2019 Program of Events
47th Annual Meeting Midwest Chapter of the American College of Sports Medicine

November 7-9 2019
Oak Brook Hills Resort & Conference Center
Oak Brook, Illinois

Midwest American College of Sports Medicine

Contents

Past-President's Welcome Letter

Dear friends, colleagues, students:

Welcome to Oak Brook, IL for the 47th Annual Meeting of the Midwest Chapter of the American College of Sports Medicine. After two successful trips to the Amway Grand Plaza in Grand Rapids, MI, I hope that you will find the change in scenery at the Oak Brook Hills Resort & Conference Center to be an equally stimulating environment to gather with colleagues and share our latest research and scholarship.

Headlining our event this year are two keynote speakers from our own Midwest Chapter. Dr. Karin Pfeiffer from Michigan State University will present our Friday keynote titled: *Sport for All: Promoting Physical Activity Through Youth Sports* and Greg Myer from Cincinnati Children's Hospital & Medical Center presenting our Saturday keynote titled: *Is it possible to Prevent Concussion or Brain Injury in Sport? Novel Strategies to provide internal Protection of the brain from head impact Exposure*. In addition to our keynote speakers, we have a full slate of presentations that include 24 faculty & professional led symposiums, 40 oral slide presentations, 93 poster presentations, a student colloquium and our annual Jeopardy Quiz Bowl on Friday evening.

Congratulations to all of our presenters on their acceptance, and specifically to our first time student presenters. The Midwest ACSM Annual Meeting has always been a tremendous career launching opportunity. I remember my own start as a student researcher at Boyne Mountain in Michigan.

To kick off our meeting this year I encourage each of you to attend our Past-President's Social that will be held in the lobby tiers of the conference hotel. Please join us after your travels and enjoy a beverage of your choice, some friendly conversation, and the opportunity to make some new friends.

As I close out my reign on the President's Council, I wanted to make sure that I thank Executive Director Jodee Schaben for her extensive work on behalf of the Chapter. There are times in the year when her workload as our ED resembles a full- time position, and I would like to take this opportunity to acknowledge that. I would also like to thank my fellow council members President Amy Gyorkos and President-Elect Derek Kingsley. Both have been instrumental in the success of our Chapter and the putting together of this conference. I appreciate their friendship and mentoring. They are both worthy of a standing ovation!

Welcome to Oak Brook and enjoy the conference!

Dan

Daniel L Carl, PhD
2019 Past-President and Program Committee Chair, Midwest ACSM

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Chapter and Conference Information

The FIRST ACSM regional chapter

In 1972, the Midwest Regional Chapter of the American College of Sports Medicine (MWACSM) was the first regional chapter to be granted permanent status. It was founded to follow, fulfill and promote, at the regional level, the objectives of the American College of Sports Medicine. The MWACSM is a chapter rich in tradition with a strong student focus. Through the years it has offered its members outstanding educational programs and opportunities for networking through the regional annual meeting.

Purpose and Objectives:

- To promote and advance scientific knowledge and application of this knowledge dealing with the effect of sports and other physical activities on the health and wellness of human beings at various stages of life.
- To collaborate with other organizations, educators, scientists, physicians, fitness practitioners, and students concerned with the same or related specialties.
- To arrange for mutual meetings of educators, scientists, physicians, fitness practitioners, and students concerned with the same or related specialties.
- To initiate, promote, and collaborate on research in these fields.
- To disseminate information pertaining to various aspects of sports, other physical activities, and medicine.

ACSM Continuing Education Credit (CEC)

The American College of Sports Medicine's Professional Education Committee certifies that the Midwest Regional Chapter meets the criteria for official ACSM Approved Provider status (Provider #650390). This conference meets the criteria for 12.0 credit hours of ACSM Continuing Education Credit (CEC). Each hour of professional education is awarded one CEC. Attendees should claim only the credits commensurate with the extent of their participation in the activity.

Name Badge

Badges must be worn at all times to gain admittance into educational sessions, poster sessions, and special events to include the opening reception. In addition, your name badge serves as your meal ticket during the meeting. If you lose your badge, please see the registration desk; there is a replacement fee of $5.00.

Annual Business Meeting and Saturday Keynote Session

The annual business meeting is scheduled for Saturday, November 9, from 10:00-10:30am in the Main Ballroom, brunch will be served following the business meeting. The annual business meeting is your opportunity to participate in the activities of the Midwest Chapter of ACSM. During this meeting, we will announce the award winners, newly elected officers, an update from the MWACSM Chapter Office and other, new items. Please plan to attend.

Awards

Awards that will be presented include the Student and Clinical Presentation Awards, the Founder's Award, and the MWACSM ActiveU Competition Award. For more information on all our student and professional awards, to include eligibility requirements, criteria, application forms, and submission deadlines, please go to: http://www.mwacsm.org/wordpress/about-mwacsm/awards/.

Continuing Education (CEC)

ACSM CEC Certificate

Participant Name

Midwest Regional Chapter of the American College of Sports Medicine

Provider Organization

2019 Midwest ACSM Annual Meeting, Oak Brook, IL

Course Title

#650390	**12.0**
Approved Provider Number	CECs Awarded

Lead Program Administrator Signature

Sponsors

MWACSM would like to thank our 2019 Sponsors for their support our regional chapter and our annual meeting. We encourage all meeting attendees to take a few moments to visit with representatives from the following companies:

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Exhibitors

Midwest ACSM wants to thank our 2019 Exhibitors, and encourages all meeting attendees to take a few moments to visit with representatives from the following companies:

We are the American College of Sports Medicine – with more than 50,000 members and certified professionals strong from 90 countries around the globe. Representing 70 occupations with the sports medicine & exercise science fields, ACSM is the only organization that offers a 360-degree view of the profession. From academicians to students and from personal trainers to physicians, our association of sports medicine, exercise science, and health & fitness professionals is dedicated to helping people worldwide live longer, healthier lives. Visit our booth to learn more about ACSM membership, certification, programs and meetings. And, students- come find out how **ACSM's $10 student membership** can help you prepare for your future!

Cincinnati Children's will improve child health and transform delivery of care through fully integrated, globally recognized research, education and innovation. For patients from our community, the nation and the world, the care we provide will achieve the best: Medical and quality-of-life outcomes, Patient and family experience, and value today and in the future.

COSMED provides a full range of "gold standard" solutions for cardiopulmonary, metabolic, and body composition assessment. Key products include the BOD POD® Body Composition Tracking System and the new K5 wearable metabolic system.

