SOUTHWEST CHAPTER

AMERICAN COLLEGE OF SPORTS MEDICINE

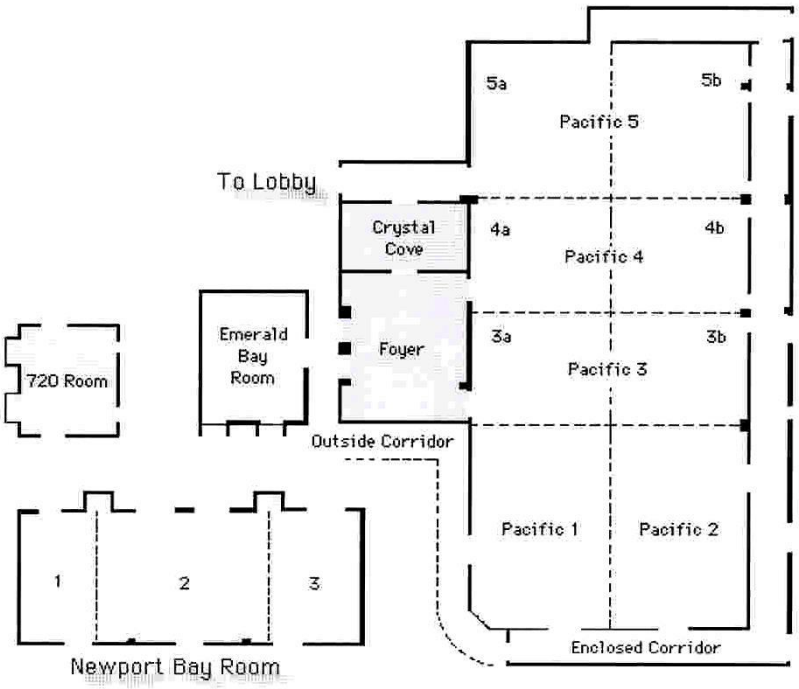
2013 ANNUAL MEETING

October 18-19, 2013

Radisson Newport Beach
Newport Beach, California

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

Floor Plan



Radisson Newport Beach
4545 MacArthur Blvd.
Newport Beach, CA 92660
Hotel Telephone: (949) 833-0570

Welcome to the

33rd Annual Meeting

of the

Southwest Regional Chapter

of the

AMERICAN COLLEGE of SPORTS MEDICINE SM

October 18-19, 2013

Radisson Newport Beach
Newport Beach, California

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

Sponsors – Thank you!!!

Parvo Medics, Inc.
(www.parvo.com)

Vacumed
(www.vacumed.com)

(www.gssiweb.org)

P.O. Box 1828
Monterey, CA 93942
Toll-Free 888-229-5745

(www.tekscan.com)

The American College of Sports Medicine
(www.acsm.org)

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, 18 OCTOBER 2013

Registration **Crystal Cove** **7:30 am – 4:00 pm**

General Session **9:00 am – 10:30 am** **Pacific 4 & 5**

Moderator: Lee Brown, Ed.D., FACSM, President, SWACSM
California State University, Fullerton

SWACSM Recognition Award

Preview of Meeting: Lorraine Turcotte, Ph.D., FACSM
University of Southern California

D.B. Dill Lecture

Healthy Eating and Physical Activity Across the Lifespan in Culturally Diverse Communities
Janice Thompson, Ph.D., FACSM, Past ACSM Vice-President
Scientific Committee, European College of Sports Science
University of Birmingham, U.K.

Concurrent Symposia **10:30 am – Noon**

Mysteries and Myth Busters: Chaperones, Sirtuing and Orphan Receptors in the Regulation of Muscle Metabolism and Function

Moderator: Andrea Hevener, Ph.D., University of California, Los Angeles

10:30 – 11:00 ***Unraveling the Contribution of Sirtuin1 (SIRT 1) to Skeletal Muscle Metabolism*** **Pacific 3**
Simon Schenk, Ph.D., University of California, San Diego

11:00 – 11:30 ***Heat Shock 72 in the Control of Mitochondrial Dynamics and Insulin Sensitivity***
Andrea Hevener, Ph.D., University of California, Los Angeles

11:30 – 12:00 ***Nuclear Receptor 4A in Muscle Metabolism and Growth***
Lily Chao, Children's Hospital, Los Angeles

FRIDAY, 18 OCTOBER 2013, continued

She has Testosterone and He has Estrogen: Skeletal Muscle Adaptation to Resistance Training **Pacific 1**

Moderator: Christina Dieli-Conwright, Ph.D., University of Southern California

10:30 – 11:00 ***Why Estrogen Matters?***
Christina Dieli-Conwright, Ph.D., University of Southern California

11:00 – 11:30 ***Why Testosterone Might Not Matter***
Jackie Kiwata, Ph.D., University of Southern California

11:30 – 12:00 ***From the Lab Bench to the Bench Press: Training Implications***
Christina Dieli-Conwright, Ph.D., University of Southern California

Postural Assessment and Corrective Exercise Strategies (Presentation/Exercise Session*) **Pacific 2**

Moderator: Pat Vehrs, Ph.D., Brigham Young University

10:30 – 11:00 ***How Does Posture Fit into the Exercise Plan?***
Pat Vehrs, Ph.D., Brigham Young University

11:00 – 12:00 ***Posature, Pain, and Performance***
Brian Bradley, Vice-President, Egoscue

Facilitators: James George, Ph.D., Ron Hager, Ph.D., Bill Myrer, Ph.D.
Brigham Young University

**The wearing of loose-fitting exercise clothing is encouraged to fully participate in this session.*

LUNCH **Noon - 1:00 PM**

FRIDAY, 18 OCTOBER 2013, continued

Student Research Award 1:00 pm – 2:30 pm Pacific 3

Moderator: Marcella Raney, Ph.D., Occidental College

1:00 **The Impact of Oral Creatine Supplementation on *In Vivo* Measures of Creatine Phosphate Concentration and Activity Following Cast-Immobilization**
N.H. Cole, University of New Mexico

1:15 **Skin Blood Flow and Muscle Oxygenation in the Shoulder during Backpack Carriage**
Clifford P. Mao, University of California, San Diego

1:30 **Changes in Impact Kinetics with Altered Foot Strike Patterns in Running**
Andrew Nordin, University of Nevada, Las Vegas

1:45 **Leg Blood Flow and Limb Circumference with Altered External Pressure for Prothesis in Sports**
Sandra Thao, University of California, San Diego

2:00 **Effects of the Novel Myokine Irisin on Skeletal Muscle Metabolism**
Roger A. Vaughan, University of New Mexico

2:15 **Metabolic Profile and Hormone Levels in Trained and Untrained Young Adults**
Desiree Vera, University of La Verne

Concurrent Symposia 1:00 pm – 2:30 pm

Warfighter Performance: Recent Research on Military Personnel Pacific 1

Moderator: Karen Kelly, Ph.D., Naval Health Research Center, San Diego

1:00 – 1:45 ***The Effects of Heavy Loads on Lumbar Spine and Subsequent Performance of Operational Tasks***
Karen Kelly, Ph.D., Naval Health Research Center, San Diego

1:45 – 2:30 ***Stress and Performance during Military Survival Training***
March Taylor, Ph.D., Naval Health Research Center, San Diego

Balancing Improvements in Performance with Mechanical Loading — Pacific 2

Moderator: Jill L. McNitt-Gray, Ph.D., University of Southern California

1:00 – 1:20 ***Regulation of Shot Distance in the Golf Swing***
Travis Peterson, Ph.D. candidate, University of Southern California

1:20 – 1:40 ***Control of Balance during Impulse Generation in Turns***
Antonia Zaferiou, Ph.D. candidate, University of Southern California

1:40 – 2:00 ***Preparations for a Quick First Step in Court Sports***
Chris Ramos, Ph.D. candidate, University of Southern California

2:00 – 2:30 ***Control and Dynamics of Landing in Realistic Contexts***
Jill L. McNitt-Gray, Ph.D., University of Southern California

Concurrent Symposia — 2:45 pm – 4:15 pm

Obesity, Weight Loss and Metabolic Health: Separating Fact From Fiction — Pacific 2

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

2:45 – 2:50 ***Introduction and Overview***
Christian Roberts, Ph.D., University of California, Los Angeles

2:50 – 3:15 ***Weight Loss: Do the Benefits Really Outweigh the Risks?***
Siddhartha Angadi, Ph.D., University of California, Los Angeles

3:15 – 3:40 ***Body Weight and Mortality: A Series of Inconvenient Truths***
Glenn Gaesser, Ph.D., Arizona State University

3:40 – 4:05 ***Diet, Exercise and Chronic Disease: Getting to the Weight of the Matter***
Christian Roberts, Ph.D., University of California, Los Angeles

4:05 – 4:15 ***Discussion and Questions***

FRIDAY, 18 OCTOBER 2013, continued

Muscle Adaptations with Exercise — Pacific 1

Moderator: Allen Parcell, Ph.D., Brigham Young University

2:45 – 3:15 ***Structural Protein Adaptations in Skeletal Muscle***
Allen Parcell, Ph.D., Brigham Young University

3:15 – 3:45 ***Exercise and the Muscle Stem Cell Response***
Rob Hyldahl, Ph.D., Brigham Young University

3:45 – 4:15 ***Regulation of Amino Acid Transporters in Skeletal Muscle of Older Adults***
Micah Drummond, Ph.D., University of Utah

Staying Vertical in Your Golden Years — Pacific 3

Moderator: Laura Held, Ph.D., West Los Angeles Veterans Administration Hospital

2:45 – 3:15 ***Life in Balance: An Approach to Falls Education***
Laura Held, Ph.D., West Los Angeles Veterans Administration Hospital

3:15 – 3:45 ***Falls Risk Screening Tests; A Revisit***
Witaya Mathiyakom, PT, Ph.D, California State University, Northridge and West Los Angeles Veterans Administration Hospital

3:45 – 4:15 ***Introduction to Vestibular Rehabilitation***
Stella Leong, PT, DPT, West Los Angeles Veterans Administration Hospital

FRIDAY, 18 OCTOBER 2013, continued

SOCIAL EVENT

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

Poster Presentations

No Host Wine/Cheese Reception

SPECIAL EVENT

Pacific 4 & 5 **6:30 -7:30 PM**

Student Jeopardy Bowl

SATURDAY, 19 OCTOBER 2013

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

Student Colloquium **8:00 am – 9:00 am** **Pacific 3**

Panel Discussion
The Path Less Traveled – Ideas on how to Reach Your Professional Goals via Unchartered Roads

Panelists
Gudrum Bara Floyd, M.S., University of Southern California
Kim Henige, Ed.D, California State University, Northridge
Matt Lee, Ph.D., San Francisco State University
Mary McGregor, PT, DPT, OCS, Kern and Associates Physical Therapy, Santa Monica
Janice Thompson, Ph.D., University of Birmingham, U.K.
Jenelle Walker, Ph.D., ACE-certified GFI Professional, Arizona State University

Panel participants will discuss personal, professional, and diversity issues

Free Continental Breakfast; Raffle (Books & ACSM items)

Gatorade Sports Science Institute **9:00 am – 10:30 am**

Fueling Options for Pro Athletes **Pacific 1**
Karen Freeman, M.S., RD, CSSD, San Diego, CA
Sponsored by Gatorade

SATURDAY, 19 OCTOBER 2013 continued

Concurrent Symposia 9:00 am – 10:30 am

Sex Differences in Weight Control Pacific 3

Moderator: Todd Hagobian, Ph.D., California Polytechnic University, San Luis Obispo

9:00 – 9:45 ***Sex Differences in Weight Gain Among Low-Income Children***
Aydin Nazmi, Ph.D., California Polytechnic University, San Luis Obispo

9:45 – 10:30 ***Sex Differences in Weight Loss with Exercise***
Todd Hagobian, Ph.D., California Polytechnic University, San Luis Obispo

Bone Metabolism and Clinical Disorders Pacific 2

Moderator: Marta vanLoan, Ph.D., USDA Western Nutrition Research Center

9:00 – 9:30 ***Inter-relationship Among Endocrine, Immune, and Bone Systems: Understanding Weight Loss-Induced Bone Loss***
Marta vanLoan, Ph.D., USDA Western Nutrition Research Center

9:30 – 10:00 ***Bone Metabolism in Prader Willie Syndrome***
Daniela Rubin, Ph.D., California State University, Fullerton

10:00 – 10:30 ***Bone Metabolism in Spinal Cord Injured Individuals***
Todd Astorino, Ph.D., California State University, San Marcos

SATURDAY, 19 OCTOBER 2013 continued

Concurrent Symposia 10:30 am – Noon

Community-Based Physical Activity and Nutrition Programs: Do They Work? Pacific 3

Moderator**:** Steven Loy, Ph.D., California State University, Northridge

10:30 – 11:00 ***LA Sprouts: A Nutrition, Cooking and Gardening Program for Obesity Prevention in Latino Youth***
Lauren Cook, Ph.D. candidate, University of Southern California

11:00 – 11:30 ***100 Citizens: A University Kinesiology Student Delivered Community Physical Activity Program. An Affordable, Accessible, and Sustainable Opportunity to Improve the Public's Health***
Steven Loy, Ph.D., California State University, Northridge

11:30 – 12:00 ***Incentivizing Fruit and Vegetable Consumption in Elementary Schools: Experience Implementing the Food Dudes Program in the U.S.***
Heidi Wengreen, Ph.D., Utah State University

Mitochondrial Adaptations with Exercise Pacific 1

Moderator: Dave Thompson, Ph.D., Brigham Young University

10:30 – 11:00 ***Ceramide-Induced Mitochondrial Fission Mediates MetabolicDisruption***
Ben Bickman, Ph.D., Brigham Young University

11:00 – 11:30 ***Changes in Skeletal Muscle Oxidative Capacity in Response to Chronic AMPK Activation and Elevated Dietary Fat***
Chad Hancock, Ph.D., Brigham Young University

11:30 – 12:00 ***Regulation of Contraction-Induced Inflammation and Mitochondrial Accretion by LKB1***
Dave Thompson, Ph.D., Brigham Young University

SATURDAY, 22 OCTOBER 2011, continued

Functional Movement Assessment and Corrective Exercise Strategies (Presentation/Exercise Session*) **Pacific 2**

Moderator: Pat Vehrs, Ph.D., Brigham Young University

10:30 – 11:00 ***Neuromotor Exercise: ACSM Guidelines***
Pat Vehrs, Ph.D., Brigham Young University

11:00 – 11:30 ***Functional Movement Screen: Background and History***
Ron Hager, Ph.D., Brigham Young University

11:30 – 12:00 ***Assessment of Functional Fitness and Corrective Exercises***
James George, Ph.D., Brigham Young University

Facilitator: Zachary Vehrs, M.S.

**The wearing of loose-fitting exercise clothing is encouraged to fully participate in this session.*

LUNCH **Noon - 1:00 PM**

SATURDAY, 22 OCTOBER 2011, continued

Concurrent Symposia 1:00 pm – 2:30 pm

Altitude Physiology Pacific 2

Moderator: Nazareth Khodiguian, Ph.D., California State University, Los Angeles

1:00 – 1:10 ***Introduction***
Nazareth Khodiguian, Ph.D., California State University, Los Angeles

1:10 – 1:40 ***Altitude Adaptations and Exercise Physiology***
Peter Wagner, M.D., University of California, San Diego

1:40 – 2:05 ***Impact of Genetics on Altitude Adaptations***
Tatum Simonson, Ph.D., University of California, San Diego

2:05 – 2:30 ***High Altitude Diseases***
Jens Johansson, D.O., Arrowhead Regional Medical Center, Colton, California

Light, Lighter, or Bare Foot? Pacific 1

Moderator: Marialice Kern, Ph.D., San Francisco State University

1:00 – 1:05 ***Introduction***
Marialice Kern, Ph.D., San Francisco State

1:05 – 1:20 ***Rearfoot and Forefoot Running: Differences in Extrinsic Muscle Activation***
Ulrike Mitchell, Ph.D., Brigham Young University

1:20 – 1:35 ***Can Western Runners Learn to Run Barefoot?***
Rami Hashish, Ph.D. candidate, University of Southern California

1:35 – 1:50 ***Intrinsic Muscle Changes and Arch Height During Transition: Potential Exercise to Help Transition***
Wayne Johnson, Ph.D., Brigham Young University

1:50 – 2:05 ***Bone Marrow Edema and Running Biomechanics***
Sarah Ridge, Ph.D., Brigham Young University

2:05 – 2:20 ***Running Economy***
Iain Hunter, Ph.D., Brigham Young University

2:20 – 2:30 ***Discussion and Questions***

SATURDAY, 22 OCTOBER 2011, continued

General Session **2:30 pm – 4:00 pm** **Pacific 4 & 5**

Moderator: Lee Brown, Ed.D., FACSM, President, SWACSM
California State University, Fullerton

Student Awards

Recognition of Host School:
California State University, San Marcos

Business Meeting

Founders Lecture

Lactate: The Forgotten Metabolic Intermediate in Health and Disease

George Brooks, Ph.D., FACSM
University of California, Berkeley
Honor & Citation Award recipient, American College of Sports Medicine
Recognition Award recipient, Southwest Chapter ACSM
Edward F. Adolph Distinguished Lectureship, American Physiological Society
Past Councilor, Environmental & Exercise Physiology Section,
American Physiological Society

SOUTHWEST ACSM RECOGNITION AWARD

1982	D.B. Dill
1983	Albert Behnke
1984	Steve Horvath
1985	Fred Kasch
1986	John Boyer
1987	Herbert de Vries
1988	Charles Tipton
1989	G. Lawrence Rarick
1990	Lawrence Morehouse
1991	William Haskell
1992	Ralph Paffenbarger
1993	Franklin Henry
1994	George Brooks
1995	James Skinner
1996	Christine Wells
1997	Lawrence Golding
1998	Ken Baldwin
1999	Robert Conlee
2000	Gail Butterfield
2001	R. James Barnard
2002	Gene Adams
2003	Vivian Heyward
2004	Fred Roby
2005	Marta Van Loan
2006	Jack Wilmore
2007	Larry Verity
2008	Steven Loy
2009	Lorraine Turcotte
2010	William Beam
2011	Priscilla MacRae
2012	Barbara Ainsworth
2013	J. Richard Coast

Southwest Regional Chapter of the
AMERICAN COLLEGE of SPORTS MEDICINE
2013 Board of Trustees

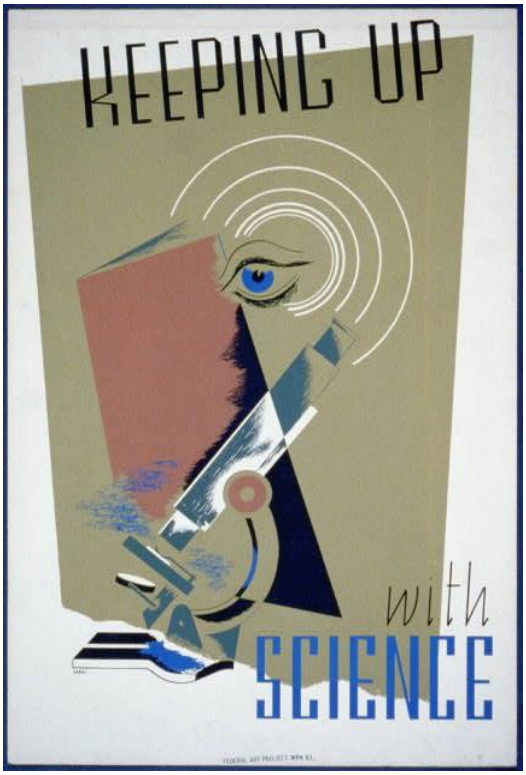
Past President	John Mercer, Ph.D.
President	Lee Brown, Ed.D., FACSM
President-Elect	Lorraine Turcotte, Ph.D., FACSM
Executive Director	Jack Young, Ph.D., FACSM
Member-at-Large	Marcella Raney, Ph.D.
Member-at-Large	Todd Astorino, Ph.D.
Member-at-Large	Matt Lee, Ph.D.
Member-at-Large	Dale Wagner, Ph.D.
Regional Chapter Representative	Marialice Kern, Ph.D., FACSM
Student Representative	Andrew Jensen
Newsletter Editor	Pauline Entin, Ph.D.
Associate Executive Director	Ben B. Yaspelkis III, Ph.D., FACSM
Founders	Gene Adams, Ph.D., FACSM Robert Conlee, Ph.D., FACSM Robert Bielen, M.D. Janet Lunn, M.A. James McIlwain, M.S. Marge Murphy, Ph.D. Gary Adams, Ph.D. (deceased)

2013 SWACSM

Annual Meeting

ABSTRACTS

Student Research Award
Poster Presentations



STUDENT RESEARCH AWARD

1. THE IMPACT OF ORAL CREATINE SUPPLEMENTATION ON *IN VIVO* MEASURES OF CREATINE PHOSPHATE CONCENTRATION AND ACTIVITY FOLLOWING CAST-IMMOBILIZATION

Cole, NH[1], Fransen, J[2], Kerksick, C FACSM[1], Schneider, S[1]
[1]Health, Exercise and Sports Sciences Department, University of New Mexico, Albuquerque, NM 87131
[2]Department of Kinesiology & Nutrition, University of Illinois-Chicago, Chicago, IL 60608

Hypokinetic scenarios are understood to produce a suite of negative muscular adaptations impacting general health and local muscular capacity. Despite the widespread applicability of any strategy capable of diminishing these adaptations, investigations have produced few viable courses of treatment, with some research indicating that creatine supplementation holds particular promise in its ability to attenuate the negative muscular changes resulting from immobilization. **Purpose**: To date, no research has been able to offer an analysis of *in vivo* intramuscular ^{31}P concentrations as they are impacted by both immobilization and oral creatine supplementation, as such; this study uses magnetic resonance spectroscopy (MRS) to examine the effects of creatine supplementation during cast-immobilization on baseline creatine phosphate (CrP) levels and phosphagen activity during exercise. **Methods**: 28 healthy subjects were randomly assigned to placebo or creatine treatment. Each subject was then familiarized to exercise protocol using a custom forearm ergometer within a 1.9 Tesla superconducting magnet. This protocol was then repeated during MRS data collection approximately one week later, directly prior to cast-immobilization (pre-tests), and again immediately after the cast was removed (post-tests), following seven days of creatine or placebo ingestion. **Results**: ANOVA conducted using baseline CrP values indicates that the group x time interaction was not significant (p = 0.713). The same analysis showed no significant impact independently attributable to treatment (p = 0.122), or immobilization (p = 0.079). Separate t-tests report a significant drop in baseline CrP (treatment p=0.223; control p=0.006) and CrP change with exercise (treatment p=0.462; control p=0.023) for the control group alone. **Discussion**: While ANOVA results make clear that any effects of creatine supplementation present in this study were limited in magnitude, the disparate significance of t-tests for differences between treatment groups offers a tantalizing suggestion of treatment effect.

3. CHANGES IN IMPACT KINETICS WITH ALTERED FOOT STRIKE PATTERNS IN RUNNING

Nordin, A.D., Castro, S.B., Dufek, J.S., Mercer, J.A.
Department of Kinesiology and Nutrition Sciences, University of Nevada, Las Vegas

Lack of an observable vertical impact transient during forefoot/midfoot running has been suggested to be a key factor in reducing injury, while the emergence of an anterior-posterior (AP) braking impact transient may be beneficial in gaining further insight into associations between running mechanics and injury. **Purpose**: The purpose of this investigation was to explore relationships among impact kinetics and running mechanics with changes in foot strike pattern during running. **Methods**: Nine male participants (mean age 26.0±4.7 years; height 1.74±0.03m; mass 79.8±7.4kg) free from lower extremity injury were examined. Foot strike conditions included obvious heel strike (OHS), subtle heel strike (SHS), midfoot strike (MFS), and forefoot strike (FFS). Participants completed 12 successful trials in each condition, under controlled speed along a 20m runway, contacting a force platform with the right foot. Kinematic and kinetic data were acquired using a 12-camera system, force platform, and sagittal video of the foot at impact. Kinetic measures included the vertical impact transient (Fz_1), local peak vertical ground reaction force (Fz_2), AP braking impact transient (Fy_1), local peak AP braking force (Fy_2), and peak AP propulsive force (Fy_3). Sagittal ankle angle at contact ($Ankx_0$) and foot strike condition were also examined. Statistical analysis was carried out using principal component analysis, providing insight into the inter-dependence among variables. **Results**: Two principal components were extracted providing 69.0% explained variance, with component 1 demonstrating common relationships among Fy_1, Fy_2, Fz_1, and Fz_2 (respective means ± sd: -272.0±125.1N, -293.9±68.0N, 1293.9±503.8N, 1904.9±339.2N). Component 2showed commonalities among Fy_3 (250.0±65.8N), $Ankx_0$ (4.2°±13.5°), and stride condition. The present research demonstrated interactions among running mechanics and impact kinetics, highlighting potential transfers of force within the body, which may have implications for injuries incurred while running.

2. SKIN BLOOD FLOW AND MUSCLE OXYGENATION IN THE SHOULDER DURING BACKPACK CARRIAGE

Clifford P. Mao, BS, Brandon R. Macias, PhD, Alan R. Hargens, PhD
Department of Orthopaedic Surgery, University of California, San Diego

Backpacks are used around the world by children and adults.The purpose of the study was to quantify the effects of backpack on pain, oxygenation, and blood flow in the shoulder region.We hypothesized that increasing backpack load decreases muscle oxygenation and skin blood flow (SkBF) in the shoulder.Each subject had a near-infrared spectroscopy (NIRS) sensor on one side of the trapezius and a laser Doppler flow (LDF) probe on the other to continuously measure oxygenation and SkBF, respectively.Eight volunteers' (4 men, 4 women, age range: 21-34) measurements were taken when they wore backpack loads of 0 kg load (empty backpack), 5 kg, and 10 kg for 5 minutes while standing. All volunteers had an 8-minute resting period before donning each backpack condition.Increasing backpack loads significantly decreased muscle oxygenation in the upper trapezius ($p<0.01$, repeated-measures ANOVA) and SkBF in the upper back ($p=0.02$, repeated-measures ANOVA). Furthermore, oxygenation levels while donning the 10 kg backpack was significantly lower than oxygenation levels while donning the empty backpack ($p=0.023$, dependent t-test). SkBF while donning the 10 kg backpack was significantly lower than SkBF while donning the empty backpack ($p=0.024$, dependent t-test). Perceived pain was significantly higher when wearing both the 10 kg and 5 kg backpack, as compared to the empty backpack ($p<0.05$, Wilcoxon signed rank test). The 10 kg backpack load applies enough pressure to significantly decrease local skin and muscle blood flow. The lower oxygenation detected by NIRS confirms that the backpack is contributing to the ischemic conditions in the upper trapezius. This ischemia probably increases the volunteers' perceived pain with heavier backpack loads. In conclusion, increasing backpack loads decreases shoulder muscle oxygenation and skin blood flow.

4. LEG BLOOD FLOW AND LIMB CIRCUMFERENCE WITH ALTERED EXTERNAL PRESSURE FOR PROSTHESIS IN SPORTS

Sandra Thao, BS; Brandon R. Macias, PhD; Alan R. Hargens, PhD
Department of Orthopaedic Surgery, University of California, San Diego

External negative pressure is associated with vasoconstriction and limb volume increase, where it causes fluid filtration from capillaries into limb tissues. Vacuum-assisted suspension sockets, used by amputee athletes, uses negative pressure to ensure a secure socket fit. Studies showed the potential maintenance and increase in residual limb volume while donning vacuum-suspension sockets. The purpose of this study is to quantify the effect of various pressures on the leg muscle and skin microvascular flows and circumference. We hypothesized that as the pressure decreases, there will be a linear increase in limb circumference and decrease in skin and muscle microvascular flows. Seven healthy, non-amputee subjects (3 women, 4 men) aged 31±17 years (mean±SD) were tested. The subjects placed one leg into a pressure chamber while lying in a supine position. Relative changes in skin and tibialis anterior muscle blood flows and the calf circumference were measured noninvasively using photoplethysmography and strain-gauge plethysmography. The following external pressures were generated: 0 (baseline), -10, -20, -30, and +10mmHg for 2 minutes each. The leg was readjusted back to baseline for 2 minutes between each pressure. The main effect of external pressure on leg muscle and skin blood flows and calf circumference are statistically significant (p=0.004). For negative pressures -10, -20, and -30mmHg, there were significant differences in skin and muscle blood flows compared to baseline (p<0.05). The calf circumference changes at pressures -10, -20, -30, and 10mmHg are statistically significant compared to baseline (p<0.001). There is also a linear decrease in calf circumference as the pressure increases (R^2=0.997). Our study shows that increasing external negative pressure significantly decreases skin and muscle microvascular flows and linearly increases calf circumference. The negative pressures cause significant limb swelling and may explain the residual limb volume increase and secure fitting in vacuum suspension sockets.

5. EFFECTS OF THE NOVEL MYOKINE IRISIN ON SKELETAL MUSCLE METABOLISM

Roger A. Vaughan MS, PhD(ABD)[1-3], Nicholas P. Gannon[2], Miguel A Barberena[2], Randi Garcia-Smith BS[2], Marco Bisoffi PhD[2,4,5], Kristina A. Trujillo PhD[2,4], Carole A. Conn PhD, RD, LD, CSSD, FACSM[3], Christine M. Mermier PhD[1]
[1]Department of Health, Exercise and Sports Science, University of New Mexico, Albuquerque, NM 87131
[2]Department of Biochemistry and Molecular Biology, University of New Mexico Health Sciences Center, Albuquerque, NM 87131
[3]Department of IFCE: Nutrition, University of New Mexico, Albuquerque, NM 87131
[4]University of New Mexico Cancer Center, Albuquerque, New Mexico 87131
[5]Biological Sciences, Chapman University, Orange, California 92866

Background: Exercise stimulates several potent metabolic effects leading to increased energy expenditure and metabolic rate. Irisin, a secreted myokine, was recently identified to promote increased metabolic rate and mitochondrial biogenesis in adipocytes, however the effects have yet to be explored in skeletal muscle. **Methods:** The effects of irisin on skeletal muscle were explored using C2C12 myocytes treated with various concentrations of irisin for various durations. Oxidative metabolism was quantified by measurement of oxygen consumption under basal and peak conditions. qRT-PCR was used to quantify metabolic gene expression, and flow cytometry and confocal microscopy were used to determine change in mitochondrial content. **Results:**Irisin treatment for 24 hours significantly elevated basal oxidative metabolism as much as 31.4% ($p<0.001$) and peak oxidative metabolism as much as 50% ($p<0.001$). Irisin treatment also significantly increased mitochondrial uncoupling roughly 19% above control. Additionally, treatment with irisin significantly elevated metabolic gene expression including PGC-1α, NRF-1, and TFAM; all of which directly control mitochondrial biogenesis. Lastly, irisin treatment significantly increased mitochondrial content approximately 250% compared with control ($p<0.001$). **Conclusions:** The effects of irisin on metabolism are currently relatively unexplored; however, our observations support the hypothesis that irisin increases metabolic rate through induction of mitochondrial biogenesis and uncoupling in skeletal muscle.

6. METABOLIC PROFILE AND HORMONE LEVELS IN TRAINED AND UNTRAINED YOUNG ADULTS

Desiree Vera[1], Danielle Burgess[2], Micaela Castillo[3], and Megan Granquist, Ph.D.[1], and Sarah L. Dunn, Ph.D.[1]
[1]University of La Verne, [2]Western University of Health Sciences, [3]California Baptist University

Physical activity may positively impact metabolic dysfunction ultimately influencing ones risk for disease (obesity, metabolic syndrome, etc...).Whether there is a significant difference between young trained and untrained males and females in association to metabolic profile and hormone levels, is unknown. **PURPOSE:** To examine the differences between body composition, lipids and hormone levels (insulin, testosterone, estradiol) in young (20.7 ± .43 yr) endurance trained (n=13) and untrained (n=11) males and females. **METHOD:** Fasting venous whole blood (40ml) and a finger prick (lipids; triglycerides, high density lipoproteins, and glucose) along with body composition measurements (percent body fat, body mass index, waist circumference, fat mass, etc...), blood pressure (systolic and diastolic) and a medical history were obtained from young apparently healthy endurance trained and untrained individuals. Enzyme-linked immunosorbent assays were conducted to analyze plasma insulin, estrodiol, and free and total testosterone levels. **RESULTS:** An Independent T-test was used to identify significant differences ($p<0.05$) between trained and untrained groups (N=24). Significant differences exist in body composition ($p<0.003$), lipids ($p<0.05$), blood pressure ($p<0.05$), and hormones (free testosterone) ($p=.0.019$). While there was a trend towards significance in insulin ($p=0.08$). Finally, a significant difference in estradiol ($p=.805$) and total testosterone ($p=.453$) was not found. **CONCLUSION:**
A significant difference exists between trained and untrained males and females in the metabolic profile and hormone levels. This suggests that physical activity has a positive impact on hormone levels and metabolic syndrome markers (waist circumference, blood pressure, etc.), minimizing disease risk in a young population.

POSTER PRESENTATIONS

1. ACUTE RESPONSES OF TESTOSTERONE TO SUBMAXIMAL RESISTANCE EXERCISE IN CHILDREN VS. ADULTS

Adams, Eric; Dr. Rubin, Daniela; Pham, Hoang; Dr. Judelson, Daniel
Department of Kinesiology, California State University, Fullerton

Background: Children have much lower basal serum testosterone (T) concentrations than men. However, previous research has shown acute increases in T concentrations of adolescent males following resistance exercise. We tested the hypothesis that prepubescent and mid-pubertal children would not display an acute T response to a bout of submaximal resistance exercise (RE) of sufficient intensity to increase T in adult males. **Methods:** Twelve lean children (ages 9±1 years, height 141±10cm, mass 31±7kg, body fat 18.3±4.7%) (six boys/six girls), seven developmental stage I, two developmental stage II, and three developmental stage III, were compared to ten lean men (ages 23±2 years, height 177±5cm, mass 77±6kg, body fat 12.7±2.9%). Exercise consisted of a 5-minute warm-up on a cycle ergometer followed by 6 sets of 10 repetitions per leg of step-ups wearing a weighted vest with 1-minute rest between sets. Step height was standardized to 20% of the subject's height, and the vest weight was standardized to 50% of the subject's lean body mass as measured by DEXA. Blood samples for serum concentrations of T were obtained from an indwelling catheter pre-exercise (PRE), immediately post-exercise (IP), and post-exercise at 15 (P-15), 30 (P-30), and 60 (P-60) minutes. **Results:** There were no significant differences in T between boys and girls so they were analyzed as a group.Overall T concentrations were significantly lower in children than adults (0.64±1.09 vs 19.84±1.19nmol/L respectively; P<0.01), and there was a significant group by time interaction (P<0.01). T concentrations did not significantly change over time in children (P>0.9) but adult T concentrations significantly increased from PRE to IP (9.6% increase; P<0.02), returning to near baseline by P-15. **Conclusion:** The T concentrations of children were much lower than the adults' and did not respond to an acute bout of resistance exercise which caused a T response in adult males.

2. THE EFFECT OF MUSIC ON VO_2, HR, AND RPE DURING A TREADMILL WORKOUT

Mejia Aguilar, Marina; Haddock, Bryan, FACSM; Costa, Pablo
Department of Kinesiology, California State University San Bernardino; San Bernardino CA

Music has often been used as a tool to stimulate and encourage exercise. The purpose of this study was to record and analyze oxygen consumption (VO_2 ml/kg/min), heart rate (HR), and rating of perceived exertion (RPE) during a treadmill workout at a predetermined pace given two variables: listening to music (techno style, 130 beats/min or faster), and in the absence of music. It was hypothesized that music would lead to significant differences in each of these variables. Methods: Fourteen healthy undergraduate students (21.6 ± 2.5 yrs.) who run regularly were recruited for this study. All participants had experience running on a treadmill and were given an opportunity to practice. Participants were scheduled for two different appointments, approximately one week apart. During the appointments participants completed a 5-minute warm up at a self-selected pace. Following this the speed was increased to 7.5 mph. Participants maintained this pace for 10 minutes, one session with music and one without. The testing order was randomized and counterbalanced. All individuals were connected to a metabolic cart and EKG monitor cart. VO_2, HR and RPE were recorded each minute. The average HR, VO_2, and RPE over the last 5 minutes of exercise was analyzed via a paired sample t-test. Results: There were no significant differences in VO_2, HR, or RPE (p>0.05) between the two sessions. Conclusion: No significant difference was noted for VO_2, HR, or RPE as a result of exercising with music. Further research examining the impact of listening to music of an individual's own preference is warranted.

