participate in the study. Body Mass Index (BMI) was calculated by measuring height to the nearest 0.1cm and weight to the nearest 0.1kg using a beam and a medical scale. Body composition was measured by dual X-ray absorptiometry (DXA). A BMD t score below -1.0 defined Osteopenia and sarcopenia was defined as appendicular lean mass/total muscle mass. Dietary intake and physical activity were assessed over a 3-day period using diet recalls and the Actigraph GT1M accelerometer. Pearson correlation coefficients were used to examine the relationship between diet with Sarcopenia and Osteopenia, and Spearman's rank correlations were used to examine relationships between physical activity intensities with Sarcopenia and Osteopenia. All data was analyzed using SPSS version 18 (SPSS, Chicago, IL), with a significance set at $P < 0.05$.
RESULTS: Sarcopenia was positively correlated with light (rho = 0.30, P = 0.02) and vigorous physical activity (rho = 0.22, P = 0.03), total caloric intake (r=0.37, P<0.00), total carbohydrate intake (r=0.36, P<0.00), total protein intake (r=0.29, P=0.03), and total fat intake (r=0.41, P<0.00). Osteopenia was inversely correlated with sedentary behavior (rho = -0.20, P = 0.04) and was not correlated with any of the dietary variables (P>0.05).
CONCLUSION: These data suggest the relationship between sarcopenia and osteopenia may indeed be mediated by physical activity and nutrition.

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23. THE INFLUENCE OF STATIC, DYNAMIC, AND ACTIVE-ISOLATED STRETCHING ON VERTICAL JUMP PERFORMANCE.

S.E. Horsch[1], L.M. Dixon[2], B.D. Hanson[2], K.S. Hamilton[2], L.K. Reikowsky[2], A. Williams[2], M. Cook[2], and J.S. Dufek, FACSM[1]
[1]Department of Kinesiology and Nutrition Sciences, University of Nevada, Las Vegas
[2]Department of Exercise Science, Indiana Wesleyan University

The sliding filament theory explains the interaction between muscle contraction and the force produced; yet it is not clear if stretching influences vertical jump performance. **Purpose**: The purpose of the study was to examine the effect of three stretching routines on vertical jump performance. **Methods:** Twenty-four male participants (18-22 yr) granted written consent to participate and were randomly assigned to one of four experimental groups: 1) control with no stretching (CG), 2) static stretching (SG), 3) dynamic stretching (DG), and 4) active-isolated stretching (AIS). Following a warm-up consisting of a half-mile jog, each subject performed three baseline vertical jumps. Subsequently, the subjects completed their designated stretching routine followed by three additional vertical jumps. Jump height was measured with use of a vertech. A difference score (experimental group – baseline) was computed from the average of three jumps for each condition and a one-way (four factor) ANOVA was conducted (α=0.05) to test for differences across groups. **Results:** The CG, DG and AIS increased performance (1.86±1.88cm; 2.71± 5.53cm, 1.14± 3.31cm, respectively) while SG did not (-0.04 ±1.78cm). However, there were no significant differences among groups ($F_{(3)}$=0.65, p=0.589). **Discussion:** It can be observed that group results were quite variable, suggesting that effectiveness of the stretching routines were subject-specific. Theoretically, jump improvement may be attributed to the sliding filament theory, leading to an increase in force production. Equivocal findings do not allow a definite conclusion as to whether DG and AIS elicited such a response.

24. COMPARISONS OF BIA DEVICES AND SKINFOLDS TO HYDROSTATIC WEIGHING IN FOOTBALL LINEMEN.

H.S Hsu[1], J.J McCormick[1], J.R. Beam[1], M.G. Kulovitz[1], G. G. Martinez[1], C.M. Mermier[1, 2], & A.L. Gibson[1]
[1]Department of Health, Exercise, and Sports Sciences, University of New Mexico[2]Employee Health Promotion Program, University of New Mexico

Purpose: Few studies have focused on measuring body composition of football linemen, who typically have a larger body size than the general population. The purpose of this study was to investigate the accuracy in estimating body fat (%BF) of football linemen by comparing whole-body multiple-frequency (InBody520), regional single frequency (Omron & Tanita) BIA devices and skinfold (SKF) method to underwater weighing (UWW). **Methods:** 15 collegiate football linemen (19.7±1.1 yrs, 190.0±4.4cm, 126.7±8.2kg) volunteered for this study. Body composition assessments were made using BIA and SKF method followed by underwater weighing. All subjects were asked to follow pretest guidelines and all measurements were completed in one visit. All BIA measurements were taken after at least 5 minutes in the standing position. SKF estimated body density using Jackson & Pollock (1978) 7 site equation for athletes (Men, 18-29yr.). Residual lung volume was measured using the oxygen dilution technique. Body density was converted to body fat using Siri's equation. The data were analyzed by paired-sample t test with Bonferroni adjustment using SPSS. Consequently, significance was $p<0.013$.
Results: The Tanita (30.3±4.8 %BF), and InBody 520 (28.4±7.1 %BF) significantly overestimated %BF ($p<.005$) when compared with UWW (24.6±7.3 %BF). There was no significant difference for SKF (23.7±5.9 %BF) and Omron (23.2±3.0 %BF) compared to UWW. **Conclusion:** Both SKF and Omron were accurate in estimating %BF in football linemen, while the Tanita and InBody 520 overestimated %BF from UWW. Further study is needed to test the validity of using the Omron regional single frequency BIA in a larger sample of football linemen.

25. FALLS RISK AND INTERMEDIATE DETERMINANTS OF HEALTH DISPARITIES

Samantha Johnson, Krystyna Gonzales, Rebecca Ellis, Marie Kosma, Robert Wood
New Mexico State University, Department of Human Performance, Dance and Recreation
Georgia State University, Department of Kinesiology and Health
Louisiana State University Department of Kinesiology

Proximal and intermediate determinates of health disparities such as race, education and income influence health outcomes. The purpose of this study is to examine the influence of race, education and income on falls risk factors. While data are scant and equivocal, health disparities theory suggests we will observe differences in falls risks related to these determinants. **Methods:** *Participants*: 730 older adults were recruited from community health centers in LA, GA, and NM. Exclusion criteria: age < 50 years old, non-ambulatory, and MMSE < 19. Participants are described as belonging to one of three income levels: Low (≤ $1306/mo.), Medium ($1307-$1836/mo.), High ($25,000/yr). The Education levels of the participants are described as: Low (High school grad or less), Medium (Associate's degree or some college), High (Bachelor's degree or above). Each participant completed the Comprehensive Falls Risk Screening Instrument[7]. Falls risk domain scores are provided for History, Physical Function, Medications, Vision, and Environment. An average Total Falls Risk Score is derived. MANCOVA and follow-up univariate tests were used to test for the effects of race, education and income on falls risks. Age, gender and location were included as covariates ($p<.05$). **Results:** Results are presented for N=626 older adults (M 72.62 years, SD 9.31). Seventy-four percent were women, 50.8% were Black, 43.3% low-income, and 60.9% low-education. Main effects were observed for race and income. Univariate tests revealed low income participants had greater scores for history ($p = .006$), physical functioning ($p = .002$), and total falls risk ($p < .001$) than high income participants. Black participants had greater scores on history ($p = .030$), physical functioning ($p = .004$), medication ($p = .012$), and total falls risk ($p = .011$) than White participants. **Conclusion:** These data suggest that Blacks and low-income seniors have higher falls risk than their White and/or more affluent counterparts.

26. OXYGEN COST OF HOUSEHOLD ACTIVITIES

Jonathan Kurka, Nathanael Meckes, Jesse Vezina, Barbara E. Ainsworth FACSM
Arizona State University, Exercise and Wellness Program

Purpose: The Compendium of Physical Activities lists the metabolic equivalents (METs) for various activities. Some activities have estimated METs because measured values have not been published. This study measured the oxygen cost and associated METs and heart rate values during three cleaning activities; mopping a floor, cleaning a tub/shower, and clearing a table and washing dishes. **Methods:** The oxygen cost in $ml \cdot kg^{-1} \cdot min^{-1}$ was recorded using an Oxycon Mobile metabolic system. Heart rate was measured in $b \cdot min^{-1}$ using a telemetry system. Each activity was performed for 8 minutes with the oxygen cost averaged over 5 minutes, excluding data for the first two and final minutes of each task. METs were calculated as work oxygen cost in $ml \cdot kg^{-1} \cdot min^{-1}$ divided by 3.5 $ml \cdot kg^{-1} \cdot min^{-1}$. **Results:** Participants included 16 adults (8 men, 8 women) with a mean age of 36 ± 13 yrs, height of 170.0 ± 11.7 cm, and weight of 82.6 ± 22.5 kg. Body mass index was computed as 28.4 ± 6.3 kg/m^2. The oxygen costs, METs, and heart rate responses were:

Task	Oxygen Cost ($ml \cdot kg^{-1} \cdot min^{-1}$)	METs	Heart Rate ($b \cdot min^{-1}$)
Sponge Mopping	11.0 ±3.2	3.14	104.6 ±19.6
Cleaning a Tub/Shower	10.1 ±2.0	2.89	98.4 ±14.9
Clearing a Table/Washing Dishes	6.8 ±1.6	1.93	89.3 ±16.4

Conclusion: MET values were higher for sponge mopping than cleaning a tub/shower and clearing a table and washing dishes. Classification of intensities identifies mopping as moderate intensity (3.0-5.9 METs) and cleaning a tub/shower and clearing a table and washing dishes as light intensity (<3.0 METs) activities.

27. EFFECTS OF DIFFERENT FOOTWEAR ON POWER AND VELOCITY DURING THE VERTICAL JUMP

Joe LaPorta, James J. Tufano, Vanessa L. Cazas, Kevin Shishido, Leah Truong, Lee E. Brown, FACSM
Center for Sport Performance, Department of Kinesiology, California State University, Fullerton.

Little is known about the effects of different footwear on power and velocity during exercise. The purpose of this study was to determine the effects of different footwear on power and velocity during the vertical jump. Twenty seven female volunteers (23±2.2 yrs, 162.94±7.37 cm, and 62.02±8.79 kg) performed a five minute warm-up on the cycle ergometer and were then randomly assigned to one of three conditions (tennis shoes, minimalist shoes, or barefoot). Subjects then performed three maximal countermovement vertical jumps. Peak power and peak velocity were measured on a force plate. A repeated measures ANOVA compared the three conditions. There were no significant differences ($p>0.05$) in peak velocity between the three conditions. Peak power was significantly greater ($p<0.05$) in barefoot (2440.19 W/403.76) when compared to minimalist footwear (2371.50 W/340.76), but not tennis shoes (2403.87 W/ 350.53). It appears that during the vertical jump exercise, peak velocity is unaffected by footwear. However, peak power was reduced by minimalist footwear. This may be due to the lack of familiarization with the minimalist footwear, affecting one's ability to produce force quickly. When training vertical jump for peak power, minimalist footwear may be detrimental to one's performance. However, there appears to be no difference in peak velocity between these different types of footwear. At this time, a change in footwear is not warranted to enhance peak power and peak velocity during the vertical jump.