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Michigan Medicine- Cardiovascular Medicine The Cardiovascular Medicine Internship offers a 16-week long internship program geared towards Exercise Physiology, Exercise Science and Kinesiology students seeking a clinical experience in cardiac rehabilitation and stress testing. Our goal is to provide students the opportunity to work within the many programs Cardiovascular Medicine offers along with observation of programs and procedures.

The National Strength and Conditioning Association (NSCA) is the trusted authority on strength and conditioning, bridging the gap between science and application for over 40 years. The NSCA offers the highly sought-after, accredited certification: Certified Strength and Conditioning Specialist (CSCS). Stop by our table and enter for a chance to win a free certification exam.

Palmer College of Chiropractic is the founding college of the chiropractic profession, and is known as The Trusted Leader in Chiropractic Education®. It was founded in 1897, in Davenport, Iowa, by D.D. Palmer, the discoverer of chiropractic. More than 2,200 students attend Palmer College campuses in Davenport, Iowa; Port Orange, Fla.; and San Jose, Calif. Palmer's nearly 30,000 practicing alumni comprise almost half of the doctors of chiropractic in the United States. Palmer's doctor of chiropractic curriculum is a five-academic-year program that's typically completed in three-and-one-third calendar years.
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Parker University is a Healthcare institution located in Dallas Texas. We offer Masters Programs in Healthcare Management (online) and Neuroscience and Doctorate Programs in Chiropractic and Sports Physician. Several BS and AS degrees in Massage, OTA, Radiology and Sonograpy are also offered.

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Center for Rural Cancer Survivorship

A comprehensive interdisciplinary center developed to **provide outpatient services to all cancer patients and survivors in need.** Whether newly diagnosed or long finished with treatment, our goal is to improve daily function and quality of life for the cancer survivor.

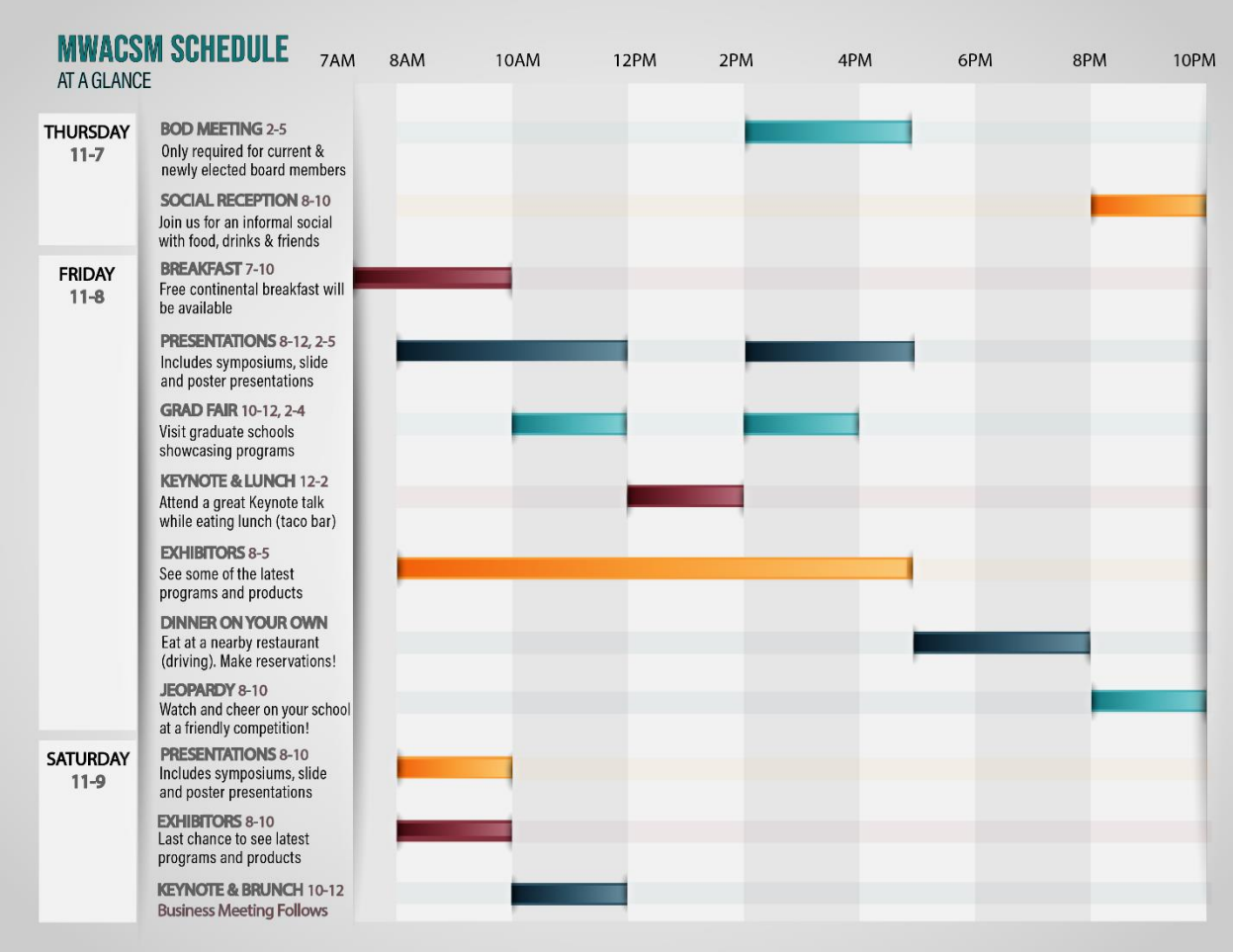
Graduate Fair

On Friday from 10:00-12:00 and 2:00-4:00pm, MWACSM will sponsor a Graduate and Internship Fair in the East and North Foyer. Information from the participating institutions will be available during this time, and attendees will have opportunity to speak with representatives about their programs.