	With music	Without music
HR (bpm)	170.3 ± 15.9	169.1 ± 16.4
VO_2 (ml/kg/min)	40.7 ± 1.9	40.5 ± 2.2
RPE	10.7 ± 2.2	11.1 ± 2.6

3. MOOD DISTURBANCE AND PERFORMANCE CHANGES ASSOCIATED WITH TRAINING DISTRESS IN SWIMMERS

KC Albiston; MA and J. Mark VanNess, Ph.D.
Department of Health, Exercise and Sport Sciences, University of the Pacific

Titrating training volume to optimize physical readiness and avoid training distress in swimmers is a difficult challenge for coaches. The purpose of this study was to examine alterations in mood state in collegiate swimmers throughout an entire season and determine if there were differences across time, between training groups, gender, and year in school. A swim test was also employed to determine if alterations in swim times were associated with mood disturbance. Mood state and the swim test times were measured every three weeks. The results showed significant alterations in total mood disturbance (TMD) across time; and between genders, year in school and training group. When training volume was the highest, TMD in the swimmers had the greatest perturbations. These time periods were also associated with small but significant increases in the swim test times. These results indicate that use of the Profile of Mood States Questionnaire and a physiological swim test may be useful for detecting training distress in swimmers. Swim coaches may benefit from employing either or both of these tools for designing and tailoring training sessions and tapering for optimal performance.

4. HIGH INTENSITY INTERVAL TRAINING IMPROVES VO_{2PEAK} IN HEART FAILURE WITH PRESERVED EJECTION FRACTION

Angadi SS[1], Tucker WJ[1], Mookadam F[2], Lee CD[1], Gaesser GA[1]
[1]School of Nutrition and Health Promotion, Arizona State University, Phoenix AZ
[2]Mayo Clinic, Scottsdale, AZ

Purpose: Heart failure with preserved ejection fraction (HFpEF) is a major cause of morbidity and mortality in the elderly. Long term moderate-intensity aerobic continuous training (MI-ACT) has been shown to improve VO_2peak in HFpEF. The effects of high-intensity aerobic interval training in this patient population are unknown.**Methods:** Fifteen patients with HFpEF (Age = 70 ± 8.3yrs) were randomized to 12 sessions (3days/week for 4 weeks) of either HI-AIT (4x4min at 85-90% HRmax separated by 3-mins active recovery between bouts;n=9) or MI-ACT (30min at 60-70% HRmax; n=6) in a phase 2 cardiac rehabilitation facility. Before and after training patients underwent a graded exercise test (modified Bruce protocol) and indirect calorimetry for estimation of VO_2peak and ventilator parameters. Within-group differences were quantified with paired T-tests.**Results:** HI-AIT significantly improved VO_2peak (pre = 18.3 ± 4.7 ml/kg/min; post = 20.3 ± 5.1 ml/kg/min; p=0.04) while MI-ACT did not (pre = 16.9 ± 3; post = 16.8 ± 4; p=0.93). No significant improvements were observed in VO_2 at ventilatory threshold, peak VE/VCO_2, VE/VCO_2 slope, rate pressure product at VO_2peak or treadmill time. **Conclusion:** Four weeks of high-intensity interval aerobic interval training improved VO_2peak in elderly patients with HFpEF. VO_2peak is a strong predictor of mortality in this population and these data may have implications for cardiovascular risk reduction in this population.

5. THE EFFECTS OF REACTIVE NEUROMUSCULAR TRAINING VERSUS TRADITIONAL HIP ABDUCTOR EXERCISE ON KNEE KINETICS IN WOMEN DURING A DROP JUMP LANDING

April, Sean A., Lynn, Scott K., Pittman, Melinda B., Hamedani, Bahar Y., Noffal, Guillermo J., Tsang, Kavin K.W.
Biomechanics Laboratory and Center for Sport Performance, Department of Kinesiology, California State University Fullerton, Fullerton, CA

A noncontact mechanism accounts for approximately 72% of ACL injuries. A large knee abduction moment has been identified as a good predictor of ACL injury; therefore, the development of exercise programs that can decrease this abduction moment are warranted. It has been shown that proper functioning of the hip abductor musculature can help in reducing the frontal plane moments on the knee. One novel method of training the hip abductors involves using Reactive Neuromuscular Training (RNT). **Purpose:** The purpose of this study is to investigate the effects of RNT and traditional hip abductor training in females on the abduction moment at the knee during a drop jump landing task. **Methods:** Twenty recreationally trained female subjects (age=22.3±2.5yrs) completed the study. Following initial testing, they were split into three groups: Control (C)(n=8), Traditional Hip Abductor Training (THAT)(n=6), and RNT (n=6). Training lasted 8 weeks and subjects performed their exercises 3 times/week. The THAT group performed side lying hip abductions (clams), while the RNT group did single leg Romanian deadlifts with a resistance band around their knee pulling it medially. Subjects were tested pre and post intervention doing a drop jump landing task. Mean peak external knee abduction moments were compared between groups using a 2x3 (Pre/Post x Group) mixed-model ANOVA. **Results:** A significant Pre/Post x Group interaction ($p<0.05$) revealed that only the RNT group decreased their abduction moment following training (Pre=0.39±0.17 Nm/kg, Post=0.26±0.09 Nm/kg, $p<0.05$). **Conclusion:** RNT training was able to reduce the knee abduction moment during a drop jump landing task, while standard hip abduction training (side lying hip abduction) did not. **Practical Applications:** RNT training may be a valuable tool to use with those prone to valgus collapse related injuries (i.e. ACL injury).

7. EFFECTS OF STRIDE LENGTH PERTURBATIONS ON ANTERIOR-POSTERIOR FORCE COMPONENTS DURING THE STANCE PHASE OF WALKING

Bailey, JP, Nordin, AD, & Dufek, JS (FACSM)
Department of Kinesiology and Nutrition Sciences, University of Nevada Las Vegas, Las Vegas, NV

Preferred gait patterns are thought to optimize cost of transport, minimizing energy expenditure. **Purpose:** To investigate preferred walking step length and step length perturbation effects on braking and propulsive phases of gait during the stance phase. Methods:Nineteen healthy adults (23.4±6.1yrs; 1.67±0.17m; 70.0±18.0kg) performed five trials of preferred speed walking (PW) followed by five stride length perturbations based on percentages of leg length (60%,80%,100%,120%,&140%). Dependent variables included stance time (ST), braking phase time (BP), propulsive phase time (PP), braking impulse (BI), and propulsive impulse (PI). Kinetic variables of single leg stance phase obtained via Kistler force platform (9281CA; 2000Hz). Statistical analysis included one-way repeated measures ANOVAs and Tukey *post hoc* tests (SPSS 19; α=.05).**Results:**There was a significant main effect for ST, PP, PI, and BI (*p*=.001). There were five pairwise significant differences among conditions for ST ranging from 0.092 s (120%vs 140%) to 0.196 s (PW vs140%). Eight significant pairwise comparisons were observed for PP and ranged from 0.054 s (60%vs80%) to 0.146 s (PWvs140%). For PI, eight significant pairwise comparisons were observed ranging from 1596 BW*s (60%vs80%) to 5642 BW*s (PWvs140%). Three significant pairwise comparisons were observed for BI ranging from 926 BW*s (60%vs80%) to 1218 BW*s (PWvs60%). **Discussion:** Results suggest that PW produces a gait pattern designed to optimize the stance phase. Optimization may occur as a result of decreased stance time, mainly focused on the propulsive phase. **Conclusion:** Preferred walking step lengths limit force requirements needed to transport the system center of mass forward at a preferred velocity.

6. NO DIFFERENCES IN HEMODYNAMIC FUNCTION IN RESPONSE TO MAXIMAL AND SUPRAMAXIMAL EXERCISE

Todd A. Astorino, Curtis Bovee, Ashley Deboe
Department of Kinesiology, California State University--San Marcos

The stroke volume (SV) response to graded exercise up to VO_2max is equivocal, as some scientists reveal that SV increases linearly up to VO_2max; whereas, others demonstrate that it levels off at submaximal work rates or even declines at workloads approaching VO_2max. This is partially explained by dissimilar techniques to assess hemodynamic responses to exercise. **Purpose:** The purpose of this study was to determine differences in stroke volume and cardiac output in response to a Wingate test (WAnT) and graded exercise test (GXT), as data from existing studies are discrepant. **Methods:** Active participants (6 men and 5 women, mean age and VO_2max = 25.0 ± 6.2 yr and 51.7 ± 7.7 mL/kg/min) completed two Wingate Tests (load = 7.5 - 8.5 %BW) and two GXTs (30 - 40 W/min increases until volitional fatigue) on an electrically-braked cycle ergometer. Trials were performed at the same time of day within subjects, and there was at least 48 h recovery between sessions. Prior to and during exercise, hemodynamic variables including heart rate (HR), stroke volume (SV), and cardiac output (CO) were continuously measured using thoracic impedance. Repeated measures ANOVA was used to examine differences in hemodynamic function across protocol. **Results:** Maximal ($p = 0.16$) and end-exercise SV ($p = 0.07$) was similar in response to WAnT (146.1 ± 28.5 mL/beat and 133.5 ± 23.3 mL/beat) versus GXT (131.8 ± 33.4 mL/beat and 113.7 ± 35.1 mL/beat). Maximal cardiac output was similar across protocol (25.1 ± 5.4 L/min for WAnT vs. 23.5 ± 6.5 L/min for GXT). Maximal HR was significantly higher ($p < 0.01$) for GXT (184.9 ± 7.8 b/min) versus WAnT (177.0 ± 10.7 b/min). **Discussion:** Despite higher maximal HR in GXT versus WAnT, cardiac output is similar in response to supramaximal exercise compared to exercise eliciting VO_2max.

8. THE RELATION OF LATERAL MOVEMENTS AND SHOT EFFICIENCY IN TENNIS

Yair Banuelos & Miguel Narvaez Ph.D.
Kinesiology Program, Western New Mexico University

The purpose of this study was to describe the relation between lateral movement and shot efficiency in tennis. It focused on the reaction step in its three variations jab, pivot, and gravity steps and their relation to shot efficiency during a practice tennis match. **Methods:** This study analyzed footage of all participants in three matches of a D-II college-level men's tennis practice during the spring season in 2013. Each match was analyzed frame by frame using video-analysis software. Every shot, the lateral reaction step used by the player and whether the ball shot was in or an error was recorded in the data sheet. The efficiency percent of jab step, pivot step, and gravity step was calculated. **Analyses:** The percentage of the shot effectiveness (whether the shot was in bounce or an error) was calculated. A nonparametric Chi-square analysis ($P<0.05$) was conducted to identify any discrepancies of effectiveness among lateral movements groups. **Results:** The step most frequently used was the jab step with 47%, followed by the pivot step with 37%, and gravity step with only 16%. When jab step was executed there was a 73% of strokes efficiency in and 27% of the strokes ended up on an error. The pivot step was the most efficient lateral movement used. When pivot step was executed there was a 74% of the strokes efficiency in and only 26% of the strokes were out. When gravity step was executed there was a 57% of strokes efficiency in and 43% were an error. **Conclusions:** Lateral movements are the most used movements in tennis. It is important to know the frequency and effectiveness of each lateral reaction movement. By quantifying this usage players and/or coaches can develop practice and training sessions that emphasize these skills and improve overall performance.

9. EFFECTS OF ASSISTED JUMP TRAINING ON NET RELATIVE GROUND REACTION FORCE AND NET RELATIVE PEAK POWER

Tori L. Beaudette, Andrea M. Du Bois, Lee E. Brown, FACSM
Center for Sport Performance, Human Performance Laboratory, Department of Kinesiology, California State University, Fullerton

INTRODUCTION: Assisted jump training has shown an increase in peak vertical jump height; however, the variables that contribute to this change need to be identified. **PURPOSE:** To investigate the roles of net relative ground reaction force (GRF) and net relative peak power in vertical jump performance after assisted plyometric jump training. **METHODS:** Eight NCAA Division I women's volleyball players (19.25 ± 0.89 yrs.; 182.84 ± 3.72 cm; 72.2 ± 9.28 kg) performed three maximal baseline countermovement vertical jumps with arm swing followed by four weeks of assisted plyometric jump training. Subjects performed 2 sets (week 1) and 3 sets (week 2) of 10 jumps at 30% bodyweight reduction (BWR), then 2 sets (week 3) and 3 sets (week 4) of 10 jumps at 40% BWR. They wore a full body harness attached to elastic cords that were stretched from the ceiling by a rope. After four weeks of training, subjects performed three maximal post vertical jumps with arm swing. All vertical jumps were performed on an AMTI force plate sampling at 1000 Hz. **RESULTS:** There was no significant ($p > 0.543$) change in net relative GRF (pre = 12.74 ± 1.83N/kg; post = 13.07 ± 1.45N/kg). There was also no significant ($p > 0.196$) change in net relative peak power (pre = 50.60 ± 5.35W/kg; post = 53.07 ± 8.39W/kg). **DISCUSSION:** Even though net relative GRF and net relative peak power were not major contributors, vertical jump height did increase. Therefore, assisted jump training could be an effective training technique for improving performance in jumping athletes. CONCLUSIONS: Although the variables contributing to an enhanced vertical jump following assisted jump training are unclear, it is still important to note that assisted jump training is performed with minimal fatigue; therefore, training vertical jump without risk of overtraining.

10. EMG ACTIVITY OF LOWER LEG MUSCULATURE WITH USE OF WEIGHTLIFTING AND RUNNING SHOES DURING THE BACK SQUAT

Beckham, George K.[1,2]., Sato, Kimitake[1,2]., Reed, Jacob, P.[1,2]., Land, David H.[3]
[1]Dept. of Exercise and Sport Science, E. Tenn. State Univ., Johnson City, TN;[2]Center of Excellence in Sport Science and Coach Education, E. Tenn. State Univ. Johnson City, TN;
[3]Athletic Dept. Murray State Univ., Murray, KS

Introduction: Weightlifting shoes (WL) are almost universally used by weightlifters, yet are not nearly as common in weightrooms, where running/athletic shoes (RS) are more common. While some studies have examined kinematic differences between shoe types in the back squat, no studies have examined EMG. **Purpose:** To compare lower body EMG activity during the back squat between WL and RS in a repeated-measures design. **Methods:** Subjects (n=12) were athletic and moderately resistance-trained young adults with 1-RM back squat between 1-1.5 times body weight. Subjects performed five repetitions of back squats at 60%, 70%, 80% of 1-RM with both RS and WL in random order. EMG activity of five lower body muscles were measured for reps 2-4, then averaged to provide a measure of overall muscle activity during each load in each shoe condition. Synced video data allowed for separation of eccentric and concentric phases. Data from each load were grouped together, then paired t-tests were used to compare footwear conditions for both eccentric and concentric phases for each of five muscles. Cohen's d was used for effect size. **Results:**There were no statistically significant differences in muscle activity between footwear conditions during the eccentric phase. In the concentric phase, the vastus medialis was higher for the WL condition ($p=0.012$; $d=0.53$), and the lateral gastrocnemius was higher for the RS condition ($p=0.034$; $d=0.37$). **Conclusion:** The inconsistent patterns in EMG found in this study, combined with findings from previous studies, indicate that choices about footwear for the back squat should be made based on kinematic differences, but not muscle activation. Further research is necessary to elucidate more about the patterns (if any) in muscle activation in different footwear.

11. A COMPARISON OF THE INTERNAL CONSISTENCY AND TEST STABILITY OF THE INBODY 720, GE IDXA, AND BOD POD® GOLD STANDARD FOR ASSESSING BODY COMPOSITION

Matthew Bell, Bruce Bailey, Gabriel LeChaminant, Timothy Hope
Department of Exercise Sciences, Brigham Young University

Purpose: The purpose of this study was to directly compare internal consistency and test stability of the InBody 720, GE iDXA, and BOD POD®. **Methods:** Eighty men and women were recruited to participate in the study. The body composition of each participant was assessed in triplicate on each of three machines (InBody 720, iDXA and BOD POD®) over two different days. This evaluated the internal consistency and test stability of each machine the same day. Internal consistency was determined by performing test retest on each machine. Test stability of each machine was determined by evaluating the agreement of results from the three machines separated by two days. Tests were performed in random order. Tests took place at the same time every day and participants arrived at the lab after following these criteria: (1) fast for a minimum of 3 hours, (2) no exercise for 12 hours, (3) no caffeine for 6 hours, (4) no alcohol for 12 hours, (5) and normally hydrated. Women wore a one-piece swimsuit and men wore tight fitting lycra shorts.**Results**: The absolute mean difference for same day test retest was 0.29±0.30 percentage points for iDXA, 0.92±0.76 for BOD POD® and 0.83±1.87 for the InBody 720. For same day test retest, 88% of tests were within 0.5 percentage points for iDXA, 33% for BOD POD® and 69% for the InBody 720. The absolute mean difference for test retest separated by 2 days was 0.51±0.49 percentage points for iDXA, 1.22±1.14 for the BOD POD® and 0.96±2.54 for InBody 720. For the 2-day test retest, 66% of tests were within 0.5 percentage points for iDXA, 30% for BOD POD® and 41% for InBody. **Conclusion:** The test stability and internal consistency were both highest for the iDXA, followed by the inBody 720, with the BOD POD® being the lowest.

12. DOWNHILL TREADMILL RUNNING IN MICE DOES NOT CAUSE DAMAGE TO HINDLIMB MUSCLES

Brenda Benson, Ryan Magoffin, Rob Hyldahl, David Thomson, Gary Mack, and Allen Parcell
Department of Exercise Sciences, Department of Physiology and Develpmental Biology, Brigham Young University

Downhill treadmill running is a common method for inducing muscle damage in rats and mice. Previous studies have evaluated which muscles are effected by downhill treadmill running in rats however the same research in mice shows inconsistencies with regards to which muscles incur damage. **Purpose:** This study assessed muscle damage in the hindlimb of mice after a single bout of DHR with the intent to identify which muscles in the mouse are most effected. **Methods:** Wild-type, male FVB mice were assigned to either a control (C) or downhill running (D) group. To identify damaged cells, mice were injected with Evans Blue Dye (EBD) 24h prior to downhill running (D) or sacrifice (C). Mice in D were run downhill (-16°) at 20 meters per minute (m/min) for 30 minutes. Twenty-four hours after exercise, the gastrocnemius (n=8) and soleus (n=6) muscles were harvested. Tissue cross-sections were mounted, fixed and viewed on a fluorescent microscope to identify cells infiltrated with EBD. **Results:** The total number of cells in the solei averaged 210+/-39 and 238+/-84 in C and D, respectively. Total cell counts in the gastrocnemius of C and D were 1956+/-181 and 1840+/-134, respectively. The average number of EBD positive (damaged) cells in the soleus muscles of C and D was 2.7+/-1 and 4.7+/-1, respectively. For the gastrocnemius the EBD positive counts were 67+/-13 and 68+/-24, C and D respectively. No significant difference in damage between C and D was found in the soleus or gastrocnemius following DHR in D ($p>0.05$). **Discussion:** These data suggest that downhill running in wild-type, FVB mice does not result in damage in the soleus and gastrocnemius muscles. These data are in disagreement with previous published literature utilizing transgenic animal models. Downhill treadmill running in small rodents may not be an effective method for generating damage in hindlimb muscles.

13. ASSESSMENT OF AEROBIC ENDURANCE PERFORMANCE IN NCAA DIVISION I SOCCER PLAYERS DURING OFF-SEASON

Christopher Berger and Patrick Mannix
Arizona State University

The assessment of blood lactate during exercise is useful for detecting changes in endurance fitness. Because soccer play demands high lactate thresholds, the purpose of this study was to assess the influence of off-season training on lactate threshold in NCAA Division I male soccer players. Eight subjects were tested over six weeks of training using treadmill running. Although resting heart rates dropped by a mean of 6 bpm, no statistically-significant ($p < 0.05$) differences in blood lactate concentrations could be attributed to off-season soccer training. This finding suggests that off-season training was not intense enough to affect aerobic threshold. The value of the present study lies in its effort to establish a protocol by which repeat endeavors can be made to gauge changes in soccer player endurance performance through the measurement of blood lactate as opposed to oxygen consumption.

14. EFFECTS OF A FAT-SUGAR SUPPLEMENTED DIET, WITH AND WITHOUT EXERCISE TRAINING, ON BODY WEIGHT AND BODY COMPOSITION

Black, Laurie E[1], Sawyer, Brandon J[2], Tucker, Wesley J[3], Bhammer, Dharini M[3], Kelly, Stephen B[4], Gaesser, Glenn A FACSM[3]
[1]Department of Kinesiology, California Baptist University, Riverside, CA; [2]Department of Biology, Point Loma, San Diego, CA;[3]School of Nutrition and Health Promotion, Arizona State University, Phoenix, AZ

The Western Pattern diet consists of high amounts of fat and sugar, and has been shown to have deleterious effects on body composition, which is exacerbated by a sedentary lifestyle. **Purpose:** We hypothesized that exercise training would attenuate weight and body fat gain during a period of excess consumption of fat and sugar in young men consuming their habitual diet. **Methods:** Twenty-one, healthy males were randomly assigned to either: (1) donut "supplement" or (2) donut "supplement" plus exercise. While maintaining their current diet,both groups consumed 2 donuts per day, 6 days per week, for three weeks. The energy value of the 36 donuts was ~11,600 kcal. The group receiving exercise completed 4 exercise training sessions per week consisting of 2 high-intensity interval training bouts (95% HRpeak) and two moderate-intensity, steady-state bouts (75% HRpeak). The energy value of the 12 exercise training sessions averaged ~ 4,000 kcal. VO2peak, body weight, and percent body fat (Bod Pod) were both measured pre and post-intervention. **Results:** As expected, VO2peak only increased significantly in the group that exercise trained (3.08 ± 0.29 L/min to 3.32 ± 0.29 L/min, $p=0.005$). Significant increases in body weight (Pre=78.8±21.7 kg vs. Post=80.5±21.5 kg, $p=0.036$), fat mass (Pre=21.2±18.3 kg vs. Post=23.6±18.9 kg) ($p=0.013$), and body fat percentage (Pre=22.9±13.1% vs. Post=24.4±12.7%, $p=0.014$) only occurred in the donut "supplement" group. **Conclusions:** Excess energy consumption, largely from fat and sugar, over a 3-week period produced significant gains in body weight and fat in young men. Exercise training during this period was able to prevent the increase in body fat, despite the fact that the cumulative energy value of the exercise training sessions was only ~35% of the energy value of the excess kcal consumed as donuts. Exercise may be essential to prevent adverse body composition outcomes associated with transient periods of excessive energy consumption.

15. GROUND REACTION FORCES DURING LAND AND CUT TASKS IN FEMALE ATHLETES

Boham, Mikaela[1]; DeBeliso, Mark[2]; Harris, Chad[3]; Pfeiffer, Ron, FACSM[4]; McChesney, John[4]; and Berning,Joe[1]
[1]New Mexico State University, Human Performance, Dance, & Recreation Department
[2]Southern Utah University, Physical Education & Human Performance Department
[3]LaGrange College, Exercise Science, Department
[4]Boise State University, Kinesiology Department

A gender discrepancy exists in the incidence of non-contact anterior cruciate ligament (ACL) injuries as females exhibit significantly higher injury rates. The ACL is at risk during activities involving landing, stop and go movements, and changes in direction. **Purpose:** To determine the effects of fatigue on ground reaction forces during non-fatigued and fatigued landing. **Methods:** Eleven healthy, female collegiate soccer athletes participated in the study (age = 20.25 ± 0.97 years; height = 167.43 ± 4.78 cm; mass = 63.65 ± 7.66 kg, and target maximum heart rate = 179.76 ± 0.87 beats per minute). Each participant performed nine landing and cutting maneuvers in both a pre-fatigued and fatigued state. Participants were instructed to land with each foot on a separate force plate and immediately perform a randomly selected side-cut (left, center, right) as directed by a cued light. The functional fatigue protocol consisted of rapid acceleration, deceleration, and change of direction activities. Fatigue was reached at 80% of the participant's calculated heart rate maximum and was maintained during the nine fatigued tasks. **Results:** A 2 x 2 ANOVA design compared groups (fatigue state) and (leg dominance). When cutting to the left, lower medial-lateral forces in the non-dominant leg ($p=0.049$) and higher anterior-posterior (AP) forces for the dominant leg ($p=0.049$) were noted with fatigue. For the center cut ($p=0.000$) and the right cut ($p=0.009$), significantly higher AP forces in the dominant leg occurred with fatigue. **Discussion/Conclusion:** Fatigue is important to landing maneuvers regardless of cutting direction. Fatigue impacted the anterior-posterior direction during landing which is significant as the primary purpose of the ACL is to prevent anterior shear force of the tibia on the femur during movement. Fatigue may be the most predominant risk factor for ACL injuries.

16. EFFECT OF SIMULATED MATCH-PLAY ON DYNAMIC STABILITY WHEN EXECUTING SIDE-CUT MANEUVERS: COMPARISON OF HEALTHY AND ACL DEFICIENT FEMALES

Bradburn, Holly R.; Azidin, Raja Firhad Raja; Ruiz, Ruth C.; Robinson, Mark; Vanrenterghem, J.; Noffal Guillermo J.
School of Sport and Exercise Science, Liverpool John Moores University
Department of Kinesiology, California State University Fullerton

The purpose of this study was to investigate how simulated match-play affects dynamic stability when executing side-cut maneuvers, comparing healthy females with females who had a previous anterior cruciate ligament injury (ACL deficient). Eight unilateral ACL deficient females (age:21.4±1.5 yrs; height:1.63±0.7 m; mass:63.82±9.7 kg; time after ACL injury/surgery:26±16.8 months) and ten healthy females (age:24.4±3.3 yrs; height:1.69±0.5 m, mass:62±5.5 kg) performed five 45° side-cut maneuvers prior to and immediately following a 45 minute soccer-specific lab-based match-play simulation. Three-dimensional kinematics and kinetics were collected synchronously with ground reaction forces during the side-cut step. Dynamic stability mechanisms were investigated by modifying balance mechanisms, providing outcome variables related to (1) foot placement relative to the extrapolated center of mass, (2) ankle control expressed as center of pressure deviations, and (3) counter-rotation of segments expressed as lateral ground reaction force variations (GRFlat). The first mechanism was observed at touchdown, the latter two during weight acceptance. Two-way repeated-measures ANOVA were used to assess the effect of group, time, and interaction ($P<0.05$). Simulated match-play resulted in 13% reduced GRFlat ($P=0.01$), suggesting a potential reduction in counter-rotation of segments. This may be explained by a 37% reduction in peak hip adduction moments during weight acceptance ($P=0.03$). No differences were observed, however, between healthy and ACL deficient females. Rather, both groups illustrated a decrease in counter-rotation of segments as a result of match-play, suggesting that postural stability related to core balance was equally affected in both groups. Whether these alterations could be detrimental to ACL loading remains unclear, but they may well indicate that with progression of match-play a growing trade-off exists between maximal performance of the side-cut maneuver and knee loading.

17. POST-RESISTANCE EXERCISE HEART RATE RECOVERY IN LEAN AND OBESE BOYS AND MEN

Castner, Diobel M.; Pham, Hoang; Judelson, Daniel A.; Rubin, Daniela A.
Department of Kinesiology, California State University, Fullerton, Fullerton, CA

One-minute post-exercise heart rate recovery (HRR) is a non-invasive determinant of all-cause mortality and cardiovascular disease risk in children and adults. HRR is typically measured following endurance exercise; however, recommendations for physical activity encourage incorporating resistance exercise. Although previous research examining endurance exercise shows 1) children recover faster than adults and 2) increased adiposity potentially stints HRR, it is unclear whether these findings also apply following resistance exercise. **Purpose:** To evaluate the effects of age on post-resistance exercise HRR. Additionally, this study evaluated the effect of adiposity on HRR within each independent age group. **Methods:** Seventeen boys (lean: n=7; mean age=9.1±1.2y; body fat=14.8±2.9%; obese: n=10; mean age=9.6±1.1y; body fat=39.4±4.7%) and 20 men (lean: n=10; mean age=23.3±2.4y; body fat=12.7±2.9%; obese: n=10; mean age=24.5±3.5y; body fat=36.2±4.0%) participated. Participants wore a vest equivalent to 50% of lean body mass while completing a bench-stepping protocol (adjusted to 20% of stature) requiring 10 steps per leg x 6 sets, separated by one-minute rest. HR was measured via telemetry throughout exercise and recovery. HRR value (HRRV) was calculated as the difference between test termination HR (TTHR) and HRR. **Results:** All groups exhibited similar mean exercise HR (p=0.117) and TTHR (p=0.133). Boys recovered significantly faster than men one minute after exercise (64±17 vs. 37±12 beats; p<0.001). Separate age-specific ANOVAs revealed obese men had a significantly slower HRRV than lean men (32±12 vs. 43±10 beats; p=0.032); no differences were found for boys (65±20 vs. 64±12 beats, respectively; p=0.883). **Discussion:** Similar to endurance exercise, boys recovered faster from resistance exercise than men. In men, obesity stinted HRRV from resistance exercise. Measuring HRR from resistance exercise is feasible and HRR values are comparable with previous research in endurance exercise.

19. EFFECT OF ELASTIC BANDS VS. FREE WEIGHTS ON DEADLIFT INTERPEAK TIME BETWEEN GROUND REACTION FORCE, POWER, AND VELOCITY

Austria Cho, Kyle A. Davis, Andy J. Galpin, Lee E. Brown, FACSM, Jared W. Coburn, FACSM
Human Performance Laboratory, Center for Sport Performance, Department of Kinesiology, California State University, Fullerton, CA

The use of elastic bands during resistance exercise results in a linear increase in force with range of motion. However, this may lead to overload occurring later in the movement. **PURPOSE:** The purpose of this study was to examine the acute effects of elastic bands on interpeak times between peak ground reaction force (GRF), peak power (PP), and peak velocity (PV) during the deadlift exercise. **METHODS:** Eight men completed two conditions at 60% one repetition maximum (1RM) in random order including: one variable resistance condition (B) and one traditional free-weight condition (NB). The B condition was performed such that 65% of the total resistance came from traditional free-weights and 35% from elastic bands. All of the resistance during the NB condition came from free-weights. The average resistance was equated for both conditions. **RESULTS:** The B condition demonstrated significantly (P<0.05) faster time (s) than the NB condition for time to GRF (B-0.033±0.114 and NB-0.386±0.149), for time from GRF to PP (B-0.271±0.088 and NB-0.347±0.103), and for time from GRF to PV (B-0.286±0.084 and NB-0.375±0.096), whereas the time from PP to PV (B-0.015±0.036 and NB-0.027±0.029) was not significantly different.**CONCLUSION:** These results suggest that when lifting at relatively low intensities of 60% 1RM with elastic bands, the timing of the peaks of ground reaction force, power and velocity occur later in the range of motion. In a traditional free-weight deadlift, the most difficult portion of the movement is at the initial pull when overcoming the inertia of the weight, while in a deadlift with bands, the most difficult portion of the movement is at the top of lift when the bands are fully stretched. Therefore, muscles may be overloaded at a different point in the length/tension curve by altering the method of resistance.

18. DIFFERENCES IN CENTER OF PRESSURE SHIFTS BETWEEN BEGINNER AND COLLEGIATE GOLFERS

Charles, James M., Noffal, Guillermo J., Lynn, Scott K.
Biomechanics Laboratory, Center for Sports Performance, California State University, Fullerton

INTRODUCTION: Weight transfer in both the medial-lateral (ML) and anterior-posterior (AP) directions is important in producing an effective golf swing. These movements of the center of pressure during the swing have not thoroughly been examined. **PURPOSE:** To analyze the effect of skill level on center of pressure (CoP) shifts during the golf swing. **METHODS:** Twenty participants (21.3 ± 2.17 yr, 1.70 ± .106 m, 72.3 ± 15.7 kg), ten beginner and ten collegiate golfers completed five golf swings each. A motion capture system (Qualisys), sampling at 500 Hz was used to identify swing phases. Participants stood with each foot on a separate AMTI force platform, covered in synthetic grass, which sampled at 1000 Hz. The movement of the center of pressure location was analyzed in the lab coordinate system during the backswing (BS) and downswing (DS) phases. Independent t-tests were used to compare groups. **RESULTS:** Beginner golfers showed a significantly greater posterior shift (Beg=-114.0±60.1mm, Col=-54.2±42.5mm, p=.02) in the lead foot during the DS, but collegiate golfers shifted more in the anterior direction (Beg=17.7±34.0mm, Col=62.7±22.6mm, p<.01) and medial directions (Beg=17.4±31.4mm, Col=68.2±32.4mm, p<.01) in the trail foot during the DS. **CONCLUSIONS:** The greater anterior and medial shift of the CoP in the trail foot for the collegiate golfers during the DS are indications that the collegiate golfers are transferring their weight onto their front foot. The difference found in lead foot AP CoP shift is due primarily to a greater anterior shift during the BS of beginner golfers. Beginner golfers shifted more onto the toes of their lead foot, and in some instances even picked up the heel of this foot. A large anterior and lateral shift on the BS could hinder the proper sequencing events required for an effective golf swing. Center of pressure data could improve swing instructional techniques.

20. THE INFLUENCE OF TREADMILL WALKING ON TYPING PERFORMANCE

Edward Christenson, Travis Masterson, Rick LeCheminant, Nathan Killpack, Kyle Hill, Kaylie Carbine, Michael J. Larson, James D. LeCheminant, FACSM
Department of Psychology, Brigham Young University, Provo, Utah
Department of Exercise Sciences, Brigham Young University, Provo, Utah

Objective: To compare typing performance while either sitting or walking at a treadmill desk.**Method:** Participants included seventy-six healthy individuals assigned to a sitting (n = 38; 17 female) or treadmill walking (n = 37; 23 female) condition. Descriptive variables were assessed including: height, weight, body mass index, fitness, along with demographic characteristics. While either sitting or walking on a treadmill (1.5 mph, 0% grade), participants completed a standardized five-minute typing test wherein overall typing speed, number of errors, and error-adjusted typing speed were calculated. Data were analyzed using independent-samples t-tests.
Results: Groups did not differ in BMI or VO_2max, ps > 0.33.Individuals in the treadmill group performed significantly worse on all areas of typing that were assessed relative to the sitting controls. Specifically, unadjusted typing speed, $t(73) = 3.12$, $p = 0.003$, number of errors, $t(73) = 2.60$, $p = 0.01$, and error-adjusted typing speed, $t(73) = 2.89$, $p = 0.005$, were all worse relative to the sitting controls.**Conclusion:** Though use of a treadmill desk is a novel approach to reduce sedentariness at the workplace, the present findings indicate that, relative to sitting, walking on a treadmill decreases overall typing speed and increases typing errors.This may be an important consideration for job descriptions that include high typing loads. Additional investigation of performance changes over time is needed.

21. EFFECTS OF TRADITIONAL VS. ALTERNATING WHOLE-BODY STRENGTH TRAINING ON SQUAT PERFORMANCE

Anthony B. Ciccone[1], Rex Hafenstine[2], Austria L. Cho[1], Lee E. Brown, FACSM[1], Jared W. Coburn[1] FACSM, Andrew J. Galpin[1]
[1]Human Performance Laboratory, Center for Sport Performance, Department of Kinesiology, California State University, Fullerton, CA

Traditional strength training utilizes 2 to 5 minute inter-set rest intervals, which can result in long workouts. Although performing dissimilar exercises during rest intervals can minimize workout duration, these workouts may affect workout quality. **PURPOSE:**Therefore, the purpose of this study was to compare the effects of traditional vs. alternating whole body strength training on squat performance. **METHODS:** Ten healthy resistance-trained males (23.1±2.0 y; height=178.6±7.9 cm; mass=83.4±10.6 kg; $1RM_{SQ}$=313.0±37.7 lbs; $1RM_{BPr}$=234.0±33.6 lbs; $1RM_{BPu}$=155.5±19.9 lbs) completed two workouts using 80% 1RM. One workout consisted of four sets of squats (SQ) on a force plate with a velocity transducer attached to the barbell, and with 3-minutes passive rest between sets (TS). Another workout consisted of SQ, bench press (BP), and bench row (BR) exercises in an alternating manner with 50-seconds rest between sets. For both workouts, sets 1-3 were performed for four repetitions, while the fourth SQ set was performed to concentric failure. Total number of completed repetitions of the fourth SQ set was recorded. Also, peak power (PP) was calculated for each repetition and averaged for each set. **RESULTS:** PP was analyzed using a 2x4 (condition x set) repeated measures ANOVA, which revealed there was a significant interaction. One-way ANOVAs showed that, in the TS condition, PP of set 1 (2539.79±459.16 W) was greater than set 4 (2018.72±498.91 W); in the AS condition, PP of sets 2 (2282.86±436.86 W) and 3 (2253.03 ± 417.68 W) were greater than set 4 (2023.24±431.35 W). There was no main effect for condition ($p>.05$). During the TS condition, subjects performed significantly more repetitions to failure (7.3±1.98) when compared to the AS condition (6.1±1.66). **CONCLUSION:** These data suggest that the addition of upper-body multi-joint exercise during the SQ rest intervals may not affect SQ PP but can decrease total workout volume.