28. ACTIVATION OF HUMAN SWEAT GLANDS USING INTRADERMAL ELECTRICAL STIMULATION

Gary W. Mack, Cory Heal, Scott Goldthorpe, and Jason Gifford
Department of Exercise Science, Brigham Young University

A model for examining sweat gland function using intradermal electrical stimulation to activate sudomotor nerves (small sympathetic cholinergic C-fibers) was examined in the dorsal aspect of the forearm in 10 healthy adults. We monitored the local sweat rate (SR) response of a small area of skin using small capsule (0.7 cm^2) containing a humidity sensor and thermocouple flushed with dry gas at 100 ml • min^{-1}. Two small stainless steel needles were place into the skin immediately outside of the capsule and stimulated at frequencies of 0.2, 1, 2, 4, 8, 16, 32, and 64 Hz at two current intensities (1.5 and 2.5 mA) for 30 s. The stimulus-response characteristics of local SR were evaluated using a non-linear four-parameter logistic curve fitting equation. The increase in local SR reached a plateau at a stimulus frequency of 32 Hz. The peak local SR response was significantly greater at 2.5 than 1.5 mA (0.21 ± 0.08 and 0.40 ± 0.12 mg • min^{-1} • cm^{-2}, $p<0.05$). The stimulus frequency that produced 50% of the increase in local SR was similar for both current intensities and averaged 11.2 ± 1.3 Hz. Subjective ratings of pain (0 to 100 scale) during intradermal electrical stimulus increased in a linear manner starting at 6 ± 2 ("weak") and rising to 34 ± 7 ("strong") at 64 Hz and 2.5 mA. Delivery of a 1% atropine sulfate solution to the skin by iontophoresis (2 mA x 10 min) completely blocked the sweating response to intradermal electrical stimulation providing strong evidence that the local SR response was mediated by acetylcholine released in response to depolarization of the small sympathetic cholinergic C-fibers. Intradermal electrical stimulation in combination with measurement of local SR can be used to quantify small C-fiber function in human skin with minimal pain.

29. LEG STRENGTH DECLINES WITH ADVANCING AGE DESPITE CHRONIC ENDURANCE EXERCISE IN ACTIVE OLDER ADULTS

Taylor J. Marcell[1, 3], Petra Martins[1], Ivan Palomino[1], Steven A. Hawkins, [2, 3], Robert A. Wiswell[3]
Department of Kinesiology[1], CSU Stanislaus; Department of Exercise Science[2], California Lutheran University; Department of Exercise Science[3], University of Southern California

INTRODUCTION: Recent physical activity guidelines for older adults have included recommendations for resistance training and intensity, whereas earlier versions focused solely on low intensity walking activities. We have previously collected longitudinal data on highly active seniors who have exclusively participated in running as a form of exercise to evaluate whether running alone was sufficient to prevent age-associated sarcopenia.

METHODS: Ninety-five very active older men (n = 59) and women (n = 36) were selected from a population of 237 master athletes participating in a longitudinal study at the University of Southern California. Subjects attend biannual comprehensive physiologic testing between May 1987 and December 2001. Isokinetic knee extension and isometric knee extension and flexion strengths were assessed using a Kin Com dynamometer (500H). Subjects self-reported training and performance data including 5 kilometer, 10 kilometer, and marathon distances.

RESULTS: Data were evaluated combined and by age tertiles (50-54 yr, 55-64 yr, & 65-80 yr). Average time between tests was 4.8 ± 2.0 yrs. VO_2 max declined significantly in men (48.4 ± 9.9 to 44.8 ± 9.8 ml/kg/min; p = 0.001) and women (43.5 ± 8.0 to 40.6 ± 9.3 ml/kg/min; p = 0.009). Isometric flexion and extension strengths declined in both men and women at all angles measured (e.g., knee-extension at 60°: 251.2 ± 55.3 N to 199.8 ± 56.7 N; p = 0.001 men & 158.8 ± 34.0 N to 126.2 ± 32.5 N; p = 0.001 women), whereas isokinetic concentric and eccentric strength changes did not reach statistical significance due to large variability in our measures.

CONCLUSION(S): Older adults who use aerobic activity as their sole means of exercise demonstrate small losses in aerobic fitness but larger losses in muscle strength. Thus, running alone will not prevent sarcopenia. The largest declines in fitness and strength were associated with those adults who decreased their running volume.

31. THE PORTABLE 4-STEP STAIR CLIMB TASK IS BOTH A RELIABLE AND VALID MEASURE OF MUSCLE POWER IN COMMUNITY LIVING OLDER ADULTS

Petra Martins, Amy Rolston, Lucinda Salvaggio, Ivan Palomino, Taylor J. Marcell
Department of Kinesiology, California State University, Stanislaus

INTRODUCTION: Falls in the elderly are often caused by frailty and have been shown to be a leading cause of mortality and morbidity. Stair climbing is an essential task of daily living and may be a useful measure in the evaluation of frailty in older adults. The purpose of this study was to evaluate the reliability of using the portable 4-step stair climb task as a quick assessment of health, balance, and muscle power in a large group of community living older adults.

METHODS: Subjects consisted of 132 women and 64 men living in the community with an average (± SD) age of 70.6 ± 8.5 (women) and 74.6 ± 8.5 (men). The women were 160.4 ± 7.9 cm, 73.0 ± 16.7 kg, and had a BMI of 28.4 ± 6.1 kg/m^2. The men were 174.8 ± 9.5 cm, 84.9 ± 14.8 kg, and had a BMI of 27.7 ± 4.5 kg/m^2. Subjects participated in free community based health fairs held in the Central Valley of California; they performed the Fullerton Senior Fitness Battery, a standardized balance assessment, gait analysis, and 4-step stair ascent. Stair climbing power was determined by body weight (kg), vertical distance climbed (m), and time (sec).

RESULTS: Stair climb power was correlated with age (r = -0.30, p = 0.000), unipedal balance (r = 0.33, p = 0.000), balance summary score (r = 0.28, p = 0.000), functional reach (r = 0.31, p = 0.001), grip strength (r = 0.31, p = 0.000), arm curls (r = 0.25, p = 0.007), chair stands (r = 0.32, p = 0.000), gait speed (r = 0.44, p = 0.000), and the timed up and go test (r = -0.61, p = 0.000).

CONCLUSION(S): The portable 4-step stair climb task appears to be both a reliable and valid measure of muscle power as it is highly correlated with common measures of function in community-dwelling older adults.

30. THE EFFECTS OF CONSTANT-LOAD EXERCISE AT PERCENTAGES OF THE VENTILATION THRESHOLDS ON THE MAGNITUDE OF HEART RATE DRIFT: A CASE STUDY

Martinez Jr, R., Bradley, R.T., Polin, M.M., Quintana, R., & Parker, D.L.
The Irvin Faria Exercise Physiology Laboratory, The Department of Kinesiology, California State University, Sacramento

Purpose: Traditionally cardiovascular drift (CVdrift), the changes in cardiovascular responses over time, despite no change in exercise intensity, has been examined at intensities set relative to a percentage of VO_2max, ignoring individual differences in intensity due to the ventilation threshold (TH_1) and respiratory compensation point (TH_2). The purpose of this study was to investigate the effects of exercising at percentages of TH_1 andTH_2, on the magnitude of heart rate drift (HRdrift), a component of CVdrift. **Methods:** A male trained cyclist, age 25, weight 61.1kg, height 164.5cm, and VO_2max 62 ml/kg/min volunteered for this case study. Visit 1 consisted of a VO_2max test to determine TH_1 and TH_2, and two power detection rides used to determine the workloads that would be used for the constant-load exercise (CLE) rides to fatigue. Visit 2 consisted of a randomized CLE ride to fatigue at a power output that elicited a VO_2 that was either 5% below TH_1 (-5%TH) or a VO_2 that was midpoint of TH_1 and TH_2 ($_{mid}$TH) in a thermal neutral environment. Visit 3 consisted of the remaining CLE ride to fatigue. Heart rate was recorded every minute; expired air, blood pressure, and RPE were recorded during the last 2 minutes of every 10 minutes. **Results:** The subject displayed a 13% and 15% increase in HR and VO_2 respectively for the -5%TH ride (179W) and a 10% and 12% increase in HR and VO_2 respectively during the $_{mid}$TH ride (206W). Time to fatigue was 108 minutes and 68 minutes for the -5%TH and $_{mid}$TH rides respectively. Terminal HR for both trials drifted near TH_2 HR determined from the GXT. **Conclusion:** The subject's data suggests that there is a small difference in the magnitude of drift below TH_1 and betweenTH_2. Further data should be gathered to assess the findings for a given population.

32. A COMPARISON OF THREE METHODS TO DETERMINE CRITICAL RUNNING VELOCITY IN HEALTHY ADULTS

N. Maryn and J.T. Penry
Department of Exercise Science, California Lutheran University

Critical power describes the maximal sustainable power generated by aerobic metabolism during a given work modality, and is predictive of maximal endurance exercise performance lasting 15-30 minutes. Critical power has been widely studied in cyclists; however, little work has been conducted in runners. Due to the weight-bearing nature of running, maximal sustained velocity (critical velocity) is used in lieu of critical power. PURPOSE: This study was designed to (1) investigate the utility of a short duration, maximal-velocity field test of critical velocity in recreationally active individuals, and (2) to examine the criterion validity of a longer duration, submaximal-velocity field test across a range of fitness levels. METHODS: Twenty subjects (mean age = 22.7 years ± 4.5) completed the criterion treadmill test of critical velocity (CRIT), the Endurance Capacity Test (ECT), and the 3-Minute All-Out Run (3MR). Data were analyzed using a repeated measures ANOVA (Greenhouse-Geiser correction). Bland-Altman plots were constructed to examine the agreement of the field tests with the criterion measure across fitness levels. RESULTS: Post-hoc tests (Bonferroni correction) showed no differences in measured critical velocity among the three tests (F (1.296, 38) = 1.384, P > 0.05). Bland-Altman plots showed the 3MR to overestimate critical velocity in lesser aerobically fit individuals, while underestimating the same variable in individuals with greater aerobic fitness. A similar trend was observed when comparing the ECT to CRIT; however, the magnitude of this difference was reduced in all but the least fit individuals. CONCLUSIONS: These results suggest good criterion validity for the ECT and 3MR in recreationally active individuals. Nevertheless, test administrators must use care when using the ECT and 3MR due to an uneven bias across the range of fitness levels. In moderate- and high-fitness individuals, the ECT appears to be a more useful test due to a closer relationship with CRIT.