- Benedictine University
- Carroll University
- Central Michigan University
- Eastern Michigan University
- Miami University - Ohio
- Michigan State University
- Northeastern Illinois University
- Northern Illinois University
- Ohio University
- Southern Illinois University
- St. Ambrose University
- University of Cincinnati
- University of Indianapolis
- University of Northern Iowa
- University of Wisconsin-River Falls
- Western Kentucky University

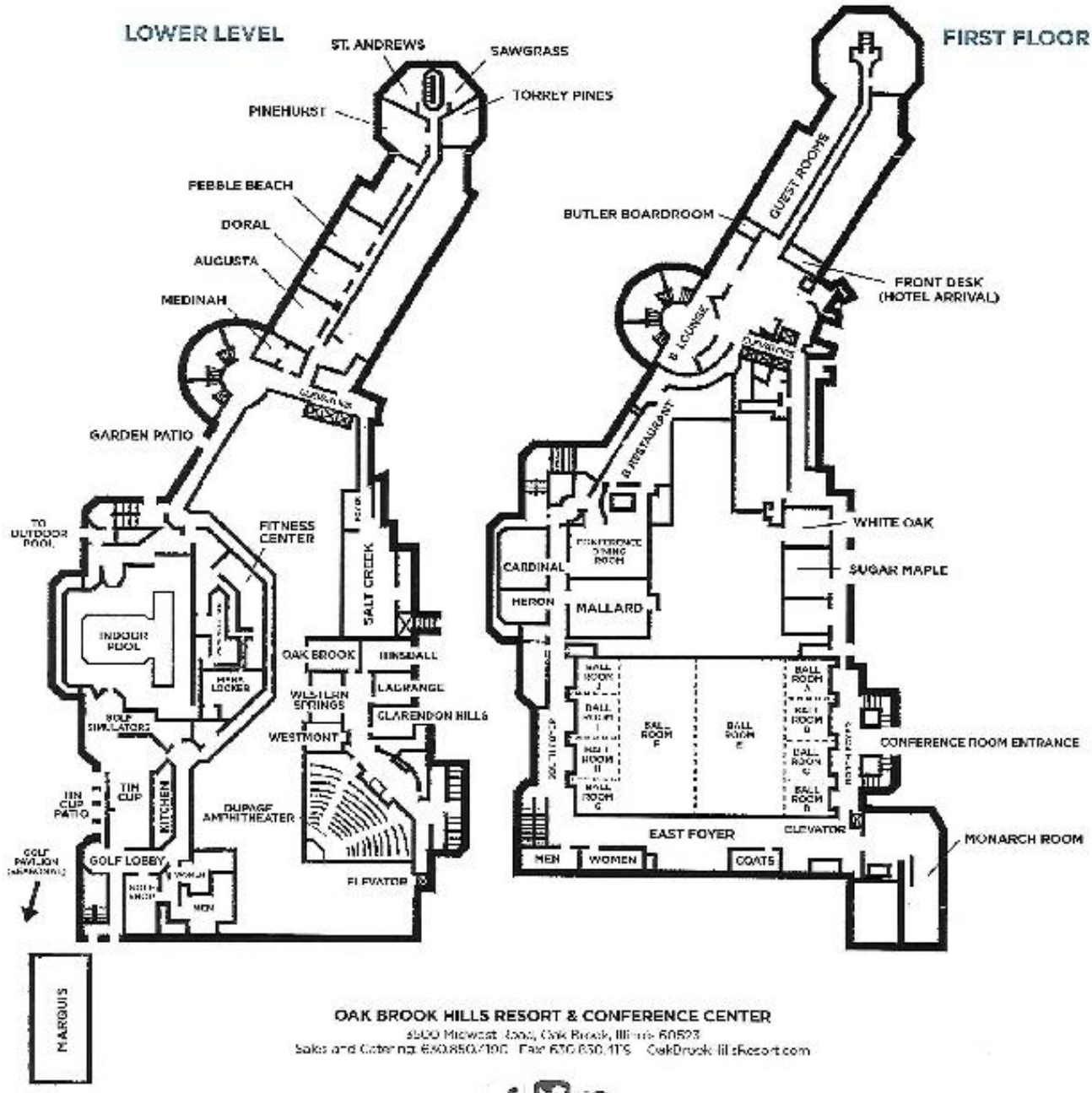
Meeting At-A-Glance

	Ballroom G-J	Monarch	Mallard	DuPage Ampitheatre	Oak Brook
8AM	Posters #1	Williams & Cook # 1	Slide Presentations # 1	Slide Presentations # 3	Mullins # 9
9AM	Posters # 2	Hew-Butler & Students # 2	Slide Presentations # 2	Timmerman & Ballard # 6	Walsh & Crommett # 10
10AM	Posters # 3	Garett Griffith + Panel of 8 # 3	Alessio, Opplinger & Ward # 4	Jagim & Camic # 7	Slide Presentations # 4
11AM		Garett Griffith + Panel of 8 # 3	Ledman & Michel # 5	Humm & Kingsley # 8	Slide Presentations # 5
Keynote Luncheon - Dr. Karin Pfeiffer					
2PM	Posters # 4 Posters # 5	Richardson # 11	Slide Presentations # 7	Montoye, Bodary & Olthoff # 15	Broeder # 18
3PM		Betz, Coughlin & Nagelkirk # 12	Slattery # 13	Petruzzello, Feito, Box # 16	Slide Presentations # 8
4PM		Slide Presentations # 6	Welch & Gavin # 14	Hew-Butler # 17	Student Colloquim
End of Presentations					
8AM	Posters # 6	Barkley # 19	Slide Presentations # 9	Elmer & Students # 21	
9AM		Knecht & Weideman # 20	Slide Presentations # 10	Marshall & Parks # 22	
Business Brunch					
Keynote Brunch - Dr. Greg Myer					


MWACSM SCHEDULE
AT A GLANCE
7AM
8AM
10AM
12PM
2PM
4PM
6PM
8PM
10PM
THURSDAY 11-7
BOD MEETING 2-5
Only required for current & newly elected board members
SOCIAL RECEPTION 8-10
Join us for an informal social with food, drinks & friends
FRIDAY 11-8
BREAKFAST 7-10
Free continental breakfast will be available
PRESENTATIONS 8-12, 2-5
Includes symposiums, slide and poster presentations
GRAD FAIR 10-12, 2-4
Visit graduate schools showcasing programs
KEYNOTE & LUNCH 12-2
Attend a great Keynote talk while eating lunch (taco bar)
EXHIBITORS 8-5
See some of the latest programs and products
DINNER ON YOUR OWN
Eat at a nearby restaurant (driving). Make reservations!
JEOPARDY 8-10
Watch and cheer on your school at a friendly competition!
SATURDAY 11-9
PRESENTATIONS 8-10
Includes symposiums, slide and poster presentations
EXHIBITORS 8-10
Last chance to see latest programs and products
KEYNOTE & BRUNCH 10-12
Business Meeting Follows

Hilton

OAK BROOK HILLS RESORT & CONFERENCE CENTER



OAK BROOK HILLS RESORT & CONFERENCE CENTER

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Keynote Speakers

Sport for All: Promoting Physical Activity Through Youth Sports

Friday, November 8th – Noon - 2:00pm, Main Ballroom

Performance in MOTION
MICHIGAN STATE UNIVERSITY College Of Education
DEPARMENT OF KINESIOLOGY