22. RELATIONSHIP OF GLOBAL DNA METHYLATION WITH CARDIOVASCULAR FITNESS AND BODY COMPOSITION

Mihaela A. Ciulei, Michael S. Jarrett, James W. Navalta
Department of Kinesiology and Nutrition Science, University of Nevada, Las Vegas

Global DNA Methylation (GDM), an epigenomic modification, has been linked to the development of cardiovascular disease and its risk factors. **Purpose:** The research focus is to identify the relationship between cardiovascular fitness measurements and the epigenetic marker GDM, in adult subjects. **Methods:** Twenty-six adult human subjects (males N = 13, females N = 13) were required to complete a physical activity and diet questionnaire. Each individual donated a small blood sample (600 µL) in order for us to analyze the Global DNA Methylation. Body composition was evaluated by using Dual-Energy X-ray Absorptiometry (DEXA Scan). The level of physical activity was assessed by the completion of a maximal exertion, graded exercise test (VO2max) on a treadmill. The Pearson's "r" value was used to reveal the correlation between GDM and various variables, while t-tests were used to assess if any differences existed between high and low value groups for each variable. **Results:** The Body Mass Index was significantly correlated (p-value, r value; 0.031, -.556) with GDM in females only. Individuals with high folate intake had significantly greater GDM than the low folate group (high = 3.1±1.2%, low =2.3±0.7, p=0.034) as determined by the diet questionnaire. **Discussion:** The results indicate that as BMI increases, GDM decreases in females. In attempt to further investigate the relationships between GDM and these variables, auxiliary research needs to be conducted with a more heterogenous subject pool containing additional sedentary participants.

23. COMPARISON OF PERCEPTUAL AND PHYSIOLOGICAL FATIGUE THRESHOLDS DURING CYCLE ERGOMETRY

Kristen C. Cochrane[1], Terry J. Housh (FACSM)[1], Haley C. Bergstrom[1], Nathaniel D.M. Jenkins[1], Joel T. Cramer[1](FACSM), Glen O. Johnson[1], and Richard J. Schmidt[1]
[1]Department of Nutrition and Health Sciences, University of Nebraska-Lincoln, Lincoln, NE

The purpose of this investigation was to compare the Physical Working Capacity at the OMNI rating of perceived exertion threshold (PWC_{OMNI}) PWC at the Heart Rate Threshold (PWC_{HRT}), PWC at the Oxygen Consumption Threshold ($PWC_{\dot{V}O_2}$), and gas exchange threshold (GET). Thirteen male (n=6) and female (n=7) subjects (mean age ± SD = 21.8 ± 2.6 yr) performed an incremental test to exhaustion on an electronically braked cycle ergometer for the determination of $\dot{V}O_2$peak and GET. The subjects also performed 4, randomly ordered 8-minute, submaximal workbouts at varying power outputs (range = 70W - 244W) for the determination of PWC_{OMNI}, PWC_{HRT}, and $PWC_{\dot{V}O_2}$. The mean power outputs associated with the fatigue thresholds were compared using a one-way repeated measures ANOVA with follow-up paired samples t-tests and Bonferroni corrections. There were no significant mean differences among the PWC_{OMNI} (112.1 ± 33.5W; 51.0 ± 7.3% of peak power), PWC_{HRT} (108.1 ± 34.1W; 49.8 ± 7.9% of peak power), or $PWC_{\dot{V}O_2}$ (105.7 ± 34.3W; 48.1 ± 7.9% of peak power). The GET (134.6 ± 44.0W; 60.6 ± 8.6% of peak power), however, was significantly greater than PWC_{OMNI}, PWC_{HRT}, and $PWC_{\dot{V}O_2}$. These findings indicated that there were dissociations among PWC_{OMNI}, PWC_{HRT}, and $PWC_{\dot{V}O_2}$,and GET. These dissociations were likely due to differences in underlying physiological mechanisms and suggested that the perception of effort may be more related to heart rate and oxygen consumption responses than excess carbon dioxide production. Furthermore, the PWC_{OMNI} may be an alternative, non-invasive estimate of metabolic and cardiac fatigue thresholds without the need for expired gas analysis.

24. EFFECT OF TWO DOSES OF INTERVAL TRAINING ON MAXIMAL OXYGEN UPTAKE IN SEDENTARY WOMEN

Chrisitna Cooper, Todd A. Astorino, Matthew M. Schubert, Elyse Palumbo, Douglas Stirling, David McMillan, and Jackie Godinez
California State University San Marcos Kinesiology Department

Background: There is growing evidence that short-term interval training elicits similar cardiovascular, metabolic, and performance adaptations as endurance training yet is more time efficient. **Purpose:**The primary aim of the current study was to compare effects of two doses of chronic high intensity interval training (HIT) on change in maximal oxygen uptake (VO_2 max), Wmax, and body composition. **Method**s: Twenty three sedentary women (age = 24.2 ± 6.2 yr) were randomized to 12 wk of either high (HI) (80 - 90 % maximal workload (Wmax)) or moderate (MOD) intensity (60 - 80 % Wmax) HIT on a cycle ergometer 3 d/wk consisting of 6 - 10 60s bouts interspersed with recovery. Body composition was assessed every 6 wk. At baseline and every 3/wk, VO_2max was assessed. **Results:**VO_2max was similarly improved in MOD (29.9±4.23 mL/kg/min to 35.84±4.3 mL/kg/min) and HI (29.9± 6.06 mL/kg/min to 35.8±5.6 mL/kg/min) in response to HIT that was similar ($p > 0.05$) across training paradigms. Similarly both Wmax and VO_2max (L/min) were improved ($p< 0.05$) with no effect of group ($p>0.05$). Results also demonstrated a greater increase in VO_2max early on in training in the HI group (60% of the overall improvements at 3 wk and 80% at 6 wk) versus the MOD group (25% at 3 wk and 60% at 6 wk). No change ($p > 0.05$) in body weight, percent body fat, or waist/hip circumference was revealed with training. **Conclusion:** Data suggest that 12 wk of either moderate or more strenuous interval training similarly enhance VO_2max in sedentary women, but do not alter body weight or body composition. More intense HIT is tolerable and effective as a rapid means to elicit dramatic increases in VO_2max soon after initiation of training.

25. EFFECT OF SIMULATED OBESITY ON THE DOUBLE SUPPORT PHASE OF GAIT

Austin Coupe, Arturo Montes, Andrew Nordin, Janet Dufek
Kinesiology and Nutrition Sciences, University of Nevada, Las Vegas, Las Vegas, NV

Purpose: Abnormal gait mechanics have been observed in overweight and obese populations compared to their normal-weight peers. Specifically, a greater amount of time spent in the double-support phase of walking has been observed. Increased time in this phase may be associated with a higher energy cost of locomotion due to disruption of the normal inverted pendulum pattern of gait. Less efficient gait mechanics may be associated with decreased activity levels, further exacerbating problems associated with obesity. The purpose of this study was to explore the effects of added mass, simulating obesity, on double-support time during walking. Thirteen non-obese subjects (23.46 ± 1.85 years, 74.58 ± 13.64 kg, 1.71 ± .07 m) completed 12 walking trials at each of five conditions: bodyweight (BW), 110%, 120%, 130%, and 140% times BW for a total of 60 trials. Obesity was simulated by adding weight to a vest with even distribution anteriorly and posteriorly, resulting in average body mass index (BMI) values ranging from 25.3 to 35.4 for the group. **Methods:** Subjects were instructed to walk at preferred pace, controlled across conditions. Successful trials included each foot contacting one of two adjacent force platforms (2000Hz) without targeting. **Results:** One-way repeated measures ANOVA results revealed significant (α=0.05) increases in percentage of time in double-support for each condition greater than BW ($p<0.001$). Obesity was simulated (BMI>30) for the 120%, 130% and 140% BW conditions. Average double-support times ranged from 12.2%-13.6% across conditions. Time in double-support increased 5.9%, 8.4%, and 10.2% for each increasingly "obese" experimental condition. **Conclusion:** Adding weight to normal-weight individuals and simulating obesity resulted in similar changes in gait patterns as observed in obese adults. Additional research is needed to determine the consequences of increased double-support time during walking in obese adults.

26. EFFECTS OF WHOLE BODY VIBRATION ON VERTICAL JUMP FORCES FOLLOWING EXERCISE INDUCED MUSCLE DAMAGE IN WOMEN

N.C. Dabbs[1], H. Chander[2], V. Cazas[2], C.R. Allen, J.A. Lundahl[2], E.M. Terrell[2], C. Castles[2], L.E. Brown, FACSM.[3], J.C. Garner[2]
[1]Applied Biomechanics and Sport Performance Laboratory, California State University, San Bernardino, San Bernardino CA 92407
[2] Applied Biomechanics Laboratory, The University of Mississippi, University, MS 38677
[3]Center of Sports Performance, California State University, Fullerton, Fullerton, CA 92833

Enhancing vertical jump performance is critical for many sports. Often following high intensity training, individuals experience delayed onset muscle soreness (DOMS), which leads to decreased performance. Many recovery modalities have been tested with conflicting results. **Purpose:** The purpose of this investigation was to determine the effect of whole-body vibration (WBV) on rate of force development (RFD) and relative ground reaction force (rGRF) following exercise induced muscle damage (EIMD). **Methods:** Twenty-seven women (age 21 ± 2 yrs, height 172.38 ± 92.27 cm, mass 58.67 ± 11.53kg) volunteered for 7 sessions and were randomly selected into a treatment or control group. WBV or control (no vibration) was administered each testing day. Vertical jump performance was assessed via RFD and rGRF before and 3 days after EIMD via split squats. Two sets of measures were collected each day, consisting of a pre measure followed by WBV or control, and then a second set of measures. To test differences between groups and over time, a 2x8 (group x time) mixed factor analysis of variance was conducted for each variable. **Results:** No significant ($p>0.05$) interactions were found for RFD or rGRF. Significant ($p<0.05$) main effects for time were found for RFD and rGRF, indicating performance declined following muscle damage. **Conclusion**: These results indicate that WBV does not aid in muscle recovery or vertical jump performance following exercise induced muscle damage.

27. EFFECTS OF VARIOUS TYPES OF MUSIC ON MUSCLE TORQUE DURING ISOKINETIC EXERCISE

Gabriel De Faria, Brian Quach, Frank John Tabarez, Alec Reyna, Roy Tejidor, Chris Winans, Todd A. Astorino
Department of Kinesiology, California State University--San Marcos

Background: Research has shown that music has little to no effect on supramaximal exercise performance. **Aim:** To determine the effects of music on muscle performance during isokinetic exercise. It was hypothesized that listening to high tempo music would improve performance and preserve peak torque across bouts compared to no music and low tempo music. **Methods:** 10 active men (mean age = 24.1 ± 2.3 yr) warmed up on the cycle ergometer for 5 minutes prior to performing 5 sets of 5 repetitions of isokinetic unilateral knee extension (KE) and flexion (KF) of the dominant leg on the Biodex Isokinetic Dynamometer. Four trials consisting of music (low tempo, high tempo, or music of choice) or no music with a 30 second rest between each bout were completed. Leg pain and Rating of Perceived Exertion (RPE) were determined after each bout for each trial. A familiarization trial was performed before testing. Each trial was at least 48 hours apart and performed at the same time of day within subjects. An ANOVA with repeated measures was used to detect significant differences in peak KE and KF across bouts and treatments. **Results:** Data showed there was a significant effect of music on KE torque ($F= 3.1$, $p = 0.03$), but there was no effect on KF torque ($F=1.88$, $p = 0.137$). Mean (SD) knee extension torque was equal to 205.62 (43.48) ft-lbs, 200.81 (53.41) ft-lbs, 194.19 (56.45) ft-lbs, 209.09 (54.73) ft-lbs, and 201.04 (44.53) ft-lbs for familiarization, no music, low tempo, high tempo, and music of choice, respectively. **Conclusion:** Individuals seeking to improve intense muscular performance during strength-based exercise should listen to high tempo music.

28. EFFECT OF REWIND YOGA ON BALANCE AND FUNCTIONAL FITNESS: A PRELIMINARY STUDY

Cheryl Der Ananian, Andrew I. Miller
School of Nutrition and Health Promotion, Arizona State University

Background: Older adults (65 and older) are a rapidly growing segment of the U.S. population. Only 15.9% of older adults met the current guidelines for physical activity in 2011, with 28-35% reporting no physical activity. Research shows that balance and functional fitness declines with age and can lead to reduced physical activity and harmful, costly falls. The development of a yoga series specialized for older adults has potential to improve balance and functional fitness, which may lead to increased physical activity. Moreover, yoga can be offered on location in senior communities and centers at relatively low cost and travel to participants. **Purpose:** To examine the effect of a newly developed yoga series (Rewind Yoga) on balance and functional fitness as measured by the Senior Fitness test. **Methods:** Older adults (n=15, mean age=67±5) were recruited by flyer to attend Rewind Yoga classes at their local senior center. Classes met 3 times per week for 60 minutes for 12 weeks. The Senior Fitness test battery was administered by an Osteopath to measure functional fitness and balance. Measures were taken at baseline, 6 weeks and 12 weeks. A quasi-experimental design was used with repeated measures ANOVA to compare changes over time. **Results:** Analysis revealed significant improvements in all aspects of the senior fitness test. Baseline, 6 weeks, and 12 week means were as follows: 30 Second Chair Stand (no. of stands) (13,12,22 $p<0.01$), Arm Curl reps (14,19,22 $p<0.001$), 2 Min Step (no. of steps) (79,102,114 $p<0.001$), Sit-and-Reach (inches±) (-3,1.4,3.5 $p<0.001$), Back Scratch (inches±) (-1.5,0.0,0.1 $p<0.001$), 8 Foot Up-and-Go (seconds) (7.1, 5.7, 4.9 $p<0.001$). **Conclusion:** The Rewind Yoga program appears to improve various aspects of balance and functional fitness outcomes. The scalability of Rewind Yoga has potential to help an array of older adults and may be offered directly at senior community centers.

29. EFFECT OF SERIAL APNEAS AND FACIAL IMMERSION ON HIGH INTENSITY AEROBIC PERFORMANCE

Andrea M. Du Bois, Garret C. Nelson, Anthony B. Ciccone, Sean M. April, Taylor S. Thurston, Lee E. Brown, Jared W. Coburn, Andrew J. Galpin & Daniel A. Judelson
Center for Sport Performance, Department of Kinesiology, California State University, Fullerton

Apnea and facial immersion result in splenic contraction, increasing hemoglobin, hematocrit, oxygen carrying capacity of the blood and potentially aerobic performance. Apnea and facial immersion also result in the diving reflex, characterized by decreased heart rate (HR) and increased blood pressure (BP) and lactate production, potentially impairing aerobic performance. Therefore, the purpose of this study was to examine the effect of apneas and facial immersions on high intensity cycling performance. Six trained male cyclists/triathletes (age=24±2 y; height=178.8±5.5 cm; mass=75.9±10.3 kg; body fat=6.8±3.7%; VO_2max=64.2±6.3 ml/kg/min) cycled to exhaustion at 85% of the wattage elicited at VO_2max following four different treatments: apnea (Ap), facial immersion (FI), apnea with facial immersion (ApFI) and control (CON). Each trial was composed of a series of three of the pre-determined treatment lasting 90% of maximal apneic time. During facial immersion trials, subjects immersed their faces in ~7 °C water. HR, arterial oxygen saturation (SaO_2) and BP were measured at baseline, post warm-up, post-treatment and post-exercise. VO_2peak, ventilation at VO_2peak (VE) and time to exhaustion time (TTE) were recorded. HR and SaO_2 decreased with apnea ($p \leq 0.003$) while there was a trend towards increased BP with facial immersion ($p=0.07$). No changes in TTE (CON=5.215±1.226 min; Ap=5.066±1.094 min; FI=4.564±1.069 min; ApFI=4.930±0.771 min; $p \geq 0.126$) ensued. However, FI resulted in significantly greater VO_2peak (ApFI+FI=60.4±2.1 ml·kg·min^{-1}, Ap+CON=57.4±3.0 ml·kg·min^{-1}, $p=0.011$) and VE (ApFI+FI=122.6±5.9 L·min^{-1}, Ap+CON=115.4±5.2 L·min^{-1}, $p=0.035$). Subjects experienced 1) limited increases in oxygen consumption (attributable to the work of breathing) and, 2) a limited response of the diving reflex. As a result, athletes will experience neither ergogenic nor ergolytic effects from executing serial maximal apneas and facial immersions prior to a high intensity aerobic activity.

30. A COMPARISON OF TWO GENERATIONS OF DOPPLER RADAR GOLF BALL TRACKING DEVICES

Dudley, Robert I., Noffal, Guillermo J., Frazier, Brett, Lynn Scott K.
Biomechanics Laboratory, Center for Sport Performance, California State University, Fullerton

The advent of technology has brought with it new tools with which to improve sport performance. In golf specifically, launch monitors provide detailed information to players, spectators, and researchers alike. The purpose of this study was to compare two models manufactured by Flightscope (Prime and X2) over a number of golf specific variables. **Methods:** One male subject (mass 71.45 kg, height 1.83 m, age 25 yrs.) was recruited for this study. Shots were simultaneously recorded using both devices. All shots were recorded indoors on a golf mat and hit into a net located 5.18 m from the tee. Devices were set-up according to manufacturer's specifications; 3.05 m behind the ball. Five shots were recorded for each of the five different clubs (9-iron, 7-iron, 5-iron, 3-hybrid and driver). **Results:** The X2 device yielded significantly ($p<0.05$) greater values for Driver Carry Distance (X2: 235.8±9.9yds, Prime: 196.8±48yds), 7i Smash Factor (X2:1.38±.02, Prime :1.34±.03), Driver Ball Velocity (X2: 256.9±2.8 mph, Prime: 252.5±4.6 mph), 5i Ball Velocity (X2: 205.5±3.7 mph, Prime: 199.4±4.1 mph), 7i Ball Velocity (X2: 193.0±1.3 mph, Prime: 188.6±1.3 mph), 9i Ball Velocity (X2: 170.3±4.8 mph, Prime: 164.7±3.9 mph), Driver Launch Angle (X2: 11.6±.8 deg, Prime: 7.6±1.8 deg), 5i Launch Angle (X2: 13.7±.9 deg, Prime: 9.4±0.6 deg). The Prime device had significantly higher values for Hybrid Launch Angle (Prime: 14.5±2.8 deg, X2: 11.5±.1.6 deg). All other clubs and conditions were not significantly different. **Discussion:** Greater values for driver ball velocity and driver launch angle could contribute to the dramatic increase in driver carry distance recorded on the X2 device. While ball velocity was greater for the 5i, 7i, and 9i on the X2, carry distances were not significantly different. In order to determine the validity of either device, research in an outdoor setting would be necessary.

31. EFFECTS OF FOAM ROLLING VERSUS STATIC STRETCHING ON RECOVERY OF QUADRICEPS AND HAMSTRINGS FORCE

Ross Edmunds, Andrew Dettelbach, Julia Dito, Alex Kirkpatrick, Alexandra Parra, Jessica Souder, Trenton Stevenson, Todd A. Astorino
Department of Kinesiology, California State University San Marcos

Background: Recent findings document efficacy of various myofascial release techniques including static and dynamic stretching, foam rolling, and massage therapy on muscle performance after exercise. Increased range of motion, decreased fatigue, and optimized performance are potential benefits of myofascial release techniques. **Aim:** To compare effects of myofascial release techniques via foam roller (FR) application and static stretching (SS) on the recovery of quadriceps and hamstring force production after intense exercise.**Methods:** Fourteen active men (mean age and BMI = 23.3 ± 3.0 yr and 25.0 ± 2.8 kg/m^2) initially completed strength testing on an isokinetic dynamometer consisting of five repetitions of maximal unilateral knee extension (KE) and knee flexion (KF) at a contraction velocity equal to 60 degrees * sec^{-1}. Seven days later, subjects performed a 1 h bout of intense lower extremity exercise and were randomly assigned to SS or FR treatment instituted immediately after exercise. Twenty four hours after this bout, muscle strength was reassessed. Subjects repeated the intense exercise protocol 7 d later at the same time of day and the other treatment was performed post-exercise. **Results:** Results revealed a main effect of treatment on knee extension torque ($p=0.001$) and a trend for knee flexion torque ($p=0.0052$). Post hoc analysis revealed that knee extension torque was lower in response to SS (190.6 ± 43.7 ft/lb) versus baseline (221.8 ± 31.2 ft/lb) or FR (208.8 ± 28.4 ft/lb). Compared to baseline, 94% of knee extension force was preserved in FR versus only 84% for SS. For knee flexion, 98% of baseline force was preserved after FR compared to 88% for SS.**Conclusion:** Application of myofascial release via foam roller after intense exercise may help to preserve muscle force on the day following exercise compared to traditional static stretching.

32. COMPARISON OF HIP FLEXION STRENGTH, VELOCITY AND SPRINT SPEED IN COLLEGIATE TRACK AND FIELD MIDDLE DISTANCE AND LONG DISTANCE RUNNERS

Ginny English, Lee E. Brown, FACSM, Jared W. Coburn, FACSM, Guillermo J. Noffal
Center for Sport Performance, Human Performance Laboratory, Department of Kinesiology, California State University, Fullerton, CA

Most coaches assume middle distance and long distance runners are one group and train them similarly. **PURPOSE:** To examine hip flexor strength, velocity, and sprint speed of collegiate track and field athletes. **METHODS:** 20 collegiate track and field athletes were categorized into either middle distance runners (n=8; 800m, 1500m) or long distance runners (n=12; 3k, 5k, 10k, 3000m steeple chase). Day one consisted of 50m sprints with timing gates every 10m. Day two consisted of hip flexion tests on each leg measured with a velocity transducer and hip flexion strength tests at 60 and 240 d/s using a Biodex System 3 isokinetic dynamometer. **RESULTS:** For 50m sprint, there was a significant ($p \leq 0.05$) main effect for group. Middle distance runners were significantly faster across all splits and the final time. For hip flexion velocity, there was no significant ($p > 0.05$) interaction but there was a significant ($p \leq 0.05$) main effect for group. Middle distance runners had significantly faster hip flexor velocity compared to long distance runners. For peak torque, there was a significant ($p \leq 0.05$) interaction of leg by group where middle distance runners had significantly greater strength in their left leg compared to their right. Long distance runners had significantly greater strength in their right leg compared to their left. There was also a significant main effect for speed with 60 being greater than 240 d/s. There was no significant relationship ($p > 0.05$) between any sprint split time and strength or velocity measures. **CONCLUSION:** Our results demonstrate that middle distance runners have significantly faster hip flexor velocity, and significantly greater hip flexor strength compared to long distance runners, which may explain why middle distance runners are faster sprinters than long distance runners. Therefore, middle and long distance runners should have separate training regimens.

33. METABOLIC COMPARISON BETWEENKETTLEBELL SWINGS AND TREADMILL RUNNING

Sherwin Facun and Trevor Gillum
California Baptist University Dept. of Kinesiology

As the use of kettlebells continue to gain popularity, a deeper understanding of the training effects induced is much needed. The purpose of this study was to compare the metabolic demands of two styles of kettlebell swings, American (AKB) and Russian (RKB), to treadmill (TM) running using the same work to rest ratio. Eight subjects (4 male, 4 female, 24 ± 4yr, 71 ± 13kg, 170 ± 8cm, 16 ± 5%bf) completed a 12 minute routine for each kettlebell style involving intervals of 35 seconds of work and 25 seconds of rest. Each subject also performed the same interval protocol by running on a treadmill at ≈95% of their age predicted HRmax. No difference was found in heart rate (AKB 175 ± 6, RKB 173 ± 13, TM 171 ± 6 bpm, p=0.38), VO^2 (AKB 31 ± 5, RKB 30 ± 5, TM 31 ± 3 $mL \bullet kg^{-1} \bullet min^{-1}$, p=0.15) or Kcals (AKB 134 ± 26, RKB 126 ± 27, TM 135 ± 21, p=0.15). RER indicated a difference between AKB and TM running, but none between kettlebell swings (AKB 1.11 ± 0.05, RKB 1.06 ± 0.1, TM 1.01 ± 0.07, p=0.02). This indicates that there may be an overall difference in anaerobic energy production between AKB and TM running. In addition, these data suggests that kettlebell training is similar to treadmill running in terms of cardiovascular strain and amount of Kcals expended.

34. EXPLORING THE EFFECT ON SELF-EFFICACY IN A PHYSICAL ACTIVITY INTERVENTION WITH RELAPSE PREVENTION

Robert J. Fernandez, Kathleen S. Wilson PhD
California State University - Fullerton, Department of Kinesiology

Background: The discussion of possible barriers (relapse prevention) is a popular technique for physical activity (PA) interventions. However, a recent review suggested that these discussions might have a detrimental effect on an individuals' confidence (self-efficacy). **Purpose:** As self-efficacy has been identified as a key predictor of PA, this study explored the effect of relapse prevention strategies on individuals' self-efficacy. **Methods:** University students (N=70: 30M, 40F) were recruited to participate in this study (Mean age=24 years, SD = 6.0). Only those who were currently active or thinking about becoming active in the near future (1 month) were included in this study. All participants were randomly assigned to one of three groups: passive control (read about study habits; n=22), active control (reviewed PA guidelines; n=28) and relapse prevention group (discussed barriers and solutions; n=20). First, all participants completed a survey about five types of self-efficacy (SE): task, barriers, scheduling, planning and goal-setting (T1). Following the intervention (or reading), participants repeated the SE questionnaire (T2). Separate 3 (group) x 2(time) mixed ANOVAs were performed to determine if there were differences in each type of SE. **Results:** Only Task SE ($F(2,66)=3.17$, $p=.048$ $\eta_p^2=.09$) and Barrier SE ($F(2,67)=6.83$, $p=.002$ $\eta_p^2=.17$) showed an interaction. With both task and barriers SE, the relapse prevention group showed the greatest change in barriers SE (% change= 16.6, p=.000) and task SE (% change=13.9 p=.000). The active control showed a smaller increase in barriers SE (% change=7.08, p=.001) and task SE (% change=12.7, p=.001). The passive control group did not change in barriers (p=.376) or task SE (p=.057). **Discussion:** It would appear that the discussion of potential barriers to PA might have an effect on some types of SE. This suggests that these relapse prevention techniques may be beneficial for inclusion in PA interventions.

35. ANGULAR KINEMATICS OF THE PELVIS DURING THE GOLF SWING: SKILL LEVEL DEFERENCES AND RELATIONSHIPS TO IMPACT CONDITIONS

Brett S. Frazier, Scott K. Lynn, Kathryn New, Robert Dudley, Phil J. Cheetham, Guillermo J. Noffal
Center for Sports Performance, Biomechanics Laboratory, Department of Kinesiology, Califronia State University, Fullerton. Fullerton, CA

Success in golf requires the ability to produce golf shots that can consistently go the appropriate distance in the desired direction. Previous research has mainly examined club head speed to determine the effectiveness of the swing without considering how efficiently the ball in struck. This research has shown that a proximal-to-distal sequence of body rotations is the most efficient way to produce high club head speeds. New technology now makes it possible to measure the efficiency of the strike using a unit-less ratio called the "smash factor" (ball speed after impact divided by club head speed before impact); however, it is unknown if this proximal to distal sequencing will also result in a more efficient strike of the ball. **Purpose:** The purpose this study was to identify differences in proximal segment (pelvic) motion and shot efficiency between elite and recreational golfers. **Methods:** 15 elite male and 14 recreational golfers were recruited to hit five 5-iron shots. Each subject had retro-reflective markers attached to the body to capture pelvis motion. **Results**: Elite players had a significantly higher average pelvic angular acceleration (Elite=2166.5±532.4 deg/s^2),Rec=1707.4±265.6deg/s^2), p<0.05), a longer time between peak pelvic velocity and impact (Elite=101.7±18.0 msec, Rec=79.6±23.0 msec, p<0.05), and a higher smash factor (Elite=1.36±0.03, Rec=1.27±0.04, p<0.05) than the beginner golfers. Significant correlations were also found in all golfers between average angular pelvic acceleration and smash factor (r=0.393, p<0.05), as well as between time from peak pelvis velocity to impact and smash factor (r=0.399, p<0.05). **Discussion/Conclusion:** If golfer can achieve higher angular pelvic acceleration and have their peak pelvic angular velocity occur earlier in the downswing, they will be more likely to produce an efficient strike on the ball and improved golf performance.

36. CHANGE IN RPE, AFFECT, AND AROUSAL IN RESPONSE TO HIGH AND MODERATE REGIMENS OF CHRONIC INTERVAL TRAINING

Rachael Gallant, Matthew M. Schubert, Elyse Palumbo, Douglas Stirling, David W. McMillan, Christina Cooper, Jackie Godinez, Donovan Martinez, Todd A. Astorino
Department of Kinesiology, California State University—San Marcos

Purpose: The aim of this study was to examine the change in RPE, affect, and arousal (FAS) across a 12 week period of one of two regimens of interval training in sedentary women. **Methods**: Twenty-three healthy sedentary women (mean±SD age and VO_2max= 23.0±5.7 yrs. and 30.1±4.4 mL Kg^{-1} min^{-1}), were assigned to one of two 12 week interval training regimens. Training consisted of 3 days per week of 6-10 60 sec. bouts at intensities equal to 60-80% Wmax (MOD, n=10) or 80-90% Wmax (HI, n=10) with a brief recovery between bouts. On the third day of each week, RPE (Borg 6-20), affect (Hardy & Rejeski -5-+5), and FAS (Svebak & Murgatroyd 1-5) were recorded during and following each bout using visual categorical scales. **Results**: RPE was significantly reduced (P=0.02) in response to training in both the MOD and HI groups with no interaction evident (P>0.05). Both groups displayed a significant increase (P<0.001) in RPE across bouts; however, the MOD group expressed a lower RPE by 2.3 compared to the HI group. There was a main effect (P<0.05) across bouts for FAS and affect yet there was no effect of training on these parameters (P>0.5). Data revealed significant (p<0.001) improvements in VO_2max in MOD (22.3 ± 6.9 %) and HI (21.9 ±11.6 %) yet no change in body fat, body weight, or waist:hip in either group. **Discussion**: Results revealed that perceived exertion during exercise is reduced as a result of moderate and more intense interval training, yet no effect on arousal or pleasure was revealed. The increased VO2max and improvements in buffering capacity, mitochondrial function, and fat oxidation likely explain this result. Overall, performing MOD intensity interval training is just as effective as HI for reducing the exertion perceived during exercise which would be more appealing to the sedentary population.

37. A PILOT FEASIBILITY STUDY OF A CAMPAIGN INTERVENTION FOR WEIGHT LOSS IN OVERWEIGHT AND OBESE ADULTS

David O. Garcia, PhD[1]; John M. Jakicic, PhD, FACSM[2]; Kelliann K. Davis, PhD[2];
Bethany Barone Gibbs, PhD[2]; Lora E. Burke, PhD, MPH[2]; Amy D. Rickman, PhD, FACSM[2]
[1]Canyon Ranch Center for Prevention and Health Promotion, Mel and Enid Zuckerman College of Public Health, University of Arizona; [2]University of Pittsburgh

Standard behavioral weight loss (SBWL) interventions produce significant short-term weight loss, which has been shown to be associated with improved health-related outcomes. However, these interventions are typically intensive and require regular in-person sessions, which can be costly to deliver and may not be feasible for all individuals. Thus, alternative and less intensive delivery strategies are needed that will produce significant weight loss and may be more widely applied. **PURPOSE:** This study compared a 12-week email delivered thematic campaign intervention (CI) to a standard on-site, group-based SBWL in sedentary, overweight/obese adults (age: 43.1 ± 8.9 years; BMI: 33.3 ± 3.7 kg/m²). **METHODS:** SBWL participants (n=13) attended weekly group meetings, were prescribed a daily reduced caloric goal and 200 minutes of moderate-intensity physical activity (PA) per week. CI participants (n=13) received the same dietary and PA recommendations as the SBWL, attended in-person group meetings only at week 0 and 12, and received tailored e-mail messages weeks 1-11. Additional CI features included a thematic framework and an incentive-based point system targeting study behavioral goals. **RESULTS:** The observed pre-post mean weight loss for completers analysis in the SBWL was (n=12; -6.1 ± 2.5 kg) and the CI (n=10; -4.0 ± 3.4 kg) ($p<0.001$) and intention-to-treat (ITT) (SBWL: -5.6 ± 2.9 kg; CI: -3.1 ± 3.4 kg) ($p<0.001$), with no between group difference. Pre-post PA also increased for completers in the SBWL (153.5 ± 80.7 mins/wk) and the CI (190.8 ± 241.1 mins/wk) ($p<0.001$) and ITT (SBWL: 141.7 ± 88.3 mins/wk; CI: 146.8 ± 224.9 mins/wk) ($p<0.001$), with no between group difference. **CONCLUSION:** Short-term weight loss and increased PA was achieved using an e-mail delivered thematic CI. Therefore, the CI may provide an alternative approach to disseminate a behavioral weight loss program; however, confirmation of these findings and studies of longer duration are needed.

39. DIFFERENCES IN ELECTROMECHANICAL DELAY BETWEEN GENDERS AND MUSCLES DURING ISOMETRIC KNEE EXTENSION/FLEXION

Claudia I. Godinez[1], Lee E. Brown, FACSM[1], Jared W. Coburn, FACSM[1], Andy J. Galpin[1], Tori L. Beaudette[1], Maria C. Pereira[2]
[1]Human Performance Laboratory, Center for Sport Performance, Department of Kinesiology, California State University, Fullerton, CA
[2]Universityof Brasilia, Brasilia, Brazil

Female athletes are five to eight times more likely to suffer an ACL injury while participating in sports. **Purpose:** The aim of this study was to investigate electromechanical delay (EMD) differences between genders during isometric actions during knee extension and flexion. **Methods:** Nineteen female and eleven male Division I soccer athletes participated. Subjects performed isometric knee flexion and extension on a Biodex System 3 isokinetic dynamometer. Knee extension was performed in a supine position with the leg at 155° (180° at full extension) and knee flexion in a prone position at 115°(180° at full extension). Surface EMG electrodes were placed on the vastus medialis (VM) and the biceps femoris (BF) muscles of the right limb. Subjects were instructed to produce maximal force upon a visual light stimulus. EMD was calculated for each muscle. A 2 x 2 mixed factor ANOVA was used to compare genders and muscles ($p<0.05$). **Results:** There was no significant interaction or main effect for gender. However, there was a significant main effect for muscle. EMD for the VM was shorter (0.042 ± 0.015 ms) when compared to the BF (0.069 ± 0.017 ms). **Conclusion:** Our findings demonstrated no significant differences between genders which may be related to the muscle not being at its optimal length during the isometric action. However, we chose to test at an angle where the ACL is at the greatest risk for injury. Also, the lag in the BF may create a force imbalance at the knee during explosive muscle actions, leading to injury.