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33. EFFECT OF TRAINING IN VIBRAM FIVE FINGERS ON RUNNING ECONOMY: PRELIMINARY RESULTS

Mark May; Sarah Ridge; A. Wayne Johnson; Iain Hunter; Ulrike Mitchell; Brenda Benson
Department of Exercise Sciences, College of Life Sciences, Brigham Young University

Purpose: The popularity of running in minimalist shoes raises questions about their benefits on running economy (RE) after training. It is thought that RE will increase after minimalist training. This study assessed RE differences between shoes and Vibram Five Fingers (VF) after training in VF.

Methods: Qualifications for participants included running a minimum of 15 miles a week with no previous minimalist running training. Subjects trained for 10 weeks in VF and performed pre and post sub maximal VO2 tests. The first test's duration was 6 minutes and the second 3 minutes. The subjects ran shod and in VF in a randomized order. The pace was based on the subject's 5 or 10K pace and held constant through the duration of the pre and post-tests.

Results: There was no significant difference in RE in either condition before training, (p=0.947). After training in VF there was no difference in RE between conditions (p=0.363). There was a significant difference in RE between pre and post-testing in both shoe conditions (shod p=0.002; VF p=0.008).

Conclusion: Overall RE improved, however there was no difference in RE between shoe conditions. Improvements in running economy may be due to a more consistent training as a result of participation in this study. The sub maximal test may have allowed for more variability in individual intensities, therefore may not be as accurate as VO2 max testing in assessing changes in RE. Further studies will assess changes in running mechanics after training in VF, which may provide further explanation of improvements in RE.

34. DUAL-TASK PERFORMANCE AMONG CHILDREN WITH CEREBRAL PALSY FOLLOWING A NOVEL PHYSICAL THERAPY INTERVENTION

McClellan J.R.*, Dufek J.S. FACSM*, Hickman R.**, Blahovec A.**, Kuiken A.**, Mears J.**, Riggins H.**
*Department of Kinesiology and Nutrition Sciences, **Department of Physical Therapy; University of Nevada, Las Vegas

Large amplitude, high-intensity movement therapy has led to improved balance and gait in individuals with Parkinson's Disease. Children with Cerebral Palsy (CP) have increased postural sway assumed to worsen under dual-task conditions. Our purposes were to (1) pilot use of pairing an instrumented tray with a computerized walkway for quantifying postural sway and (2) to test the concept of adapting large amplitude, whole body movements, similar to those used in Lee Silverman Voice Training BIG® for use with children with CP. After receiving institutionally approved informed consent from a parent and child assent, five children diagnosed with CP (7.0±1.0yrs; 125.7±7.3cm; 26.0±5.1kg) walked twice across an instrumented electronic walkway (CIR Systems, Inc.; 120hz) while carrying a tray instrumented with an inclinometer (60hz), before and after a 15 minute intervention session focused on large amplitude, whole body movements. Two dependent variables, anteroposterior (AP) and mediolateral (ML) sway velocity, were extracted bilaterally during single support for all steps (n=11-24) and compared pre-post intervention using a single-subject Model Statistic procedure (α = 0.05). Data were successfully extracted for four subjects, with results for ML showing a non-significant trend toward improvement for three subjects (S1, S2 and S3) with a post-intervention reduction in sway velocity. Results for AP were statistically significant for two subjects with S2 showing improvement, reducing sway velocity following the intervention (60.2±16.3 deg/s pre vs. 42.7±15.6 deg/s post), while S3 exhibited significantly greater AP sway velocity (108.7±19.9 deg/s pre vs. 145.1±35.5 deg/s post). The effectiveness of large amplitude exercise remains unclear and may be influenced by learning or fatigue. The study demonstrated feasibility of pairing an instrumented tray and computerized walkway to quantify dual-task activity for children with CP. It is important to refine these technologies and continue to explore the effectiveness of clinical doses of large-amplitude movement interventions for this population.

35. ABILITY OF NEW UPRIGHT BIOIMPEDANCE ANALYZER TO ESTIMATE FAT-FREE MASS IN ADULTS

J.J. McCormick[1], J.R. Beam[1], H.S. Hsu[1] M.G. Kulovitz[1], G. G. Martinez[1], C.M. Mermier [1,2], & A.L. Gibson[1]
1. Department of Health, Exercise, and Sports Sciences, University of New Mexico,
2. Employee Health Promotion Program, University of New Mexico

INTRODUCTION: A major goal of applied body composition assessment is the development of valid methods to accurately estimate fat-free mass (FFM). The purpose of this study was to evaluate the accuracy of a new upright analyzer (InBody 520) to estimate FFM in comparison to underwater weighing (UWW). METHODS: Fifty men (29.3±13.4 yrs, 181.4±8.5 cm, 95.8±28.4 kg, 27.7±4.7 kg/m²) and fifty women (22.2±4.2 yrs, 165.8±4.7 cm, 68.0±11.9 kg, 24.6±3.7 kg/m²) volunteered to have FFM assessed using the InBody 520 and UWW. Standard pre-test guidelines for body composition assessment were followed and residual volume was measured using oxygen dilution. The constant error (CE), standard error of the estimate (SEE), and total error (TE) were determined to evaluate the accuracy of the Inbody 520 when compared to UWW for men and women. Bland-Altman plots were compiled to further investigate methodologic bias between the reference and InBody 520 between men and women. RESULTS: There was a significant difference ($p<0.05$) in FFM between UWW and the InBody 520 for men (UWW:75.52±18.17kg, InBody: 72.37±16.67kg) and women (UWW:46.16±5.76, InBody: 45.35±5.08kg). There was large individual variance in FFM between UWW and the InBody 520 for both men and women. The CE, SEE, and TE were lower in the women (0.81, 2.35, 2.3, respectively) than in the men (3.15, 4.88, 4.78, respectively).Bland-Altman plots indicated FFM was not estimated within 2SD for 6 men and 3 women. CONCLUSION: The results of this study showed that when compared to UWW the InBody 520 underestimated FFM in both men and women. The InBody 520 was more accurate in estimating FFM in the women than in the men.

36. HIGH INTENSITY INTERVAL TRAINING IN AN AQUATIC ENVIRONMENT AS A TREATMENT FOR OSTEOARTHRITIS

Andrew Miller, Eadric Bressel, Dennis Dolny
Health, Physical Education & Recreation, Utah State University

Previous research conducted at in our laboratory has reported on functional benefits of acute aquatic treadmill exercise in patients with osteoarthritis. Namely a reduction in pain and improved mobility was observed when compared to a similar land based treadmill protocol. A longer multi-week training period examining the effectiveness of a training protocol that incorporates traditional moderate intensities and high intensity intervals was a logical follow-up to the previous results. High intensity interval training (e.g, RPE = 16-19) on land using patients with osteoarthritis would likely yield low tolerance due to the pain induced by the load forced on the joints. However, the unique properties of water, which reduce joint loads, make high intensity interval training possible for the osteoarthritis population. Accordingly, the purpose of this study was to have participants with osteoarthritis perform high intensity interval training over a six week period on an aquatic treadmill to examine its effects on pain, balance and functional movements. High intensity interval protocols included, walking against jet resistance and static balance against jet resistance. The outcome measures included pain, mobility, and balance which was measured pre and post treatment via a NeuroCom Clinical Research System. The results showed general improvements in select balance, pain and functional movements. For example, center of pressure maximum excursions displayed a 21% increase ($p = 0.04$) after training while 10 m walk time decreased by 28% ($p = 0.02$). Overall, the aquatic protocol, which incorporated high intensity intervals at RPE levels greater than 17, was well tolerated with all participants completing the protocol. It may be concluded that high intensity aquatic treadmill exercise in patients diagnosed with osteoarthritis may produce beneficial effects terms of balance, pain, and function.

37. EFFECTS OF KETTLEBELL TRAINING ON METABOLIC SYNDROME IN WOMEN

Karen I. Moreno & Peggy A. Plato
Department of Kinesiology, San José State University

Metabolic syndrome (MetS) is a compilation of interrelated risk factors with the potential to significantly increase incidence of type 2 diabetes and cardiovascular disease. The prevalence of MetS is growing (AHA, 2009), with more women affected than men. Decreased physical activity and increased adiposity are contributing factors. There are substantial data supporting physical activity, primarily aerobic exercise, in the prevention of MetS, and an independent and inverse relationship between muscular fitness and prevalence of MetS has been reported in men (Jurca et al., 2004). However, the effect of increasing muscular fitness on MetS has not been explored in women. **PURPOSE:** To examine the effects of a community-based, kettlebell resistance training program on the core components of MetS in women. **METHODS:** Six physically inactive women, mean age (± *SEM*) 48.8 ± 2.9 years, BMI 31.8 ± 2.4 kg/m^2, and meeting at least two other components of MetS successfully completed the training program. Risk factors for MetS were measured before and after the twice weekly, 10 week kettlebell program. **RESULTS:** Upper and lower body muscular fitness increased 42% and 10%, respectively. Aerobic fitness increased 12%. Favorable changes were seen in fasting glucose and body fat. Four of the participants were in the prediabetic range during the preassessment and had normal fasting glucose after the training program. On average, body weight decreased 1 kg, but body fat decreased 3.8 kg. Waist circumference decreased 2.1 ± 1.9 cm. Systolic and diastolic pressures decreased 1.8 ± 2.4 and 1.2 ± 2.1 mm Hg, respectively. Lipid changes were variable; overall, the training program did not favorably change triglycerides or HDL-C. **CONCLUSION:** Individual improvements were encouraging and suggest that kettlebell training has potential for improving components of MetS in middle-aged women. A program of greater frequency and longer duration may provide more widespread benefits.