Karin Pfeiffer Ph.D.,
Professor, Department of Kinesiology
Michigan State University

Karin Allor Pfeiffer, Ph.D., FACSM is a Professor in the Department of Kinesiology and faculty in the Center for Physical Activity and Health at Michigan State University (MSU). She completed her doctoral studies at MSU in 2001 and has been studying physical activity and health-related fitness in children and youth for the past 24 years. Her main areas of expertise are in measurement of physical activity and interventions to increase physical activity, and she has over 160 publications in peer-reviewed journals. She has also procured external grant funding from the National Institutes of Health and various foundations. She serves on the Leadership Board of the National Youth Sports Health and Safety Institute and is a Past-President of the North American Society for Pediatric Exercise Medicine. She also is a Past-President and Founder's Award recipient of the Midwest regional chapter of the American College of Sports Medicine (ACSM) and was a Trustee of national ACSM. She recently was elected to the Board of Directors of the International Society for the Measurement of Physical Behavior and appointed as Chair of the Sport Sector of the National Physical Activity Plan.

Keynote Speakers

Is it possible to Prevent Concussion or Brain Injury in Sport? Novel Strategies to provide internal Protection of the brain from head impact Exposure

Saturday, November 9th – 11:00-12:00 Noon, Main Ballroom

Gregory D. Myer, PhD, FACSM, CSCS*D
Director, Research, SPORT Center and The Human Performance Laboratory
Division of Sports Medicine, Cincinnati Children's Hospital Medical Center

Gregory D. Myer is the Director of Research, SPORT Center and The Human Performance Laboratory for the Division of Sports Medicine at Cincinnati Children's Hospital Medical Center. He maintains primary faculty appointment in the departments of Pediatrics and Orthopaedic Surgery in the College of Medicine at the University of Cincinnati. Dr. Myer has published over 350 medical manuscripts (*h-Index Scopus: 62; Google Scholar: 86; Total Citations:>28,000*) and has published books and several book chapters related to his research on the injury biomechanics, human performance, pediatric exercise science, preventative medicine and sensorimotor neuroscience.

Dr. Myer is a recognized leader in the field injury prevention and human performance neuroscience and has received numerous awards for his excellence in research. Among those awards are the American Orthopedic Society of Sports Medicine's O'Donoghue Sports Injury Research Award (2005, 2015) and The NCAA Research Award (2010), National Strength & Conditioning Association Sports Medicine/Rehabilitation Specialist of the Year (2011), the Association of Bone & Joint Surgeons Nicolas Andry Award (2012), and the George J. Davies - James A. Gould Excellence in Clinical Inquiry Award Excellence in Clinical Inquiry Award (2014, 2016). Dr. Myer has been recognized three times by the Clint Thompson Award for Clinical Advancement in Athletic Training (2005, 2010,

and 2013). Greg has been recognized for the American Academy of Orthopaedic Surgeons Kappa Delta/OREF Clinical Research Award, British Journal of Sports Medicine Systematic Review Award, the American Orthopaedic Society for Sports Medicine O'Donoghue Sports Injury Research Award, American Journal of Sports Medicine Systematic Review Award, and Sports Health Journal T. David Sisk Research Award. More recently Greg has also been the recipient of Rocky Mountain University of Health Professions Outstanding Alumnus Award and Franklin College Distinguished Alumni Award where he received his doctoral and undergraduate degrees respectively.
Dr. Myer is currently certified with Distinction by the National Strength and Conditioning Association and has been designated as a Fellow of the American College of Sports Medicine. Dr. Myer is serving or has served as an investigator on several nationally funded medical and industry sponsored grants that have contributed multi-million research dollars to his institution. He serves as ad hoc reviewer on NIH study sections and as associate/section editor for multiple medical journals.

Schedule – Friday Morning: Symposia

Symposium #1: Monarch Room, 8:00-8:50am

How useful is RPE in determining exercise intensity?

Session moderator: Whitney Welch, Northwestern University
Presenters and Institutional Affiliations:

Dr. Aly Williams, CSCS, AT-Ret; Indiana Wesleyan University, Marion, IN
Dr. Williams has served at Indiana Wesleyan University for 20 years as a Professor of Exercise Science and now as the Dean of the School of Physical and Applied Sciences. She holds a B.S. in psychology and athletic training, an M.S. in exercise science and a PhD in public health with an emphasis in community health promotion and education. She has clinical experience as an Athletic Trainer and is a Certified Strength and Conditioning Specialist through the National Strength and Conditioning Association.

Dr. Melissa Cook, EP-C, Indiana Wesleyan University, Marion, IN

Dr. Melissa Cook has served at Indiana Wesleyan University for 13 years as a Professor of Exercise Science and Director of CAAHEP/CoAES accredited Exercise Science program. She holds a B.S. in Sports Sciences, an M.S. in Kinesiology and Health Promotion and an EdD in Physiology with an emphasis in Human Bioenergetics.

Learning objectives:
At the conclusion of the symposium, the audience should be able to:

1. Describe the connection between Rating of Perceived Exertion (RPE) and heart rate during exercise and use of RPE to measure exercise intensity during exercise
2. Recognize how perceived intensity differs depending upon exercise modality and client population
3. Explain the potential limitations in using RPE as a method of measuring exercise intensity

Symposium Description:
The American College of Sports Medicine (ACSM) guidelines for exercise prescription follow the FITT-VP protocol, which contains recommendations for several elements including frequency, intensity, time, type, volume and progression. Intensity can be prescribed in many variations with objective measurements such as heart rate reserve (HRR) and percentage of maximal oxygen consumption ($VO_{2\ max}$) commonly used. Rating of perceived exertion (RPE) is a simple, validated, subjective means of assessing cardiovascular effort and intensity that is easily explained and requires no additional equipment. The Borg RPE scale allows an individual to rate strain generated by symptoms and signals from the muscles and joints of his/her periphery, cardiovascular and respiratory functions, and central nervous system during exercise. The increase in perceived strain should show a linear relationship to exercise heart rate response. Although the Borg scale is a simple and easy measurement, recent studies call into question its connection to heart rate response particularly when used across different modes of exercise. This presentation will review the original literature related to the Borg RPE, how RPE varies across exercise modality and client population and provide suggestions for use including proper instruction for clients. Also presented will be new data further evaluating the relationship between reported RPE and exercise heart rate response. Finally, the presentation will include a conversation about potential limitations of the RPE scale and how to best mitigate those limitations to ensure clients achieve their desired exercise intensity.