38. DETERMINANTS OF PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR IN TODDLERS

Ryan M. Glatt, Rebecca K. Haas, Mason D. Hill, Louise A. Kelly Ph.D, Janie Rider Ph.D
Department of Exercise Science, California Lutheran University

Background: Understanding the factors that influence physical activity can aid the design of more effective interventions to promote physical activity and reduce obesity in children.While a plethora of data exists for preschoolers, data on toddlers are limited. **Purpose:** The purpose of the present study was to predict factors that influence light physical activity (LPA), moderate to vigorous physical activity (MVPA) and sedentary behavior (SB) in toddlers from Ventura County. **Methods**: Participants were 9 families and toddlers (5 boys and 4 girls) aged 12-36 months recruited from childcare facilities and homes around Ventura County. Total physical activity was measured for 7 consecutive days (mean XX hours; SD XX) using the Actigraph GT1X accelerometer. Age specific cut-points were used to identify time spent engaged in physical activity and sedentary behavior. Data on determinants were collected using a previously published questionnaire by Sallis et al (2002). **Results**: Toddlers spent a total of 3909 ±1510 minutes per week engaged in total physical activity. Time spent in SB was 48.7 ± 17.4%, 1.2 ± 0.3% for LPA and 43.7 ± 7.2 for MVPA. Demographic, environmental, psychosocial factors did not significantly predict SB, LPA or MVPA (p.0.05). **Conclusion**: Results from the current study suggest that determinants of toddlers' physical activity and sedentary behavior may not be predicable. However, as our sample size was very small these results should be viewed with caution. Future studies with a much larger sample size are clearly warranted.
This study was funded by the Swenson Summer Research Fellowship

40. EFFECTS OF UNILATERAL KNEE BRACING ON KINEMATICS AND KINETICS OF LOWER EXTREMITIES DURING DROP LANDING

Gougeon, Madeline S., Johnson, Alexa K., Lynn, Scott K., Noffal, Guillermo J., Kersey, Robert D.
Biomechanics Laboratory and Center for Sport Performance, Department of Kinesiology, California State University Fullerton, Fullerton, CA

In 2006, 12 million Americans saw a physician for some sort of knee injury or ailment. One simple method of treating various types of knee pain is the use of a brace. Research to date investigating knee braces has concentrated on the involved knee and has not examined the contralateral limb for compensations. Therefore, this study investigated the effects of a wrap-around, hinged, prophylactic knee brace on bilateral lower extremity joint ranges of motion, joint moments, and vertical ground reaction forces during a drop landing task. **METHODS:** Fifteen healthy subjects (9 females, 6 males) performed five drop landings from a 30 cm box while wearing a hinged, wraparound knee brace on their dominant leg and five landings with no brace. Bilateral hip, knee, and ankle ranges of motion in the sagittal plane were calculated. Bilateral sagittal plane hip moments, sagittal and frontal plane knee moments, and vertical ground reactions forces were also calculated. **RESULTS:** The dominant knee ROM was smaller during the braced condition as compared to the un-braced (UB=77.1± 23.50°, B=56.8±35.0°, $p<0.05$), dominant hip ROM was also decreased(UB=56.4±19.50°, B=41.4±28.90°, $p<0.05$), while dominant knee flexion moment increased (UB=2.0±0.4 Nm/kg, B=2.3±0.3 Nm/kg, $p<0.05$), and dominant knee extension moment was decreased (UB=0.16±0.5 Nm/kg, B=0.10±0.04 Nm/kg, $p<0.05$). Dominant limb VGRF also increased with the brace(UB=1068.6 BW, B=1133.8 BW, $p<0.05$). Non-dominant ankle (UB=26.4±8.0°, B=22.5±7.8°, $P<0.05$), knee (UB=76.2±26.8°, B=61.1±25.1°, $p<0.05$), and hip (UB=55.8±22.3°, B=45.7±21.0°, $p<0.05$) ROM also decreased when the other leg was braced. **CONCLUSION:** A hinged prophylactic knee brace resulted in bilateral kinematic and unilateral kinetic changes of the lower extremity joint. These compensatory movement patterns when wearing a brace could put the braced and non-braced limb at higher risk of injury and therefore, require further study.

41. FITNESS LEVEL EVALUATION BASED ON HEART RATE VARIABILITY AND HEART RATE ASYMMETRY PARAMETERS

Noelia Grande Gutiérrez, Alan R. Hargens
Department of Orthopaedic Surgery, University of California, San Diego

Heart Rate Variability (HRV) analysis is an established method characterizing autonomic nervous system regulation related to cardiac function and HRV parameters are related to prediction of some cardiac pathologies. In addition, the irreversibility of underlying processes for cardiovascular systems is represented as Heart Rate Asymmetry (HRA). The main purpose of this study is to compare 2 groups of subjects of different fitness levels (normal healthy sinus subjects and highly-trained athletes) considereing different HRV and HRA parameters based on the Poincaré plot in order to determine wether these indices are susceptible of being used as fitness level indicators. As HRA is related with a healthy cardiovascular system, more asymmetry in athlete's heart rate was expected. We used a new HRV index based on the percentage of RR equal interval on an ECG signal and Guzik index in order to quantify HRA. The results, showed significant differences for HRV and HRA for both groups. Both, HRV and HRA were greater fot the athlete group. In addittion, new variability index showed better performance than the standard SD1 parameter used in other studies based on Poincaré plot when comparing HRV between healthy normal subjects and elite triathlon athletes from a quantitative point of view. The values obtained remain in an interval with little overlap between the two groups. Also, from the analysis of HRA we can conclude that predominant parasympathetical activity is registered for both groups, although it is more present for higher fitness levels subjects. These results imply that parameters analyzed in this study enable fitness level assessment to be performed in an easier and non-invasive way using ECG recordings. Futher analysis will be desirable considering larger samples and more groups. Over-trained subjects should be included. As a non healthy condition of the cardiovascular system, overtraining should be detectable using HRA.

43. EFFECT OF CAFFEINE ON NF-Kb PHOSPHORYLATION IN HYPERTROPHYING SKELETAL MUSCLE

Grigg, Carlie A.; Moore, T.M.; Mortensen, X.M.; Thomson, David M.
Department of Physiology & Developmental Biology, Brigham Young University, Provo, UT

Skeletal muscle hypertrophy requires the coordinated activation of many signaling processes. Excess activation of inflammation-induced NF-κB signaling impairs skeletal muscle hypertrophy and promotes atrophy. Erk and p38 mitogen activated kinases promote NF-κB activity. Caffeine suppresses NF-κB activation in non-muscle cell types, but its effect on skeletal muscle NF-κB is unknown. The purpose of this study was to determine whether caffeine suppresses NF-κB, Erk, and p-38 signaling during skeletal muscle hypertrophy in rats. To test this, unilateral plantaris (PLT) overload hypertrophy (OVLD) was induced via tenotomy of the gastrocnemius & soleus muscles of Sprague-Dawley rats (n = 8-9/group). The contralateral PLT was sham operated as a control. Rats received caffeinated water (1g/L) or tap water during the overload period. After 1 week, the PLT was harvested from both legs. PLT hypertrophy was significantly ($P < 0.05$) attenuated at 1 week by caffeine. Erk and NF-κB phosphorylation increased similarly with OVLD in both treatments, while p38 phosphorylation did not increase after OVLD with either treatment. In conclusion, our results do not support a role for caffeine in regulating signaling through NF-κB, p38 or Erk in hypertrophying skeletal muscle.

42. THE EFFECTS OF A COMBINATION OF PHYSIOLOGICAL BUFFERS ON HIGH-INTENSITY EXERCISE PERFORMANCE

Jonathan W. Gregory, James J. Barber, Jeffrey R. Bernard and Derek W. Marks
Saint Mary's College of California, Department of Kinesiology

Creatine monohydrate (Cr), beta-alanine (BA), sodium bicarbonate ($NaHCO_3$), and sodium citrate (Na-citrate) supplementation have been shown to improve exercise performance. However, the effects of acute, combined supplementation of these buffers on high-intensity exercise remain unknown. The purpose of this study was to examine the effects of acute (24-hour) supplementation of a Cr, BA, $NaHCO_3$, and Na-citrate mixture on high-intensity exercise performance. Seven healthy, male collegiate rugby players completed two of the following conditions using a randomized, double-blinded, crossover design: (a) Placebo (PL; maltodextrin + salt), (b) Buffer Juice (BUFF; Cr + BA+ $NaHCO_3$ + Na-Citrate). Each condition consisted of acute supplementation, divided into five smaller doses over a 24-hour period prior to the execution of the exercise protocol, followed by a 1-week washout/recovery period. Maximal performance of the bench press, burpee test and 500m row were assessed. Blood lactate, blood pH, and base excess were also determined. Compared with PL, pre- and post-test blood concentrations of $NaHCO_3$ were significantly higher in BUFF [Pre: 25.8± 0.4 mmol/L (PL) vs. 30.7±1.0 mmol/L (BUFF); Post: 8.1± 0.3 mmol/L (PL) vs. 9.4± 0.8 mmol/L (BUFF)]. Compared with PL, pre- and post-test blood concentrations of base excess were significantly higher in BUFF [Pre: 1.8± 0.6 mEq/L (PL) vs. 10.9± 2.8 mEq/L (BUFF); Post: -22.2± 0.7 mEq/L (PL) vs. -19.9± 1.3 mEq/L (BUFF)]. Compared with PL, pre- and post-test blood pH values were significantly higher in BUFF [Pre: 7.4± 0.01 (PL) vs. 7.5± 0.02 (BUFF); Post: 7± 0.02 (PL) vs. 7.1± 0.03 (BUFF)]. Positive trends were observed in exercise protocol performance measures in BUFF when compared to PL, but were not statistically significant. These data suggest that combined supplementation of these compounds may be advantageous for athletes participating in high-intensity exercise. However, further testing of this buffer mixture may be warranted.

44. OBJECTIVELY MEASURED HABITUAL PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR IN A REPRESENTATIVE SAMPLE OF TODDLERS

Rebecca K. Haas, Mason D. Hill, Ryan Glatt, Louise A. Kelly Ph.D
Department of Exercise Science, California Lutheran University

Background: The pediatric obesity epidemic has intensified the awareness of decreased physical activity and increased sedentary behavior as a major public health concern. While the research clearly shows ethnic disparities in obesity risk, very few have examined ethnic differences in physical activity. Most of these studies conducted were in older populations where the patterns of activity have already been "set". To our knowledge no studies have objectively investigated differences in the physical activity and sedentary behaviors of between Caucasian and Hispanic children aged 12 to 36 months. **Purpose:** The aim of the present study was to test the hypothesis that light physical activity (LPA), moderate to vigorous physical activity (MVPA) and sedentary behavior (SB) differs between very young children in association with ethnicity.**Methods:** Physical activity and sedentary behavior was measured in sixty one toddlers (mean age 29.7 ± 6.6 months) using the Actigraph GT1M (Pensacola, Florida). GT1M's were worn for a minimum of 6 waking hours per day (approximately 60% of the waking hours for children of this age), for a minimum of 4 days. Age appropriate cut-offs were used to categorize intensities of physical activity and describe levels of sedentary behavior. Analysis of Variance (ANOVA) was used to test for significance ethnic differences in LPA, MVAP and SB, with α significance set at 0.05. **Results**: Caucasian children spent 56% in SB, 1.3% in LPA and 42.6% in MVPA, whereas Hispanic children spent 58.8% in SB, 1.2% in LPA and 40.5% in MVPA. There were no significant ethnic differences in LPA ($F(1,31) = 0.002$, $p=0.961$), MVPA ($F(1,31) = 1.020$, $p=0.320$), and SB ($F(1,31) = 0.194$, $p=0.662$). **Conclusion:** The present study has been the first to objectively measure ethnic differences in physical activity and sedentary behavior of children aged 12 to 36 months. It shows that levels of physical activity and engagement in sedentary behaviors are similar in children. The amount of inactivity at this young age is of major concern. This research was funded by The Center for Equality and Justice Fellowship

45. SPECIFIC JOINT ANGLE ASSESSMENT OF THE SHOULDER ROTATORS

Rex W. Hafenstine, Cassio V. Ruas, Ronei S. Pinto, Maria C. Pereira, Lee E. Brown, FACSM
Human Performance Laboratory, Center for Sport Performance, Department of Kinesiology, California State University, Fullerton, CA

Shoulder strength ratios based only on peak torque have failed in replicating the functionality of the muscles used during overhead activities. **PURPOSE:** To compare shoulder external rotation (ER) and internal rotation (IR) independent peak torque (IPT) ratios with ten degree angle specific torque (AST) ratios. **METHODS:** Twenty healthy adult males (24.65 ± 2.4 yrs) performed concentric (C) and eccentric (E) IR and ER of the right shoulder on an isokinetic dynamometer through 150º of ROM at 60º·s^{-1} and 180º·s^{-1}. **RESULTS:** At 60º·s^{-1}, IPT dynamic control ratio (DCR) was significantly less than AST DCR at -40º and -30º, but significantly greater at -80º, -70º, -60º and 40º. At 180º·s^{-1} while IPT DCR was significantly less than ASPT DCR at 0º, but significantly greater than -80º, -70º, -60º, 40º, 50º. IPT conventional ratios (CR) were not significantly different than any AST CR at either speed. The last 3 ten degree AST DCR were also compared, where the end of ROM occurred. At 60º·s^{-1}, AST DCR at 30º was significantly greater than 40º. AST DCR at 40º was significantly less than 30º. At 180º·s^{-1}, AST DCR at 30º was significantly greater than 40º and 50º. AST DCR at 40º was significantly less than 30º, but significantly greater than 50º. AST DCR at 50º was significantly less than 30º and 40º. **CONCLUSION:** Misinterpretation of shoulder rotator strength DCR may occur due to IPT DCR not occurring at the same angles for the agonist and antagonist muscle groups, while the ten degree AST DCR allows an angle specific measure of IR and ER shoulder rotator strength ratios. Significant differences between the last 3 ten degree segments of AST DCR, where the end of ROM occurred, could also lead to discrepancies where 30 degree AST DCR intervals are used to analyze end ROM ratios, considering that those are the angles where most imbalances occur. These results show that IPT could be used to calculate CR, but ten degree AST should be used to calculate DCR.

46. THE EFFECT OF GRIP STRENGTH TRAINING ON FINE MOTOR SKILLS WITHIN A MILD SPECIAL EDUCATION CASSROOM

Nicole Haines and Laurie Black
California Baptist Univeristy, Department of Kinesiology

Grip strength is an essential part of life and is the primary supplier for the activities of daily living. This study will investigate the effects that grip strength training has on primary aged special needs children and their increase in performance proficiency of fine motor skills. The study is composed of 17 subjects in a local primary school ranging from ages of 9-11 years old. The majority of the subjects suffer from visual processing deficits and autism spectrum disorder (ASD). The study was conducted over a period of three weeks. Both the control and experimental group had their grip strength measured using the Baseline 200 LB Standard Head Hydraulic Hand Dynamometer (EN-120240) before and after the grip strengthening program. Each group was also assessed on six fine motor skills before and after the grip strengthening program to see if there was any improvement in their fine motor skills and grip strength. The average for the initial grip strength for group 1 was 25.5 ±12.728, the average for the post grip strength was 28.44±13.292. The results showed an average of 2.94±2.542 for the grip delta. The average for the initial grip strength for group 2 was 26.14±18.907, post grip strength 26±18.965, and the average for the grip delta -.14 ±.378. The results supported the claim that has been greatly researched that children with ASD and visual processing deficit disorders have difficulty with motor tasks. To our knowledge there hasn't been a study conducted like the one presented in this paper.

47. ACUTE EFFECTS OF ELASTIC BANDS ON POWER CHARACTERISTICS DURING THE DEADLIFT

Roque Harmon, Kyle A. Davis, Lee E. Brown (FACSM), Jared W. Coburn (FACSM), Andrew J. Galpin
Human Performance Lab, Center for Sport Performance, Department of Kinesiology, California State University, Fullerton

The use of elastic bands in combination with free-weight has been reported to be an effective tool for enhancing force and power values during the back squat. However, less is known regarding the acute effects of elastic bands when performing the deadlift exercise. **Purpose:** The purpose of this study was to examine the acute effects of elastic bands on peak force (PF), average force (AF), relative force (RF), rate of force development, peak velocity, average velocity, peak power, average power, and relative power during the deadlift exercise. **Methods:** Eight men (24.5±1.0y; 182±1.3 cm; 80.2±1.9 kg, deadlift 1RM = 203.4±24.2 kg) completed three conditions at 60% 1RM in random order including: two variable resistance conditions and one traditional free-weight condition (NB). Variable resistance condition one was performed such that 80% of the total resistance came from traditional weight plates and the remaining 20% came from the bands (B1). Variable resistance condition two utilized the same concept, except had a higher percentage of resistance coming from bands (65% from weights, 35% from bands) (B2). All of the resistance during NB came from free-weight plates. The average resistance over the entire deadlift movement was equated for all conditions. **Results:** None of the power or velocity measurements differed between any of the conditions. However, peak (NB=2,534±292N, B1=2,504±294N, B2=2,459±290N), mean (NB=1,693±253N, B1=1,659±255N, B2=1,616±252N), and relative (NB=19.8±2.3N, B1=19.3±2.4N, B2=18.9±2.3N) force differed significantly between all three conditions such that the great percentage of resistance coming from bands, the lower the force production (NB>B1>B2). **Discussion:** The results of this study suggest that when lifting at relatively low intensities of 60% 1RM, power and velocity are not altered by the addition of band tension; whereas force decreases as the amount of physical bar weight at rest decreases.

48. THE ACUTE EFFECT OF A UNILATERAL SHOULDER PRESS OF THE THROWING SHOULDER ON PITCHING VELOCITY

Aaron Hartsock and Trevor Gillum
Department of Kinesiology, California Baptist University, Riverside, CA

Ten male division II baseball pitchers were tested to determine the acute effect of a unilateral shoulder press of the throwing shoulder on pitching velocity. The participants of the control (C) condition threw 5 fastballs followed by a 3 minute rest, and then threw an additional 5 fastballs. In the experimental (E) condition, the participants threw 5 fastballs, followed by 2 sets of unilateral shoulder press with an intensity set at 87% of each participants five repetition maximum (5RM), followed by a 1 minute rest in between sets. After the second set, participants rested 3 minutes and threw an additional 5 fastballs. Velocity readings were recorded using a Stalker Sports Radar Gun. The results of the study showed no significant improvements in velocity (C =82.52 ± 3.31; E = 83.5 ± 2.85) (p = 0.52). C condition had a mean velocity of .58mph higher than that of the experimental condition. While results weren't statistically significant, these data could have practical significance for baseball pitchers. Coaches and pitchers should impose more exercises that may elicit the most influential post-activation potentiation (PAP) results prior to season.

49. ASSOCIATION OF TOTAL AND REGIONAL LEAN BODY MASS TISSUE PERCENTAGE AND UPPER AND LOWER LIMB ISOKINETIC STRENGTH

Angela C. Harvel, Brandon Miller, Giovanni Trilleras, Jeffrey Montes, Tedd J. Girouard, James W. Navalta
Department of Kinesiology and Nutrition Sciences, University of Nevada, Las Vegas, Las Vegas, NV

Previous independent studies have been conducted comparing muscle strength and body composition, primarily correlating sarcopenia with decreased muscle strength. A more recent study was conducted comparing the isokinetic upper and lower limb strength with total and regional lean body mass tissue percentage. Purpose: The purpose of this study was to examine the relationship among total and regional lean mass percentage, and isokinetic upper and lower limb strength in young adults, both conditioned and unconditioned. Methods: Subjects (N= 8) consisted of 6 men and 2 women (age: 31 ± 7.9 yr, height: 169.80 ± 8.3 cm, weight: 78.1 ± 23.2 kg, lean body mass: 77.9 ± 8.0 %) with normal to obese body mass indexes (26.5 kg/m2 ± 6.0). Total body, dual-energy x-ray absorptiometry (DXA) was used to asses total and regional lean mass tissue percentage and isokinetic strength was assessed using a Biodex System 3 Isokinetic Dynamometer. Subjects were asked to perform three familiarization repetitions followed by six maximal repetitions at sixty degrees per second. Peak torque, work done, and average power for extension and flexion were compared against lean mass percentage data. Data were analyzed using Pearson's correlation coefficient with significance accepted at p<0.01. Results: There was no significant relationship between isokinetic leg strength and regional leg lean mass percentage or total lean body mass percentage (p>0.05). Similarly, there was no significant correlation between isokinetic arm strength and regional arm lean mass percentage or total body lean mass percentage (p>0.05). Discussion: These results are different compared to what has been previously reported in correlating muscle strength and body composition and suggest that percentage of lean mass in conditioned and unconditioned individuals may not be the best predictor of isokinetic muscle strength.

51. THE EFFECT OF PHYSICAL ACTIVITY-INFUSED HEALTH AND SCIENCE LESSONS ON ELEMENTARY SCHOOL STUDENT BEHAVIOR

Adriel Henriksen, Austin Wang, Marcella Raney, PhD
Department of Kinesiology, Occidental College, Los Angeles, CA

Background: Studies have shown that regular physical activity (PA) breaks lasting 20 – 60 minutes have a positive effect on student focus and cognitive performance in elementary school classrooms. However, increased demands on teachers for curriculum delivery and test preparation have resulted in a decrease in PA opportunities during the school day. **Purpose:** The purpose of this study was to evaluate the impact of 1-Minute Energizers, brief (1 - 5 minute) interactive health and science lessons delivered with PA, on student behavior in an elementary school classroom. **Methods:**Two kindergarten (K: n=37), 1st (n=37), and 2nd (n=37) grade classrooms were randomly assigned to the control (C) or experimental condition (E). Teachers instructed two 1-Minute Energizers (E) or spent an equivalent time delivering the same information without a physical activity component (C) every day for 6 weeks. Each student was observed for twenty 5 second increments during a pre- and post-intervention classroom observation. The change in frequency of non-compliant (NC), inattentive (I), and disruptive (D) behaviors as well as the percent of time on-task (OT) was analyzed with a mixed factorial repeat measures ANOVA. **Results:** An interaction effect was found between time and condition for I ($F(1,98)=14.982$, $p<0.05$), D ($F(1,98)=21.673$, $p<0.05$), OT ($F(1,98)=35.627$, $p<0.05$). Experimental, but not control ($p>0.05$) students significantly decreased negative behavior frequency and increased on-task behavior from pre- to post-intervention [I (-0.017+/-0.003s^{-1}); D (-0.007+/-0.001s^{-1}); OT (+14.7+/-1.7%); $p<0.05$].1st graders improved behavior (I,D,OT) more than K or 2nd over the intervention period independent of condition ($p<0.05$). There was no difference in pre- or post-intervention I, D, OT between genders ($p>0.05$). Males exhibited greater NC pre- and post-intervention ($F(1,98)=7.3$, $p<0.05$).**Conclusion:** The results of this study suggest that brief recurring PA breaks combined with academic content delivery may improve aspects of students' behavior previously related to academic performance.

50. UTILITY OF OFFLOADED RUNNING GAIT RETRAINING IN A RUNNER WITH MEDIAL KNEE OSTEOARTHRITIS AND A VARUS THRUST: A CASE REPORT

Nicolas S. Hatamiya, Anthony C. Luke MD, MPH, FACSM
UCSF Human Performance Center; Department of Orthopaedic Surgery; University of California, San Francisco

HISTORY: A 57 y.o. male presented with persistent right medial knee pain. An active runner since 13 y.o., he was running 60 miles per week and 3 marathons annually. The patient could not run without severe pain, despite avoiding impact activity for 2 months with NSAIDs and traditional physical therapy. EXAMINATION: The patient was 1.80m and weighed 84kg with a minimally antalgic gait. His right knee was tender over the medial joint line and patella, with ROM 0-135. There was no effusion. He had a varus alignment. McMurray was negative. Ligaments were intact. DDX: Osteoarthritis, meniscal tear, chondral defect, ligament injury.TEST RESULTS: X-rays of the right knee showed KL2 osteoarthritits in the medial compartment. MRI showed increased marrow reactive changes and cartilage loss in the medial femoral condyle likely due to a stress reaction, with a medial meniscus root tear. Video-analysis of his running gait showed a varus thrust of his right knee during stance phase. 3-Dimensional biomechanical evaluation of his running quantified the peak knee adduction angle [8.40°±0.42°**]** and frontal plane knee excursion [6.44°±0.47°**]** on the right.FINAL DIAGNOSIS: Medial compartment knee osteoarthritis.TREATMENT: A 14-week running program using an offloading treadmill progressed the patient from 20% body-weight to a full weight-bearing state. Gait-retraining techniques used visual feedback and verbal cues to promote a compliant running style. Exercises focused on hip abductor, external rotators and VMO strengthening and stretching. OUTCOMES: Post-intervention 2D video-analysis of the patient's running showed a visual reduction in varus thrust of the right knee. Significant decreases in peak knee adduction angle [6.99°± 0.39°**,** p<.05] and frontal plane knee excursion [3.17° ± 0.47°**,** p<.05] were found with post-intervention 3D biomechanical analysis, indicating less knee varus alignment during stance phase. After retraining, the patient successfully returned to sport and completed a marathon four months later.

52. TRACKING OF PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR IN TODDLERS (12-36 MONTHS)

Mason D. Hill, Ryan Glatt, Rebecca K. Haas, Louise A. Kelly Ph.D, Janie Rider Ph.D
Department of Exercise Science, California Lutheran University

Background: It would be valuable if at risk groups with low physical activity could be identified early and offered targeted intervention. While there is an abundance of studies tracking the physical activity and sedentary behavior in children over the age of 4years there is a paucity data concerning the behavior of toddlers.**Purpose:** The aim of the present study was to examine the tracking characteristics of light activity (LPA) moderate to vigorous activity (MVPA) and sedentary behavior (SB) in a sample of young children over a one-year period. **Methods:** The tracking of LPA, MVPA and SB was examined in at baseline then 12 months later. Study participants included 24 toddlers (14 males and 10 females) with a baseline mean age of 19.83 ± 5.84 years. TPA, LPA, MVPA and SB were measured objectively for 7 consecutive days annually using the Actigraph GT1M accelerometer. Time spent in MVPA and sedentary behavior was established using our previously published age specific cut-offs. In keeping with recent research in this area, tracking of LPA, MVPA and sedentary behavior were analyzed in three ways: Spearman Rank correlations, percentage agreements and finally KAPPA statistics. **Results:**There were positive and significant Spearman rank correlations for MVPA (r_s=0.63, p=0.02) and for SB (r_s=0.62, p=0.02). Percentage agreement for LPA, MVPA and SB were 2.1%, 4.2% and 7.7% respectively. KAPPA statistics for LPA, MVPA and SB were poor (KAPPA <0.2).**Conclusion:**These results indicate low levels of tracking of LPA, MVPA and sedentary behavior in toddlers over a one-year period. These data raise the possibility that interventions targeted at very young children to promote and increase physical activity and more importantly decrease sedentary behaviour may change tracking trajectories. The findings of the present study may carry important implications for policy and practice in the fields of public health. Further research in this area is clearly warranted.
This study was funded by the Swenson Summer Research Fellowship

53. ATTENTIONAL FOCUS AND BIASING EXPECTATIONS ON MOTOR PERFORMANCE

Rachel Ho, Will Wu, Jared Porter, Jim Becker
California State University Long Beach, Kinesiology

Skill acquisition studies have demonstrated the benefits of an external focus of attention over an internal focus of attention on motor performance (Wulf, HoB, & Prinz, 1998; Porter, Ostrowski, Nolan, Wu, 2010; Wu, Porter, Brown, 2012). Studies have shown that enhancing a performer's expectations of ability and directing focus of attention during an endurance task elicits benefits on motor performance (Lohse & Sherwood, 2011). The purpose of this study was to investigate the interaction between negative bias and an alternating focus of attention. Our hypothesis consisted of two parts. Part one, that an attentional focus effect would occur between the external and internal focus conditions. Part two, that a negative bias would negate traditional attentional focus effects. Twenty-three male and female university students performed 1 standing long jump in 5 different conditions. Verbal instructions were provided to direct participants on where to focus their attention before each trial within each condition. The Internal Condition (INT) instructed participants to focus on extending their knees while jumping. The External Condition (EXT) instructed participants to focus on jumping towards a cone placed in front of them. The Control Condition (CON) instructed participants to "jump to the best of your abilities." A negative biased condition consisted of feedback indicating that the "upcoming 2 trials will result in your worst jumps." Using a within participants design, each participant experienced all attentional focus conditions with and without negative bias expectations. Attentional focus strategy and bias were counterbalanced. Measures of jump performance, peak force, and projection angle were collected to measures changes in performance. Results indicate that no attentional focus effect was found between the EXT and INT focus conditions. An attentional focus effect was found between biased conditions.

55. IMPROVEMENTS IN VO_2PEAK ARE UNRELATED TO CHANGES IN SUBMAXIMAL HEART RATE AFTER 12 WEEKS OF AEROBIC WALKING IN WOMEN

Holzapfel SD, Sawyer BJ, Angadi SS, Bhammar DM, Ryder JR, Gaesser GA
School of Nutrition and Health Promotion, College of Health Solutions, Arizona State University, Phoenix, AZ

Purpose: We examined the relationship between exercise training-induced changes in VO_2peak and submaximal (HRsub) and maximal heart rates (HRmax). **Methods:** Eighty sedentary women (baseline: age 30.6 ± 7.7 years, BMI 25.6 ± 5.8 kg/m2, VO_2peak 30.6 ± 5.9 ml/kg/min) completed a supervised, 12-week treadmill walking intervention. Subjects exercised 30 min per session, 3-days/week at heart rates equivalent to ~70% of VO_2peak. VO_2peak was assessed before and after training with a modified Balke protocol and indirect calorimetry. The treadmill stage associated with HRsub-pre (~75% of measured HRmax at baseline) was recorded and used to assess HRsub-post at same treadmill stage during post-intervention testing. Subjects were dichotomized based on change in VO_2peak into high responders (Hres > 50th percentile) and low responders (Lres < 50th percentile). **Results:** Hres increased their VO_2peak (ml/kg/min) significantly more compared to Lres (Hres = 4.38 ± 1.52 vs. Lres = 0.56 ± 1.76; $p < 0.01$). Change in HRsub of Hres did not differ from Lres (Hres = -3 ± 9 bpm vs. Lres =2 ± 8 bpm; $p = 0.44$). HRmax increased significantly in Hres compared to Lres (Hres = 3 ± 8 bpm vs. Lres = -2 ± 9 bpm; $p = 0.01$). Change in respiratory exchange ratio at VO_2peak from pre- to post-test was similar across both groups (Hres = 0.004 ± 0.010 vs. Lres = 0.010 ± 0.061; $p = 0.70$). **Conclusion:** Improvements in VO_2peak following 12-weeks of aerobic exercise training are accompanied with changes in HRmax but not HRsub. This suggests that changes in submaximal exercise heart rate may not be a good predictor of increases in VO_2peak after exercise training in young women.

54. EFFECTS OF ADDED MASS AND HORIZONTAL DISPLACEMENT ON LANDING STRATEGIES

Holt, J.L., Nordin, A.D., Dufek, J.S.
Department of Kinesiology and Nutrition Sciences; School of Allied Health Sciences; University of Nevada, Las Vegas

PURPOSE: The purpose of the study was to test whether landing strategies change when increasing the stressor during the execution of a simple horizontal jump. **METHODS:** 12 healthy adults (24.7±4.0 yr.; 1.73±0.1 m; 75.31±12.4 kg) performed landing trials from a distance of 30cm and 60cm at 100%, 110% and 120% bodyweight; fifteen trials each, onto two force platforms (Kistler, 2000Hz). Load was added via a backpack with mass distributed equally anteriorly and posteriorly. The dependent variable was the peak vertical ground reaction force (vGRF) during landing. The peak vGRF at 100% bodyweight was set as the baseline (zero), for comparative purposes. A purely Newtonian Response at 110% and 120% loads was calculated using F=ma for the group. Statistical Analysis included 3x2 (load x distance) repeated measures ANOVA with Sidak post-hoc contrasts (SPSS 20.0; $\alpha = .05$) using the Huynh-Feldt method to adjust the degrees of freedom. Simple linear regression was used to define strategy, based upon slope of the regression line. **RESULTS:** ANOVA results showed a significant load main effect only ($F2, 22=6.22$; $p<0.007$; $\eta2=0.361$, suggesting that as load increased the strategies used during landing changed in a non-linear, i.e., non-Newtonian fashion (average increase at 110% across distances = 30cm: -45.3±387.8 N, 60cm: -57.3±465.9 N; average increase at 120% across distances = 30cm: -181.0±373.8 N, 60cm: -260.7±427.8 N.) Explained variance from the linear regression demonstrated poor predictability between the perturbations of load and distance. However, individuals did not follow this group trend. **CONCLUSION:** The mean response of the participants exhibited a change in strategy to a Negative Biomechanical response at both distances across load, but strategies used by individuals varied widely. Likely explanations for the outcomes include choice of dependent variable (peak vGRF vs. peak braking force) and/or the degree of difficulty of the task.

56. ADHERENCE TO 2010 DIETARY GUIDELINES FOR AMERICANS AND THE RELATIONSHIP TO ADIPOSITY IN YOUNG WOMEN

Nicholas Jackson, Bruce Bailey, Matthew Bell, Bill Errico
Department of Exercise Sciences, Brigham Young University

Background: The dietary guidelines for Americans were developed for Americans ages two and older and contain authoritative advice on diet intended to decrease risk of disease and maintain a healthy weight. To date, no studies have examined how adherence to the 2010 Dietary Guidelines relates to adiposity.***Objective:*** Determine the relationship between adherence to the 2010 Dietary Guidelines for Americans and adiposity in young women with and without statistical adjustment for physical activity.***Methods:*** The study was cross-sectional. Three hundred and twenty-four apparently healthy young women were recruited to participate (ages 17-25). Dietary intake was measured using the Dietary History Questionnaire (DHQ) and diet quality was determined using the 2010 Healthy Eating Index (HEI-2010). Percent body fat was assessed using the BOD POD. Physical activity was measured using accelerometry over seven days. ***Results:*** The average HEI-2010 score was 65.9±10.7 out of 100. Women in the top quartile of HEI-2010 had significantly lower percent body fat than women in the lowest three quartiles ($F = 3.36$, $P = 0.0359$). Controlling for objectively measured physical activity weakened this relationship by 20%. These young women also had 0.37 (95% CI: 0.16-0.85)odds of having a body fat greater than 32%. Stepwise regression of the 12 components of the HEI-2010 demonstrated that only the density (equivalents per 1000) of dairy (inverse) and percent of energy from empty calories were predictive of percent body fat. ***Conclusions:*** Young women whose diets more closely meet the 2010 dietary guidelines for Americans tend to have lower adiposity. Specifically, consuming higher levels of dairy and a lower percent of dietary energy from empty calories is predictive of lower adiposity in young women.

57. IMPROVEMENTS IN AEROBIC FITNESS FOLLOWING A MODERATE-INTENSITY EXERCISE PROGRAM IS INDEPENDENT OF STEP COUNTS AMONG SEDENTARY ADULT FEMALES

Catherine L. Jarrett[1], Brandon J. Sawyer[2], Dharini M. Bhammar[3], Wesley J. Tucker[1], Justin R. Ryder[1], Angadi Siddhartha[1], Glenn A. Gaesser[1], FACSM.
[1]Arizona StateUniversity, Phoenix, AZ; [2]Point LomaNazareneUniversity, San Diego, CA; [3]University of Texas Southwestern MedicalCenter, Dallas, TX

Purpose: To assess if step counts have an influence on improvements in VO_2peak during a supervised, 12-week treadmill walking exercise program. **Methods:** Fifty-nine sedentary women (Age = 30.6± 7.7yrs; BMI = 25.3± 5.9 kg/m^2) participated in a supervised, 12-week moderate intensity walking exercise program. Preferred walking speed was assessed at baseline and VO^{2}peak was assessed at baseline and 12-weeks post-intervention using a modified Balke incremental exercise test and indirect calorimetry. Subjects underwent exercise training 3 d/wk for 30min/session at 90% of preferred walking speed on an incline that elicited heart rate corresponding to 70% VO_2peak. Step count was assessed using pedometers and recorded daily in a diary. Pearson correlation was used to assess the association between change in step-counts between weeks 1 and 12 versus change in VO2peak. Change in step-counts within subjects, and difference between ΔVO_2peak in improvers (increased >2000 steps/day) vs non-improvers were assessed using paired and independent t-test statistics respectively.**Results:** VO_2peak improved significantly after the intervention (pre = 29.7 ± 5.6 vs. post = 32.3 ± 6.1 ml/kg/min; p<0.001) however step-counts did not change (pre = 7321 ± 2590 vs. post = 7745 ± 2499 steps/day; p=0.23). Subjects who improved steps counts > 2000 steps/day did not show greater improvements in VO_2peak compared to those who did not increase steps/day (ΔVO_2peak; improvers = 3.1 ± 3.2 ml/kg/min vs. Non-improvers = 2.3 ± 2.6 ml/kg/min; p=0.3). Change in steps/day was not associated with ΔVO_2peak (r= -0.005; p=0.9).**Conclusions:** Sedentary women who undergo a 12-week, moderate-intensity training program demonstrate improvements in aerobic fitness independent of change in daily step counts.