38. THE IMPACT OF OUTDOOR GYM EQUIPMENT ON PHYSICAL ACTIVITY BEHAVIOR AND MUSCULAR STRENGTH

Caroline Nguyen and Marcella Raney
Department of Kinesiology, Occidental College

Outdoor gyms in Los Angeles public parks provide an alternative to costly indoor gyms. The purpose of this study was to compare the impact of non-adjustable outdoor gym (OG) equipment to similar adjustable indoor equipment (IG) on physical activity behavior and muscular fitness adaptations. Seven sedentary healthy subjects performed repetitions to fatigue on four exercises in two experimental trials: 1) 60% of estimated 1-repetition maximum indoors; 2) non-standardized resistance based on machine mechanics outdoors. Subjects completed a significantly greater number of repetitions on the outdoor chest press (23.29±1.95 vs. 14.86±0.60), leg press (80.17±2.89 vs. 18.67±1.15), and leg extension (65.43±6.53 vs. 12.43±1.25, $P<0.05$). Muscle activity measured by surface electromyography was greater indoors for all lower body muscles tested ($P<0.05$). No difference was found in upper body muscle activity between locations ($P>0.05$). In addition, a total of 85 indoor and outdoor gym users completed physical activity behavior surveys. Although OG subjects perform strength training (ST) at the same frequency as IG subjects (median: 3-4 days/week, $P>0.05$), it is performed at a lower relative intensity (median RPE: 9-11 vs.15-17, $P<0.05$). Indeed, only 17% of OG users perform ST within the intensity recommended by ACSM. In conjunction with the difference in training intensity 0% of IG subjects compared to 22.1% of OG subjects complete more than 15 repetitions per set ($P<0.05$). In addition, a lower percentage of OG subjects have been engaging in regular physical activity for more than 30 days (53.3% vs. 81.0%; $P<0.05$). Results from this study suggest that outdoor gyms provide inadequate resistance for muscular strength adaptations and may be insufficient for the promotion of lasting ST participation. Additional studies are needed to determine whether the presence of outdoor gyms increase physical activity behavior in low-income populations and the extent to which outdoor gyms provide general health benefits to the community.

39. INTRA-RATER RELIABILITY OF FOOT INTRINSIC MUSCLE SIZE MEASURED BY ULTRASOUND

Ty Olson; A. Wayne Johnson; Sarah T. Ridge; Ulrike H. Mitchell; Iain Hunter; Judd Asay; Jordan Petersen
Department of Exercise Sciences, College of Life Sciences, Brigham Young University

Purpose: This study was done to establish intra-rater reliability of the ultrasound measurement of the cross-sectional area of the flexor digitorum brevis (FDB) and the thickness of the flexor hallucis brevis (FHB) muscles in runners. Foot intrinsic muscles are important for the proper functioning and health of the foot.
Methods: Images of the FDB and the FHB muscles were recorded of twenty participants' feet using Doppler Ultrasound (GE LogiqP5). These images were taken maintaining the probe position perpendicular to the surface of the foot. Aligning the probe with the navicular tuberosity, the cross-sectional area image of the FDB was recorded. Then, aligning the probe with the shaft and visualizing the head of the metatarsal as a consistent bony landmark, the image of the FHB was recorded. Using the recorded images, calculations of the cross-sectional area and thickness were made using the ultrasound machine's internal measurement tools. The thickness of the FHB was measured perpendicularly from the point of the tendon that was 3.00cm from the distal head of the metatarsal along the shaft of the bone. Once the initial measurements of all participants were recorded, the process was repeated by the same tester who did not have access to the initial measurements. The two measurements were separated by at least 1 week. The two sets of data were then compared to test measurement reliability using the Intra-class Correlation Coefficient (ICC) (SPSS version 18).
Results: The ICC for the measurement reliability of cross-sectional area of the FDB and the thickness of the FHB were .99 and .97 respectively.
Discussion/Conclusion: Excellent intra-rater reliability of the measurement cross-sectional area and muscle thickness was shown in runners. Measurements of muscle size can be considered reliable and can be used in research studies of intrinsic foot muscles.

40. EFFECTS OF 4 DAYS OF HIGH INTENSITY INTERVAL TRAINING (HIT) ON POWER OUTPUT, VO_2MAX, & SUBSTRATE USE

Elyse Palumbo, Douglas Stirling, Samantha Spatter, Sam Schaber, Stacy Andersen, Raymond Basto, Jeff Kegler, Rachael Gallant, Alecia Elder, & Todd A. Astorino
Department of Kinesiology, California State University, San Marcos

Background: High-intensity interval training (HIT) alters cardiovascular fitness and substrate metabolism similar to endurance training. **Aim:** To compare the effect of two modalities of HIT (10 s versus 30 s Wingate test) on VO_2max, substrate metabolism, and power output. **Methods:** Subjects consisted of 5 women and 6 men, mean age = 27.0±5.7 yr, of moderate fitness level. Initially, Wingate-derived power output (day 1) and VO_2max and substrate metabolism were assessed using a graded protocol to volitional fatigue (day 2). Two groups were formed to complete either 30 s or 10 s HIT, consisting of 4 bouts on days 1 and 2 followed by 5 bouts on days 3 and 4 separated by a 5 min recovery. HIT consisted of 10 or 30 second Wingate tests at a load of 7.5 % body weight. Repeated measured ANOVA was used to identify differences in variables from pre-post training, with group as a between-subjects factor. **Results:** There was no significant change in VO_2max with HIT. However, peak power was increased with HIT ($p<0.05$), and the change in peak power was different in the 30 s group (744.0±145.0 W to 816.0±149.0 W) versus the 10 s group (596.0±173.0 W to 622.0±185.0W) as shown by a significant training by group interaction. RER was different ($p<0.05$) across time and with HIT, and a training by group trend ($p=.06$) was revealed in that subjects in the 10 s group showed a marked decline in RER (0.92± 0.05 to 0.86± 0.07 from 3-6 min of exercise, for example), yet no change was revealed in the 30 s group (0.86±0.03 to 0.85±0.03). **Discussion:** A four-day HIT program did not alter VO_2max, but improved power output and fat oxidation in moderately-trained men and women. These adaptations are similar to those observed with endurance training with minimal time commitment.

41. FIBER TYPE COMPARISON BETWEEN WILD-TYPE AND DESMIN KNOCK-OUT MICE

Brenda Benson, Michael Leavitt, Daniel Nelson and Allen C. Parcell, FACSM (presenter)
Department of Exercise Sciences, Brigham Young University

Proteins of the muscle cytoskeleton are important for the transmission of forces and appear to be a component of the adaptive response to chronic overload. Questions remain as to how cytoskeletal proteins may mediate the translation of a contractile stimulus to an adaptive response. As an initial phase to approach these questions the purpose of this research was to conduct a contemporary examination of muscle morphology in a desmin knockout mouse with regard to muscle fiber-type composition. The gastrocnemius-soleus muscle complex was dissected from wild-type and desmin knockout mice. Tissue cross-sections were stained for myosin ATPase with an acid preincubation pH of 4.54. Sections were assessed for type I and type II cells by two independent evaluators after which fiber counts and distributions were calculated. Wild type mice possessed and fiber-type distribution of 45% type I and 55% type II cells. Desmin knockout mice had a muscle composition of 17 and 83% type I and type II fibers, respectively. These discrepancies in muscle fiber-type between mouse litter-mates in this study suggests that the absence of the cytoskeletal protein desmin influences morphological development suggesting a role for the same protein in adaptive responses in normal muscle.

42. A SINGLE LEG PRESS EXERCISE SESSION CAN DECREASES SYSTOLIC BLOOD PRESSURE

Perez J, Chandler E, Marsile J, Krieger T, Gillum T.
California Baptist University, Department of Kinesiology

Exercise can be used to treat hypertension. A major hindrance to exercise adherence is time. Resistance training is often prescribed to treat hypertension and may possess similar hemodynamic health benefits as aerobic exercise. **Purpose:** To quantify the optimal sets, reps, and load necessary to reduce blood pressure (BP). **Methods:** 22 normotensive subjects (11 college females and 11 college males) completed 3 different leg press routines: 3 sets of 15 reps with 50% of 1 RM, 3 sets of 8 reps with 70% of 1 RM, and 3 sets of 2 reps with 90% of 1 RM. 90 seconds of rest was given between sets. BP was assessed pre exercise, and 0, 15, 30, and 60 min post exercise through an automated pressure cuff. Routines were done in a counterbalanced order and 1 week separated each trial. The 1 RM was assessed according to the ACSM protocol 1 week prior to trial 1. **Results:** Diastolic blood pressure (DBP) was unaffected by exercise intensity ($p=0.2$), but was significantly higher than pre immediately post exercise ($p=0.00$) before returning to pre values by 60 min post. Systolic blood pressure (SBP) was unaffected by exercise intensity ($p=0.7$), but was higher than pre immediately post exercise ($p=0.00$) and lower than pre at 60 min post exercise ($p=0.00$). **Discussion:** Results suggest that a single leg press exercise session can decrease SBP in normotensive subjects, regardless of exercise intensity. SBP decreased by 4% from pre exercise values, which is considered clinically relevant. This may be an effective and attractive option to maintain exercise adherence or treat hypertension in individuals with time constraints.

43. BREAKING DOWN THE WALL: ASSESSING MOOD IN RUNNERS DURING A MARATHON

Benjamin Steven Peschek
California State University- Long Beach

The popularity of distance running has increased precipitously in recent years, however, there is a dearth of research on the mood experience of runners during a marathon. The current study sought to develop a novel approach for assessing mood in runners over the course of a marathon using Thayer's Energy-Tension mood model. Participants (n=15) were current entrants in the 2011 Birch Bay Marathon who agreed to participate in the study. Packets were distributed to participants two weeks before raceday that included an overview of the procedure, an explanation of the differences between energy and tension, and a brief questionnaire. On race-day, a series of five assessments were taken for each of the participants using an abbreviated form of the AD-ACL across the race-course. Results showed participants were able to discriminate between energy and tension, with overall mood ratings on par with the expected trends across the course as predicted by the Energy-Tension model. A significant increase in tension also occurred at "the wall," a conceptual location during the marathon where the runner is expected to experience the most distress. The study demonstrated apparent changes in mood that are associated with running a marathon, which future studies can further explore by utilizing the procedure developed here.

44. THE FEAR OF FALLING AND NOT POLYPHARMACY IS MORE PREDICTIVE OF PHYSICAL PERFORMANCE AND BALANCE MEASURES IN A GROUP OF COMMUNITY-LIVING OLDER ADULTS.

Amy Rolston, Petra Martins, Lucinda Salvaggio, Ivan Palomino, Taylor J. Marcell
Department of Kinesiology, California State University, Stanislaus

INTRODUCTION: Polypharmacy is often considered a risk factor for falls in the elderly. Further, the fear of falling often leads older adults to avoid physical activity and thus increases their risk of injury as a result of a fall. The purpose of this study was to evaluate the relationship between polypharmacy, fear of falling, and functional measures in a group of community living older adults.