Symposium #2: Monarch Room, 9:00-9:50am

Of Mice and Men – The Physiology, Psychology, and Pathology of Overhydration

Session moderator: Phil Anton, Southern Illinois University
Presenters and Institutional Affiliations:

Tamara Hew-Butler DPM, PhD, FACSM, Wayne State University, Detroit, MI
Dr Tamara Hew-Butler is a podiatric physician and associate professor of Exercise and Sports Science at Wayne State University in Detroit, Michigan. She obtained her BS in Kinesiology at the University of California at Los Angeles, CA; Doctor of Podiatric Medicine (DPM) at Temple University in Philadelphia, PA; and Philosophy Doctor (PhD) at the University of Cape Town, South Africa. She is a Fellow of the American College of Sports Medicine (FACSM) and specializes in both sports medicine and exercise physiology. Her expertise is in exercise-associated hyponatremia and the endocrine regulation of water and sodium balance. Her scientific work has been highlighted on radio shows (Science Friday, National Public Radio), television (The Weather Channel), podcasts (CJSM), newspapers (New York Times, Washington Post, CNN), a comic strip (xkcd) and reality television show (Adam Ruins Everything).

Wayne State University doctoral students: Valerie Smith-Hale, Alyssa Pollard-McGrandy, and Matthew VanSumeren

Learning objectives:
At the conclusion of the symposium, the audience
should be able to:
1) Understand fluid homeostasis and the physiological responses to overhydration
2) Recognize the psychology behind polydipsia
3) Identify the pathological consequences of acute and chronic overdrinking

Symposium Description:
The detrimental effects of dehydration, to both mental and physical health, are well-described. The potential adverse consequences of overhydration, however, are less understood. This presentation will summarize the existing data obtained from both animal and human studies regarding the physiology, psychology, and pathology of overhydration. The physiology section will highlight the molecular strength and significance of aquaporin-2 (AQP2) water channel downregulation, in response to chronic anti-diuretic hormone suppression. The psychology section will highlight reasons why humans and animals may overdrink, likely in response to anxiety or social isolation whereas polydipsia triggers mesolimbic reward pathways. Lastly, the potential acute (water intoxication/hyponatremia) and chronic (urinary bladder distension, ureter dilation and hydronephrosis) pathologies associated with overhydration will be examined largely from the perspective of human case reports and early animal trials. How these data relate to the potentially fatal consequences of exercise-associated hyponatremia will be emphasized.

**this presentation will highlight data contained in our recent publication on the topic: https://www.mdpi.com/2072-6643/11/7/1539*

Symposium #3: Monarch Room, 10:00-11:50am*

*This symposium will last 1 hour and 50 minutes.

Pediatric Clinical Exercise Physiology: Pushing the Limits with Research and Clinical Programs

Session moderator: Dr. Laura Richardson, University of Akron
Presenters and Institutional Affiliations:

Garett Griffith (Northwestern University). Garett received his Master of Science in Clinical Exercise Physiology from Ball State University in 2014 and Master of Public Health in Health Policy and Administration from the University of Illinois at Chicago in 2016. He is certified through the American College of Sports Medicine as a Registered Clinical Exercise Physiologist. His research has focused on physical activity- and exercise-mediated responses of the cardiovascular and autonomic systems in clinical patient populations with chronic conditions, and he has presented his findings at both regional and national conferences. Garett is currently working as the Clinical Research Manager for Northwestern University's Department of Neurology. Previously, he has developed graduate assistant and undergraduate internship programs in Kinesiology & Nutrition, and directly supervised all research- and community-based cardiopulmonary exercise tests for the University of Illinois at Chicago's Integrative Physiology Laboratory from 2014 to 2018. He has worked in cardiac rehabilitation settings, and has served as the primary research coordinator for research studies focusing on cardiovascular responses to exercise in pediatric patients.

Katie Baschen (Ann & Robert H. Lurie Children's Hospital of Chicago). Katie received her Master of Science in Clinical Exercise Physiologist from Benedictine University in 2015. She has extensive experience in pediatric cardiology and pediatric pulmonary medicine, working with complex patients in both cardiopulmonary rehabilitation and diagnostics. Katie has been involved in the growth and evolution of the Exercise Medicine program at Lurie Children's Hospital, including the development of the preventive cardiology clinic, cardiac rehabilitation, pulmonary rehabilitation, and fontan (i.e., cavopulmonary connection) exercise consultations. She has presented at symposia, consortiums and family education days at the hospital to promote exercise in health care providers and patients. She is experienced in cardiogenic diagnostic testing, cardiac rehabilitation, and exercise programming.

Taylor DePaola (Ann & Robert H. Lurie Children's Hospital of Chicago). Taylor received her Masters of Science in Clinical Exercise Physiology from Benedictine University. Her prior education includes an undergraduate degree from North Central College with an emphasis in Exercise Science and Psychology. Tayle completed many widespread internships including areas such as health in fitness, cardiac rehabilitation and cardiopulmonary stress testing. Tayle holds a NIOSH (National Institute for Occupational Safety and Health) certification which focuses on proper spirometry testing and technique, common errors and ATS guidelines and interpretations. Tayle also holds certifications in pediatric and adult advanced cardiac life support. Her clinical experience has been focused in both pediatrics and adult populations where her skills in electrocardiograms, stress testing, pulmonary function testing as well as both inpatient and outpatient cardiac and pulmonary rehabilitation have been utilized. Since working at Lurie, along with completing testing and rehabilitation sessions for patients she has focused on making a cardiac rehabilitation education booklet. Another project she is currently working on is updating Lurie's current inpatient pulmonary rehab program using current research on common pulmonary diagnoses, including Cystic Fibrosis and Bronchiectasis. Tayle has extensive experience performing multiple types of stress tests on children and adult patients of which include a wide variety of diagnoses. Outside the field of Exercise Physiology, Tayle has a broad background in coaching and training adolescents and adults, which has come in handy for her clinical work.

Brittany Holst (Ann & Robert H. Lurie Children's Hospital of Chicago). Brittany received her Masters of Science in Clinical Exercise Physiology from Benedictine University in 2017 and is certified in advanced pediatric and cardiac life support. Her clinical experience started in adult cardiology and pulmonary medicine before moving to pediatrics. During her time working in with the adult population she used her clinical expertise to develop an educational program in cardiac rehabilitation and focus her skills to improve individualized treatment plans. She worked closely with the American Association of Cardiovascular and Pulmonary Rehabilitation registry to collect surveys, outcome measures and assessments during patient's duration in rehab. After moving to pediatrics at Lurie Children's, Brittany has worked to develop and revamp the ambulatory blood pressure monitoring protocol by utilizing new standards and organizing new equipment. She has used her experience and research skills to develop a unique exercise protocol, including cardiopulmonary exercise test and exercise prescription, for POTS (postural orthostatic tachycardia syndrome) patients, preventive exercise prescriptions as well as cardiopulmonary exercise testing. With her expertise in cardiac rehabilitation, she is the current cardiac rehabilitation coordinator, where she has helped the team to develop a unique set of patient specific outcome measures and program progression, while developing individualized treatment plans for patients that will start during inpatient rehab into outpatient. Brittany also has experience as a clinical speaker for education seminars at Lurie's for the cardiology fellows and advance practice nurses.