59. MECHANICAL EFFICIENCY OF THE STANDARD VERSUS A MODIFIED YMCA 3 MINUTE STEP TEST

Daniel B Jensen, Kyle Mefferd, Robert Rietjens, Antonio Santo, Ph.D., R.D., C.S.S.D., Janet S Dufek, Ph.D
Department of Kinesiology and Nutrition Sciences, University of Nevada, Las Vegas; Las Vegas, NV, USA

Background: The YMCA 3 minute test is widely accepted, with results given as heart beat count (HBC). This provides a quick categorization of cardio-respiratory fitness but does not directly relate to VO_2max or functional aerobic capacity. Trunk angle has been shown to have a high correlation linking HBC to VO_2max. The standard step test uses a set height (30.5cm). Height differences among participants may influence trunk position, affecting overall test validity. The purpose of the study was to examine the effects of step height on kinematics during a step test. **Methodology:** Ten participants (27.6±7.3yrs, 1.73±0.09m, 76.6±10.0kg) provided institutionally approved informed consent. Participants were instrumented with five reflective markers placed on the right side (acromion process, greater trochanter, lateral joint line of the knee, lateral malleolus, fifth metatarsal head). Two experimental conditions: C1) standard YMCA step test, and C2) step height- and gender-adjusted test (0.192*height, males; 0.189*height, females) were completed with order counterbalanced and cadence controlled (24 Hz). Participants were videotaped (60 Hz) during the first (T1) and second (T2) minute of each condition. Video records were digitized (MaxTRAQ, version 2.2.2.2, Innovision Systems, Ann Arbor, MI). Dependent variables included ankle, knee and hip range of motion (ROM) as well as thigh inclination (TI). Data were evaluated using 2 (condition) x 2 (time) mixed model ANOVAs (α=0.05). **Results:** There were no significant time main effects or condition x time interactions. All dependent variables exhibited significant increases from C1 to C2; hipROM (4.2±1.3deg, p=.006), thighTI (3.7±0.9deg, p=.001), kneeROM (3.2±0.9deg, p=.003), and ankleROM (2.2±0.8deg, p=.009). **Discussion:** The results suggest that there are mechanical differences between a standard and modified YMCA step-test. The observed increases in ROM values during C2 suggest that the current YMCA step test may introduce a bias against individuals of shorter stature.

58. THE EFFECTS OF COOLING ON SUBSTRATE METABOLISM AND PERFORMANCE DURING PROLONGED CYCLING

Jennings, Hillary M.; Martin, Cristina G.; Fava, Kevin; Wright, Juliane; Astorino, Todd A.
Department of Kinesiology, California State University San Marcos, San Marcos, CA

Background: Exercise increases the body's core temperature causing physiologic and cardiovascular strain, and heat stress elicits fluid and electrolyte imbalances that can inhibit performance. **Aim**: To examine the effects of cooling during intense exercise on exercise performance and substrate use within temperate laboratory conditions. **Method**: Results were obtained from ten active men and women with age, height, weight, and VO_2 max equal to 24.2 ± 6.3 yr, 169.0 ± 21.9 cm, 69.4 ± 16.8 kg and 43.5 ± 5.1 ml/kg/min. Initially, subjects performed a VO_2 max test on a cycle ergometer followed by a 5 km cycling time trial. On each of two experimental days separated by 48 h after a 3 h fast, subjects completed 35 min of submaximal exercise at 40-50% Wmax, during which indirect calorimetry was performed to determine substrate use, followed by an 8.1 km time trial to assess cycling performance. Treatment order was randomized to cooling using acommercially-available vest (Kewlfit, Tech Niche International, Vista, CA) made of Phase Change Material releasing temperature-specific (14°C) cooling relief and a control condition in which subjects did not wear the cooling vest. During the last 20 min of submaximal exercise, VO_2, VCO_2, and RER were collected and averaged every 5 min to determine substrate use. HR, RPE, and pleasure were recorded during exercise. **Results**: RER increased from 0.94 ± 0.02 to 0.96 ± 0.03 during exercise (p < 0.01), though no effect of cooling on substrate use was determined (p = 0.15). Data revealed no significant effect of cooling on cycling performance (16.73 ± 1.93 min vs. 16.71 ± 1.56 min, p = 0.86), RPE (p = 0.64), or pleasure (p = 0.83). **Conclusion**: Cooling did not modify substrate use or cycling performance under thermoneutral laboratory conditions.

60. CALORIE EXPENDITURE AND PRODUCTIVITY DURING ACTIVITIES PROMOTING NON-EXERCISE ACTIVITY THERMOGENESIS

Amy Jewett, Katie Elston, Katie Akbar, Pete Charukesnant, & Peggy Plato
Department of Kinesiology, San Jose State University

Obesity-related medical expenditures pose a significant public health challenge. With the sedentary lifestyle common in most American adults, finding ways to increase calorie expenditure is crucial for successful weight loss. However, many job tasks are increasingly sedentary and screen-based, contributing to a reduction in non-exercise activity thermogenesis (NEAT), or the energy expended when not sleeping, eating, or engaging in structured exercise or sporting activities. Increasing calorie expenditure in the workplace is one method to increase NEAT; however, work performance must be maintained. **Purpose:** This study measured energy expenditure and the ability to perform cognitive and work-related tasks during three conditions: seated (control), using a mini-cycle while seated, and using a walking workstation. **Methods:** Participants (7 men, 6 women) completed four tasks: Stroop word-color test, typing, calculating math problems, and searching the internet. Calorie expenditure was measured using open-circuit spirometry. **Results:** Compared to the seated control condition (1.5 ± 0.1 Kcal/min, mean ± SEM), calorie expenditure increased significantly when using the mini-cycle (2.4 ± 0.2 Kcal/min) and walking workstation (2.7 ± 0.2 Kcal/min), $F(2,12) = 69.806$, $p < 0.001$. The difference between work and rest calorie expenditure was 0.10 ± 0.07, 1.17 ± 0.12, and 1.29 ± 0.13 Kcals/min for the control, mini-cycle, and walking conditions, respectively. There were no significant differences in performance on the cognitive and work-related tasks between conditions. **Discussion/Conclusion:** Replacing seated work with pedaling or walking increased calorie expenditure by 54 and 72 Kcal/hour, respectively, without impacting work productivity. These results support using either a mini-cycle or walking workstation to increase NEAT in the workplace. Based on these results and assuming maintenance of calorie intake, pedaling or walking 2 hours/day while working would result in an annual weight loss of 7.5-10 lbs.

61. THE EFFECT OF WHOLE BODY VIBRATION ON SKIN BLOOD FLOW AND NITRIC OXIDE PRODUCTION IN DIABETIC PATIENTS

Johnson, Paula K. and Mitchell, Ulrike
Department of Exercise Sciences, Brigham Young University, Provo, UT

Background: Vascular dysfunction due to hyperglycemia in individuals with diabetes is a factor contributing to distal symmetric polyneuropathy Reactive oxygen species reduce the bioavailability of nitric oxide (NO), a powerful vasodilator, resulting in reduced circulation and nerve ischemia. Increases in blood NO concentrations and circulation have been attributed to whole body vibration (WBV). The purpose of this study was to the determine the effects of low frequency, low amplitude WBV on whole blood NO concentration and skin blood flow (SBF) in individuals with symptoms of DSP.**Research Design and Methods:** Ten subjects with diabetes and impaired sensory perception in the lower limbs participated in this cross-over study. Each submitted to two treatment conditions, WBV and sham, with a one week washout period between. Blood draws for NO analysis and Doppler laser image scans of SBF were performed before, immediately after and following a 5 minute recovery of each the treatments.**Results:** Low frequency, low amplitude WBV vibration significantly increased skin blood flow compared to the sham condition ($F_{2,18}=5.82$, $p=0.0115$). Whole blood nitric oxide concentrations did not differ between the WBV and sham condition immediately or 5 minutes post-treatment ($F_{2,18}=1.88$, $p=0.1813$).**Conclusions:** These findings demonstrate that subjects with diabetes respond to whole body vibration with increased skin blood flow compared to sham condition. The release of NO due to vibration-induced shear stress may be only a local effect. The implication is that WBV is a potential non-pharmacological therapy for neurovascular complications of diabetes

62. BIOMECHANICAL ANALYSIS OF GOALIE-INDEPENDENT AND GOALIE-DEPENDENT PENALTY KICK STRATEGIES

Kacena, Jason; McCardell, Morgan; Prosser, Kristen; Soucy, Michael; Truver, Bryce; LeBlanc, Michele
Exercise Science Department, California Lutheran University

Penalty kicks are an integral part of soccer and often determine the outcome of the game. In the goalie-independent strategy (GIS), the kicker disregards any movement cues from the goalie. In the goalie-dependent strategy (GDS), the kicker uses goalie movement cues and kicks the ball to the corner opposite the goalie's movement. **Purpose:** The purpose of this study was to compare biomechanical characteristics for GIS and GDS penalty kicks in the player's preferred kicking direction. **Methods:** Twelve male collegiate soccer players shot at targets (0.60 m x 0.60 m) located in the bottom left and right goal corners using an investigator assigned strategy. During each kick, ground reaction forces were collected with a Kistler 9281CA force plate (1200 Hz) and 3-dimensional kinematic data was obtained with 6 Vicon MX40 cameras (240 Hz) and Motus software. Kicks were analyzed from the kicking leg takeoff until ball contact. Two accurate shots for each strategy were used for analysis. Differences were determined using SPSS v. 20 ($p < 0.05$). **Results:** Kicking foot velocity at ball contact was greater using GIS than GDS (10.3±1.4 m/s versus 9.8±1.3 m/s; $p = 0.003$), but there was no difference in knee kinematics for either the plant or kicking leg. Kicking hip extension with GIS was greater than with GDS at touchdown (-13.0 ±13.2° versus -7.0±8.6°; $p = 0.045$) and less externally rotated at ball contact ($p = 0.039$). GIS kicks had more clockwise shoulder twist ROM ($p = 0.023$), however they had less clockwise hip twist ROM ($p = 0.038$). There were differences in the kinetics associated with the kicks, primarily in the vertical direction with a greater force at ball contact for GIS kicks ($p = 0.031$). **Conclusions:** Players were less effective when taking goalie movement into account, but did remain consistent in their knee mechanics.

63. "ROOTING ME ON": EXPLORING THE SOCIAL INFLUENCES OF PATIENTS RECOVERING FROM TOTAL KNEE ARTHROPLASTIES

Kato, Brittany, Wilson, Kathleen S. & Lynn, Scott K.
Kinesiology; California State University, Fullerton

Background: The high prevalence of knee osteoarthritis in older adults has led to an increased rate of knee replacement surgeries. Total knee arthroplasty (TKA) is an invasive surgical procedure that requires a long process of rehabilitation. When considering factors that contribute to successful rehabilitation, patients' satisfaction with the social support they receive has been associated with an improved health-related quality of life. However, little is known about the content of these interactions and why a patient may be satisfied. **Purpose:** This study qualitatively explored the social influences patients experience following a TKA. **Methods:** Participants (N=6; 4 females & 2 males) were all first-time TKA patients; two females and two males had one knee operated on, one female had both knees operated on, and one female had multiple revisions done to her TKA. Participants ranged in age from 41 to 65 years. Semi-structured interviews were conducted in which participants were asked about their experience at multiple points ranging from pre-operative to the end of their rehabilitation. These interviews were audio recorded and transcribed verbatim. Thematic analysis was then performed to identify themes that emerged both within and across cases. **Results:** One theme focused on trust in the doctor during the surgery. Other themes focused on the rehabilitation process. Themes emerged about the clinicians being "very attentive to my specific needs" and the clinic as being "just a friendly atmosphere". In addition to the values placed on positive social environment within the clinic, participants also valued the emotional support: "Rooting me on" and tangible support: "I had all kinds of back up and help" received from family and friends. These themes display the importance of social influence throughout recovery process. **Conclusions:** These findings have implications for clinicians, patients and their families to ensure successful rehabilitation from TKA.

64. COMPARISON OF 1-REPETITION MAXIMUM IN CONCENTRIC AND ECCENTRIC BENCH PRESS

Kelly, Stephen B.[1]; Brown, Lee E.[2], FACSM; Hooker, Steven P.[3], FACSM; Swan, Pamela D.[3], FACSM;Buman, Matthew P.[3]; Alvar, Brent A.[4], FACSM; Black, Laurie E.[5]
[1]Department of Kinesiology, Vanguard University, Costa Mesa, CA;[2]Sport Performance Laboratory, California State University, Fullerton, CA;[3]School of Nutrition and Health Promotion, Arizona State University, Phoenix, AZ;[4]Rocky Mountain University of Health Professions;[5]College of Allied Health, California Baptist University, Riverside, CA

Introduction: Eccentric muscle actions (ECC) are characterized by muscle lengthening, despite actin-myosin crossbridge formation. Research has indicated that muscles acting eccentrically are capable of producing more force when compared to muscles acting concentrically. **Purpose:** The purpose of this study was to determine if ECC bench press yields greater strength than concentric (CON) as measured by one-repetition maximum (1RM). **Methods:** 30 healthy males (age = 24.63 + 5.6 years) were tested for 1RM in CON and ECC bench press. A mechanical hoist was affixed to a gantry crane and placed over a standard flat bench. The hoist was connected via chain to 45lb plates that were loaded on a standard barbell, which allowed for mechanical raising and lowering of the barbell. Following general and bench press-specific warm up, 1RMs were randomly tested seven days apart. For CON repetitions, the weight was mechanically lowered to the chest and the participant pressed it up until the elbows were fully extended. The ECC bench press consisted of lowering a barbell from a fully extended elbow position to the chest in a continuous, smooth, controlled manner for three seconds as determined by a countdown in correspondence to a digital metronome. A failed ECC repetition was defined as the participant being unable to control the velocity of the descent of the bar at any time or allowing the barbell to touch the chest before the three second count expired. **Results:** Paired t-tests showed that ECC 1RM (255.17 ± 68.37lbs) was significantly ($p < 0.05$) greater than CON 1RM (205.83 ± 58.43lbs). **Conclusions:** These data indicate that ECC actions yield increased force capabilities (~120%) as compared to CON in the bench press. Future research should examine reps to failure at a constant percentage.

65. THE EFFICACY OF PHYSICAL THERAPY IN REDUCING DISABILITY AND LOWER BACK PAIN

Zvart Keyan*, Emily Rosario PhD+, Suzi Johnson PT+
*University of La Verne, +Casa Colina Rehab Hospital

Many suffer from different forms of lower back pain (LBP). Studies have shown that exercise(s) and therapy may help reduce LBP although it is undetermined which is the best method to receive the most benefits. **Purpose:** To examine the effectiveness of land-based and aquatic physical therapy on reducing LBP and disability in comparison to individuals not receiving therapy services. **Method:** Three groups were compared in this study, the control group and 2 physical therapy groups, aquatic or land-based therapy. At the initial evaluation subjects were given three self-report surveys, the Oswestry Disability Questionnaire, Fear Avoidance Belief Questionnaire, and SF-12 Quality of Life, and scored on five functional tests; time to complete 5 sit-to-stand, timed 5m walk, timed up and go, lumbar flexion, and self report pain on a 0-10 scale. The participants completed therapy (aquatic or land) sessions and after thirty days, all areas were retested and the surveys were administered again. A repeated measures ANOVA was used to identify significant differences ($p<0.05$) between groups. **Results:** Seventy-nine participants completed all testing sessions and surveys and at baseline no significant differences between groups in self-reported disability were found. A significant difference ($p<0.01$) was found between the therapy groups compared to the control group. Those in the aquatic and land-based therapy groups showed significant changes over time. **Conclusion:** A significant difference exists between the aquatic and land-based therapy groups compared to controls in the self-report surveys as well as in the five functional tests. These findings support the use of physical therapy to improve LBP.

66. THE EFFECT OF FUNCTIONAL FATIGUINE EXERCISES ON ANKLE AND KNEE BIOMECHANICS DURING A FORWARD-SIDE JUMP

Kim, HS[1]; Son, SJ[1]; Roundy, R[2]; Seeley, MK[1]; Reese, CS[2]; Hopkins, JT[1], FACSM
[1]Department of Exercise Sciences, Brigham Young University, Provo, UT; [2]Department of Statistics, Brigham Young University, Provo, UT

Background: Neuromuscular fatigue is suggested as a risk factor for a lower extremity injury. Specifically, fatigue has been shown to impair neuromuscular control as well as dynamic stability of the ankle and knee joints. **Purpose:** To examine the effect of functional fatiguing exercises on ankle and knee joint kinematics, and joint kinetics during a forward-side jump.**Methods:** Twenty-one (14M, 7F) healthy participants (23±3yrs, 175.6±8.7cm, 69.1±12.3kg) with no history of ankle or knee injury performed five trials of a forward-side jump onto a force plate. A functional fatiguing protocol included subjects completing a 5-minute incremental running protocol on a treadmill at between 5 and 6 mph. Next, subjects performed 20 seconds of lateral counter movement jumps (CMJ), and 20 repetitions of vertical CMJs. 10-second rests were given between fatiguing exercises. After all three fatiguing exercises, subjects performed one trial of a maximum vertical jump. The subject repeated cycles of those three exercises until subjects' RPE scale reached 17 and the vertical jump height fell below 80% of their maximum jump heights. After the fatigue protocol, subjects immediately performed 5 trials of the forward-side jump onto the force plate. **Results:** Fatigue resulted in increased plantarflexion and knee extension during the intial stages of landing. Plantarflexion moments were significantly increased during 0-20% of stance. At the knee joint, extension and varus moments were initially decreased during 0-20% of stance while extension and varus moments were increased during 20-

67. VARIATIONS IN SUBSTRATE METABOLISM IN RECREATIONALLY ACTIVE WOMEN ON CYCLE ERGOMETER AND TREADMILL

Leesa R. King, Kelsey C. McCarthy, Paige Louis, Whitney Sillers, Astorino, Todd A. Astorino PhD
Department of Kinesiology, California State University, San Marcos, CA

Background: Muscle metabolizes substrates (carbohydrate (CHO) and fat) during exercise to meet the demand for ATP. Factors such as fed state, exercise intensity/duration, and fitness level contribute to differences in substrate metabolism. **Aim:** The focus of this study was to determine differences in substrate use in recreationally active (exercise < 5 hr/wk) women during both treadmill (TM) and cycle ergometer (CE) exercise at the same rating of perceived exertion (RPE). **Methods:** Eleven recreationally active women (age = 23.0 ±3.0 yr, BMI = 20.79 ± 1.7 kg/m2) participated in this study. Subjects performed 30 min of exercise on both the CE and TM with a 5-minute warm-up. Gas exchange data were obtained to assess fat and CHO use at RPE 11, 13, and 15 (10 min/stage). Subjects fasted 3 hr before exercise and standardized their dietary intake one day prior using a self-recorded food log. **Results:** A two-way ANOVA with repeated measures was used to determine significant differences in fuel use between exercise modes. Fat oxidation was higher in TM versus CE ($p = .009$). RER was higher in CE compared to TM at RPE = 11 (CE = 0.926±0.031 vs. TM = 0.875±0.063) 13 (CE = 0.949±0.031vs. TM = 0.887±0.050), and 15 (CE = 1.005±0.031 vs. TM 0.930±0.047), illustrating that whole-body fat oxidation was 16 – 23 % higher with CE compared to TM. CHO oxidation was higher in CE ($p = 0.003$) compared to TM at RPE = 11 (CE 3.73±0.70 kcal/min vs. TM 2.24±1.08 kcal/min), 13 (CE 5.14±0.70 kcal/min vs. TM 3.58±1.45 kcal/min) and 15 (CE 8.24±2.20 kcal/min vs. TM 5.50±1.58 kcal/min) **Conclusions:** Fat oxidation was significantly higher during graded walking on the TM versus CE at the same relative intensities based on RPE. Women desiring to optimize fat oxidation should select treadmill exercise compared to cycle ergometry.

68. HIGH CARBOHYDRATE OXIDATION IS ASSOCIATED WITH VEGAN DIETS AND DYSLIPIDEMIA

Knurick, Jessica R.; Johnston, Carol S.; Swan, Pamela D., FACSM
School of Nutrition and Health Promotion, Arizona State University, Phoenix, AZ

Vegetarian diets are associated with health advantages in epidemiological studies, but the mechanisms have not been elucidated. Differences in substrate utilization may be a possible explanation, as a reduced capacity to oxidize fat is associated with metabolic disorders. However, this has not been directly measured in a vegetarian population. **Purpose:** To compare dietary composition, substrate utilization, and health markers in long-term omnivores (OMN), vegetarians (LOV), and vegans (VEG).**Methods:** Dietary intake, substrate utilization, and blood lipids were examined in healthy OMN (n=23), LOV (n=21), and VEG (n=25), aged 19-50 years (30.3 ± 8.0 y). Dietary status ranged from one-year to lifetime adherence. All testing was performed in the morning following an overnight fast. Three-day food records were used to assess dietary intake and resting metabolic rate was measured by indirect calorimetry using a facemask system with the metabolic cart. Substrate utilization was assessed with correction for 24-hour urinary nitrogen and blood lipids were measured in plasma with colorimetric enzymatic assays. Data were normalized if necessary. Univariate analyses and Pearson correlations were controlled for gender. **Results:** Energy intake (kcal/day) did not differ between diets ($p=0.92$). However, LOV consumed less protein (PRO; $p<0.01$) than OMN, while VEG consumed less PRO ($p=0.04$) and fat ($p=0.01$) than OMN and more CHO than both OMN ($p<0.01$) and LOV ($p=0.046$). VEG oxidized more CHO than both OMN and LOV ($p=0.04$), which reflected dietary CHO intake ($p=0.05$) but not dietary fat ($p=0.98$). CHO oxidation correlated directly with blood triglyceride concentration ($r=0.37$; $p<0.01$) and indirectly with HDL cholesterol ($r=-0.34$; $p<0.01$). **Conclusion:** Elevated CHO oxidation, which correlated with CHO intake, was a distinctive feature of the vegan diet. This was associated with raised triglycerides and decreased HDL cholesterol. These data suggest that diets favoring elevated CHO oxidation, relative to fat, may pose health risks.

69. INTERACTION OF RESISTANCE TRAINING, DIET AND ELECTROACUPUNCTURE TREATMENTS ON SKELETAL MUSCLE FUNCTION AND GLUT-4 PROTEIN CONCENTRATION IN RATS

Nathalie S. Lambrecht[1], Sukho Lee[2], Kijeong Kim[3], Junyoung Hong[2], Marlayana T. Burns[1], Jeffrey R. Bernard[1]
[1]Saint Mary's College of California USA, [2]Texas A&M University- San Antonio USA, [3]University of Ulsan Republic of Korea

The purpose of this study was to 1) investigate the effects of resistance training, diet, and electroacupuncture on skeletal muscle mass and muscle contractile properties in rats, and 2) examine the effects of these treatments on components of the insulin signaling cascade. Forty female Sprague-Dawley rats were randomly divided into five groups: 1) Control (CON), 2) Resistance Training (RT), 3) RT+Electroacupuncture (RTA), 4) RT+Herbal supplement (RTD), and 5) RT+ Electroacupuncture+Herbal supplement (RTAD) (n=8 each). Resistance training was performed using ladder climbing every other day for 8 weeks. Sparse-wave electroacupuncture treatment (2-15 Hz, 2-4 Voltage for 15 min) was applied by needling ST36 and GB34 three times/week for 8 weeks. Huang Qi (Radix Astragali Membranceus) was given via oral gavage once a day for 8 weeks (1 ml mixed with water based on concentration of 368 mg/kg). Total Akt and GLUT-4 protein concentration was determined via Western Blotting. Data was analyzed using a one-way ANOVA with a Least Significant Difference post hoc test. Results indicate that resistance training significantly increased muscle mass of flexor halluces longus (FHL) compared to CON ($p<.05$) The isomeric twitch (Pt) and tetanic tension (Po) of FHL in the RTD and RTA groups were significantly higher than CON and RT groups ($p<.05$). Resistance training and electroacupuncture significantly increased total GLUT-4 protein concentration in FHL but had no impact on Akt. The results suggest that electroacupuncture and herbal supplementation are effective treatments for increasing muscle strength when combined with resistance training. Additionally, resistance training and electroacupuncture may be an effective method for improving glucose tolerance as a result of increases in GLUT-4 protein concentration.

70. CALORIC EXPENDITURE DIFFERENCES BETWEEN ACUTE RESISTANCE TRAINING BOUTS: HYPERTROPHY AND ENDURANCE

Marco Lopez, Duke Choi, Alberto Vallejo
Clinical Exercise Research Center, University of Southern California. Los Angeles, CA

Resistance training has yet to be acknowledged in the health and fitness field. This is due in part to the fact that very little research has been done to estimate caloric expenditure during resistance training. **Purpose:** The goal of this study was to determine the caloric expenditure associated with two resistance training bouts, namely an acute endurance and a hypertrophy-specific training bout (as defined by NSCA). **Methods:** Using a crossover experimental design, four healthy male college-aged subjects (height: 70 inches), whose average fat mass and fat free mass measured by bioelectrical impedance was 14.0 ± 6.2 kg and 65.1 ± 6.8 kg, were tested for their 1RM by NSCA standards on all the exercises in the training bout that consisted of bench press, leg press, dumbbell should press, leg curl, lat pulldown, and seated row. Caloric expenditure during each training bout was measured using a facemask which allowed the Oxycon Mobile Unit to analyze the inspired gas. A within-subjects t-test was performed to compare results (heart rate, oxygen uptake) obtained for the two bouts. **Results:** There was a trend ($P=0.2$) for heart rate during the acute endurance bout to be higher (127.1±8.1 bpm) than that observed during the hypertrophy-specific bout (121±12.9 bpm). There was also a trend ($P=0.16$) for oxygen uptake (mL/min*kg) to be higher during the hypertrophy-specific bout (15.0±2.7) than during the acute endurance (13.5±2.3) bout. **Conclusion:** These findings suggest that hypertrophy-specific resistance training might be a better resistance training prescription for weight loss. However, given the small sample size utilized in this study, future studies should aim to test more subjects to confirm this finding.

71. MUSCLE POWER DOES NOT VARY SUBSTANTIALLY ACROSS A BROAD RANGE OF FORCE OUTPUTS IN THE LEG AND CHEST PRESS

Danielle Mahler, Stephen Lenz, K.C. Hall, and Taylor Marcell
Department of Kinesiology, Califonia State University Stanislaus

Muscle power is considered the rate of force development and is known to vary with the velocity of movement. The problem is different studies have reported a wide-range of power outputs. **Purpose:** the purpose of this study was to measure the optimal load (weight) to determine muscle power in both the upper- and lower-body. **Methods:** Thirty-six college-aged subjects (18 men and 18 women) participated in the measurement of lower-body one repetition maximal (1-RM) strength using a pneumatic leg press exercise and then upper-body strength using a pneumatic bi-lateral chest press exercise (A420, Keiser Sport, Fresno, CA). After a short rest (3-5 min) lower and upper body power was assessed by performing 6 repetitions at 30%, 40%, 50%, 60%, and 70% of the measured 1-RM strength in random order. **Results:** Peak power (mean ± SD) for the leg press (1339.1 ±436.7, 1456.9 ± 468.5, 1540.4 ± 498.4, 1566.6 ± 484.8, 1572.7 ± 483.2, 984.9 ± 370.3 watts for 30%, 40%, 50%, 60%, 70%, and 100% 1-RM, respectively) and the chest press (476.0 ± 259.3, 491.2 ± 248.8, 479.9 ± 231.1, 463.4 ± 186.9, 417.0 ± 178.9, 213.7 ± 90.4 watts for 30%, 40%, 50%, 60%, 70%, and 100% 1-RM, respectively) varied across the forces measured. However, one-way ANOVA with post-hoc analysis demonstrated there were no significant differences between 40% to 70% power measures for either the leg or chest press. **Discussion:** The most important finding of this study was that peak power does not vary considerably over a broad range of force outputs. These findings suggest that during whole body exercises such as the leg and chest press that as load increases the body compensates to maintain maximal power outputs.

72. CARDIOVASCULAR AND PERCEIVED EXERTION COMPARISON OF UPHILL VERSUS DOWNHILL PORTIONS OF A TRAIL HIKE

Jacob W. Manning[1], Giovanni Trilleras[2], Jeffrey Montes[2], Tori M. Stone[2], Mihaela A. Ciulei[2], Brandon L. Miller[2], James W. Navalta[2], Mark DeBeliso[1]
[1]Department of Physical Education & Human Performance, Southern Utah University, Cedar City, UT; [2]Department of Kinesiology and Nutrition Sciences, University of Nevada, Las Vegas, Las Vegas, NV

Previous laboratory research has shown downhill walking to induce lower cardiovascular and perceived exertion responses compared to positive grade walking. **Purpose:** Since it is unknown whether these physiological responses can be applied to a less controlled field setting, the purpose was to characterize responses to uphill and downhill phases of a trail hike. **Methods:** Seven participants completed a 1.13 mile uphill trail hike at 2.0 mph on the "C" Trail with an average grade of 17.6% (10 degrees) to an elevation of 7000 feet in Iron County, Utah. Following 15-min rest, participants hiked the same route on the downhill portion of the trail. Measures of heart rate (HR), systolic blood pressure (SBP), and ratings of perceived exertion (RPE) were obtained at rest, at the midpoint, and end of each trail hike. Data were analyzed using a 2 (trail: up, down) x 3 (time: start, mid, end) repeated measures ANOVA with significance at $p\leq0.05$. **Results:** A significant trail x time interaction was observed for RPE ($p=0.03$), with greater exertion at the mid (11±0.6) and end (10±7) of the uphill hike compared to downhill (mid=9±6, end=9±6). Significant main effects were noted for HR and trail (uphill=96±6, downhill=79±3 bpm, $p=0.006$), and over time (start=76±4, mid=95±9, end=92±6 bpm, $p=0.001$). With regards to SBP, the only main effect observed was for trail, with positive grade hiking eliciting significantly greater response than the downhill trail walk (122±3, 116±3 mmHg, $p=0.01$). **Discussion:** Trail hikes are rated according to difficulty level, with those containing significant elevation and incline being categorized as strenuous. These results provide evidence that the downhill portion of a trail hike is less strenuous from both a cardiovascular and perceived exertion perspective than the uphill component. Individuals wishing to utilize trail ratings as a guide for exercise intensity should take these findings into consideration.

73. THE FORCE-VELOCITY RELATIONSHIP IS NOT CURVELINEAR FOR THE LEG PRESS OR CHEST PRESS EXERCISE.

Taylor Marcell, Danielle Mahler, and Stephen Lenz
Department of Kinesiology, Califonia State University Stanislaus

During concentric-isotonic contractions the muscle will contract at different velocities depending upon the load applied. A.V. Hill first described this curvilinear relationship known as the force-velocity relationship. **Purpose:** The purpose of this experiment was to test this relationship during dynamic whole body movements such as the leg and chest press. **Methods:** Thirty-six college-aged subjects (18 men and 18 women) participated in the measurement of lower-body one repetition maximal (1-RM) strength using a pneumatic leg press exercise and then upper-body strength using a pneumatic bi-lateral chest press exercise (A420, Keiser Sport, Fresno, CA). After a short rest (3-5 min) lower and upper body force and velocity were assessed by performing 6 repetitions at 30%, 40%, 50%, 60%, and 70% of the measured 1-RM strength in random order. **Results:** Force across the range for leg press was 582.2 ± 138.0, 733.6 ± 169.1, 899.3 ± 208.6, 1055.7 ± 255.2, 1219.8 ± 293.2, and 1944.3 ± 509.7 Newtons for 30%, 40%, 50%, 60%, 70%, and 100% 1-RM, respectively, while for chest press it was 230.5 ± 105.3, 296.4 ± 134.1, 360.1 ± 160.4, 430.4 ± 187.2, 494.9 ± 216.3, and 713.0 ± 318.9 Newtons for 30%, 40%, 50%, 60%, 70%, and 100% 1-RM, respectively. Velocity decreased as force values increased: 1.54 ± 0.23, 1.37 ± 0.20, 1.21 ± 0.20, 1.05 ± 0.15, 0.87 ± 0.14, and 0.27 ± 0.08 m/s for leg press and 1.53 ± 0.38, 1.35 ± 0.36, 1.09 ± 0.31, 0.93 ± 0.25, 0.71 ± 0.23, and 0.21 ± 0.11 m/s respectively. **Discussion:** Force measures increased with increasing percentages of the one-repetition maximum (%-RM) while velocity decreased. These values for both the dynamic isotonic leg and chest press were best described by a linear relationship.

74. THE INFLUENCE OF TREADMILL WALKING ON VERBAL LEARNING AND MEMORY RECALL

Masterson,Travis; Hill, Kyle; Carbine, Kaylie; Christenson, Edward; Killpack, Nathan; LeCheminant, Rick; Larson, Michael J.; LeCheminant, James D.
Department of Psychology, Brigham Young University, Provo, Utah; Department of Exercise Science, Brigham Young University, Povo, Utah

Objective: To prevent sedentary activity in the workplace, treadmill desks are becoming common. No studies, however, have used sensitive neuropsychological instruments to study the effects of treadmill walking on learning and memory abilities. Therefore, the purpose of this study was to determine if treadmill walking would significantly impact rapid learning and recall tasks. **Method:** Participants included seventy-six individuals assigned to a sitting (n = 38; 17 female) or walking (n = 37; 23 female) condition. Descriptive variables were assessed, including: height, weight, BMI, cardiovascular fitness, and demographic characteristics. While sitting or walking on a treadmill desk (1.5 mph, 0% grade), participants completed the Rey Auditory Verbal Learning Test (AVLT), a list-learning test with five learning trials, an interference trial, and recall and recognition trials after an approximately thirty minute delay. Data were analyzed using independent-samples t-tests and repeated measures analysis of variance (ANOVA).**Results:** Groups did not differ in BMI or VO2max, (ps > 0.33). Individuals in the treadmill group performed poorer than those in the sitting group for initial recall ($t(73) = 2.89$, $p = 0.005$) and total recall after five learning trials ($t(73) = 2.18$, $p = 0.03$). Groups did not differ after a distractor list (i.e., short delay) ($t(73) = 1.01$, $p = 0.32$) or in 30-minute-delay recall (i.e., long delay) ($t(73) = 1.07$, $p = 0.29$) or recognition ($t(73) = 0.33$, $p = 0.74$). A 2-Group x 5-Time ANOVA on the learning trials showed main effects of learning ($F(4,292) = 294.59$, $p < 0.001$), and group ($F(1,73) = 4.75$, $p = 0.03$), but no significant Group x Time interaction ($F(1,73) = 1.50$, $p = 0.20$).**Conclusion:** Findings indicate that walking on a treadmill decreases initial learning, but not overall recall. Tasks that require immediate recall or rapid learning may be negatively affected by use of a treadmill desk.

75. METABOLIC AND HEMODYNAMIC DIFFERENCES BETWEEN TRADITIONAL AND ALTERNATIVE VO_2MAX TESTING PROTOCOLS; DOES FITNESS PLAY A ROLE?

David W. McMillan, Ross M. Edmunds, Eduardo Sanchez, and Todd A. Astorino
Dept of Kinesiology at California State University San Marcos

Recent investigations have shown that alternatively-structured testing protocol can elicit higher determinations of maximal oxygen uptake (VO_2max) when compared to the traditional ramp protocol, but the mechanism explaining this increase is unknown. The purpose of the current study was to observe potential differences in VO_2max between the ramp and alternative decremental and self-paced protocols, to determine if responses were similar across fitness levels, and to derive partial-causality of potential differences via the concurrent measurement of central cardiovascular function. Thirty men and women (mean age and body fat = 26.0 ± 5.0 yr and 15.7 ± 7.1 %) initially completed a ramp protocol to volitional fatigue to determine VO_2max and were separated into three groups based on fitness level. On a subsequent day they completed the deceremental test and then over the next two sessions, separated by 48 h whose order was randomized across subjects, they performed a self-paced and an additional decremental protocol. During exercise gas exchange data were obtained using indirect calorimetry and thoracic impedance was utilized to assess hemodynamic function. Repeated measures analysis of variance was used to examine differences in maximal determinations of VO_2, heart rate (HR), and stroke volume (SV) and cardiac output (CO) across protocols. Results demonstrated significantly lower ($p = 0.000$) VO_2max via the ramp (49.7 ± 10.2 mL/kg/min) compared to the self-paced (52.7 ± 9.6 mL/kg/min) and decremental protocols (51.2 ±9.8 and 51.2 ± 9.0 mL/kg/min, respectively), with a significant interaction ($p = 0.047$) seen for fitness level. Maximal HR and CO ($p = 0.02$) were higher in response to the self-paced protocol versus other protocols. These data show that the traditional ramp protocol underestimates VO_2max versus two newly-developed protocols in men and women of varying fitness level, with a greater cardiac output potentially responsible for this outcome.