METHODS: Community living older women (n = 20) and men (n = 12) completed the Fullerton Senior Fitness Battery, a standardized balance assessment, gait analysis, and 4-step stair ascent. A self-reported health history, numbers and types of medications, fear of falling, and regular physical activity type and levels were also obtained.

RESULTS: The subjects average (± SD) age was 75.9 ± 7.3 yrs, MMSE 28.7 ± 1.5, BMI 26.5 ± 3.9 kg/m^2, unipedal balance 14.0 ± 10.6 sec, 5 chair stands 9.4 ± 2.6 sec, gait 1.17 ± 0.27 m/s, and stair ascent power 3.3 ± 1.0 W/kg. Fear of falling (and not polypharmacy) was correlated to MMSE ($r = -0.49$; $p = 0.014$), balance ($r = -0.61$; $p = 0.002$), chair stands ($r = 0.60$; $p = 0.003$), gait ($r = -0.49$; $p = 0.015$), and stair power ($r = -0.52$; $p = 0.009$). 50% of the women and 30% of the men reported falling within the last year; none reported significant fractures as a result of their fall.

CONCLUSION(S): In a group of community living older adults fear of falling was more associated with muscle performance and balance than polypharmacy.

45. THE EFFECT OF HIGH INTENSITY INTERVAL TRAINING ON 2-KILOMETER ERGOMETER TIMES IN FEMALE HIGH SCHOOL ROWERS

Ryan, D., Carr, N., Sawyer, B., Angadi, S., Chisum, J., Gaesser, G
Arizona State University, School of Nutrition and Health Promotion

PURPOSE: The purpose of this study was to determine the effectiveness of high-intensity interval training (HIIT) as compared to standard endurance training (ET) on improving 2-kilometer (km) ergometer time-trial performance in female, high school rowers. **METHODS:** Twenty-three females (Age 16 ± 1.0 yr, Weight = 61.9 kg ± 10.6 kg, Height 1.70 meters ± 0.10 meters) volunteered to participate in this study. Participants were randomly selected to either HIIT or ET. All participants completed a 2-km rowing ergometer test prior to the start of training. In addition to regular training, over the next 4 weeks subjects in each group completed a total of 12 training sessions (3 per week) on a rowing ergometer. Each HIIT session consisted of six 30-sec bouts of "sprint" rowing (modified Wingate tests) with 4 min of light active recovery in between each bout. ET sessions consisted of one 30-min continuous bout of exercise at 60-70% VO_{2max}. After 4 weeks all participants completed another 2-km ergometer test. ANOVA and t-tests were performed to examine the differences within and between groups. **RESULTS:** There was a trend toward improvement on the 2-km ergometer times that did not reach statistical significance (HIIT: Pre-training: 518.3 ± 21.3 seconds, Post-training: 501.5 ± 21.9 seconds, p = 0.07; ET: Pre-training: 523.0 ± 20.7 seconds, Post-training: 505.0 ± 19.3 seconds, p= 0.10). There was no significant difference between groups (p< 0.142). **CONCLUSIONS:** These findings suggest that, over a relatively short period of 4 weeks, both HIIT and classic ET are similarly effective for improving 2-km ergometer time-trial performance in young female rowers. Longer training programs will be necessary to determine whether there are differences between HIIT and ET with regard to the upper limit of training adaptations.

47. ABILITY OF THE SENSEWEAR™ ARM BAND TO PREDICT ENERGY EXPENDITURE DURING FREE-LIVING ACTIVITIES

Brandon Sawyer, Dharini Bhammar,Siddhartha S. Angadi, Glenn Gaesser, FACSM.
School of Health Promotion and Nutrition, Arizona State University; Healthy Lifestyles Research Center

Background: The accuracy of the Sensewear™ arm band (SWA) in predicting energy expenditure during short, continuous, free-living activities in adults has never been tested.
Methods: 11 males (age 63.2 ± 14.0 yr.; ht: 173.9 ± 8.3 cm; wt: 87.9 ± 20.7 kg; %BF: 30.2 ± 8.1) and 15 females (age 59.9 ± 12.9 yr.; ht: 162.1 ± 3.6 cm; wt: 70.0 ± 17.3 kg; %BF: 36.1 ± 11.0) underwent a 65-minute free-living activity routine while wearing the SWA and the Oxycon Mobile™ (OM). The routine consisted of 5 minutes of seated rest followed by 12 activities each lasting 5 minutes with no rest between activities. Activities included walking, jogging, cycling, rowing, simulated sports, and simulated activities of daily living. Pulmonary gas exchange and ventilation were measured continuously. Energy expenditure estimates from the SWA were compared to kcals measured by the OM. Comparisons were made via intraclass correlations (ICC), paired samples T-tests, and Bland-Altman plots.
Results: Total kcal estimates for the entire 65-minute routine from the SWA differed significantly from kcal measured by the OM (SWA: 285 ± 83 kcal vs. OM: 200 ± 63 kcal, p <0.001). The ICC for kcal/min between each device was significant, but in the moderate range (R = 0.668, p <0.001). ICC values between SWA and OM for each activity ranged from 0.265 (rest) to 0.893 (incline treadmill walking). The Bland Altman plot revealed a consistent overestimation of energy expenditure by the SWA with a large 95% confidence interval, and no apparent bias throughout the range of energy expenditures.
Conclusions: The SWA consistently overestimated energy expenditure for the 65-minute routine. On average SWA overestimated energy expenditure by ~1.29 kcal/min. We conclude that the SWA is not a valid means of estimating energy expenditure during short, continuous, free-living activities.

46. IMPROVEMENTS IN LIPOPROTEIN SUBFRACTIONS AND OXIDIZED LOW-DENSITY LIPOPROTEIN FOLLOWING LIFESTYLE INTERVENTION IN OBESE LATINO ADOLESCENTS

Justin Ryder[1,3], Sonia Vega-Lopez[3,4], Rocio Ortega [1,2,4], Darwin Tsinajinnie[2], Dawn Colleta[2], Gabriel Shaibi[1,2,3,4]
[1]College of Nursing and Health Innovation, Arizona State University
[2]Mayo / ASU Center for Metabolic and Vascular Biology, Arizona State University
[3] School of Nutrition and Health Promotion, Arizona State University
[4] Southwest Interdisciplinary Research Center, Arizona State University

Background: Low-density lipoprotein (LDL) and high-density lipoprotein (HDL) particle size may be more responsive to lifestyle changes than traditional cholesterol measures. In conjunction with oxidized LDL concentrations, these measures may give light to early alterations in atherosclerosis due to intervention. Whether these measures can be improved through diet and exercise in high-risk populations of youth has not been established. Therefore, the purpose of this study was to examine the impact of a lifestyle intervention on the distribution of cholesterol among LDL and HDL subfractions as well as oxidized LDL in a sample of high-risk adolescents. **Methods:** Fifteen (7 male; 8 female) obese (BMI percentile = 96.4 ± 4.5) Latino adolescents (15.0 ± 1.0 years) completed a 12-week lifestyle intervention that included weekly nutrition education classes and 180 minutes of moderate to vigorous exercise per week (3 X 60 minute sessions). Participants were assessed, fasting, at baseline and 12-week follow-up. **Results:** The intervention resulted in a 0.9% increase in mean LDL-particle size (269.3 ± 0.9 to 271.6 ± 0.7Å, p=0.0003), a 65.6% decrease in the amount of total cholesterol in small LDL subfractions (1.6 ± 0.5 to 0.6 ± 0.3 % area, p=0.007), a 19.6% increase in the amount of cholesterol in large HDL subfractions (22.4 ± 2.9 to 26.8 ± 2.7 % area, p=0.007) and a 21.8% decrease in oxidized LDL (58.7 ± 10.3 to 45.9 ± 17.5 U/L, p=0.001). The improvements in Lipoprotein subfractions and oxidized LDL were observed in the absence of significant weight loss (90.7 ± 6.8 to 89.9 ± 7.2 kg, p>0.05).
Conclusions: These findings suggest that lifestyle interventions may improve the cardiovascular health of high-risk youth by shifting the lipoprotein profile towards a less atherogenic phenotype. Moreover, these measures should be considered as potential targets for determining the success of prevention programs in the future.

48. LEGAL ASPECTS OF AEROBIC CAPACITY

Emily M. Schmit, Matthew T. Council, Margaret E. Ciccolella
Sports Sciences Department, University of the Pacific

This poster will examine legal aspects of aerobic capacity. Specifically, case law relevant to challenges of age mandated retirements and long-term disability benefits will be used to illustrate how evidence of work capacity is argued in a legal setting.

Policy mandated retirement for police and wildlife officers 55 and older have been based on observations, reports, and assumptions about whether this group could effectively perform their duties. The mandates were upheld in court primarily because of evidence from physiologists, serving as expert witnesses, about the minimum metabolic requirements to perform required duties and the inevitable declines in aerobic capacity as a consequence of aging. Concepts relevant to fatigue, MET levels, and aerobic capacity were inextricably linked to the legitimacy of policy and law mandating age-based retirements.

Aerobic capacity is also relevant in disability cases. In order to receive disability related insurance benefits patients/claimants must objectively document restrictions on the ability to engage in "substantive gainful employment," which is typically defined as a 40-hour work week. Again, aerobic capacity is used to argue fitness to work.

49. THE EFFECTS OF POWER BALANCE BANDS ON STRENGTH, BALANCE, AND FLEXIBILITY

Shipman L, Bennett A. Braun H, Powell K, Gillum T.
California Baptist University, Department of Kinesiology

Little scientific research has been done on the physiologic effects of the Power Balance band technology on sport performance. The company reports that the bands improve balance, strength, and flexibility. **Purpose:** To quantify the Power Balance band's effect on balance, strength, and flexibility. **Method:** 31 participants (16 college females and 15 college males) were tested through three circuit tests of balance, strength, and flexibility in a counterbalanced order: once with no band (C), once with a placebo band (P), and once with the actual Power Balance band (PB). The circuit consisted of a balance test (BESS), a sit and reach test, and a hand grip dynamometer test. **Result** Mean and standard deviation for strength for C was 36.1±12.3 kg, for P was 36.5±13.9 kg, and for PB was 36.5±13.5 kg. Balance for C was 3.1±2.5 errors, for P was 2.9±3.1 errors, and for PB was 2.7±2.6 errors. Flexibility for C was 28.9±9.7 cm, for P was 30.6±10.3 cm, and for PB was 30.2±9.9 cm. The presence of the power band showed no statistically significant difference ($p>0.05$) compared to P or C on any dependent variable. **Discussion:** Results suggest that not only does the Power Balance band technology not work, but that the placebo effect does not apply to our measurements of strength, flexibility, or balance. The manufacturer of Power Balance bands claims could be misleading. The Power Balance bands did not improve balance, strength, or flexibility.