Melissa McMahon (Ann & Robert H. Lurie Children's Hospital of Chicago)
Melissa received her Master of Science in Clinical Exercise Physiology from Eastern Illinois University in 2002 and has been certified through the American College of Sports Medicine as an Exercise Physiologist since 2003. Her clinical experience is focused within the specialty areas of pediatric cardiology and pediatric pulmonary medicine. Melissa has developed and grown Children's Memorial, now Lurie Children's, clinical internship programs for undergraduate and graduate exercise physiology students and acted as a direct preceptor during student rotations. As a part of the Lurie children's physiology team, Melissa has developed and implemented multiple exercise physiology specialty programs which include preventive exercise physiology and pediatric inpatient and outpatient cardiopulmonary rehabilitation. She has experience as a clinical speaker for Lurie Children's Hospital education seminars, along with cardiology fellowship and advanced practice nursing presentations regarding cardiopulmonary exercise testing, interpretation and protocols. Prior experience involves exercise prescription for healthy populations, geriatric exercise programming and adult diagnostic testing. Melissa's current career path has transitioned to the administrative side of the field as a manager for the cardiopulmonary labs at Lurie Children's Hospital.

Neil McMillan (University of Illinois at Chicago)

Jake Tudorica (Ann & Robert H. Lurie Children's Hospital of Chicago)
Jake Tudorica received a Master of Science degree in Clinical Exercise Physiology from Benedictine University in 2014. He is currently employed Edward Hospital in Naperville, IL in the Cardiac Diagnostics department as well as in the Exercise Stress Testing Lab at Lurie Children's Hospital. Working in both healthcare organizations has allowed him to become an expert in both adult stress testing as well as pediatric stress testing. He is also an adjunct professor at Benedictine University in the Clinical Exercise Physiology Master's Program as well as at North Central College in the Exercise Science program.

Dr. Kendra Ward (Ann & Robert H. Lurie Children's Hospital of Chicago; Northwestern University). Dr. Ward is a leading expert in the fields of pediatric cardiology and electrophysiology, and her clinical responsibilities include following pediatric and adult congenital patients with complex arrhythmias. Additionally, she has developed outreach and clinical programs focused on exercise medicine, exercise testing, and cardiac rehabilitation. Her work is aimed at determining appropriate exercise parameters for children with heart disease, cardiac changes from intense sports training, and exercise prescription in pediatric cardiac rehabilitation settings. Her preventive cardiology clinical work focuses on hyperlipidemia, obesity, and hypertension in pediatric patients. Dr. Ward has an extensive publication record in the areas of pediatric exercise testing responses and provider perspectives of preventive screening programs for these patient groups, and has presented both case studies and the results of her research at regional and national conferences.

Learning objectives:
At the conclusion of the symposium, the audience should be able to:

1) Identify pediatric specific differences in exercise physiology
2) Understand the need for contemporary, standardized reference values for cardiopulmonary exercise testing in pediatric patients
3) Understand billing and coding challenges for pediatric exercise programs
4) Identify limitations to exercise in children with sickle cell anemia
5) Discuss challenges and opportunities in exercise testing and program development for children with acquired and congenital heart disease

Symposium Description:
The pediatric patient population provides novel challenges and opportunities for clinical exercise testing and exercise medicine programs. The patient cohort is diverse with developmental and physiologic variation and different disease states than those seen in the adult patient population. This symposium includes a panel of pediatric exercise physiologists, researchers and physicians from the Ann & Robert H. Lurie Children's Hospital of Chicago and collaborating institutions with expertise in this complex pediatric patient population. This symposium will consist of two presentation blocks. Block A will focus on pediatric specific differences and challenges of cardiopulmonary exercise testing and program development. Block B will include presentations on innovative exercise research, testing and programming to address the unique needs of diverse pediatric patient cohorts. Specific topics to be covered include:

Block A: Pediatric Specific Considerations: (45 minutes)

- Children are Not Little Adults: Important Differences in Pediatric Cardiopulmonary Exercise Testing (Jake Tudorica and Taylor DePaola)
    - This presentation will highlight differences between cardiopulmonary exercise testing in pediatric and adult patients. Presenters will discuss developmental and physiologic differences in the pediatric population. We will review specific information to be obtained from each pediatric exercise test. Additionally, there will be a discussion of the impact of the varied congenital disease physiology on test results and data compared to healthy peers.

- Pediatric Cardiopulmonary Exercise Testing Reference Values (Garett Griffith)
    - Efforts have been made to standardize reference data sets for adult cardiopulmonary exercise testing and cardiorespiratory fitness data. Indeed, the ACSM has adopted such objectively obtained data as reference values in recent editions of the *Guidelines*. Cardiopulmonary exercise testing in pediatric patients can provide clinically important outcome information, and reference data are needed to help health care providers interpret tests. This presentation will focus on preliminary data from a cardiopulmonary exercise testing database and discuss efforts to create a pediatric registry.

- Coding, Billing and Insurance Coverage: Overcoming Administrative Challenges in the Pediatric Population (Melissa McMahon)

- This presentation will discuss the barriers and present solutions to overcome the obstacles associated with securing coverage for pediatric patient services.

Block B: Innovative Exercise Testing and Pediatric Program Development (60 minutes)

- Cardiopulmonary Exercise Testing in Challenging Pediatric Patients (Kendra Ward)
  - Complex pediatric patients pose challenges to traditional exercise testing. Pediatric patients may have developmental or physical barriers to testing that require a creative approach to exercise assessment. At times there is a perplexing diagnostic dilemma and exercise testing, regardless of perceived or real obstacles to testing, is the best way to obtain critical clinical data. This presentation will highlight, via a case presentation format, some of the creative approaches we use to obtain important diagnostic and treatment information in challenging pediatric patients.

- Incorporating Exercise Evaluation, Consultation and Prescription in a Pediatric Preventive Cardiology Program (Katie Baschen)
  - This presentation will discuss how adding exercise evaluation and consultation with clinical exercise physiologists can help contribute to patients' knowledge of exercise, incorporation of exercise into lifestyle changes, and improved cardiovascular health. Age and interest specific exercise prescription approaches will be reviewed.