76. ACCOMODATION TO, AND EFFECTS OF UNLOADING ON A BODY WEIGHT-SUPPORT TREADMILL

McNeill, D.[1], Williams, C.[1], De Heer, H.[2], and Coast, J.R.[1]
[1]Department of Biological Sciences, Northern Arizona University
[2]Department of Physical Therapy, Northern Arizona University

Purpose: We sought to examine the metabolic characteristics of body weight-supported running on a lower-body positive-pressure treadmill (LBPPT) in two ways: 1), to examine whether there was an accommodation and stabilization in VO_2 with repeated exposures to running on the treadmill, and how long that took, and 2), to examine the relationship between the amount of body weight support and the amount that VO_2 decreased with said support following accommodation. We hypothesized that VO_2 would decrease and stabilize after approximately 60 minutes of LBPPT exposure, and that once stabilized, VO_2 would drop less than in direct proportion to the amount of body weight-support. **Methods:** Eight moderately trained runners (five male, three female, mean age 23.63+/- 5.37 yrs) completed seven 15-minute bouts of running on a LBPPT at each of three levels of body weight-support for five minutes each: 50, 70, and 90 percent of body weight. Velocity remained unchanged through the trials and was prescribed at a velocity associated with 70-80 percent of VO_2 max from an initial incremental maximal running test. **Results:** Two-way repeated measures ANOVA showed differences in VO_2 at each level of body weight support across trials. No significant differences between trials at each level of support occurred after the fourth trial. After accommodation, the percentage drop in VO_2 was not significantly different from the percentage decrease in body weight. **Conclusions:** Results demonstrate a period of accommodation equivalent to approximately sixty minutes of running on a LBPPT before stable VO_2 values are achieved, which is an important consideration for examining the relationship between weight support and drop in energy cost. The relationship between percent weight support and percent drop in energy cost was not significantly different, suggesting that the percent change in weight support can predict the change in metabolic cost of running.

77. LKB1 REGULATES SKELETAL MUSCLE INFLAMMATION AFTER CONTRACTIONS

McVey, Natalie L.; Chen, Ting; Moore, Tim M., Madsen, Steven R.; Hallowell, David M.; Thomson, David M.
Department of Physiology & Developmental Biology, Brigham Young University, Provo, UT

Excess inflammation is associated with impaired metabolic regulation and function in skeletal muscle. Liver kinase B1 (LKB1) is an important mediator of metabolic regulation in skeletal muscle, but its role in the control of skeletal muscle inflammation is unknown. The purpose of this study was to determine whether skeletal muscle LKB1 is essential for controlling inflammation-induced gene transcription after a bout of muscle contraction. To test this, 15 minutes of unilateral hindlimb muscle contraction was induced by sciatic nerve electrical stimulation (STIM) in skeletal muscle-specific LKB1 knockout (KO) and littermate control (C) mice (n=8/group). Contralateral muscles served as resting controls (REST). The gastrocnemius-plantaris-soleus complex was removed 0, 2 or 3 hours after STIM. The 0 and 2 hour-samples were used for western blotting, and 3-hour samples for mRNA analysis. Phosphorylation of NF-κB and STAT3 increased significantly ($p < 0.05$) above REST in KO but not C muscles at 0 and 2 hours post-STIM, respectively. Microarray analysis indicated elevated mRNA expression of many inflammation-induced genes at 3 hours post-STIM in KO but not C muscles. Real-time PCR analysis (n=6/group) for 4 of these genes confirmed the microarray results, demonstrating significantly increased expression of FOS, SELP, IER3 and Bcl3 after contraction in KO but not C muscles. These results suggest that LKB1 is necessary for limiting the inflammatory response to skeletal muscle contraction.

78. THE EFFECTS OF ACUTE ORAL GLUTAMINE SUPPLEMENTATION ON GASTROINTESTINAL PERMEABILITY AND HEAT SHOCK PROTEIN REGULATION IN PERIPHERAL BLOOD MONONUCLEAR CELLS OF ENDURANCE RUNNERS

Christine Mermier, Ph.D.[1], Micah Zuhl, Ph.D.[1,3],Suzanne Schneider, Ph.D.[1], Karol Dokladny, Ph.D.[2], Roy Salgado, MS[1], and Pope Moseley, MD FACSM[2]
[1]Dept of Health, Exercise & Sport Science &[2]Dept. of Internal Medicine, University of New Mexico, Albuquerque, NM, and [3]Dept. of Health Sciences, Central Michigan Univ., Mt. Pleasant, MI.

Background: Glutamine is the most abundant amino acid in the body and a known inducer of heat shock protein 70 (HSP70). Recently, we have shown that seven days of glutamine supplementation activates HSP70, along with lowering exercise induced GI permeability, endotoxin leakage, and suppression of the pro-inflammatory cytokine response to vigorous exercise. This may reduce exercise related gastrointestinal distress, which occurs at high rates among endurance athletes. Whether or not an acute glutamine dosage up-regulates HSP70 and attenuates the inflammatory response to exercise is not known. **Methods:** Trained runners (N=7) completed baseline and exercise intestinal permeability tests. Exercise included two 60-min treadmill runs at 70% of VO2max in a 30°C room after ingestion of glutamine (.9g/kg FFM) (GLN) or placebo (PLA). Plasma levels of endotoxin and TNFα, along with PBMC protein expression of HSP70 and IκBα were measured pre-exercise, immediate post-exercise, two, & four hrs post-exercise. **Results:** Permeability was lower in the GLN trial when compared to PLA (0.042 ± 0.008 vs. 0.061 ± 0.01). Plasma endotoxin and TNFα were lower at 4 h post-exercise in the GLN vs. PLA (6.72 ± 0.017 pg/ml vs. 7.952 ± 0.419 pg/ml, and 1.643 ± 0.091 pg/ml vs. 1.874 ± 0.126 pg/ml, respectively. PBMC expression of IkBα was higher at 4hr post-exercise in GLN trial vs. PLA (1.551 ± 0.246 vs. 1.094 ± 0.152). HSP70 was higher pre-exercise and at 2hr post-ex in GLN trial when compared to PLA (1.356 ± 0.082 vs. 1.000 ± 0.000 and 1.652 ± 0.087 vs. 1.279 ± 0.104) **Conclusions:** Acute oral glutamine supplementation prevents exercise induced intestinal permeability and suppresses the inflammatory response possibly through HSP70 activation.

79. TRAINING EFFECT OF A HIGH INTENSITY INTERVAL TRAINING (HIIT) PROGRAM USING UPPER EXTREMITY EXERCISE

Nicole Mier, James W. Salassi III, Dr. Ralph Rozenek
California State University, Long Beach

Purpose: High intensity interval training (HIIT) has been shown to produce beneficial cardiopulmonary and metabolic adaptations. Most studies investigating the effects of HIIT have involved the use of the lower extremities. The purpose of this study was to investigate the physiological effects of HIIT when performed utilizing the upper extremities. **Methods:** 20 college-aged students were randomly assigned to a continuous training (CT) (n =10) or HIIT (n = 10) group. Groups completed 2 sessions/week for 6 weeks using a Krankcycle® for training. Both groups completed 30 min of exercise (5 min warm-up; 20 min work; 5 min cool-down) each session. HIIT trained using 10 x 1 min work and 1 min rest intervals. During the 20 min work phase, CT trained at an average of 82±2.1 $\%HR_{GXTpeak}$,while HIIT trained at an average of 83± 1.4%$HR_{GXTpeak}$ with an average peak HR during the work intervals of 92±1 $\%HR_{GXTpeak}$. **Results:** Improvements in$VO_{2GTXpeak}$ were observed for HIIT from pre- to post-training, (33.5± 9.7 ml x kg^{-1} x min^{-1} vs. 38.3±9.3 ml x kg^{-1} x min^{-1}, $p< 0.05$); however, no significant change was seen in CT (27±6.3 ml x kg^{-1} x min^{-1} vs. 28±6.9 ml x kg^{-1} x min^{-1}). HIIT also showed increases in $HR_{GXTpeak}$ (180±6.4 b x min^{-1} vs. 185±6.0 b x min^{-1}, $p< 0.05$), whereas CT saw no change. Total time to fatigue increased for both groups (HIIT, 16±3.6 min vs. 18.5±3 min; CT, 15±1.5 min vs. 16±1.7 min, $p< 0.05$) **Conclusion:** Upper extremity HIIT appears to produce significant improvements in cardiopulmonary function and work capacity when compared to CT and may be a time-effective alternative for those who cannot perform lower extremity exercise.

80. EFFECT OF ¡Fuerte y en Forma! ON BALANCE OUTCOMES IN HISPANICS WITH ARTHRITIS: A PILOT STUDY

Andrew I. Miller, Cheryl Der Ananian, Richard Hinrichs
Physical Activity Nutrition and Wellness, Arizona State University

Background: Osteoarthritis (OA) is a known risk factor for balance impairment and falls. OA is estimated to affect 27 million Americans and 34% of adults over the age of 65. Studies have shown that Hispanics with arthritis are less active than non-Hispanic whites yet few evidence-based physical activity (PA) programs for arthritis are available in Spanish. Research investigating the effects of evidence- based PA programs on balance in people with OA is limited. **Purpose:** To examine the effects of a Spanish version of Fit and Strong!(¡Fuerte y en Forma!), on balance in Hispanics with lower extremity OA.**Methods:** Fourteen Hispanic, community-dwelling, Spanish speaking adults, with a diagnosis of OA participated in ¡Fuerte y en Forma! at a local community health center. ¡Fuerte y en Forma!, is an 8 week, multi-component exercise (low-impact aerobic, lower extremity strength, balance and flexibility) and health education program delivered in Spanish. Participants attended 90 min classes (60 min of exercise, 30 min of health education), 3 times per week, for 8 weeks. The study used a pre-post, quasi-experimental design. Center of pressure (COP) measurements were taken for 30 seconds in 7 stances of varying difficulty via a force-platform at baseline and 8 weeks. Paired T-Tests were used to compare mean differences across time. **Results:** Open-stance with eyes open revealed COP improvements in deviation from centroid in the medio-lateral direction (delta=0.28 cm, p=0.01), 66% sway area (delta=0.25 cm2, p=0.05), and length of the 95% ellipsis major axis (delta=0.32 cm, p=0.04). Other stances revealed improvements in medio-lateral and anterior-posterior max velocities, average velocity, 95% area ellipsis and path length ($p<0.05$). **Conclusion:** Participating in ¡Fuerte y en Forma!resulted in improved postural balance as measured by objective, COP data. Findings suggest ¡Fuerte y en Forma! may help improve balance in a population at risk for falls.

81. THE EFFECTS OF VISUAL INPUT ON LOWER BODY ISOKINETIC STRENGTH

Brandon L. Miller, Giovanni Trilleras, Angela C. Harvel, Jeffrey Montes, Tedd J. Girouard, James W. Navalta
Department of Kinesiology and Nutrition Sciences, University of Nevada, Las Vegas, Las Vegas, NV

Previous independent studies have been conducted comparing the isokinetic leg strength of blind individuals with age and gender matched visually-abled counterparts. A more recent study was conducted in the repeated measures fashion comparing the isotonic leg strength of non-impaired individuals, with and without a blindfold. **Purpose:** The purpose of the present study was to evaluate the effect that visual input has on the isokinetic strength of the knee flexors and extensors. **Methods:** Eight subjects (male N = 6, female N = 2) participated in this repeated measures study utilizing two counterbalanced trials of data collection. A Biodex System 3 Isokinetic Dynamometer was used to gather data. On one day the subjects were asked to perform three familiarization repetitions followed by six maximal repetitions at sixty degrees per second, with their vision unobstructed. On the other day, the same procedures were used with the exception that the participants wore a blindfold to obstruct vision. Peak torque, work done, average power, and seconds to peak for extension and flexion were compared between the two trials. Data were analyzed using a paired T-test with significance accepted at $p \leq 0.05$. **Results:** Work done during extension without vision obstructed was significantly greater than work done during extension with vision obstructed (Vision = 181.4 ± 83.6 ft▪lbs, No Vision = 170.4 ± 84.8 ft▪lbs, $p = 0.04$). No other measures were significant (peak torque extension $p = 0.60$, peak torque flexion $p = 0.14$, work done flexion $p = 0.09$, average power extension $p = 0.65$, average power flexion $p = 0.44$, seconds to peak extension $p = 0.80$, and seconds to peak flexion $p = 0.51$). **Discussion:** These results are different compared to what has been reported for isotonic strength and suggest that visual input does not affect isokinetic strength.

82. THE EFFECT OF SHORT PHYSICAL ACTIVITY BREAKS COMBINED WITH HEALTH AND SCIENCE CONTENT INSTRUCTION ON STUDENTS' ACADEMIC PERFORMANCE

Jessica Minton and Marcella Raney,PhD
Department of Kinesiology, Occidental College, Los Angeles, CA

Background: Previous studies show that physical activity (PA) breaks and a subsequent increase in PA levels in elementary school classrooms have a positive effect on academic performance in all subject areas. Despite this evidence, many teachers hesitate to interrupt instructional time for PA. 1-Minute Energizers, a set of 1 – 5 minute health and science lessons, integrate PA with the introduction of the human body. **Purpose:** The purpose of this study was to evaluate the impact of 1-Minute Energizers on elementary student knowledge in health and science topics related to California's State Curriculum Standards. **Methods:** Two kindergarten (K; n=30), 1st (n=36), and 2nd (n=35) grade classrooms from the San Gabriel Unified School District were recruited to participate in this study and randomly assigned to the control (C) or experimental (E) condition. Teachers were instructed to lead two 1-Minute Energizers (E) or spend an equivalent time delivering the same information without a physical activity component (C) everyday for 6 weeks. Student knowledge was assessed with one-on-one oral quizzes (40 questions; 1pt/question) before (pre) and after (post) the intervention period. Data was analyzed using a mixed factorial repeat measure ANOVA at a significance level of 0.05. **Results:** The intervention had a significant main effect on student knowledge from pre to post [+6.9±0.44pts; $F(1,90)=241.71$, $p<0.05$]. Knowledge changes did not differ between control and experimental groups [($F(1,90)=0.09$, $p>0.05$)] or between genders [($F(1,90)=0.70$, $p>0.05$)]. 1st and 2nd graders both scored higher than Kindergartners on the pre-test [$F(2,90)=35.53$, $p<0.05$] and improved significantly more with the intervention [K: +3.4±0.7pts; 1st: +9.2±0.7pts; 2nd: +8.0±0.8pts; ($F(2,90)=15.08$, $p<0.05$].**Conclusion:** The data suggest that combining bursts of physical activity with health and science concepts is an effective way to enhance both academic performance and physical activity levels in an elementary school classroom.

83. VIBRATION AND SKIN BLOOD FLOW CHANGES IN SUBJECTS WITH RESTLESS LEGS SYNDROME (RLS)

Mitchell, UH, Johnson, PK
Department of Exercise Sciences, Brigham Young University

Background: Vascular disturbances leading to tissue hypoxia have been named as one of possible causes for RLS. Vibration to the whole body (WBV) in healthy individuals results in nitric oxide (NO) generation, which then leads to increased blood flow. **Purpose:** The purpose of this investigation was to determine if WBV will 1) improve skin blood flow, as measured in flux, in individuals with RLS and 2) induce increases in NO blood concentration. The data were compared to healthy age-matched subjects. **Methods:**Ten subjects with RLS and 10 controls underwent one 10-bout, 30-second WBV and one sham treatment session. Flux measurements with laser Doppler and blood draws were performed before, immediately after and 5 minutes after the sessions. **Results:** Baseline flux was significantly higher in the RLS group compared to control ($p < 0.001$); flux in the RLS group immediately after WBV was significantly higher compared to baseline, sham treatment and compared to control group. There was no difference in NO concentration within subjects and between groups. **Conclusions:** This study has shown that subjects with RLS have increased pedal skin blood flow and react significantly stronger with vasodilation to whole body vibration than subjects without RLS. This suggests that, because subjects with RLS have a different blood flow base line and increased reaction to vasodilatory stimuli, the etiology for RLS might involve changes or disturbances in blood flow control.

84. TEST-RETEST RELIABILITY OF CARDIOVASCULAR AND PERCEIVED EXERTION RESPONSES TO TRAIL HIKING

Jeffrey Montes[1], Jacob W. Manning[2], Tori M. Stone[1], Giovanni Trilleras[1], Brandon L. Miller[1], Mihaela A. Ciulei[1], Robert W. Rietjens[1], Mark DeBeliso[2], James W. Navalta[1]
[1]Department of Kinesiology and Nutrition Sciences, University of Nevada, Las Vegas, Las Vegas, NV; [2]Department of Physical Education & Human Performance, Southern Utah University, Cedar City, UT

One of the benefits of field-based research is the ability to take measurements in an applied setting, whereas a drawback is the level of control available when making these measures. In field-based research, it is important to obtain repeatable measures in order to minimize variation. **Purpose:** The purpose of this investigation was to determine the intraclass correlation reliability of cardiovascular measurements and ratings of perceived exertion to trail hiking. **Methods:** Volunteers (male, N = 5, female N = 2) completed two 1.13 mile trail hikes at Three Peaks Recreation Area in Iron County, Utah at 2 mph with a 15 minute rest between trials. Measurements obtained were heart rate (HR), systolic and diastolic blood pressure (SBP, DBP), and ratings of perceived exertion (RPE). Rate pressure product (RPP) was calculated as the product of HR x SBP. Measurements were taken between 4 pm and 6 pm with temperatures reaching 75°F ± 2°. Weather conditions were sunny and wind speeds averaged 15-19 mph with gusts as high as 23 mph. Intraclass correlation coefficients (ICC) for each variable were determined using SPSS. **Results:** Significant ICC were observed for HR ($r = 0.72$, $p = 0.03$) and RPE ($r = 0.88$, $p = 0.01$). ICC for SBP ($r = 0.63$, $p = 0.056$), DBP ($r = -0.14$, $p = 0.67$) and RPP ($r = 0.59$, $p = 0.075$) were not significant. **Discussion:** These findings show that select cardiovascular and perceived exertion variables display significant test-retest reliability in a trail hiking setting. However, other variables (i.e. blood pressure) were difficult measurements to obtain on the trail, due to unanticipated environmental factors.

85. IMPACT OF CAFFEINE ON FUNCTIONAL OVERLOAD-INDUCED MUSCLE GROWTH

Moore, Tim M.; Mortensen, Xavier M., Harris, Alex M.; Thomson, David M.
Department of Physiology & Developmental Biology, Brigham Young University, Provo, UT

Caffeine has been shown recently to inhibit skeletal muscle insulin-stimulated Akt and mechanistic target of rapamycin (mTOR) pathway signaling in vitro, perhaps in part via amp-activated protein kinase (AMPK) activation. Here, we investigated the impact of chronic caffeine consumption on muscle growth and phosphorylation of AMPK, Akt, and the mTOR-regulated targets ribosomal protein S6 (S6) and eukaryotic elongation factor 2 (eEF2) in functionally overloaded (OVLD) plantaris (PLT) muscle from male rats (n = 8-9). OVLD was induced by unilateral tenotomy of the right gastrocnemius & soleus muscles. The contralateral limb was sham operated as a control (SHAM). PLT hypertrophy with OVLD was significantly attenuated in caffeine treated animals. AMPK phosphorylation increased significantly ($p < 0.05$) more after OVLD in caffeine vs. water-treated PLT. Akt phosphorylation increased after OVLD only in water-treated muscles. Phosphorylation of S6 and eEF2 increased similarly after OVLD with both treatments. Our findings suggest that caffeine may enhance AMPK activation and impair Akt activation with muscle overload. Activation of the mTOR pathway, however, does not appear to be affected by caffeine.

86. THE EFFECTS OF 8 WEEKS OF LOW DOSE SUPPLEMENTATION OF CREATINE AND SODIUM BICARBONATE ON REPEATED SPRINT PERFORMANCE

Morris, Amanda J.[1], Hall, Kellie G.[1], Phelan, Suzanne[1], Olmstead, Jenny[1], Hagobian, Todd A.[1]
[1]Department of Kinesiology, California Polytechnic State University, San Luis Obispo, CA

Short-term (3-7 days), high doses of creatine (20g/d) and/or sodium bicarbonate (0.5g/kg body weight) supplementation increase exercise performance during short term high intensity activities; however, it remains unclear whether long-term, low doses of these supplements have a positive impact on exercise performance. The purpose of this study was to determine the effects of long-term (8 weeks), low dose creatine supplementation on exercise performance, and whether combining creatine and sodium bicarbonate supplementation has an additive effect. Sixty-three healthy, habitually active, adults (28 M, 35 W; 22±2 years; 23± 3 BMI) were randomly assigned by sex to one of three supplement groups: placebo (PL), creatine only (3g/day; Cr), or creatine plus sodium bicarbonate (3g creatine plus 1g sodium bicarbonate; Cr+Sb) for 8 weeks. Before and after supplementation subjects completed two exercise performance tests on separate days. Subjects completed repeated Wingate sprint tests (6 x 10 second sprints) and changes in the slope across the 6 sprints (rate of decline) was analyzed between groups. We also collected 5 km time-trial and the data were analyzed using repeated measures ANOVA. In the repeated sprint test, peak power output slope was significantly decreased ($P=0.04$) in PL (-83%) and Cr+Sb (-82%) but did not change in Cr alone and was significantly better ($P=0.03$) than Pl and Cr+Sb. Similarly, mean power output slope significantly decreased ($P<0.001$) in PL (-73%) and Cr+Sb (-150%), but not in Cr alone. In the 5 k time-trial, PL (-0.4%) and Cr+Sb (+0.5%) had no significant change ($P>0.05$) in time to completion. However, Cr alone significantly improved time to completion (-3%; $P=0.01$). Taken together, these data suggest that long-term, low dose creatine supplementation increases exercise performance but adding sodium bicarbonate supplementation has no beneficial impact on exercise performance.

87. PROPERTIES OF THE PHASE RESETTING CURVE FOR HUMAN GAIT

Jeff A. Nessler, Ph.D., Andrew Craig-Jones, Tavish Spargo
Department of Kinesiology, California State University, San Marcos

Human gait is sometimes modeled as a limit cycle oscillator. This approach assumes that when perturbed, the oscillator will converge toward its limit cycle, and its overall behavior can therefore be described in terms of a phase resetting curve (PRC). The PRC represents the time shift in the cycle period of an oscillator induced by a perturbation that is a function of the phase in which it is received. Currently, the PRC for human gait is not well defined. Therefore, the purpose of this experiment was to investigate two questions: 1) How is the PRC affected by changes in walking speed? and 2) Is the PRC consistent across all individuals? Fourteen subjects completed 4 walking trials that were 4 minutes in duration, each at different treadmill speeds: their preferred walking speed, 1.8 mph, 2.5 mph, and 3.2 mph. A 250 msec perturbation was applied to their right ankle in a pseudo random fashion every 12-20 strides by a rope and pulley system that was actuated by an electric motor. An 8 camera motion capture system was used to record motion of the lower extremity. Phase resetting behavior appeared to change as a function of deviation from preferred walking speed. Specifically, when perturbations were applied during late swing, phase advance of the new gait cycle was greater for lower walking speeds. In addition, several subjects exhibited atypical behavior when the perturbation was applied at 20-30% of swing. Data from these cases suggest that there is a small region during mid-swing where perturbation will generate a larger than normal phase delay. We surmise that this perturbation “sweet spot” may lie at the interface of the flexor and extensor response to perturbation, placing an individual at greater risk for fall. Further study is needed to determine the exact nature of this behavior.

88. PRELIMINARY STUDY ON CHANGES IN MULTIFIDUS CROSS-SECTIONAL AREA IN FEMALE COLLEGIATE VOLLEYBALL PLAYERS FROM PRESEASON TO POST SEASON; COMPARING MULTIFIDUS CSA CHANGES TO BACK PAIN

Neves, Coulter[1]; Johnson, A. Wayne[1]; Myrer, J. William[1]; Bridges, Jarom[1]; Neves, Taubi[2]; Eggett, Dennis[3]
[1]Dept of Exercise Sciences, Brigham Young University; [2]Women’s Volleyball, Utah State Univeristy; [3]Dept. of Statistics, Brigham Young University

Background/significance: Division I female collegiate volleyball players often suffer from back pain throughout the season. Understanding the relationship between multifidus muscle size and low back pain (LBP) can lead to further understanding of LBP trends and the development of exercise protocols to strengthen the multifidus muscle in an effort to minimize LBP. Smaller multifidus CSA associated with LBP has been associated with an increased risk of future LBP.
Purpose: To investigate changes in lumbar multifidus cross-sectional area (CSA) at 4th and 5th vertebral level of Division I female collegiate volleyball players from preseason to post season over two consecutive seasons and to compare CSA changes among players with and without LBP. **Methods:** Transverse images of the multifidus muscle were taken bilaterally at the 4th and 5th vertebral level of 12 Division I female collegiate volleyball players using ultrasound imaging (GE Logic e) at preseason and postseason over two consecutive seasons. Internal software was used to measure the cross-sectional area and the data was analyzed using SAS.**Results:** Preliminary results indicated a significant decrease in lumbar multifidus muscle CSA at the 5th vertebral level from preseason to postseason ($p=0.05$) in all assessed volleyball players. Players with LBP had significantly smaller multifidus muscle area at the 4th lumbar vertebral level compared to players without back pain ($p=0.029$). **Conclusion:** There was a decrease in multifidus CSA at the 5th vertebral level from preseason to post season, which may indicate muscle atrophy of the course of a competitive season. Players with back pain showed significant smaller multifidus CSA at the 4th vertebral level as compared to players without pain. Further research should investigate training protocols to mitigate the decrease of multifidus CSA from preseason to postseason and in players with LBP.

89. CHANGES IN ACHILLES' TENDON CROSS-SECTIONAL AREA IN COLLEGIATE CROSS COUNTRY RUNNERS ACROSS A COMPETITIVE SEASON

Neves, Katy A; Johnson, A. Wayne; Hunter, Iain; Myrer, J. William; Neves, Coulter, Bridges, Jarom
Department of Exercise Sciences, Brigham Young University

Background/significance: The Achilles' tendon (AT) is the most frequently ruptured tendon in runners. Individuals suffering AT ruptures are often asymptomatic, being very physically active in training and competition pre-injury. Understanding the effects of running on AT area can lead to further understanding injury risk and developing training protocols.**Purpose:** To investigate changes in AT cross-sectional area (CSA) of collegiate cross-country runners after a bout of running (before-run to after-run) in the preseason and again in the immediate postseason.**Methods:** The AT of 27 collegiate cross-country runners (age: 21±2.3 years, ht: 175.26±10.16 cm, wt: 62.27±8.3 kg) was measured 8 cm from the plantar surface of the calcaneus using ultrasound imaging (GE Logic e). Transverse images were taken before and after a regular training run (females ran 4 miles; males ran 8.3 miles) both in the preseason and postseason. The data was analyzed using a repeated measures ANOVA (SPSSv21) and Tukey HSD post hoc tests.**Results:** There was a significant decrease in AT CSA from before-run to after-run during a single bout of running at preseason ($p<0.03$), and again at postseason ($p<0.03$). Runners experienced a greater decrease in AT CSA following their preseason run than postseason run ($p<0.03$). Runners had no difference in their initial, before-run AT CSA from preseason and postseason. There was no gender difference in the magnitude of change in AT CSA, despite the men and women running a different duration and mileage. **Conclusion:** There appears to be a thinning of the tendon due to running. This thinning was not as drastic postseason, after runners endured 3 months of training and competition. Further research should investigate correlations between AT CSA and the type of workout (e.g. hilly versus flat), running season (i.e. cross-country versus track), and/or the time to tendon thinning during a bout of running.

90. A FORCE PLATE ANALYSIS OF THE DEADLIFT PERFORMED WITH AND WITHOUT CHAINS

Ramsey M. Nijem, Jared W. Coburn FACSM, Lee E. Brown FACSM, Scott K. Lynn, Anthony B. Ciccone
Human Performance Laboratory and Center for Sport Performance, Department of Kinesiology, California State University, Fullerton

The purpose of this study was to determine the effects that chains, as an accommodating resistance, have on ground reaction forces (GRFs) and rate of force development (RFD). Eight resistance trained men (24 ± 4 y, 179 ± 9 cm, 87.0 ± 21.9 kg) volunteered for the study. On day one subjects performed 1 repetition maximum (1RM) testing of the deadlift exercise after a standardized dynamic and deadlift warmup. On day 2, in random order and after a standardized dynamic and deadlift warmup, subjects performed one set of three repetitions with a load of 85% 1RM with chains and one set of three repetitions without chains. For the chain condition, the chains accounted for approximately 20% (19.9% ± 0.6%) of the 85% 1RM. Peak GRFs and RFD weremeasured using a force plate. Paired sample T tests were run using the first repetition of the sets performed at 85% of 1RM with and without chains to determine differences between the chain and no chain conditions. Results indicated that deadlifting at 85% with an accommodated chain resistance of approximately 20% does not affect RFD. However, peak GRFs for the no chain condition were significantly higher than the chain condition. We speculate that this was due to the greater average load for the no chain condition, as loads were matched at the top of the deadlift (i.e. at full hip and knee extension).

91. GENDER DIFFERENCES IN HUNGARIAN CHILDREN AGED 10-12 YEARS ON THE FUNCTIONAL MOVEMENT SCREEN AND ELBOW FLEXOR AND EXTENSOR STRENGTH

Nomiyama, Misae[1]; Johnson, A.Wayne[1]; Mitchell, Ulrike[1]; Vehrs, Zach[1]; Uvacsek, Martina[2]; Toth, Miklos[2]; Mako, Laszlo[2]; Vehrs, Pat FACSM[1]
[1]Department of Exercise Sciences, Brigham Young University; [2]Physical Education and Sport Sciences, Semmelweis Univeristy

Significance: The functional movement screen (FMS™) has become a popular screening tool for functional movement and used to predict the likelihood of injury. Most research to-date using the FMS™ has been done in adults. The FMS™ may be a useful assessment of children's functional fitness. **Purpose:** To investigate gender differences in the FMS™ and elbow flexor and extensor strength in children 10-12 years of age. **Methods:** Participants were 75 Hungarian boys and girls, aged 10-12 yrs. Elbow extensor strength was measured using a dynamometer with the arm held against the body, the elbow flexed 90°, and forearm pronated. Subjects preformed a maximal isometric voluntary contraction by pulling down the dynamometer. Elbow flexion strength was tested using the same position, but with the forearm supinated and the subjects pulling up. Subjects performed 3 trials of each test and scores were averaged. The children then performed the 7 FMS™ screen activities while being videotaped for later review. At a later time, two raters reviewed all videos and scored the FMS™ for each subject. Scores for each screen were added to give the total FMS™ score. Data were analyzed using ANOVA. **Results:** Demographics: Boys (n= 44, age: 10.5±1.4 years, height: 1.48±.12 m, weight: 39.8±11 kg) and girls (n= 31, age: 10.6±1.1 years, height: 1.49±0.1 m, weight: 39.9±10.8 kg). The girls scored significantly higher on the FMS™ compared to boys ($p=0.005$), while the boys were significantly stronger in both arm flexion ($p=0.026$) and extension strength ($p= 0.024$). **Conclusion:** Pre-teen girls performed better on in the FMS™, while pre-teen boys showed greater upper extremity strength. Girls often develop earlier in many aspects of life including physical ability and often participate in activities that encourage balance and flexibility, which may account for why girls performed better in FMS™ than boys in this age group.

92. REBREATHING BAG VOLUME EFFECTS ON THE ACCURACY OF THE MEASUREMENT OF PULMONARY DIFFUSING CAPACITY AND CARDIAC OUTPUT

K.C. O'Connor, M.J. Lee and J.R. Coast, FACSM
Department of Biological Sciences, Northern Arizona University, Flagstaff, AZ

The rebreathing method for determining the pulmonary diffusing capacity (D_L), and its components: membrane diffusing capacity (D_M), and pulmonary capillary blood volume (V_C), as well as cardiac output (Q) and end-expiratory lung volume (EELV) requires a gas mixture consisting of helium (He), acetylene, carbon monoxide (CO), and nitric oxide (NO) rebreathed from a 5L anesthesia bag and analyzed by mass spectrometry. The method consists of filling the bag to approximately the subject's tidal volume, and rebreathing from the bag following a normal exhalation. In prior research, we found that timing is essential for beginning the rebreathing maneuver. Errors occurred when the subject began the rebreathing maneuver before or after a normal exhalation. However, due to results from our previous study on bag filling volume, this study involved deeper investigation with overfilling the rebreathing bag volume and its effects on D_L, Q and EELV. Ten healthy subjects (5 men, 5 women) underwent several rebreathing maneuvers during rest and exercise (50/75 Watts) on the cycle ergometer with random assignment to four overfilling variations: +250mL, +500mL, +750mL, and +1000mL. Data was averaged from trials at each condition for each subject and analyzed using one-way repeated measures ANOVA. We found that overfilling the bag at any condition affected Q at rest ($P = 0.003$) and exercise ($P = 0.006$) but no effect on D_L or EELV ($P > 0.05$). Q is measured using acetylene with a concentration of 0.602%. Overfilling the bag results in inability for subject to empty bag with each normal breath, potentially affecting the disappearance of acetylene throughout the rebreathing maneuver. We can conclude that as timing of switching into the rebreathing bag is important, bag-filling volume remains relatively unimportant in the measurement of D_L and EELV, but should remain close to the subject's tidal volume for Q measurements.

93. 100 CITIZENS: A PUBLIC HEALTH SOLUTION

Oglesby, Sarah[1]; Loy, Steven F[1]; Henige, Kim[1]; Xie, Jimmy[2]; Burke, Sloane[3]
[1]Dept. of Kinesiology,[2]Dept. of Recreation and Tourism Management; [3]Health Sciences, Cal State Univ., Northridge, Northridge, CA

El Parque de Ejercicio (The Fitness Park) is in fact Recreation Park in San Fernando, CA. Residents of the city use this "nickname" because of the 100 Citizens, FREE public park-based exercise program which has transformed the community's use of the park. The nationally awarded program, conducted by Kinesiology students from Cal State Northridge, exceeds Centers for Disease Control and Prevention exercise guidelines for improving health. In its third year, the Northridge students and over 75 participants per day, have become a community which is a key to the program's success. While public health creates policy, they don't provide programmatic solutions. There is a need for programs designed to improve health, particularly in underserved communities lacking access and the ability to afford quality exercise programming. Kinesiology students and professionals can provide this. They are able educate participants on fitness, proper shoe wear, important nutrition facts, and encourage them to be role models for their children. 100 Citizens is a win for the citizens, an opportunity for Kinesiology students to apply their education, and an exposure of the Kinesiology profession to the Parks and Public Health who represent employment opportunities. The students are part of a collaborative internship with the Parks which to be sustainable, requires the Parks to employ Kinesiology educated professionals as program supervisors. Similarly, Public Health will hire Kinesiology graduates as they begin to understand how to convert policy regarding exercise into practice. 100 Citizens is an affordable, accessible, sustainable solution to physical inactivity and obesity. Our next evolution is expansion to the entire CSU system of Kinesiology departments and an inclusion of a diabetes prevention program … all at no cost to the participants. With expansion of 100 Citizens across the state and country, the potential for employment of Kinesiology majors is enormous.

94. DIFFERENCES IN UNILATERAL CHEST PRESS KINEMATICS ON A STABLE VERSUS UNSTABLE SURFACE WHILE HOLDING 1 VERSUS 2 DUMBBELLS

Oppenheimer, Nicole E., Patterson, Jeff, Harper, Erin N.
Kinesiology Department at Arizona State University

The following study evaluated the effectiveness of the CÖR Bench, to determine if its unstable surface allows for both greater range of motion and greater tendency towards co-contraction, in comparison to a traditional flat bench. An initial session assessed the 19 participants' (age, 22.364 ± 2.480 years; mass, 77.850 ± 18.328 kg; height, 1.787 ± 0.0923 m) current one-repetition maximum strength levels for the unilateral chest press. Four different conditions were used to test the kinematic variables such that each participant completed 5 repetitions of unilateral chest presses at 70% of their max with one and two dumbbells on both the COR Bench and traditional flat bench. Differences in ROM were evaluated by measuring an angular representation of the shoulder complex. Levels of co-contraction were determined by analyzing the middle trapezius EMG. The results indicate a significant difference in ROM between the conditions (p = .00); specifically, a greater ROM during the one dumbbell condition versus the two dumbbell condition on the COR and the flat benches (p = .002, 0.001 respectively); greater ROM with two dumbbells on the COR bench compared to the flat bench (p = .022).The middle trapezius EMG data showed a significant difference in co-contraction levels between conditions (p = .00); specifically, a greater co-contraction during the one dumbbell condition versus the two dumbbell condition on the COR and the flat benches (p = .001, 0.008 respectively); greater co-contraction with one dumbbell on the COR bench compared to the flat bench (p = .010). This lends support for the future use of the COR bench as a means for more efficient exercise through a full range of motion; however, it also suggests that more practice is necessary to master the movement on the bench to decrease co-contraction activity.