50. FEASIBILITY OF MEDITATIVE MOVEMENT IN BARIATRIC PATIENTS

Lisa L. Smith, Linda K. Larkey, Robin P. Blackstone, & Melisa C. Cortes´
Arizona State University, Department of Exercise and Wellness

Successful interventions are needed to help improve obesity rates in the United States. About two-thirds of adults in the United States are overweight almost one-third are obese. In 1991, the National Institutes of Health released a consensus statement endorsing bariatric surgery as the only means for sustainable weight loss for severely obese patients. However, approximately one-third of bariatric patients will experience significant post surgical weight gain. **PURPOSE:** This study is designed to determine if meditative movement (MM) would be a successful physical activity (PA) modality to prevent weight regain in bariatric surgery patients. **METHODS:** A feasibility study was recently completed in 39 bariatric patients at Scottsdale Bariatric Center (SBC) during regularly scheduled bariatric support groups at SBC. A short demonstration of MM was presented after which a short focus group was conducted to gauge interest level, acceptability and the potential demand for MM programs in this population. Information on attitudes and intentions surrounding MM as a physical activity was collected. **RESULTS:** 75% of participants indicated they would consider practicing MM as part of their post surgical PA routine. **CONCLUSION:** MM may be a viable PA alternative in bariatric patients to attenuate post surgical weight gain.

51. EFFECTS OF HEATING OR COOLING ON MUSCLE DAMAGE MEASURES FOLLOWING ECCENTRIC EXERCISE-INDUCED MUSCLE DAMAGE

Bülent Sökmen[1], Brian Turner[2], Dennis Wilson[2], Christina Asai[2], Angela Yonkers[2], Julianne Tres[2], Thomas Spalding[2], and William Beam, FACSM[3].
[1]Department of Kinesiology, Sonoma State University, [2]Department of Kinesiology and Health Promotion, California State Polytechnic University, Pomona, [3]Department of Kinesiology, California State University, Fullerton

PURPOSE: The purpose of this study was to determine the effects of passive heating and cooling on delayed onset muscle soreness (DOMS), isokinetic strength, and creatine kinase (CK) activity following eccentric exercise-induced muscle damage (EIMD). **METHODS:** Thirty healthy females (22.0±3.0 y, 165.0±2.8 cm, 61.66±10.3 kg, and 24.1±4.1 % body fat) were randomly assigned to passive heating (H) at 44 ºC or passive cooling (C) at 15 ºC for 20 minutes, and a no treatment control (NT). On day 1, subjects completed 50 reps of eccentric elbow flexions and extensions at 120 $deg \cdot s^{-1}$. DOMS was measured pre-exercise (Pre), and at 24h, 48h, 72h, and 96h post-exercise. Isokinetic strength of the elbow extensors and flexors was measured at 60 $deg \cdot s^{-1}$at Pre, 24h, and 72h. CK activity was measured at Pre, 48h, and 120h after EIMD. **RESULTS:** No significant group (H, C, and NT) by time (Pre, 24h, 48h, 72h, and 96h) interaction for DOMS, isokinetic strength, or CK activity ($p>0.05$) was found. However, at all time points, DOMS was significantly increased compared to Pre in each group ($p<0.05$). In all groups, CK activity (mean ± SE) increased significantly from Pre to 48h and 96h, in H from 48.4±5.2 to 179.5±95.4 and 623±353.0 IU, in C from 99.1±30.7 to 120.7±25.4 and 482.5±246.3 IU, and in NT from 58.5±6.8 to 137.5±33.1 and 451±148.7 IU, respectively. **CONCLUSION:** Although muscle damage was present as evidenced by increased DOMS and CK across days, passive heating and cooling prior to strength testing but post-EIMD had no effect on ratings of DOMS, isokinetic strength or CK activity when compared to no treatment.

52. EFFECTS OF STATIC STRETCHING ON MAXIMAL LEG STRENGTH

Solano P, Bethel A, Gillum T.
California Baptist University, Department of Kinesiology

Two of the five principles of fitness are muscular strength and flexibility and it is common practice for an individual to stretch before a bout of exercise. Current studies show that prolonged, static stretches performed before isokinetic or isometric exercise requiring high power output have a negative effect on performance, specifically maximal strength. However, little is known regarding the effects of short, acute bouts of stretching prior to performing maximal lifts during an isotonic exercise. **PURPOSE:** To assess the effects of acute, static stretching on maximal lower body strength. **METHODS:** 15 subjects (7 females, 8 males), age 21 ± 0.9 years, height 170.5± 5.8 cm, weight 71.2 ± 9.4 kg completed two exercise bouts: static stretching prior to exercise (STR) and a control trial with no stretch (CON). The test was done in three steps: a 10 min warm up at an approximate 60% HR max on stationary bicycle, 30 seconds of stretching for each of the 5 stretches administered, and a maximal leg press. Stretching consisted of two quadriceps stretches, two biceps femoris stretches, and one stretch for the triceps surae. Strength was assessed based on the 1RM ASCM guidelines. One week separated each exercise bout. **RESULTS:** The weight lifted after STR was 284.1 ± 133.9 kg while the weight lifted in CON was 277.2 ± 123.9 kg. There was no difference between groups ($p= .06$). **CONCLUSION:** Our stretching protocol sought to mirror practical warm up techniques used by athletes and fitness enthusiast. Although other studies have shown that stretching can be detrimental to maximal strength, testing was done in a different manner by stretching muscle groups for prolonged periods of time, as well as only testing the muscle group stretched with isometric or isokinetic exercise. Our results suggest that short, acute stretching has a limited effect on maximal isotonic contractions of the lower body.

53. POST- RESISTANCE EXERCISE RESPONSES IN OBESE AND NORMAL WEIGHT CHILDREN

J.G. Tan, D. Mendoza-Castner, J. Ng, J.J. Tufano, D.A. Rubin, D.A. Judelson.
Department of Kinesiology, California State University, Fullerton

It has been suggested that overweight individuals may cope better with activities that are discontinuous such as resistance exercise. Similar information in children is scant. **PURPOSE**: To compare the resistance exercise responses in normal weight (NW) and obese (OB) children. **METHODS**: Nine NW (body fat % < 85th percentile) and fourteen OB children (body fat % >than the 95th percentile) participated. Subjects donned a weighted vest loaded with 50% of their lean body mass (determined by DXA) during six sets of ten repetitions of a step-up exercise with each leg onto a step with height individualized at 20% of subject's stature. Subjects' heart rate (HR) and rating of perceived exertion (RPE; OMNI scale) were recorded immediately after each set. Blood pressure (BP) was recorded after the sixth set. Peak HR, test termination HR, and total time to complete the protocol (Total Time) were recorded as well. **RESULTS:** RPE (NW: 6 ± 2 vs. OB: 5 ± 2), systolic BP (NW: 121 ± 13 vs. OB: 130 ± 18 mmHg) and diastolic BP (NW: 67±12 vs. OB: 64 ± 14 mmHg) ($p > 0.05$ for all). Test termination HR of NW (163 ± 17 bpm) was significantly lower than OB (178 ± 15 bpm). Mean HR and Peak HR of NW (156 ± 15 bpm and 168 ± 13 bpm, respectively) almost showed significance compared to OB (168 ± 15 bpm and 180 ± 16 bpm, respectively, $p < 0.082$). Both groups presented similar Total Time (NW:727 65 and OB: 738±129 seconds). **DISCUSSION:** It appears that OB children had a higher sympathetic response to the protocol as suggested by the HR. However, the excess adiposity did not interfere with their time to complete the protocol, their perception of effort, or their BP response. Supported by USAMRAA Award W81XWH-08-1-0025.

54. EFFECT OF A NATURAL VERSUS COMMERCIAL PRODUCT ON RUNNING PERFORMANCE AND GASTROINTESTINAL TOLERANCE

Brandon W. Too, Sarah Cicai, Kali R. Hockett, Elizabeth Applegate FACSM, Brian A. Davis FACSM, and Gretchen A. Casazza
Sports Performance Laboratory, University of California, Davis, Medical Center Sports Medicine Program,

Purpose: To examine the effects of raisins and chews on running performance and gastrointestinal (GI) tolerance. **Methods**: Eleven male (29.3 ± 2.4 yrs) runners completed three randomized trials (raisins, chews and water only) separated by 7 days apart. Each trial consisted of 80-min submaximal (75%VO_{2max}) running followed by a 5-km time trial (TT). Heart rate (HR), respiratory exchange ratio (RER), glucose, lactate, free fatty acids, glycerol, insulin, electrolytes, creatine kinase, GI symptoms and rating of perceived exertion (RPE) were recorded every 20-min during the submaximal trial and at the end of the TT. Whole body muscle soreness and fatigue were also measured. **Results:** VO_2, HR, muscle soreness and fatigue, electrolytes, lactate and RPE did not differ due to treatment**.** RER was significantly higher during the carbohydrate treatments, as was blood glucose (104.9 ± 3.6, 107.0 ± 2.5, 98.0 ± 2.9 $mg \cdot dl^{-1}$ for raisin, chews and water respectively). Plasma creatine kinase was higher with raisins (466.6 ± 101.7, 308.2 ± 58.5, 321.5 ± 48.3 $U \cdot L^{-1}$ for raisin, chews and water respectively). Time to complete the TT was shorter for both carbohydrate treatments (20.6 ± 0.8, 20.7 ± 0.8, 21.6 ± 0.8 min for raisin, chews and water respectively). GI disturbance was mild for all treatments. **Conclusion:** Both the raisins and chews maintained high blood glucose levels and improved running performance compared to water only. Running performance between the raisins and chews were similar with no significant GI differences.
Key words: blood glucose, time trial, respiratory exchange ratio, creatine kinase, carbohydrate, fiber

55. COMPARING THE ACCURACY OF THE BODYBUGG TO THE POLAR HR MONITOR AND DIRECT MEASURES OF OXYFEN CONSUMPTION (VO_2) IN DETERMINING CALORIC EXPENDITURE OF VARIOUS MODES OF ACTIVITY AMONG MEN AND WOMEN

Brian Thornock and Julie Taylor
Physical Education Dept., Southern Utah University

Introduction: Weight management has become a common concern among Americans due to the increase of obesity in the United States. Advances in exercise science technology have resulted in the development of devices which are designed to measure energy expenditure during daily activities and exercise. The Apex bodybugg and Polar heart rate monitor can be used to monitor caloric expenditure, but can consumers place confidence in these devices? The purpose of this study is to compare the bodybugg and Polar HR monitor to indirect calorimetry measures to determine the accuracy of these devices during submaximal treadmill and rowing exercises.
Methods: Twelve men and twelve women were recruited for the study. Each subject completed an informed consent form and health survey before testing. All 24 "apparently healthy" subjects performed a 24 minute, submaximal (60-70% max HR) treadmill exercise. During an additional testing session, twelve of these subjects performed a 24 minute, submaximal rowing exercise. We measured body parameters for each subject and fitted her/him with a bodybugg, a polar HR monitor, and facemask for collection of expired gases. Following the exercise, caloric expenditure was recorded from each of the devices and statistically compared. Significance was set at $p<0.05$.
Results: A paired T-test compared both the HR monitor and the bodybugg to VO_2 measures. A significant difference was found when comparing bodybugg vs VO_2 in both women ($p=0.021$, 9% overestimation) and men ($p=0.011$, 13% overestimation). T-tests were also run for the rowing exercises and differences were only found with men when comparing the HR monitor and VO_2 measures ($p=0.011$, 28.5% overestimation). We conclude that the Polar HR monitor is the more accurate device for measuring caloric expenditure during submaximal jogging exercises and the bobybugg is the more accurate device for measuring caloric expenditure during a submaximal, upper body exercise.