- Cardiac Rehabilitation in Pediatric Congenital and Myopathic Heart Disease: Moving in Unexplored Territory (Brittany Holst)
  - This presentation will help identify the benefits of pediatric cardiac rehabilitation and how to individualize programming in pediatric populations. It will include case studies and highlight effective pre- and post-assessments that can be seamlessly completed to quantify outcomes and demonstrate patient improvement.

- Exercise Responses in Sickle Cell Anemia (Neil McMillan)
  - Sickle cell anemia results in a series of pathophysiological consequences that limit participation in physical activity and exercise. This presentation will focus on data from novel research in children with sickle cell anemia, and will describe the cardiopulmonary and metabolic responses to graded exercise testing and to a multiple brief bout exercise challenge in this population.

- Wrap up and questions: (Kendra Ward + panel of speakers)
  - Summarize important points from presentations
  - Question and answer session with all speakers available for questions

<u>Symposium #4:</u> Mallard Room, 10:00-10:50am

Urgent Need for Active Transport to Enhance Health - Locally and Globally

Session Moderator: Steven Vitti, University of Illinois, Springfield
Presenters and Institutional Affiliations:

Helaine Alessio, PhD, FACSM, Miami University.
Helaine Alessio, PhD, FACSM is a Professor and Chair of the Department of Kinesiology and Health at Miami University. She serves on the ACSM's ActivEarth National Task Force and collaborates with a variety of organizations - local, regional, and national - that enhance public health by advocating for active transportation on campus, in towns, and across the country.

Robert A. Oppliger, Ph.D. FACSM.
Robert A. Oppliger, Ph.D. FACSM, is a retired faculty member and current Member of the Board of Directors for the League of American Bicyclists.

Monte Ward, American College of Sports Medicine
Monte Ward is Vice President of Government Relations for the American College of Sports Medicine.

Learning objectives:
At the conclusion of the symposium, the audience should be able to:

1. Describe current evidence showing how climate change impacts health and recognize urgency for action, particularly by professionals in the exercise and health science fields.
2. Examine and assess goals related to enhancing human health and sustainability by organizations such as ACSM, ActivEarth, EcoAmerica, Climate for Health and Bike Friendly America, with a focus on active transportation.
3. Construct and compare problem-solving strategies likely to positively impact human health, with a focus on active transportation and sustainability, that can be implemented on college campuses and communities.

Symposium Description:
This symposium is both informational and a call to action to MWACSM membership to address an emerging urgent public concern: climate change and health. It recognizes the responsibility that exercise and health science professionals have in encouraging personal, family, friends', and lawmakers' actions to address the health consequences associated with increasingly warmer and unpredictable climate worldwide. Specific strategies that promote active transportation to reduce greenhouse gas emissions and ways of becoming stewards of the environment will be explored using evidence based and innovative approaches.

ACSM and ActivEarth are partners with ecoAmerica and Climate for Health to raise awareness of the health impacts of built environments that reduce physical activity and affect climate change by increasing heat and pollution. These partnerships include collecting evidence based data about sedentary work and lifestyles, temperature related death,

illness, and air quality, and then communicating the impact of these on physical and mental health. ACSM encourages leadership among its members to promote active transportation as a climate and health solution. This includes contributing to the science, translating, and advocating at all levels (campus, city, state, national, and international) to influence healthy behaviors by personal example and shape and pass policies. This symposium is designed to provide current foundational knowledge and specific steps for members to take to become informed advocates for healthy change focusing on active transport.

Symposium #5: Mallard Room, 11:00-11:50am

Pain and perception: Two significant barriers to physical activity for Americans

Session Moderator: Dan Carl, University of Cincinnati
Presenters and Institutional Affiliations:

Cassandra Ledman, MS, ACSM CES, EIM, NASM CES Clinical Assistant Professor.
Department of Health and Kinesiology, Purdue University.
Cassandra Ledman is a Clinical Assistant Professor in Health and Kinesiology at Purdue University since July 2016. Cassandra also serves as committee member for Purdue's EIM-oc leadership team and an instructor for ACSM certification prep courses. Cassandra has over 11 years of experience as an ACSM Clinical Exercise Physiologist specializing in diagnostic stress testing, heart failure patients and cardiopulmonary rehab in the hospital setting. Cassandra is a graduate of Purdue University and Ball State University, where she obtained her M.S. in Clinical Exercise Physiology.

Damien Michel, BS, NASM CPT Graduate student.
Health and Kinesiology, Purdue University.
Damien Michel is a graduate student in The Department of Health and Kinesiology at Purdue University and is the Graduate Assistant of Fitness Operations and Services at Purdue's Recreation and Wellness Center. Damien has been a NASM certified personal trainer since July 2015 and has instructed group fitness since May 2016. Damien received his Bachelor's degree in Exercise Science and Health Promotion at Florida Atlantic University, Boca Raton, Florida.

Learning Objectives:
At the conclusion of the symposium, the audience should be able to:

- Review the
- current health status of the U.S.
- Demonstrate the role barriers play in the U.S. Health status.
- Develop a working framework and understanding of pain and perceptions as it pertains to barriers to physical activity.
- Review the current body of literature regarding lack of adherence to physical activity due to pain and perceptions, fear avoidance, the biopsychosocial model, and more.
- Understand how various populations are affected by barriers (clinical, general population, etc.).
- Learn how to prescribe exercise for pain management.
- Understand the role and scope exercise professionals play as it pertains to a client's pain experience.
- Analyze methods that can be directly applies in your practice.

Description:
The evidence indicating that participating in physical activity has positive health benefits for most healthy individuals is insurmountable. The question is why don't more people engage in physical activity even though its vast benefits are common knowledge? This can be demonstrated by the 39.8% of adults in the U.S. classified as

obese in 2016 (Hales et. al, CDC 2017). Simply knowing physical activity is good doesn't eliminate the barriers people face in their lives. Two of the most common barriers to physical activity are pain and perceptions. Fear of pain, specifically joint pain, has been rated as the #3 barrier to participating in physical activity in older adults (Crombie et.al.). In 2016, 50 million American adults were considered to have chronic pain (CDC 2016), and an estimated 80% of all people will experience low back pain at some pain in their life (Mayo Clinic). With the appropriate prescription exercise can serve as a powerful treatment for chronic pain. If the state of physical inactivity isn't addressed these conditions will continue to become more prevalent and debilitating. We as professionals have the potential to make a significant impact! This session will review the nation's current health status, define pain and perception, and explain why these are barriers for various populations. Finally, professional scope of practice will be established, and participants will develop practical techniques to implement when working with individuals afflicted by these barriers.