95. THE EFFECT OF A WORKSITE HEALTH PROMOTION PROGRAM ON ATTITUDES TOWARDS EXERCISE

Orozco, B.Z., & Leininger, L.J.
Kinesiology Department, California State University, Monterey Bay

The benefits of physical activity are well documented. These benefits include weight loss, improved mood and improved health indicators. Worksite health promotion programs have the opportunity to help employees establish healthy physical activity patterns and increase positive attitudes towards exercise. **Purpose:** The purpose of this study was to evaluate the effect of a worksite walking competition on attitudes towards exercise benefits among university employees. **Methods:** The research study was a pre/post design that coincided with the four week "Workplace Walkoff Challenge" (WWC) at a small California university. The WWC was a physical activity intervention coupled with an education series with the topics motivation and barriers, exercise programs, and nutrition. Before and after the WWC, 34 participants completed questionnaires regarding attitudes about the benefits of exercise participation. Variables included exercise as a weight control benefit (WCB), mood improvement (MI), aesthetics (AE), disease prevention (DP), stress relief (SR) and social opportunities (SO). **Results:** Results indicated that there was no significant difference in WCB and DP (p>.05) before and after the WWC. There was also no significant difference in MI, SR and AE (p>.05) before and after the WWC. However, there was a significant difference (p<.05) in SO attitude before and after the WWC. **Conclusions:** The WWC had a positive effect on the attitude of participants for social opportunities with colleagues. This may be due to the fact that the WWC was designed as a team competition, and encouraged group exercise. This is an encouraging result, as team-based interventions may be effective in increasing positive attitudes toward exercise. Attitudes towards the other variables remained unchanged, and should be an area of further research.

96. INDOOR VERSUS OUTDOOR PHYSICAL ACTIVITY; PREFERENCES, BEHAVIOR AND SELF-EFFICACY

Parra, Melissa M. & Wilson, Kathleen S.
Department of Kinesiology, California State University, Fullerton

Background: People engage in physical activity (PA) in different settings but little attention has focused on indoor and outdoor PA participation. As different correlates have been associated with PA in different settings, self-efficacy (a key correlate of PA) might also differ between indoor and outdoor PA. One might also expect perceptions such as self-efficacy (SE) to differ based on preferences for location of PA. **Purpose:** This study explored differences in frequency of PA by setting (indoor and outdoor) and preferences (indoor, outdoors or no preference). In addition, differences in SE between setting and preference were explored. **Methods:** College students (N=256;Mage=23.1yrs) responded to an online survey asking their preference for PA location (indoor, outdoor or no preference), the past two weeks PA including setting of the PA (indoor or outdoors) and both regulatory and barriers SE for PA. Several 2(setting) x 3(preference) mixed ANOVAs were performed with frequency of PA, regulatory and barriers SE as the dependent variables. **Results:** For PA frequency, there was a significant interaction between preference and setting ($F(2,252) = 14.42$, $p<.001$). Those who preferred indoor PA or had no preference were more active indoors than outdoors ($p<.001$). There was a trend for those who preferred outdoor PA to be more active outdoors than indoors ($p=.09$). For barriers SE, there was a significant setting by preference interaction ($F(2,204)=3.11$, $p=.047$). Those preferring indoor PA reported greater barriers SE for indoor PA than for outdoor PA ($p=.023$). The other preferences did not differ in across settings. For regulatory SE, there was a significant setting effect ($F(2,207)=6.90$, $p=.009$) with individuals being more confident for indoor PA than outdoor PA. **Discussion:** Results of this study suggest that our preferences for PA settings may affect the frequency of PA in those settings. Similarly, self-efficacy also seems to vary by location and preferences.

97. DIFFERENCES IN UNILATERAL CHEST PRESS MUSCLE ACTIVATION ON A STABLE VERSUS UNSTABLE SURFACE WHILE HOLDING ONE VERSUS TWO DUMBBELLS

Patterson, J., Oppenheimer, N., Harper, E.
Kinesiology Department, School of Nutrition & Health Promotion, College of Health Solutions, Arizona State University

Training the bench press exercise on a traditional flat bench does not induce a level of instability as seen in sport movements and activities of daily living. Because of this, many new types of equipment have been created in an attempt to induce instability, such as the COR Bench. 15 males and 7 females between the ages of 18 and 30 were recruited for the present study, which tested two forms of instability: using one dumbbell rather than two, and lifting on the COR bench compared to a flat bench. Thusly, EMG was used to measure muscle activity in four separate conditions of unilateral bench press movements: on a flat bench with one dumbbell, on a flat bench with two dumbbells, on the COR Bench with one dumbbell, and on the COR Bench with two dumbbells. Results indicated that lifting with one dumbbell compared to two dumbbells on the flat bench significantly increased muscle activity across all four muscles being analyzed (pectoralis major, $p = .005$; middle trapezius, $p = .008$; external obliques, $p = .004$; and internal obliques, $p = .003$), but lifting with one dumbbell compared to two dumbbells on the COR Bench only significantly increased muscle activity in the middle trapezius ($p = .001$), external obliques($p = . 032$), and internal obliques ($p = .001$). The only muscle to exhibit an increase in muscle activity when going from one dumbbell on the flat bench to one dumbbell on the COR Bench was the middle trapezius ($p = .010$). These results imply that the COR Bench itself does not increase muscle activity as much as switching from two dumbbells to one dumbbell, regardless of the bench being used.

98. EFFECTS OF SKATEBOARDING, SQUAT ANGLE, AND GENDER ON BILATERAL STANCE

Iowayna M. Peña, Ann-Margaret Tovar, Austria L. Cho, Anthony B. Ciccone, Andrea M. Du Bois, Lee E. Brown, FACSM
Human Performance Laboratory, Center for Sport Performance, Department of Kinesiology, California State University, Fullerton, CA

Skateboarding requires balance to be maintained while on an uneven surface in a dynamic environment. Frequent participation in this activity may result in dominance in one leg during bilateral stance. **PURPOSE:** The purpose of this study was to examine the effects of skateboarding and gender on bilateral stance at different squat angles. **METHODS:** Sixteen subjects (10 controls: Age 25.90 +/- 5.10, Ht 168.91 +/- 8.90,: and 6 skateboarders: Age 24.33 +/- 4.71, Ht 171.87 +/- 9.85) completed a bilateral squat test at four knee angles (0deg., 30deg., 60deg., and 90deg). All skateboarders were regular foot skaters. Percent body weight on each foot was determined using a Balance Master. **RESULTS:** There was an interaction of group and gender collapsed across angle. For skateboarders, women placed significantly greater percent body weight on their left leg (-7.75 +/- 2.46) compared to men (-1.25 +/- 1.74). For non-skateboarders men placed significantly greater percent body weight on their left leg (-4.50 +/- 1.55) compared to women (0.30 +/- 1.55). **CONCLUSION:** These results suggest that skateboarding produces significantly different stance asymmetries in women when compared to men. This may be explained by the greater Q-angles in women.

99. NO EFFECT OF GRADUATED COMPRESSION SLEEVES ON AVERAGE TORQUE

Pereira, MC.[1]; Brown, LE. FACSM[2]; Martorelli S.[1]; Rocha-Júnior [1]; VA., Carmo, J.[1]; Bottaro, M.[1]
[1]University of Brasília, Brasília, DF, Brazil; [2]California State University, Fullerton, CA, USA

Recently, the use of upper-body compression garments has become popular in sports that require muscular strength. **Purpose:** Thus, the aim of this study was to investigate the effects of graduated compression sleeves on elbow flexor average torque. **Methods:** Twenty-two resistance trained males (age: 24.6 ±5.1 years; body mass: 77.6 ±9.4 kg; height: 175.4 ±6.2 cm) were randomly assigned to one of two groups: 1) graduated compression sleeves (CS, n= 11) or placebo sleeves (PS, n= 11). Subjects performed 4 sets of 10 unilateral maximal concentric/eccentric reciprocal actions with their dominant arm. All exercise was performed on a Biodex System 3 isokinetic dynamometer at 120°s-1 with one minute rest between sets. Average torque (Nm) was calculated for each set of concentric and eccentric actions. **Results:** There was no significant interaction but there were significant ($p<0.05$) main effects for set for both concentric and eccentric actions. For concentric actions, average torque significantly decreased across sets for both CS (set 1: 45.5 ±3.6 Nm > set 2: 38.9 ±3.2 Nm > set 3: 36.5 ±2.8 Nm = set 4: 36.7 ±2.7 Nm), and PS (set 1: 46.8 ±3.6 Nm > set 2: 39.8 ±3.2 Nm > set 3: 37.1 ±2.8 Nm = set 4: 35.6 ±2.7 Nm). Similarly, average torque significantly decreased across sets for eccentric actions for both CS (set 1: 71.9 ± 3.5 Nm > set 2: 54.8 ± 2.8 Nm > set 3: 44.2 ± 2.4 Nm > set 4: 40.6 ± 2.7 Nm), and PS (set 1: 69.3 ± 3.5 Nm > set 2: 56.0 ± 2.8 Nm > set 3: 42.9 ± 2.4 Nm > set 4: 39.2 ± 2.7 Nm). **Conclusion:** Our findings suggest that the use of graduated compression sleeves during elbow flexion exercise has no effect on average torque for either concentric or eccentric actions.

100. ENDOCRINE RESPONSE TO ACUTE RESISTANCE EXERCISE IN LEAN VERSUS OBESE COLLEGE-AGED MALES

Pham, Hoang N.; Rubin, Daniela A.; Tutor, Andrew; Adams, Eric; Judelson, Daniel A.; Coburn, Jared W., FACSM
Department of Kinesiology, California State University, Fullerton, CA

Previous studies using endurance protocols demonstrated that excess adiposity affects the normal hormonal response to exercise. Similarly, the purpose of this study was to examine if adiposity affects the resistance exercise (RE)-associated growth hormone (GH), insulin-like growth factor-1 (IGF-1), and testosterone response. **Methods:** Ten healthy, college-aged physically active obese males (OB) (body fat percentage 36.2 ± 4.0%) were compared to their lean counterparts (LN) (body fat percentage 12.7 ± 2.9%). The moderate-intensity RE protocol consisted of six sets of ten repetitions per leg of stepping onto an elevated platform (20% of participant's height) while wearing a weighted-vest (50% of participant's lean mass). Pre-, immediately post- (IP), 15 minutes post- (+15), 30 minutes post- (+30), and 60 minutes post-exercise (+60) blood samples were collected. **Results:** There was no significant group by time interaction for GH ($p = 0.073$). However, OB's mean GH value was 61.0% lower than LN's value ($p = 0.02$). There was a significant group by time interaction for IGF-1 ($p = 0.005$). However, Tukey's post hoc tests showed that the pairwise comparison between groups were not significantly different ($p > 0.050$ for all comparisons). Moreover, OB's mean IGF-1 value was 27.7% lower than LN ($p = 0.032$). There was also a significant group by time interaction for testosterone ($p = 0.017$). LN presented an 8.7% increase in testosterone at IP compared to pre ($p = 0.017$), but OB presented no statistically significant change from pre to IP in response to RE ($p = 0.471$). Additionally, testosterone values at all time-points were higher in LN than OB for the same time points ($p < 0.05$ for all comparisons). **Conclusion:** These findings confirm that obesity alters the function of the GH/IGF-1 axis in response to RE and prevent a testosterone response to RE in relatively healthy young males.

101. THE ACUTE EFFECTS OF 4 WARM UP MODALITIES INCORPORATING WBV UPON SELECT FORCE/VELOCITY CHARACTERISTICS DURING CMVJ'S IN NCAA DIVISION III MALE AND FEMALE ATHLETES

C. Plascencia., Shanaberger S. M., Davis T., Lamont H. S.
Department of Exercise Science, California Lutheran University

PURPOSE. To asses' acute differences in Jump Height (JH), absolute and relative Peak Power (Pmax, Pmax/kg), and Peak Velocity (Vmax) during 8 CMVJ's following 4 treatments with and without Whole Body Vibration (WBV). **METHODS.** 19 NCAA Division III athletes; 7 females and 12 males, participated in five testing sessions (1 familiarization session), with one randomly assigned treatment per session; (1.WBV, 2.CMVJ (20KG, 40KG), 3. WBV, CMVJ, WBV, 4. CMVJ, WBV, CMVJ). A broom handle was used for all jumps with a Gymaware linear position transducer (50Hz) attached. Four, three-way repeated measures ANOVA's; Condition (4), Time points (9)), Group (2) utilizing a Bonferroni correction, and post hoc tests where necessary. **RESULTS.** JH, main effect for; Time ($p = .000$, T1 > T2, T3 and T8), and Gender ($p = .000$, M > F, mean diff = 11.77cm). Main effect for time ($p = .002$, T1 > T2 and T9) for males only. Pmax, main effects for Time ($p = .001$, T1 > T2, T4 > T2), and Gender ($p = .000$, M > F, mean diff = 1820.68 W), and main effect for time ($p = .001$, T1 > T2, T1 > T9) for males. Pmax/kg, main effect for time ($p = .001$, T1 > T2) and gender ($p = .000$, M > F, mean diff = 7.441 W/kg). Males, main effect for time ($p = .007$, T1 > T2). Main effect for time, Vmax ($p = .035$, T1 > T2 and T6) and gender ($p = .000$, M > F, mean diff = .453 m/s). No significant interactions were seen for any of the variables ($p > 0.05$). **CONCLUSIONS.** Significant differences were seen between genders, but not treatments. High between and within subject variability suggests individualized variations of the treatments may be more effective than the treatments alone.

102. DIFFERENCES IN BONE DENSITY AND MUSCLE STRENGTH BETWEEN MECHANICAL AND BIOLOGICAL OSTEOARTHRITIS

Kristen Prosser, Michele LeBlanc, Ph.D., Michael Bahk, M.D., Mark Mirisch D.P.T., Steven Hawkins, Ph.D., FACSM
Human Performance Laboratory, California Lutheran University

PURPOSE: The purpose of this study was to determine if differences exist in bone density and muscle strength between asymptomatic femoral acetabular impingement (FAI), symptomatic FAI and biological osteoarthritis (OA). **METHODS:** Thirty-two subjects aged 18-83 years participated in the study (18 male, 14 female) and were distributed into one of three groups based on radiographic hip assessments performed by an orthopedic surgeon. Whole body, hip and lumbar spine bone density (BMD) was determined by Dual Energy X-ray Absorptiometry. Muscle strength was determined by 1-RM on a leg press machine. **RESULTS:** Using ANCOVA controlling for age significant differences were found between groups for right hip femoral neck BMD ($F = 5.223$, $p<0.05$) and left hip femoral neck BMD ($F=3.274$, $p<0.05$). Post hoc testing identified these differences between the asymptomatic (right hip 0.815±0.160 g/cm^2, left hip 0.839±0.150 g/cm^2) and symptomatic (right hip 0.905±0.140 g/cm^2, left hip 0.931±0.170 g/cm^2) FAI groups ($p<0.05$). Significant differences were found for relative and absolute strength between asymptomatic FAI (relative 2.6±0.9 kg/kg, absolute 227.9±84.2 kg) and OA (relative 2.1±1.3 kg/kg, absolute 143.8±100.9 kg) groups ($p<0.05$) as well as between the symptomatic FAI (relative 3.0±1.1 kg/kg, absolute 267.8±95.6 kg) and OA (relative 2.1±1.3 kg/kg, absolute 143.8±100.9 kg) groups ($p<0.05$). In conclusion, bone remodeling may be greater in symptomatic FAI compared to asymptomatic FAI, possibly due to changes in loading patterns or a greater prevalence of osteoarthritis. Moreover, strength differences could be due to greater physical activity reduction in the OA group. These explanations remain to be tested.

Research Funded by Swenson Summer Research Fellowship

103. EFFECTS OF CAFFEINE AND TRAINING STATE ON AEROBIC EXERCISE AND EXCESS POST-EXERCISE OXYGEN CONSUMPTION IN FEMALES

Christine R. Quiros, Jared W. Coburn FACSM, William C. Beam FACSM, Daniel A. Judelson FACSM, Leland A. Barker
Exercise Physiology Laboratory and Center for Sport Performance, Department of Kinesiology, California State University, Fullerton

Caffeine is often used as an ergogenic aid during aerobic exercise and has been thought to alter physiological responses to exercise. The purpose of this study was to evaluate the physiological effects of caffeine on aerobic exercise and excess post-exercise oxygen consumption (EPOC) between trained and untrained females. Because many of the acute effects of caffeine are also evident as chronic responses to regular aerobic training (e.g., increased reliance on fat for energy), we hypothesized that the responses to caffeine may differ between aerobically trained and untrained females. Sixteen subjects visited the lab on three occasions. For the first lab visit, subjects completed a VO_2max test on a cycle ergometer. These results were used to classify training status as well as to determine the power level for subsequent visits. Subjects were classified as being either trained (n = 8; VO_2max > 40 ml·kg^{-1}·min^{-1}) or untrained (n = 8; VO_2max < 35 ml·kg^{-1}·min^{-1}). On two subsequent visits separated by 48 hours, subjects completed 30 minutes of exercise on a cycle ergometer at 55% of the maximal power output achieved during VO_2max testing followed by 30 minutes of EPOC measurements recorded during a passive, resting recovery. Using a double-blind, randomized design, subjects consumed caffeine (6 mg·kg^{-1} body mass in Crystal Lite®) or a placebo (Crystal Lite® only) 60 minutes prior to these exercise bouts. Heart rate, RPE, RER, VO_2, VE and energy expenditure were measured every five minutes during exercise and recovery. The results indicated that caffeine had no effect (p> 0.05) on the physiological responses to exercise regardless of fitness level. However caffeine did affect RPE responses during the early phases of exercise.

104. COMPARISON OF FOOT STRIKE PATTERNS IN HABITUALLY SHOD RUNNERS: ANALYSIS OF PRELIMINARY DATA

Jenevieve L. Roper[1], James G. Dexter[2], & Len Kravitz[1]
[1]Department of Health, Exercise & Sports Sciences, University of New Mexico
[2]Department of Orthopedics, Physical Therapy, University of New Mexico

INTRODUCTION: Recreational running is a popular mode of exercise. However, many people get injured each year, and subsequently, increase their risk of re-injury. Barefoot running has become more prevalent with research indicating that it aids in natural locomotion during running because runners are more likely to land on their forefoot, which decreases collision forces. However, little research exists comparing the effects of altering foot strike patterns under shod versus barefoot conditions. **PURPOSE:** To determine the difference in kinetics and kinematics during barefoot and shod running while using a forefoot strike (FFS) or rearfoot strike (RFS) pattern. **METHODS:** 5 female (24.8±3.2 yrs; 164.26±7.78 cm; 61.54±4.96 kg) and 4 male (31.75±1.25 yrs; 179.45±8.43 cm; 91.15±17.64 kg) recreational runners participated in the study. Subjects were fitted with reflective markers for 3-D motion analysis (Vicon; 1000Hz) of running kinetics and kinematics. Volunteers performed several jogging trials across force platforms (AMTI; 1000Hz) at a self-selected pace under the different experimental conditions (barefoot FFS, barefoot RFS, shod FFS, shod RFS). Kinetics and kinematics were analyzed during stance phase of the gait cycle. **RESULTS:** Analysis of preliminary data shows a trend towards significant differences between the four conditions for knee varus/valgus ($p=0.075$), knee flexion ($p=0.197$) and ankle dorsiflexion/plantarflexion ($p=0.010$) at initial contact, and peak vertical ground reaction forces ($p=0.077$). Similar patterns in all variables measured were observed for the shod and barefoot conditions. **CONSLUSION:** Upon completion of data collection from the remaining subjects, we expect there to be significant differences between the foot-strike patterns regardless of shoe condition. Due to the beneficial parameters associated with a forefoot strike, we may be able to conclude that usage of a forefoot strike pattern is more important than running shod versus running barefoot.

105. UTILITY OF hsCRP AND THE SBAS FOR PREDICTING CARDIOVASCULAR RISK IN YOUNG AFRICAN AMERICAN WOMEN: A PILOT STUDY

Dana Ryan PhD, Mary-Lynn Brecht PhD, Jo-Ann Eastwood PhD
School of Nursing, University of California Los Angeles

African American women (AAW) have a significantly higher morbidity and mortality from Cardiovascular Disease (CVD) then Caucasian women. In addition AAW have lower reported levels of physical activity (PA) then other ethnicities. Increased PA may reduce CVD risk by lowering systemic inflammation. An accepted measure of inflammation in the development of atherosclerosis is highly sensitive C-Reactive Protein (hsCRP). Lower levels of hsCRP indicate a lower risk for CVD. **PURPOSE:** The purpose is to examine the relationship between hsCRP levels and PA in young AAW at risk for CVD, aged 25-45.**METHODS:** The Women's Heart Health Study recruited AAW ages 25-45 with≥ 2 CVD risk factors. Demographic information, medical history and anthropometric measures were obtained. HsCRP levels were procured by fingerstick and analyzed using the Alere Cholestech LDX. The Stanford Brief Activity Survey (SBAS), a 2-question self-assessment of home, leisure time and work-related PA was used. All analyses were performed using SAS. **RESULTS:** Thirty-four AAW age 38.6±5.6, mean BMI of 31.5 ± 6.5, mean hsCRP of 2.1 ± 2.1 had HsCRP levels ranging from <1 to 9 (>3= high risk). No significant relationships between hsCRP and PA-home (r=.04, p=.84), leisure (r=-.30, p=.09), or work (r=-.04, p=.84) were found. For those that were less active, 9 (25%) were at high risk with an hsCRP>3. Those with moderate/high activity 6 (19%) had an hsCRP>3. **CONCLUSIONS:** In an at risk population, there was a non-significant relationship between hsCRP and PA unlike previous studies. A possible explanation is that this population is obese (BMI>31), elevated hsCRP and obesity are related which may attenuate the effect of PA. Additionally the SBAS may not be sensitive enough to assess PA in this population. Further research needs to be done focusing on appropriate instruments/markers of CVD risk unique to AAW.

107. HIGH-INTENSIY INTERVAL TRAINING AND CONTINUOUS VIGOROUS EXERCISE: DIVERGENT EFFECTS ON FLOW-MEDIATED DILATION

Brandon J Sawyer[1], Dharini M. Bhammar[2], Wesley J Tucker[3], Glenn A Gaesser[3], FACSM
[1]Point Loma Nazarene University, San Diego, CA; [2]University of Texas Southwestern Medical Center, Dallas, TX; [3]Arizona State University, Phoenix, AZ

Purpose: The purpose of this study was to compare the effects of high-intensity interval training (HIT) to continuous vigorous (CONT) exercise training for the improvement of endothelial function in sedentary, obese adults. **Methods:**17 sedentary, obese men (N=9) and women (N=8) were randomized to either HIT (N=9, age=35.6±8.9 years, BMI=37.4±6.2 kg/m^2) or CONT (N=8, age=34.0±7.9 years, BMI=34.6±3.4 kg/m^2). Subjects trained 3 days/week for 8 wk. Each HIT session consisted of ten 1-min intervals at 90-95% of heart rate max (HRmax) separated by 1-min active-recovery periods. CONT consisted of 30 min at 70-75% of HRmax. Before and after training body composition was assessed via Dual-Energy X-ray Absorptiometry and endothelial function was assessed via brachial artery flow-mediated dilation (FMD). Linear mixed models were used to assess between-group and within-group differences in body composition, brachial artery diameter and FMD over the intervention period. **Results:** There was a modest, but statistically significant reduction in body fat that did not differ by group (46±6.3 to 45.4±6.6%, *P*=0.025). Resting baseline brachial artery diameter was significantly increased after CONT (0.367±0.062 to 0.386±0.062 cm, P = 0.001) but not after HIT (0.404±0.071 to 0.409±0.072 cm, *P*=0.542). By contrast, peak brachial artery diameter during the FMD procedure increased after HIT (0.422±0.068 to 0.442±0.071 cm, *P*=0.009), but not after CONT (0.388±0.065 to 0.396±0.056 cm, *P*=0.301). Consequently, HIT led to a significantly greater improvement in FMD compared to CONT exercise (HIT: 4.8±2.7 to 8.6±9.5%; CONT: 5.9±5.3 to 2.8±3.09%, *P*=0.043) **Conclusions:** With a 36% lower time commitment, high-intensity interval training led to superior improvements in flow-mediated dilation in obese subjects compared to continuous vigorous exercise. The divergent effects between the two interventions may have been due in part to differing arterial structural adaptations elicited by the interventions.

106. THE ACUTE CARDIOPULMONARY AND METABOLIC EFFECTS OF VARIOUS HIGH-INTENSITY INTERVAL TRAINING (HIIT) PROTOCOLS

James W. Salassi III, Nicole Mier, and Ralph Rozenek, Ph.D.
Kinesiology Department, California State University, Long Beach

High-intensity interval training (HIIT) has been regarded as an effective means of increasing and maintaining cardiovascular fitness. A 60 second, 1:1 work to recovery ratio for HIIT has been shown to be an effective program design for improving cardiometabolic effects. However, the ideal relative intensities of the work and recovery intervals have yet to be established. The purpose of this study was to compare the acute metabolic and cardiopulmonary effects of four HIIT protocols using varying combinations of relative intensities during the work (W) and recovery (R) periods. Eleven healthy, college-aged males (n=5) and females (n=6) (26 ± 5 years, VO_{2peak} = 48.5 ± 9 ml·kg^{-1}·min^{-1}) performed four, 20-minute HIIT protocols at a 1:1 W:R ratio on an electronically braked cycle ergometer in random order. The W:R relative intensities, based upon previously determined peak power outputs, were: 80%:0%, 80%:50%, 100%:0%, and 100%:50%. Oxygen uptake (VO_2), heart rate (HR), blood lactate (bLa), and rating of perceived exertion (RPE) were measured during each session. All measures of $VO_2$and HR were expressed as a percentage of the peak values established during a prior graded exercise test. The overall %VO_{2peak}means for 80:0, 80:50, 100:0, and 100:50 were 54.8% (±6.51), 74.7% (±8.73), 65.4% (±8.98), and 82.8% (±6.18), respectively. Mean values for overall %HR_{peak} were 75.0% (±7.10), 86.2% (±6.64), 83.3% (±7.28), and 90.9% (±3.80), respectively. Significant differences for %VO_{2peak} and %HR_{peak} were observed among protocols ($p \leq 0.05$). RPE and bLa were also significantly different among protocols ($p \leq 0.05$). Based upon the results, the 80:50 and 100:0 protocols may produce the best combination of effects. 100:50 produced the greatest physiological response, however not all participants completed the protocol and it may not be practical for the general population.

108. EFFECT OF INCREASING EXTERNAL ATTENTIONAL FOCUS DISTANCE ON DROP JUMP PERFORMANCE

Kyle Schutts, Will Wu, Guillermo Noffal, Rachel Ho
Department of Kinesiology, California State University-Long Beach, Long Beach, California; and Department of Kinesiology, California State University-Fullerton, Fullerton, California

Several studies within the motor control literature have demonstrated that using verbal cues to direct a performer's attention externally (toward the movement outcome) significantly enhances motor skill performance. Limited research has also demonstrated that providing a more distal point of external focus amplifies the performance effects associated with an external focus of attention. The purpose of this study was to investigate the limitations, or boundaries, of increasing the distance of the external focus cue. Twenty-two participants were provided external focus cues that oriented their attention to various overhead targets. Using a within-subject design, verbal cues were provided in a counterbalanced fashion. Untrained participants performed 7 total drop jumps, separated by 2 minutes of rest, and following 3 types of verbal instruction. For all participants, the first 3 jumps served as a control condition in which no specific focus cues were provided. Following the control condition, participants were provided verbal cues that fostered an internal (toward bodily movements) and external focus of attention. Drop jumps within the external focus instruction set were combined with a distally increasing external focus goal height of +0% max, +50% max, and +100% max. A one-way ANOVA with repeated measures, and a Sidek pairwise comparison, revealed a significant difference for condition. Significant differences between variables of interest were not observed for either center of mass displacement, peak force, or peak impulse. The task complexity, coupled with the untrained population, may be responsible for these observed results. It is plausible that the subject's unfamiliarity with the task blunted their ability to adopt either an internal or external focus of attention when prompted. These findings highlight the importance of factoring in a performer's stage of learning when applying an attentional focus paradigm.

109. EFFECT OF HIKING STYLE ON EFFICIENCY AMONG WILDLAND FIREFIGHTERS

Elizabeth M. Shannon, Jared W. Coburn FACSM, Lee E. Brown FACSM, Daniel A. Judelson, FACSM, William C. Beam FACSM
Exercise Physiology Laboratory and Center for Sport Performance, Department of Kinesiology,
California State University, Fullerton

Wildfire suppression is a seasonal occupation in which firefighters are subjected to extreme conditions for extended periods of time. If a certain variation in stride length or frequency was shown to be more effective in terms of improved efficiency and energy conservation, not only would that help maintain optimal job performance throughout an entire shift, but it could potentially save lives during an emergency.The purpose of this study was to examine two opposing styles of hiking for efficiency among wildland firefighters. Our hypothesis was that hiking up a 15% grade using smaller strides, therefore taking more steps, would be more efficient than using larger strides but fewer actual steps. Subjects were professional wildland firefighters (n = 8; age = 29.6 ± 4.6 y; height 180.5 ± 6.4 cm; body mass 91.5 ± 14.6 kg; body fat 11.2 ± 3.0%), who carried a 25lb BLM backpack, and walked on a treadmill with a 25% grade for one half mile. One condition involved walking with a stride frequency of 65 steps/min, and the second at a frequency of 115 steps/min. Heart rate was monitored continuously throughout the trials, and RPE, RER, VE and oxygen consumption were collected every minute of each trial and each three minutes were averaged and compared with the corresponding three minute average of the second trial. The results indicate that a stride frequency of 115 steps/min elicited a significantly higher VO_2, RPE, RER than a stride frequency of 65 steps/min.

110. EFFECTS OF COMBINED CREATINE AND CARBOHYDRATE SUPPLEMENTATION ON ENDURANCE EXERCISE PERFORMANCE

Nicholas Shields, Jenny Olmstead, Todd Hagobian
Kinesiology Department - California Polytechnic State University

BACKGROUND: Creatine and carbohydrate supplementation independently increase exercise performance, but the combined effects remain unclear. **PURPOSE:** To determine whether combining creatine and carbohydrate supplementation increases endurance exercise performance more than each supplement alone. **METHODS:** Currently, five healthy, endurance trained adults (3 W, 2 M; 19.2 ± 0.7 years; 21.8 ± 0.9 BMI; 50.9 ± 9.8 ml/kg-min) have completed this study. Subjects exercised on a cycle ergometer at 60% of max wattage (Wmax) to exhaustion and were given the following supplements 40 minutes prior to the exercise test and every 20 minutes thereafter in a blocked-randomized, double blind fashion; 1) Placebo (P), 2) Creatine alone (0.5g; Cr), 3) Carbohydrate alone (5g; CHO), 4) Creatine plus Carbohydrate (0.5g, 5g; Cr-CHO). The primary outcome measure assessed is time to exhaustion during exercise. **RESULTS:** Preliminary analysis of time to exhaustion showed that relative to placebo, Cr alone had no impact (-4%), whereas CHO and Cr-CHO were 4% and 13% higher, respectively. **CONCLUSION:** Data collection is currently ongoing, and if results in the final 5 subjects follow the same trend, combining creatine and carbohydrate supplementation during exercise may increase endurance exercise performance more than each supplement independently.

111. THE EFFECT OF ACUTE QUERCETIN SUPPLEMENTATION THROUGH FRS ON RUNNING ECONOMY: A RANDOMIZED DOUBLE-BLIND ASSESSMENT OF RECREATIONALLY ACTIVE COLLEGE AGE MALES

Kara Shook and Trevor Gillum
Department of Kinesiology; California Baptist University

Running economy is defined as the submaximal measurement of oxygen at a given pace and is measured through the achievement of steady state oxygen consumption. Quercetin is a natural flavonoid in the diet that has been shown to increase endurance performance. The purpose of this study was to determine if the acute ingestion of quercetin through the consumption of FRS chews improved running economy (RE). Eight subjects age: (22.1±3.14), height: (177± 8.82 cm), weight: (76±9.40 kg) completed a RE protocol upon a treadmill 15 minutes after the ingestion of 500 mg of FRS or placebo chews. Subjects ran six-four minute stages beginning at 5 mph and ending at 7.5 mph. Each stage increased by 0.5 mph. RE was determined by averaging the last 30 seconds of each stage. Rate of Perceived Exertion (RPE) and heart rate (HR) were monitored during each stage. RE was higher for FRS per stage (35.1±5.6 ml/kg/min) compared to placebo (33.2±5.4 ml/kg/min) (p<0.05). HR was not different between groups (FRS = 161± 20; Placebo = 155±19). There was no difference in RPE for FRS (12.4±2.8) and placebo (12.1±2.8). This data suggests that quercetin does not have the ability to improve running economy in recreationally active college age males after acute ingestion.

112. FRONTAL PLANE LOWER EXTREMITY KINEMATIC ALTERATIONS BETWEEN HEALTHY AND ANKLE INSTABILITY SUBJECTS DURING A FORWARD-SIDE JUMP

SJ Son, HS Kim, Matthew K. Seeley, J. Ty Hopkins, FACSM
Department of Exercise Sciences, Brigham Young University, Provo, UT

Background: The ankle is most commonly traumatized body part and accounts for 30% of all sports injuries. Ankle sprains occur most frequently during sports activities. Ankle sprains without proper treatment, result in long-term disability, which can be characterized as chronic ankle instability. **Purpose:** The aim of this study was to examine frontal plane lower limb kinematic differences between healthy and ankle instability subjects during a forward-side jump. Subjects: Thirty four subjects were identified with ankle instability through a self-assessment tool (Foot and Ankle Ability Measures and Modified Ankle Instability Index), and thirty four subjects were matched as healthy controls. **Procedures:**Fifty nine reflective markers were placed over anatomical landmarks to collect kinematic data via a ten-camera VICON MX system. Subjects were instructed to perform five forward-side jumps. **Data analysis:** Functional analyses were used to detect differences between two groups with regard to center of mass, and frontal plane ankle and knee angles during a forward-side jump. **Results:** In relation to matched controls, the center of mass remained closer to the center of pressure in the ankle instability group from 25% to 45% of the stance phase. Ankle instability patients were more everted over the stance phase. Moreover, the ankle instability group exhibited a greater varus alignment from 0% to 60% of stance. **Discussion:** These findings imply altered landing strategies, possibly providing the ankle instability group with perceived protection against ankle inversion trauma. This protective landing strategy provides a stable situation by shifting the center of mass closer to the center of pressure with a laterally everted ankle angle and a vertically aligned knee angle. However, this altered sensori-motor reaction to a highly demanding forward-side jump may place these subjects in a susceptible position laterally when the center of mass is excessively moved laterally at the time of foot contact.

113. EFFECT OF FATIGUE ON PATELLAR TENDON STRAIN IN HEALTHY SUBJECTS

Soucy, Michael; Hawkins, Steven A., FACSM; LeBlanc, Michele
Exercise Science Department, California Lutheran University, Thousand Oaks, CA

Measuring mechanical properties of tendon is difficult to achieve in vivo, and as a result, most of what is known about human tendon is either from cadaver or animal studies. Recently, a software program, EchoSoft, was developed to enable obtaining mechanical characteristics of soft tissue via acoustoelasticity. **Purpose:** The purpose of this study was to determine the effects of fatigue on patellar tendon strain. **Methods:**Twenty three recreationally active males and females (age 20.4 ± 1.7 years) participated in this study. Subjects performed two sets of ramped isometric knee extensor contractions on a Biodex System 3 dynamometer (Shirley, NY) before and after undergoing a repeated concentric contraction fatigue protocol. Ultrasound data was collected during each 5 second isometric contraction with a Terason 3200 ultrasound system (Burlington, MA). After data was collected, two pre-fatigue and two post-fatigue ultrasound DICOM files were analyzed using EchoSoft analysis software (Madison, WI). Data was analyzed using SPSS v. 20 ($p < 0.05$). **Results:** The subjects' overall peak torque was lower (150.4 ± 56.7 Nm versus 134.6 ± 55.7 Nm; p =0.012) and time to reach the peak torque trended towards longer (2.34 ± 0.68 s versus 2.55 ± 0.66 s; p =0.107) after the fatiguing protocol indicating that the protocol was effective. The peak torque during the analysis period was lower post-fatigue when compared as the percentage of the overall peak torque (p = 0.011). However, the peak strain, both overall and during the analysis period, did not differ between the pre and post-fatigue trials (14.0 ± 3.2% versus 14.8 ± 4.5% and 11.6 ± 2.8% versus 11.5 ± 4.7%, respectively). **Conclusion:** These results indicate that following muscle fatigue, the tendon yields similar amounts of strain from smaller amounts of torque. This may have implications for how susceptible the tendon is to injury when fatigued.