56. EFFECT OF FOOTWEAR ON GROUND REACTION FORCE AND VERTICAL JUMP HEIGHT

James J. Tufano, Vanessa L. Cazas, Joe LaPorta, Kevin Shishido, Leah Truong, and Lee E. Brown, FACSM
Department of Kinesiology, Center for Sport Performance, California State University, Fullerton,

Research is lacking on the effect of minimalist footwear on performance. The purpose of this study was to examine the effect of footwear on ground reaction force and vertical jump height. Twenty-seven recreationally trained females (23±2.2 yrs, 162.94±7.37 cm, and 62.02±8.79 kg) participated in this study. Following a 5-minute cycling warm-up, each subject completed three vertical jumps while wearing one of three different types of footwear: tennis shoes (TS), bare feet (BF), or minimalist shoes (MS; Fila Skele-toes). The order in which the footwear was worn was randomized until each subject had jumped with all three conditions in the same visit. All counter-movement vertical jumps were performed on a force plate with hands placed on the hips. Thirty seconds of rest was given between trials and 2 minutes was allotted between conditions. Ground reaction forces (GRF) were directly measured at 1000Hz using an AMTI force plate and vertical jump height (VJH) was estimated using the time-in-the-air equation of projectile motion. Repeated measures ANOVA revealed no differences in GRF between the TS (1316.28±175.68 N), BF (1324.37±204.32 N), or MS (1313.21±192.15 N) conditions. However, there was a significant ($p<0.05$) main effect for condition for VJH. Post hoc tests demonstrated a significant difference between the TS (22.94±4.55 cm) and MS conditions (22.20±4.83 cm), while no differences were seen between either, the TS and BF (22.50±4.93 cm) or MS and BF conditions. DISCUSSION: Since GRF was not influenced by footwear, the rate of force development or the velocity at takeoff may have influenced VJH. The increased VJH during the TS condition may have resulted from error that occurs from estimating VJH. MS may not affect GRF during jumping. However, wearing MS during jumping activities may hinder performance. Therefore, the efficacy of wearing MS during athletics should be questioned.

57. PREVALENCE AND ASSOCIATION OF SARCOPENIA AND OSTEOPENIA

S. Van Gorder, M. LeBlanc, and S.A. Hawkins, FACSM
Department of Exercise Science, California Lutheran University

The aim of this study was to investigate the prevalence and interaction of sarcopenia and osteopenia in a sample of older adults. One hundred and five male (n=34) and female (n=71) participants over the age of 65 were tested for body composition and bone mineral density by DXA. Muscle strength was determined by 1 RM leg press, handgrip test and pinch test. Functionality was established with a 6m Get-Up and Go test. Pearson correlations were used to examine relationships, and independent t-tests compared sarcopenic subjects to non-sarcopenic by gender ($p \leq 0.05$). For the female participants, 23 were sarcopenic based on ASM/ht² (5.24 ± .33 vs. 6.45 ± .58, respectively, $p \leq 0.05$), whereas 12 were categorized as sarcopenic based on hand grip strength. For males, 9 were sarcopenic based on ASM/ht² values (6.94 ± .19 vs. 8.21 ± .70, respectively, $p \leq 0.05$), and three were sarcopenic based on their hand grip strength. Based on hip BMD, 44 women were osteopenic and eight were osteoporotic, while 16 men were osteopenic. Six men were sarcopenic and osteopenic. Twelve women were sarcopenic and osteopenic, and six were osteoporotic and sarcopenic. Group comparisons of those sarcopenic vs. not by ASM/ht^2 identified differences in leg press strength, right and left hand grip strength, lean body mass, fat mass and hip BMD ($p \leq 0.05$) for the females, whereas males differed only for lean body mass, total body BMD, forearm BMD, and age ($p \leq 0.05$). ASM/ht^2 correlated with leg press ($r = 0.74$, $p \leq 0.05$) and all measures of BMD ($r = 0.42 – 0.60$, $p \leq 0.05$). In conclusion, ASM/ht^2 appears the most definitive measure for identifying prevalence of sarcopenia, and there appears to be an interaction between osteopenia and sarcopenia.

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59. PERCEIVED STRESS, PHYSICAL ACTIVITY AND BODY FAT DISTRIBUTION IN WOMEN

Jenelle R. Walker, Darith James, Pamela Swan, FACSM
School of Nutrition & Health Promotion, Healthy Lifestyles Research Center, Arizona State University

Stress can affect the intention-behavior relationship for physical activity and illicit physiological responses that can affect health (Logan & Barksdale, 2008; McEwen & Lasley, 2003). The physiological stress response has been shown to effect body fat distribution. Central obesity is now accepted as an independent risk factor for the chronic diseases; High levels of stress can affect body fat distribution and physical activity may have an effect on this relationship.

Purpose: The purpose of this study is to evaluate the relationships between stress and body fat distribution and to describe the influence of physical activity (PA).

Methods: This cross sectional study recruited women (25-65 years 42±12; N = 69) from the local University and Phoenix metropolitan area. Measures of stress [perceived stress scale questionnaire, 10 item, 4-point scale, higher score indicates increased stress (PSS)], Physical activity (GPAQ) and body composition (%body fat- bioelectrical impedance (Tanita,) waist circumference) were taken.

Analysis: Subjects were grouped by physical activity level and compared for associations with perceived stress and body composition. Data were analyzed using one-way ANOVA and Pearson correlations with PASW 18.

Results: Significant between group differences were found when comparing physical activity and perceived stress ($p<.05$) when controlling for weight. Significant associations were shown for age and all body composition variables ($p<.05$).

Conclusion: Perceived stress was lower for those who had greater minutes of physical activity per week between the highest groups. Interestingly, this difference was not seen when comparing the lower physical activity groups. This may be due to under reporting perceived stress levels in these groups. Future analysis will compare objective measures of stress and physical activity to see if these differences remain.

58. EVALUATION OF ABUNDANT LIFE WELLNESS' FALLS PREVENTION PROGRAM

[1]Jesse W. Vezina, [2]Melanie Mitros, & [1]Cheryl Der Ananian
[1]Exercise & Wellness Program, Arizona State University
[2]Arizona Living Well Institute

Despite the high prevalence of falls in older adults, few community-based, sustainable falls prevention programs are available. PURPOSE: To evaluate the feasibility of implementing a community-based Falls Prevention Program (FPP). METHODS: Participants (n=29) were recruited from and participated in the FPP at two community-based locations. Nine independently living individuals were recruited from a retirement community and 20 community dwelling residents were recruited from a senior center. Participants had to be at least 60 years old, and be either at risk for a fall, defined as having two or more known risk factors for a fall, or had a history of a fall within the past year. Contraindication to exercise warranted exclusion from the study. A single group, pre- post- design was used to examine the efficacy of the FPP on Berg balance scores, physical function (Timed Up-And-Go, repeated chair stands, and repeated arm curls), and flexibility (back scratch test and chair sit-and-reach). The twelve-week FPP was a combined falls prevention education and exercise program targeting balance and lower extremity strength delivered by allied healthcare students from a large university in the Southwest. Pre- post- differences in outcomes were examined with dependent t-tests. RESULTS: Twenty nine individuals (86% female, 50% white, 40% black, mean age=77.4 [9.2], 48% experienced a fall within the past year) were tested at baseline and 22 were tested at follow-up. No significant improvements were observed in balance, Timed Up-And-Go, shoulder or hamstring/low back flexibility ($p>0.05$). There was a trend toward improvement in chair stands ($p=0.09$), and a significant improvement was observed in number of arm curls ($p=0.03$). CONCLUSIONS: Although the FPP did not demonstrate significant effects on balance and physical function in this small sample, feasibility of delivery by allied healthcare students was demonstrated. Future studies with larger sample sizes are warranted.

60. EFFECT OF 4 WEEKS RESVERATROL SUPPLEMENTATION ON BODY COMPOSITION IN HEALTHY ADULTS

[1]Wherry, S.J., [2]Smoliga, J.M.,
[1]Arizona State University, [2]Marywood University

Due to the other health benefits commonly associated with resveratrol supplementation, a large body of research has been dedicated to investigating its many possible uses. However, a majority of the research has been directed towards cardiovascular health, and very little on the effects on body composition. **PURPOSE:** To evaluate the effects of 4 weeks of 400 mg of resveratrol supplementation on body composition in a healthy population, including fat mass and lean mass. **METHODS:** 41 healthy adults (13 male, 28 female) between the ages of 18-75 were randomized to either the resveratrol (RES) or placebo (PLA) groups. They participated in two testing visits, a baseline (Pre) and a post-supplementation (Post) visit, spaced 4 weeks apart. Each visit included a Dual-Energy X-ray Absorptiometry (DEXA) scan. Data were analyzed using Repeated Measures ANOVA to determine significance ($\alpha = 0.05$) of Group x Visit effects. **RESULTS:** There were no significant differences between PLA (Pre: 24.2 ± 9.5kg, Post: 24.3 ± 9.6kg) and RES (Pre: 23.7 ± 9.3kg, Post: 23.7 ± 9.3kg) for changes in fat mass ($p = 0.295$). There were also no significant differences between groups for changes in lean mass (PLA: Pre: 46.4 ± 10.3kg, Post: 46.1 ± 9.9kg; RES: Pre: 48.1 ± 10.2kg, Post: 48.3 ± 10.0kg, $p = 0.203$). **CONCLUSIONS:** It appears that short-term resveratrol supplementation does not alter body composition in healthy adults. Further research using large sample sizes, longer supplementation periods, and concurrent exercise should be performed to better evaluate resveratrol's efficacy.