114. COMPARISON OF CARDIOVASCULAR AND PERCEIVED EXERTION REPSONSES TO TRAIL HIKING UNDER EASY AND STRENUOUS WORKING CONDITIONS

Tori M. Stone [1], Jacob W. Manning[2], Robert W. Rietjens [1], Mihaela A. Ciulei [1], Brandon L. Miller [1], Giovanni Trilleras [1], Jeffrey Montes [1], Mark DeBeliso[2], James W. Navalta [1]
[1]Department of Kinesiology and Nutrition Sciences, University of Nevada, Las Vegas, Las Vegas, NV; [2]Department of Physical Education & Human Performance, Southern Utah University, Cedar City, UT

Purpose: The purpose of this study was to compare the cardiovascular effects and perceived exertion responses to easy versus strenuous trail hiking. **Methods:** Volunteers (N=7) completed two 1.13 mile trail hikes on separate days. The easy hike was completed at Three Peaks Recreational Area in Iron County, Utah on a relatively flat, circular trail loop. The strenuous hike was completed on the "C" Trail with an average grade of 17.6% (10 degrees) to an elevation of 7000 feet. Measurements obtained were heart rate (HR), systolic blood pressure (SBP), and ratings of perceived exertion (RPE). Rate pressure product (RPP) was calculated as HR x SBP x 100^{-1}. Measurements were taken at the midpoint and end of each hike. GPS devices were given to participants in order to navigate trails properly and instructions to maintain a hiking pace of 2.0 mph. **Results:** HR and RPP were significantly greater on the strenuous hike (HR mid = 107±4, HR end = 101±6 bpm; RPP mid = 135±7, RPP end = 121±7 bpm*mmHg) compared to the easy hike (HR mid = 71±4, HR end = 74±6 bpm, p=0.001; RPP mid = 87±7, RPP end = 89±7 bpm*mmHg, p = 0.001). In addition, RPE was significantly greater on the strenuous hike (mid = 11±5, end = 11±4) compared to the easy trail (mid = 7±5, end = 7±4, p = 0.001). No difference was observed for SBP (p = 0.18) **Discussion:** These findings display that significant differences are evident between easy trail hiking and strenuous trail hiking when relating them to select cardiovascular and perceived exertion responses. While differences in the trail type were observed, the strenuous trail only elicited a heart rate response approximately 50% of estimated VO_{2max}. This is in opposition to what the ACSM deems strenuous activity which is at or above 70% VO_{2max} (lactate threshold).

115. EFFECT OF WINGATE START PROCEDURE ON PEAK POWER, AVERAGE POWER, AND FATIGUE INDEX

Taylor S. Thurston, Anthony B. Ciccone, Xavier M. Avila, Barry A. Spiering, Daniel A. Judelson FACSM
Human Performance Laboratory, Center for Sport Performance, Department of Kinesiology, California State University, Fullerton, CA

The Wingate Anaerobic Cycling Test is widely accepted as the gold standard for anaerobic power testing. Though a standardized start procedure exists, researchers and coaches have frequently utilized alternate protocols without previously identifying if these changes influence the resulting power characteristics. **PURPOSE:** Therefore, the purpose of this study was to test the effects of start procedure on peak power (PP), average power (AP), and fatigue index. **METHODS:** Twelve male recreational exercisers (age = 25.2±4.1 y, mass = 76.2±10.3 kg, height = 175.2±9.3 cm, body fat = 14.5±6.5 %) completed three experimental sessions. All trials began with a five-minute warm-up that included five maximal sprints each lasting 5 s. During the final 5 s of the warm-up, subjects completed a ramped start (RS), constant load start (CLS), or dead start (DS) in counterbalanced order. During RS, participants increased pedaling rate from 60 to maximal rpm. During CLS, participants maintained a constant pedal rate of 60 rpm. During DS, participants did not pedal. Immediately after the 5 s lead-in, subjects pedaled maximally for 30s against a resistance set at 7.5% of body mass. **RESULTS:** PP and AP during DS (PP = 795.1±167.6 W, AP = 576.4±103.4 W) and CLS (PP = 786.2±159.8 W, AP = 576.8±111.8 W) significantly exceeded RS (PP = 690.4±154.7 W, AP = 527.7±109.1 W). No differences existed between trials for fatigue index (RS = 52.3±11.5 %, CLS = 55.5±9.2 %, DS = 55.2±9.0%). **DISCUSSION:** These findings suggest that performing a RS reduces power output compared to CLS and DS. Furthermore, the similarities between CLS and DS indicate testers might select either CLS or DS based on the specific sporting or research setting.

116. EFFECT OF SKATEBOARDING ON CENTER OF GRAVITY SWAY VELOCITY DURING UNILATERIAL STANCE

Anne-Margaret Tovar, Iowayna M. Peña, Austria L. Cho, Anthony B. Ciccone, Andrea M. Du Bois, Lee E. Brown, FACSM
Human Performance Laboratory, Center for Sport Performance, Department of Kinesiology, California State University, Fullerton, CA

Skateboarding requires a continuous shift of ones center of gravity during the duration of the activity. However, chronic skateboarding for transportation may lead to differences in unilateral balance.**PURPOSE:** The purpose of this study was to examine the chronic effects of transporter skateboarding on center or gravity (COG) sway velocity.**METHODS:** Sixteen subjects (10 controls: Age 25.90, Ht 168.91 cm,: and 6 skateboarders: Age 24.33, Ht 171.87 cm,) completed three unilateral balance trials under two conditions, full vision (EO) and absent vision (EC). The average percent leg difference in mean COG sway velocity was measured for both conditions using a Balance Master. **RESULTS:**There was no significant difference in mean COG sway velocity between skateboarders and non-skateboarders across both conditions (EO 0.99 +/- 0.21 deg/s: EC 6.81+/- 0.69 deg/s).**CONCLUSION:** These results suggest that chronic transporter skateboarding has no effect on center of gravity sway velocity in unilateral stance. One possible explanation for lack of difference may be the extended time skateboarders spend in a tandem stance position.

117. UPPER ARM ISOKINETIC STRENGTH AS EFFECTED BY VISUAL INPUT

Giovanni Trilleras, Brandon Miller, Angela Harvel, Jeffrey Montes, Tedd J. Girouard, James W. Navalta
Department of Kinesiology and Nutrition Sciences, University of Nevada, Las Vegas, Las Vegas, NV

Numerous studies have researched the relationship of vision to lower body muscular strength by testing blind subjects vs. their sighted counterparts. Researchers have found significant data to suggest blind populations express reduced muscular strength when compared to sighted individuals. There has been little research regarding upper arm muscular strength with and without visual input. **Purpose:** The purpose of this study was to assess whether loss of visual input has an effect on upper arm isokinetic strength. **Methods:** Eight volunteers (Male N = 6, female N = 2) of the University of Nevada, Las Vegas community participated in this study. Data was collected using a Biodex System 3 Isokinetic Dynamometer on two counterbalanced days with repeated measures. Subjects were asked to perform three familiarization repetitions followed by six maximal force repetitions at sixty degrees per second with vision obstructed (by use of blindfold) or unobstructed. The following week subjects repeated the test but opposite of their visual input from the first data collection. Data were analyzed using a paired T-test with significance accepted at p<0.05. **Results:** There were significant differences between unobstructed and obstructed vision with peak torque (Vision = 32.32 ± 14.50 ft▪ lbs, No Vision = 34.51 ± 12.97 ft▪ lbs, p = 0.047) and average power (Vision = 33.26 ± 17.90 ft▪ lbs, No Vision = 36.27 ± 16.86 ft▪ lbs, p = 0.050). No other measures were significant. **Discussion:** These results suggest upper arm isokinetic strength is increased with vision obstructed.

118. FUNCTIONAL MOVEMENT BIOMECHANICS DIFFERENCES BETWEEN INDIVIDUALS WITH FEMORALACETABULAR IMPINGEMENT AND OSTEOARTHRITIS

Truver, Bryce[1]; Hawkins, Steven A., FACSM[1]; Bahk, Michael[2]; Mirisch, Marc[2]; LeBlanc, Michele[1]
[1]Exercise Science Department, California Lutheran University, Thousand Oaks, CA; [2]Southern California Orthopedic Institute, Thousand Oaks, CA

Biological osteoarthritis is the degradation of bone due to aging and repetitive forces. Femoroacetabular impingement (FAI) is “mechanical” osteoarthritis caused by abnormal contact between the femur and the acetabular rim. **Purpose:** To investigate the differences in functional movements between individuals with symptomatic and asymptomatic FAI and those with osteoarthritis (FAI-s, FAI-a, OA, respectively).**Methods:** An orthopedic surgeon assisted in recruiting 32 subjects based on radiographs that categorized the subjects into the three groups. Subjects walked at a self-selected pace across the lab and performed maximal squats without pain. At least three trials were collected for each movement. Kinematic data was collected at 120 Hz by 6 Vicon MX40 motion capture cameras. Analysis was performed using SPSS v.20 (p< 0.05). **Results:** There was a trend towards differences in gait velocity (p = 0.078) with OA subjects walking slower than FAI-a (1.11 ± 0.21 m/s vs. 1.28 ± 0.11 m/s; p=0.031). Stride lengths represented as a percentage of standing height differed (p = 0.023). Hip ROM differed in the frontal plane (p = 0.001) and trended towards different in the sagittal plane (p = 0.059). Squat low point, represented as a percentage of leg length, differed between each group (51.6 ± 12.8% for FAI-a vs. 65.5 ± 6.2% for FAI-s vs. 76.1 ± 8.0% for OA; p < 0.001). The lower extremity joint angle total at the low point differed between each group (p< 0.001). Only the knee angle at the low point differed between groups with OA values differing from both FAI-s and FAI-a values (106.2 ± 13.9° vs. 90.7 ± 12.3° and 81.5 ± 10.6°, respectively; p< 0.001). **Conclusions:** Functional movement mechanics differ between the groups in both the hip and knee. FAI-a subjects differ primarily from OA subjects with some differences between the two FAI groups.

119. HIGH-INTENSITY INTERVAL EXERCISE AND ENDOTHELIAL DYSFUNCTION ASSOCIATED WITH A HIGH-FAT MEAL IN HEALTHY MALES

Wesley J. Tucker[1], Brandon J. Sawyer[2], Catherine Malone[1], Dharini M. Bhammar[3], Justin R. Ryder[1], Glenn A. Gaesser[1], FACSM.
[1]Arizona State University, Phoenix, AZ; [2]Point Loma Nazarene University, San Diego, CA; [3]University of Texas Southwestern Medical Center, Dallas, TX

Purpose: We assessed whether high-intensity interval exercise (HIE) could attenuate endothelial dysfunction induced by a high-fat (HF) meal. We also examined whether HIE could prevent postprandial lipemia following a HF meal. **Methods:** Nine recreationally active males (Age = 25.4±1.8 yr; BMI = 23.2±1.2 kg/m2; VO2peak = 3.4±0.2 L/min) performed three treatment conditions in a randomized repeated measures design: (1) Sixteen, 1-min sprint intervals (90-95% HRpeak) separated by 1-min recovery (16x1 HIE), (2) Four, 4-min sprint intervals (90-95% HRpeak) separated by 3-min recovery (4x4 HIE), and (3) no-exercise control. Exercise was performed at ~1500 h the day prior to a morning meal challenge, which occurred at 0900h. Participants consumed a McDonald’s Big Breakfast TM including hotcakes and 1% milk (1090 kcal, 59g fat, 123g carbohydrate). Brachial artery flow-mediated dilation (FMD) was measured at 0, 30 min, 2-h and 4-h following HF meal and capillary triglycerides at 0, 2-h and 4-h. Mixed models were used to assess differences in FMD (after adjustment of baseline diameter) and triglycerides by condition. **Results:** Fasting FMD prior to HF meal ingestion was similar across conditions. The HF meal reduced 2-h FMD, with a significant time effect in the control (6.5±0.9% to 2.8±0.9%, p = 0.01) but not in 4x4 (6.2±0.9% to 4.8±0.9%, p = 0.3) or 16x1 (6.7±0.9% to 4.4±0.9%, p = 0.08) conditions. Triglycerides increased significantly at 2-h and 4-h post-meal in all conditions (p<0.05). No significant conditions x time interactions were observed for FMD or triglycerides. However, a condition x time trend (p=0.098) towards preservation of FMD in the 4x4 HIE versus control was observed 2-h post-meal. **Conclusions:** HIE (4x4 or 16x1) appears to blunt the adverse acute effects of a HF meal on the vascular endothelium. The salutary effects of HIE appear to minimize endothelial dysfunction independent of change in post-meal triglycerides.

120. HIP AND KNEE KINEMATICS AND KINETICS DURING RUNNING IN NATURAL AND CONVERTED FOOT STRIKE PATTERNS

Valenzuela, Kevin A., Lynn, Scott K., Mikelson, Lisa R., Noffal, Guillermo J., Judelson, Daniel A.
Biomechanics Laboratory, Center for Sport Performance, Department of Kinesiology, California State University, Fullerton

While running barefoot, a runner generally exhibits a more fore-foot strike (FFS) pattern. Recent research has shown certain benefits to this style of running. However, while running shod, some believe runners adapt a more heel or rear foot strike (RFS) pattern. Research is limited examining the change in biomechanics in shod running when runners attempt to switch from their natural foot strike pattern to their unnatural pattern. **Purpose:** Examine hip and knee moments and ranges of motion (ROM) in the sagittal plane during shod running while using FFS and RFS patterns. **Methods:** Subjects were filmed with a high speed camera while running a 5K at self-selected pace to determine natural foot strike pattern on day one. Natural Forefoot Group (NFFG, N=10) and natural rear foot group (NRFG, N=11) subject were identified (N=21, age=22.8±2.2 years, mass=73.1±14.5 kg, height 1.75±0.10 m). On day two, subjects performed five overground run trials in both their natural and unnatural strike patterns while motion and force data were collected. Several 2 (Foot Strike Pattern – FFS, RFS) x 2 (Group – NFFG, NRFG) mixed model ANOVAs were run. **Results:** Within subject effects demonstrated that the RFS condition had lower peak vertical ground reaction force (VGRF) (RFS=2.58±0.21 BW, FFS=2.71±0.23 BW, p<0.05) and higher peak knee moment (RFS=2.61±0.54 Nm/kg, FFS=2.39±0.61 Nm/kg, p<0.05), knee ROM (RFS=31.72±2.79 deg, FFS=29.58±2.97 deg, p<0.05), and hip ROM (RFS=42.72±4.03 deg, FFS=41.38±3.32 deg, p<0.05) as compared with the FFS condition. There were no significant interactions or between group differences for any of the measured variables. **Discussion/Conclusion:** Although VGRF was higher for FFS pattern, the force vectors acted closer to the joint rotation centers keeping the moment values lower for the FFS condition and requiring less ROM. This may be important to runners with lower limb pathologies or limited ROM in any lower limb joint.

121. PREDICTION OF VO_2MAX IN CHILDREN AND ADOLESCENTS USING PHYSICAL ACTIVITY QUESTIONNAIRES

Pat R Vehrs, FACSM, Nate Black, James D. George, Ron Hager
Department of Exercise Sciences, Brigham Young University – Provo UT

This study evaluated the use of non-exercise (N-EX) data and data gathered during a treadmill walk-jog-run protocol previously developed for use in adults to estimate VO_2max in ninety-one 12-17 year old boys and girls. Data collected responses to the Perceived Functional Ability (PFA) and Physical Activity Rating (PA-R) questionnaires, steady-state exercise heart rate (HR), self-selected treadmill speed, maximal treadmill grade, and VO_2max**.** Regression analysis was used to build a N-EX Model to predict VO_2max that included the PFA and PA-R scores and self-selected treadmill speed. A second maximal exercise model included self-selected treadmill speed and maximal treadmill grade. The cross-validation PRESS statistics for both models demonstrate minimal shrinkage in the accuracy of the regression models. The results of this study show for the first time, that N-EX data can be used to accurately predict VO_2max in youth. The exercise test validated in this study can be used to assess cardiorespiratory fitness of youth having a wide range of fitness levels and interests. The exercise test protocol is practical for use in schools, athletic facilities, and community fitness centers.

N-EX Model: VO_2max (mL/kg/min) = 11.201 + (6.877 x Gender; 0=female; 1=male) + (3.573 x treadmill speed; mph) – (0.174 x kg) + (0.405 x PFA) + (0.653 x PA-R) + (1.019 x age)

Maximal Exercise Model: VO_2max (mL/kg/min) = -3.264 + (3.359 x Gender; 0=female; 1=male) – (0.082 x kg) + (7.351 x treadmill speed; mph) + (1.750 x maximal treadmill grade)

122. THE FUNCTIONAL MOVEMENT SCREEN IS NEGATIVELY CORRELATED TO BMI AND BODY FAT IN CHILDREN

Vehrs, Zachary F.; Vehrs, Pat R., FACSM; Nomiyama, M.; Johnson, Wayne A.; Mitchell, Ulrike H.; Barker, Hailey
Department of Exercise Sciences, Brigham Young University – Provo UT

The Functional Movement Screen (FMS) can be considered an assessment of functional fitness. The FMS includes 7 tests of movement quality, core stability, strength, and flexibility. Although the FMS has been studied in adults, no research has been published using the FMS on children. **Purpose.** This study evaluated the relationship between BMI, body composition, and performance on the FMS in children. **Methods.**75 Hungarian boys and girls (9-13 y) participated in this study. Height, weight, and percent body fat percent were measured prior to being video recorded while performing the FMS. The videos were later evaluated and each participant was scored on a 0-3 scale (max score of 21) for each of the seven tests by two reviewers. **Results.** The overall average FMS score was 13.8 (±1.9) with girls (14.6 ±1.5) scoring significantly (p=0.006) higher than boys (13.3 ±2.1). Four of the 7 tests had significant negative correlations with either BMI or body fat. The overall FMS score for both genders was also negatively correlated with both BMI (-0.25, p=0.036) and body fat (-0.36, p=0.002**). Discussion/Conclusion**: In children, higher BMI and percent body fat values contribute to poor performance on the FMS. Although it is known that BMI and body fat affect various components of health-related physical fitness, this data suggest that they also affect functional fitness. In adults, FMS performance has been shown to be predictive of sports related injuries. Overweight children may also be at higher risk of injuries during participation in physical activity, recreation, and sports. School physical education programs could consider including the FMS and functional fitness training into their curriculum as a tool to educate children on the merits of functional fitness.

123. EXERCISE PHYSIOLOGISTS IN THE UNITED STATES: A NATIONAL SURVEY, 2012

Dale R. Wagner
Human Movement Science Program, HPER Dept., Utah State University, Logan, UT

Despite being a substantial and important constituent of sports medicine and exercise science, there is lack of demographic data on exercise physiologists. **Purpose:** The aim of this survey was to obtain descriptive data regarding the educational background, professional experience, work setting, and salaries of exercise physiologists in the United States. **Methods:** A survey was made available on the Internet during the first 6 months of 2012. An invitation to take the survey was posted on the American Society of Exercise Physiologists (ASEP) web site, and self-identified exercise physiologists from the American College of Sports Medicine (ACSM) membership directory and faculty websites of universities that offer an exercise physiology course were contacted (emailed). **Results:** There were 603 respondents, with 589 having usable data. Demographics included 59% male (43.6 ± 11.0 y), 41% female (40.5 ± 11.9 y), with the largest percentage in the Great Lakes region (27%). The majority of this sample was employed in universities (60%) or clinical settings (24%); 334 (57%) had a Ph.D., and 69% held at least one current professional certification. Average annual income for the sample was $62,000 ± 26,344; however, there were significant differences in salary between genders ($p < 0.01$), among employment settings ($p < 0.01$), and across regions of the country ($p = 0.012$). Those with a Ph.D. ($72,816 ± 24,474) made significantly ($p < 0.01$) more than M.S.-prepared exercise physiologists ($49,881 ± 22,251), who made more than those with a B.S. ($39,926 ± 16,865). Additionally, income was significantly ($p < 0.01$) related to age ($r = 0.50$), number of years employed in current position ($r = 0.49$), and number of years as an exercise physiologist ($r = 0.56$). **Discussion/Conclusion:** Despite an inherent sample bias toward ACSM members and/or those working in academia, this is the first national survey of exercise physiologists and sets a precedent for future research.

124. SAGITTAL PLANE KINEMATICS OF THE PELVIS DURING THE GOLF SWING: SKILL LEVEL DIFFERENCES AND RELATIONSHIP TO IMPACT CONDITIONS

Ward, Casey E.; New, Kathryn N.; Lynn, Scott K.; Frazier, Brett S.; Wu, Will F.W.; Cheetham, Phil J.
Biomechanics Laboratory, Center for Sport Performance, Department of Kinesiology, California State University Fullerton, Fullerton, CA

It has been observed that posterior pelvic tilt at impact is a common swing characteristic of professional golfers. A current theory among golf fitness professionals suggests that posterior pelvic tilt at impact is a key power position in the golf swing. **PURPOSE:** The purpose of this study was to investigate the differences in sagittal plane pelvic kinematics and ball flight determinants between golfers of different skill levels. It also sought to examine correlations between sagittal plane pelvic kinematic measures and ball flight determinants. **METHODS:** 15 elite male golfers and 13 recreational male golfers were fitted with full-body retro-reflective markers. Markers were also placed on the club and ball. A 9 camera Qualysis motion capture system was used to collect kinematic data and Flight Scope 3D Doppler radar was used to collect measures of ball flight. Participants performed 5 golf shots with a 5-iron. **RESULTS:** There was no significant difference in peak posterior pelvic tilt velocity between groups (elite = 114.63±44.09 deg/sec, recreational = 142.71±45.45 deg/sec, $p > 0.05$). There was no significant difference in time from peak posterior pelvic tilt velocity to impact between groups (elite = 0.075±0.047 ms, recreational = 0.052±0.014 ms, $p > 0.05$). There were no significant correlations between ball flight determinants and peak posterior pelvic tilt velocity or time from peak velocity to impact. **CONCLUSION:** This study suggests that increasing posterior pelvic tilt velocity in the golf swing does not produce any additional improvements in ball flight determinants. Greater pelvic tilt velocity could actually be a potential mechanism of injury in players of all skill levels. Further research examining the relationship between sagittal pelvic kinematics, golf performance and injury is needed.

125. TEST-RETEST RELIABILITY OF THE ACHILLES INSIGHT CALCANEAL QUALITATIVE ULTRASONOMETER IN WOMEN

Wherry, SJ & Swan, PD, FACSM
School of Nutrition and Health Promotion, Arizona State University, Phoenix, AZ

INTRODUCTION: Due to the high costs associated with purchasing and maintaining a dual-energy x-ray absorptiometry (DXA) scanner, qualitative ultrasound (QUS) of the Os Calcis has emerged as a promising means for tracking changes in bone health over time. While there is some evidence to suggest that DXA and QUS values correlate well in some populations, there is limited evidence regarding the test-retest reliability of QUS in non-clinical populations. **PURPOSE:** To determine the test-retest reliability of the Achilles InSight qualitative ultrasonometer in healthy adult women with no history of ankle injuries.**METHODS:** Healthy women (n= 76) between the ages of 18-65 years, representing a variety of body weights and ethnicities, underwent QUS of the right and left foot twice, using the sequence RIGHT-LEFT-RIGHT-LEFT. The machine was reprogrammed with the women's data and recalibrated between each measurement. The alternating pattern was used to ensure that foot placement by the operator was a factor in test repeatability. Repeat QUS t-score, z-score, and stiffness index (SI) were compared for each pair. Data were analyzed using interclass correlation coefficients (ICC). **RESULTS:** Test-retest reliability at a single time point was high for both the right and left foot. The ICC for QUS t-score was 0.897 and 0.966 for the right and left foot, respectively. The ICC values were also high for z-score (R: 0.890, L: 0.963) and SI (R: 0.894, L: 0.969). **CONCLUSIONS:** It appears that QUS has high within day, test-retest reliability across a range of women within a single operator. However, while the within day alternating foot pattern ensured that similarity in repeat measures was not due to identical foot position, between day reliability testing needs to be conducted before the QUS can be fully adopted as a reliable research tool.

126. DO LANDING STRATEGIES VARY WITH INCREASED SYSTEM ENERGY?

Jared N. Wilson, Andrew D. Nordin, Janet S. Dufek, Ph.D., FACSM
Department of Kinesiology and Nutrition Sciences; University of Nevada, Las Vegas, Las Vegas, NV

A strategy is a neuromuscular solution to a movement task. The purpose of this study was to investigate the effects of increased mechanical energy on strategy responses in a vertical landing task. Twelve healthy participants (10 male, 2 female; age = 23.2±1.4 yr; height = 1.73±0.07 m; mass = 74.2±8.9 kg) volunteered to participate. Participants landed from two heights (30cm, 60cm) at three loads (100%, 110%, & 120% of bodyweight) onto two synchronized force platforms (Kistler 9281CA, 9281B; 2000Hz),14 trials per condition. Mean maximum vertical ground reaction force (vGRF) was used to determine strategy response selection across conditions. Results of a 3 (load) x 2 (height) repeated measures ANOVA (α=0.05) identified significant vGRF increases with added load (F[2,22] = 4.34, p=.026, η^2 = 0.283) and with landing height (F[1,11] = 14.52, p=.003, η^2 = 0.569). A significant interaction (F[1.50, 16.54] = 14.43, p=.001, η^2 = 0.567) identified a decrease in vGRF with increased load at 30cm (average = -154N) and an increase in vGRF at 60cm (average = 372N). The greatest load and landing height produced a greater than predicted (by F=ma) increase in peak vGRF relative to 100% bodyweight (vGRF predicted [height = 60cm, load = 120%] = 146±17N, vGRF mean [height = 60cm, load = 120%] = 514±519N) with the greatest explained variance (R^2 = 0.315). Participant strategies varied greatly across conditions, with peak vGRF ranges decreasing at increased task demands ([height = 30cm, load = 100%] range = 3195N; [height = 60cm, load = 120%] range = 2814N). Results suggest that as task demands increase, predictability of strategy selection may increase due to the fact that the movements become increasingly mechanically driven, thus limiting the possible biological degrees of freedom available to perform the task. Importantly, unique strategies were observed among participants.

127. THE EFFECT OF AN ENERGY DRINK ON ACUTE MUSCLE STRENGTH AND FATIGUE IN YOUNG MALES

Zachary Zeigler, Michelle Hawley, and Pamela Swan FACSM
Physical activity, Nutrition, and Wellness, Arizona State University

Introduction: The popularization of energy drink use as a supplement immediately prior to exercise is steadily increasing, especially among young adult males. However, the effects of energy drinks on muscular performance in young adults have yet to be clearly elucidated. **Purpose:** The purpose of this study was to determine differences in acute muscular strength and endurance and profile of mood state (POMS) scores between three treatments (RockStar (RS), sugar-free RockStar (SFRS), and sugar free caffeine-free Placebo (PA)). **Methods:** Eight male subjects (mean age: 23.3+/- 4.3 yrs, height: 181.0 +/- 5.3 cm, fat percent 17.8+/- 5.2%, and weight 85.3+/- 12.6 kg) completed this randomized double-blinded cross over study. Each man was tested randomly at least 1 week apart. Diet and time of day were held constant across trials. Subjects were asked to drink the unknown beverage and begin test within 30 minutes of ingestion. Peak torque of knee extensors and flexors at 60, 180, 240 degrees/second and fatigue index and total work were calculated by performing 50 repetitions at 240 degrees/second on an isokinetic dynamometer (HUMACNORM: CSMI Medical Solution). **Results:** There were no significant difference in peak torque, fatigue index, or total work measures or in subjective measures of fatigue or vigor from the POMS between the treatments. **Conclusion:** This study indicates that RockStar energy drinks have no acute ergogenic effects in young men performing isokinetic strength or endurance testing when consumed 30 minutes prior to exercise.

AUTHOR INDEX

Name	Abstract
Adams E	1,100
Akbar K	60
Albiston KC	3
Allen CR	26
Alvar B	64
Angadi SS	4,55,57
April S	5,29
Astorino TA	6,24,27,31,36,58,67,75
Avila XM	115
Azidin RFR	16
Bahk MD	102,118
Bailey B	11,56
Bailey JP	7
Banuelos Y	8
Barber JJ	42
Barker H	122
Barker LA	103
Barone Gibbs B	37
Beam WC	103,109
Beaudette TL	9
Beaudette TL	39
Becker J	53
Beckham GK	10
Bell M	11,56
Benson B	12
Berger C	13
Bergstrom HC	23
Bernard JR	42,69
Berning J	15
Bhammer DM	14,55,57,107,119
Black LE	14,46,64
Black N	121
Boham M	15
Bottaro M	99
Bradburn HR	16
Brecht M-L	105
Bridges J	88,89
Brown LE	9,19,21,26,29,32,39,45,47,64,90 98,99,109,116
Buman MP	64
Burke LE	37
Burke S	93
Burns MT	69
Carbine K	20,74
Carmo J	99
Castern DM	17
Castles C	26
Cazas V	26
Chandler H	26
Charles JM	18
Charukesnant P	60
Cheetham PJ	35,124
Chen T	77
Cho A	19,21,98,116
Choi D	70
Christenson E	20
Christenson E	74
Ciccone AB	21,29,90,98,115,116
Ciulei M	22,72,84,114
Coast JR	76,92
Coburn JW	19
Coburn JW	21,29,32,39,47,90,100,103,109
Cochrane KC	23
Cooper C	24,36
Coupe A	25
Craig-Jones A	87
Cramer JT	23
Curtis B	6
Dabbs ND	26
Davis KA	19,47
Davis KK	37
Davis T	101
DeBeliso M	15,72,84,114
Deboe A	6
DeFaria G	27
DeHeer H	76
Der Ananian C	28,80
Dettelbach A	31
Dexter JG	104
Dito J	31
Dokladny K	78
DuBois AM	9,29,98,116
Dudley RI	3035
Dufek JS	7,25,54,59,126
Eastwood J-A	105
Edmunds R	31,75

Eggett D 88
Elston K 60
English G 32
Errico B 56
Facun S 33
Fava K 58
Fernandez RJ 34
Frazier B 30,35,124
Gaesser GA 4,14,55,57,107,119
Gallant R 36
Galpin AJ 19,21,29,39,47
Garcia DO 37
Garner JC 26
George JD 121
Gillum T 33,48,111
Girouard TJ 49,81,117
Glatt RM 38,44,52
Godinez C 39
Godinez J 24,36
Gougeon MS 40
Grande Gutierrez N 41
Gregory JW 42
Grigg CA 43
Haas RK 38,44,52
Haddock B 2
Hafenstine R 21,45
Hager R 121
Hagobian TA 86,110
Haines N 46
Hall KC 71
Hall KG 86
Hallowell DM 77
Hamedani BY 5
Hargens AR 41
Harmon R 47
Harper EN 94,97
Harris AM 85
Harris C 15
Hartsock A 48
Harvel AC 49,81,117
Hatamiya NS 50
Hawkins S 102,113,118
Hawley M 127
Henige K 93
Henriksen A 51
Hill K 20,74
Hill MD 38,44,52
Hinrichs R 80
Ho R 53,108
Holt JL 54
Holzapfel SD 55
Hong J 69
Hooker SP 64
Hope T 11
Hopkins JT 66,112
Housh T 23
Hunter I 89
Hydahl R 12
Jackson N 56
Jakicic JM 37
Jarrett CL 57
Jarrett MS 22
Jenkins NDM 23
Jennings HM 58
Jensen DB 59
Jewett A 60
Johnson AK 40
Johnson AW 88,89,91
Johnson GO 23
Johnson PK 61,83
Johnson S 65
Johnson WA 122
Johnston CS 68
Judelson D 1,17,29,100,103,109,115,120
Kacena J 62
Kato B 63
Kelly LA 38,44,52
Kelly SB 14,64
Kersey RD 40
Keyan Z 65
Killpack N 20,74
Kim HS 66
Kim HS 112
Kim K 69
King LR 67
Kirkpatrick A 31
Knurick JR 68
Kravitz L 104

Lambrecht NS 69
Lamont HS 101
Land DH 10
Larson MJ 20,74
Laszlo M 91
LeBlanc M 62,102,113,118
LeChaminant G 11
LeCheminant JD 20,74
LeCheminant R 20,74
Lee CD 4
Lee MJ 92
Lee S 69
Leininger LJ 95
Lenz S 71,73
Lopez M 70
Louis P 67
Loy SF 93
Luke AC 50
Lundahl JA 26
Lynn SK 5,18,30,35,40,63,90,120,124
Mack G 12
Madsen SR 77
Magoffin R 12
Mahler D 71,73
Malone C 119
Manning JW 72,84,114
Mannix P 13
Marcell T 71,73
Marks DW 42
Martin CG 58
Martinez D 36
Martorelli S 99
Masterson T 20,74
McCardell M 62
McCarthy KC 67
McChesney J 15
McMillan D 24,36,75,
McNeill D 76
McVey NL 77
Mefferd K 59
Mejia Aguilar M 2
Mermier C 78
Mier N 79,106
Mikelson LR 120
Miller AI 28
Miller AL 80
Miller B 49,72,81,84,114,117
Minton J 82
Mirisch M 102,118
Mitchell UH 83
Mitchell UH 122
Montes A 25
Montes J 49,72,81,84,114,117
Mookadam F 4
Moore TM 43,77,85
Morris AJ 86
Mortensen XM 43,85
Moseley P 78
Myrer JW 88,89
Narvaez M 8
Navalta JW 22,49,72,81,84,114,117
Nelson GC 29
Nessler JA 87
Neves C 88,89
Neves KA 89
NevesT 88
New K 35,124
Nijem RM 90
Noffal G 5,16,18,30,32,35,40,108,120
Nomiyama M 91,122
Nordin AD 7,25,54,126
O'Conner KC 92
Oglesby S 93
Olmstead J 86,110
Oppenheimer NE 94,97
Orozco BZ 95
Palumbo E 24,36
Parcell A 12
Parra A 31
Parra M 96
Patterson J 94,97
Pena IM 98,116
Pereira MC 39
Pereira MC 45,99
Pfeiffer R 15
Pham H 1,17,100
Phelan S 86
Pinto RS 45

Pittman MB 5
Plascencia C 101
Plato P 60
Porter J 53
Prosser K 62,102
Quach B 27
Quiros CR 103
Raney M 51,82
Reed JP 10
Reese CS 66
Reyna A 27
Rickman AD 37
Rider J 38,52
Rietjens R 5984,114
Robinson M 16
Rocha-Junior VA 99
Roper JL 104
Rosario E 65
Roundy R 66
Rozenek R 79,106
Ruas CV 45
Rubin D 1,17,100
Ruiz RC 16
Ryan D 105
Ryder JR 55,57
Ryder JR 119
Salassi III JW 79,106
Salgado R 78
Sanchez E 75
Santo A 59
Sato K 10
Sawyer BJ 14,55,57,107,119
Schenider S 78
Schmidt RJ 23
Schubert MM 24,36
Schutts K 108
Seeley MK 66,112
Shanaberger SM 101
Shannon EM 109
Shields N 110
Shook K 111
Sillers W 67
Son SJ 66,112
Soucy M 62,113
Souder J 31
Spargo T 87
Spiering BA 115
Stevenson T 31
Stirling D 24,36
Stone T 72,84,114
Swan P 64,68,125,127
Tabarez FJ 27
Tejidor R 27
Terrell EM 26
Thompson D 12,43,77,85
Thurston TS 29,115
Toth M 91
Tovar A-M 98,116
Trilleras G 49,72,81,84,114,117
Truver B 62,118
Tsang KKW 5
Tucker WJ 4,14,57,107,119
Tutor A 100
Ulrike M 61
Ulrike M 91
Uvacsek M 91
Valenzuela KA 120
Vallejo A 70
VanNess J 3
VanNess MA 3
Vanrenterghem J 16
Vehrs P 91,121,122
Vehrs Z 91,122
Wagner DR 123
Wang A 51
Ward CE 124
Wherry SJ 125
Williams C 76
Wilson JN 126
Wilson KS 34,63,96
Winans C 27
Wright J 58
Wu W 53,108,124
Xie J 93
Zeigler Z 127
Zuhl M 78


SOUTHWEST ACSM REGIONAL CHAPTER • UTAH • ARIZONA • CALIFORNIA • HAWAII • NEVADA • NEW MEXICO
AMERICAN COLLEGE OF SPORTS MEDICINE
• FOUNDED 1954 •
®