61. RELIABILITY OF THE BRUININKS-OSERETSKY TEST OF MOTOR DEVELOPMENT IN CHILDREN AND ADOLESCENTS WITH PRADER WILLI SYNDROME

Elizabeth White, Lindsay Schroeder, Pamela Wright, Daniela Rubin, Debra J. Rose, Lenny Wiersma,
Department of Kinesiology, California State University, Fullerton

Individuals with Prader Willi Syndrome (PWS) present overall motor deficiency but the specific areas have yet to be identified in youth. To determine specific areas of deficiency a reliable instrument must be used. **Purpose:** To determine if the Bruininks-Oseretsky Test of Motor Development (BOT) is a reliable instrument to assess motor proficiency in children and adolescents with PWS. **Methods:** 10 children with PWS (5 girls/5 boys, mean ages 11.1±1.7 y, body mass 62.0±27.7 kg, height 144.5.44±10.7 cm, body fat 48.0±9.5 %) participated in this study. Nine out of ten participants were using growth hormone therapy and eight out of ten were attending physical therapy. Participants completed the test on two separate morning visits, one week apart. The BOT test evaluates the following areas of motor proficiency: Fine motor precision (Item 1), fine motor integration (Item 2), manual dexterity (Item 3), bilateral coordination (Item 4), balance (Item 5), running speed and agility (Item 6), upper limb coordination (Item 7), and strength (Item 8). The test provides subtest item scores and a total composite score (TCS). **Results:** The Pearson product correlation coefficients between visits were as follows: Total composite test score r=.989, Item1 r= .809, Item 2 r= .965, Item 3 r= .930, Item 4 r= .712, Item 5 r= .731, Item 6 r= .866, Item 7 r= .891, Item 8 r= .805; all significant at $p<0.021$). **Discussion:** The total composite test score and the majority of subtest item scores showed moderate-to- high test-retest correlation coefficients. In conclusion, based on this pilot data, the BOT appears to be a reliable test to assess motor proficiency in children and adolescents with PWS ages 8 to 15 years old.

62. SITE-SPECIFIC RELATIONSHIPS BETWEEN MUSCLE AND BONE IN YOUNGER AND OLDER WOMEN

T. White, S.A. Hawkins, FACSM, and M. LeBlanc
Department of Exercise Science, California Lutheran University

The purpose of this study was to investigate relationships between muscle strength and mass with site-specific BMD and to determine if this relationship is age-dependent. Fifty young women (18-30 yrs) and fifty older women (65-81 yrs) with equivalent activity levels were tested for body composition and bone mineral density by DXA. Site-specific BMD was also determined for mid-femur, mid-shank, mid-humerus and mid-forearm. Muscle strength was determined by pinch test, hand grip, 1RM leg press, and isokinetic knee flexion and extension peak torque. Pearson correlations were used to examine relationships ($p < 0.05$). Grip strength correlated with values from the mid-femur ($r = 0.38$, $p = 0.009$), mid-humerus ($r = 0.45$, $p = 002$), and mid-radius ($r = 0.36$, $p = 0.016$) for the Young women. In contrast, for the Older women only the value from the mid-humerus correlated with the grip strength ($r = 0.39$, $p = 0.007$). For Young women, the peak extension torque correlated with mid-tibia and mid-radius ($r = 0.34$, $p = 0.023$ and $r = 0.31$, $p = 0.036$ respectively). There was a trend towards correlation with the mid-femur and mid-humerus. For Older women, peak extension torque correlated only with the mid-femur ($r = 0.43$, $p = 0.003$). Normalized leg press force did not correlate with any of the site-specific values for either group but there were some correlations between the absolute force for both groups. In conclusion, the relationships between site-specific BMD and muscle strength were different between the two groups with the Older women exhibiting more direct relationships while Young women exhibited more systemic relationships.

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63. TRAINING VARIABLES OF THE LIVE LOW-TRAIN HIGH TRAINING MODEL: A META-ANALYSIS

Wortman, M., Parker, D., and Quintana, R.
Irvin Faria Exercise Physiology Research Laboratory California State University

Athletes and coaches are always looking for a way to improve athletic performance; recently one of the more popular techniques has been through hypoxic training. Recent meta-anlaytic studies have shown that of the multiple hypoxic training models that the live low-train high model has the most potential to improve athletic performance in endurance sports. However, it is unclear how to best achieve the benefits of this form of hypoxic training. **Purpose**: To develop an optimal training protocol for the live low-train high hypoxic training model by deriving data from current research and applying the meta-analytic technique to the data. **Method**: A search was performed to collect data from current research articles and code them for the following variables: training altitude, length of training cycle, frequency of exercise, length of training session, training intensity, and time to post-hypoxic peak. Effect sizes (ES) for each variable were calculated using the means and standard deviation from each study. Studies that had fewer than 20 subjects were corrected for small sample size. The line of best fit was applied to a graph of each variable to determine where the peak ES occurred. **Conclusion**: An optimal live low-train high hypoxic training model, based off the current research, consists of training at an altitude between 2500-3000m, for 15 days, 6 days per week, 97 minute per training session, each session at an intensity of 60-65% VO_{2max}, and an athlete should expect to see the greatest performance peak 8 days after ending their hypoxic training exposure.

64. BODY FAT PATTERING IN CONGENITAL OBESITY CAUSED BY PRADER-WILLI SYNDROME

Pamela Wright, Daniela Rubin, Diobel Castner, and Daniel A. Judelson
Department of Kinesiology- California State University, Fullerton

Prader-Willi Syndrome (PWS) is a genetic disorder resulting in excessive adiposity and reduced lean mass. Adults with PWS present differences in fat patterning (increased fat mass in the limbs) compared to non-syndromal obese adults who have increased fat mass in the trunk. In children, there is paucity of data. **Purpose:** To describe fat patterning in children with PWS as it compares to obese children without PWS. **Methods**: Eleven children with PWS and 42 obese (OB=body fat >95th percentile) children ages 8-11 y participated. Children underwent body mass, stature, waist circumference (WC) measurements and a total body dual x-ray absorptiometry scan. Body fat % was measured for total, trunk, gynoid, and android fat. Body mass index (BMI) was calculated. **Results:** Independent t-tests showed that PWS and OB had similar BMI (PWS: 24.7 ± 6.3 kg/m^2; OB: 27.8 ± 9.4 kg/m^2), and waist circumference (PWS: 80.4 ± 14.0 cm; OB: 88.6 ± 11.0 cm) ($p>.05$). Also no significant differences were observed for total body fat % (PWS: 43.8 ± 8.0%; OB: 42.1 ± 8.0%), trunk fat (PWS: 43.9 ± 10.4%; OB: 44.1 ± 8.8%), gynoid fat (PWS: 53.2 ± 3.3%; OB: 49.8 ± 6.7%), and android fat (PWS: 53.6 ± 6.4%; OB: 51.0 ± 8.5%) ($p >0.05$ for all). **Discussion:** Previously, it has been shown that PWS adult males presented with higher gynoid body fat % than non-syndromal obese males with similar BMI. Our results suggest no differences in body fat patterning, particularly in the abdominal and limb regions, between PWS children and non-syndromal obese children with similar BMI and levels of body fat.

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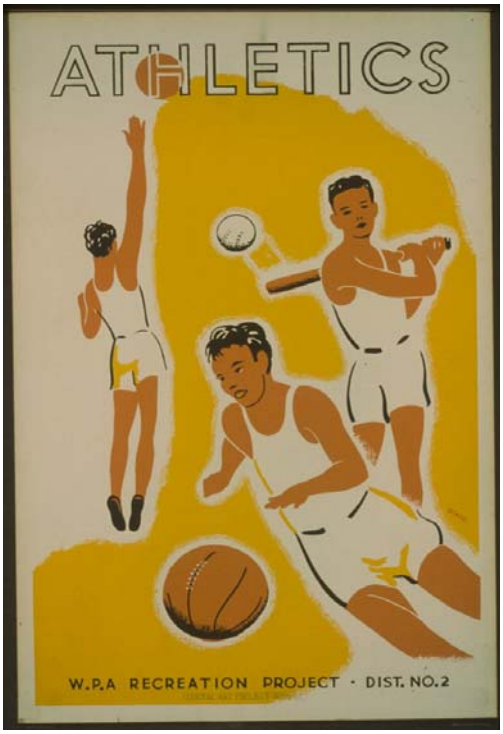
65. EFFECTS OF EXERCISE ON APPETITE RATINGS AND FOOD INTAKE IN MEN AND WOMEN

Megan Yamashiro, Jake Hinkel-Lipsker, Katherine Streder, Hanne Wolf, Terry Hackney, Nero Evero, Todd A. Hagobian
Kinesiology Department- California Polytechnic State University, San Luis Obispo

A single bout of aerobic exercise suppresses subjective appetite responses and subsequent relative energy intake in men. However, it remains unclear whether the same response occurs in women when exposed to the same exercise intervention. **Purpose:** To determine whether exercise alters subjective appetite responses and *ad libitum* energy intake differently in men and women. **Methods:** 11 healthy men (22 ±2 yrs; 16 ±6 %BF; 42.9 ±6.5 ml/kg-min) and 10 healthy women (21 ±2 yrs; 23 ±3 %BF; 39.9 ±5.5 ml/kg-min) completed both a no-exercise and exercise condition in a counterbalanced, cross-over fashion. Subjects either rested for 60 minutes (no-exercise) or exercised on a cycle ergometer at ~70% VO2 max until 30% of their total daily energy expenditure was expended (men= 975 ±195 kcal, 82 ±13 min; women= 713 ±86 kcal, 84 ±17 min). Forty minutes after completion of both conditions, subjects were given an *ad libitum* buffet meal. Using a repeated ANOVA, subjective appetite responses (hunger, fullness, satiety) were assessed before, immediately after, and up to 30 minutes post each condition, and relative energy intake was calculated from the buffet meal. **Results:** There was no sex difference in subjective appetite responses. In both men and women, perceptions of satiety and fullness were significantly higher ($P<0.05$), and hunger was significantly lower after the buffet meal compared to all other time points in both conditions. In both men and women, relative energy intake was significantly lower ($P<0.05$) in the exercise condition versus the no exercise condition; however this did not differ by sex. **Conclusion:** Exercise, compared to the no-exercise, decreased relative energy intake with subtle changes in subjective appetite responses in men and women. These data suggest that prolonged high-intensity aerobic exercise may be advantageous to suppress food intake and may aid in preventing body weight gain over-time.



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