Symposium #6: DuPage Amphitheater, 9:00-9:50am

Measures of Insulin Resistance/Sensitivity: Influence of Aging, Obesity, and Physical (In)Activity

Session Moderator: Angela Hillman, Ohio University
Presenters and Institutional Affiliations:

Kyle Timmerman, Ph.D., FACSM
Department of Kinesiology and Health, Miami University, Oxford, OH
Dr. Timmerman is an Associate Professor in the Department of Kinesiology and Health at Miami University, and a Fellow of the American College of Sports Medicine. Prior to arriving at Miami University, he earned a PhD in Exercise Science from Purdue University, and completed a postdoctoral fellowship at the University Of Texas Medical Branch's Sealy Center on Aging. He has published more than 40 peer-reviewed manuscripts related to his research focused on physical activity, aging, inflammation, and chronic disease. His lab is currently conducting a clinical research trial funded by the National Institute of Aging. This clinical trial is exploring the mechanisms underlying the anti-inflammatory effects of weight loss and exercise training in older, overweight adults. In addition to his research, Dr. Timmerman teaches undergraduate and graduate courses on exercise testing and prescription; exercise physiology; and research methods in exercise science.

Kevin Ballard, Ph.D., CSCS, FACSM
Department of Kinesiology and Health, Miami University, Oxford, OH
Dr. Ballard is an Assistant Professor in the Department of Kinesiology and Health at Miami University. Prior to joining the Miami faculty, he worked as a Senior Scientist in Preventive Cardiology at Hartford Hospital, completed a postdoctoral fellowship in Nutritional Sciences at the University of Connecticut, and earned his Ph.D. in Kinesiology from the University of Connecticut. He is a Fellow of the ACSM and is certified by the National Strength and Conditioning Association. The research conducted in Dr. Ballard's laboratory investigates the impact of exercise and/or dietary strategies on vascular function, oxidative stress, and cardiometabolic risk in healthy and clinical populations.

Learning objectives:
At the conclusion of the symposium, the audience should be able to:

1. Communicate the clinical significance of IR.
2. Describe advantages and limitations of various direct and indirect measures of IR/IS in humans.
3. Explain the influence of age, obesity, and physical (in)activity on select measures of IR/IS.
4. Identify factors to consider when selecting a method to measure IR/IS.

Symposium Description:
Insulin is an essential hormone whose primary metabolic action is to maintain whole body glucose homeostasis. Insulin resistance (IR) (i.e., decreased insulin sensitivity (IS)) represents a major public health problem that contributes to the pathophysiology of several prevalent cardiometabolic disorders, including metabolic syndrome, type 2 diabetes, and cardiovascular disease. Therefore, quantifying IR/IS is clinically important, particularly as the global obesity epidemic drives the increased incidence and prevalence of cardiometabolic disorders. Direct (e.g., hyperinsulinemic euglycemic glucose clamp) and indirect (e.g., oral glucose tolerance test) measures of varying complexity are currently employed to assess IR/IS in humans, each with distinct advantages and limitations. Research conducted in our lab and others have investigated the influence of aging, obesity, and/or physical (in)activity on various measures of IR/IS. Thus, the **purpose** of this symposium is to 1) provide an overview of common measures of IR/IS; 2) describe the influence of aging, obesity, and physical (in)activity on selected measures of IR/IS; and 3) identify factors (e.g., study population, time, cost) to consider when selecting a measure of IR/IS.

Symposium #7: DuPage Amphitheater, 10:00-10:50am

Dietary Supplement Safety and Considerations for Athletes

Session Moderator: Jake Barkley, Kent State University
Presenters and Institutional Affiliations:

Dr. Andrew Jagim, PhD, CISSN, CSCS*D. Mayo Clinic Health System, Director of Sports Medicine Research.
Dr. Jagim is currently the Director of Sports Medicine Research at Mayo Clinic Health System in Onalaska, WI. Dr. Jagim earned his Bachelor's degree in Physical Education and Exercise Science at the University of North Dakota. He went on to complete a Master's degree in Human Performance at the University of Wisconsin – La Crosse. He later completed his PhD in Kinesiology with an emphasis in Exercise Physiology at Texas A&M University, working in the Exercise and Sport Nutrition Lab. His primary research area focuses on the use of different nutritional and training strategies to improve measures of performance and health. This research has led to several publications in peer reviewed journals and he has presented at multiple national conference events. He currently is investigating changes in energy availability and body composition throughout a season in several team sport athletes.
Dr. Jagim is also a certified strength & conditioning specialist through the National Strength & Conditioning Association and a certified sports nutritionist through the International Society of Sports Nutrition.

Clayton Camic, PhD. Department of Kinesiology and Physical Education, Northern Illinois University.
Clayton L. Camic received a BS (2001) degree in Exercise Science from Morehead State University, MS (2003) degree in Exercise Physiology from the University of Wyoming, and PhD (2011) degree from the University of Nebraska-Lincoln. He is currently an Associate Professor in the Kinesiology and Physical Education Department at Northern Illinois University. His main research interests include nutritional supplements as ergogenic aids and the evaluation of muscle function and fatigue using electromyography.

Learning objectives:
At the conclusion of the symposium, the audience should be able to:

- Describe the prevalence of dietary supplement use among athletes and common reasons for use
- Describe current literature regarding the safety of acute and long-term use of dietary supplements
- Describe risks of inadvertent doping in athletes
- Identify specific dietary supplements which may be associated with a higher risk of adverse events
- Identify key features to look for when choosing or recommending a dietary supplement

Symposium Description:
As new dietary supplements are released to the market, it is important for consumers, particularly athletes, to be aware of any safety concerns regarding product consumption and the risk of a failed drug test, if participating in a drug-tested sport. The majority of sport organizations and the respective overseeing regulatory agency tend to have strict guidelines for banned ingredients and performance enhancing drug use. The focus of the current symposium will be on dietary supplement safety and considerations for use among athletes. We will highlight the current body of literature regarding the impact of acute and long-term supplementation on markers of clinical health. We will also define and summarize the risk of inadvertent doping among athletes. Lastly we will provide practical recommendations when it comes to deciding whether or not to recommend a dietary supplement to an athlete and key safeguards to look for when selecting a specific product.

Symposium #8: DuPage Amphitheater, 11:00-11:50am

Caffeine and resistance exercise: Effects on performance and practical applications

Session Moderator: Abby Peairs, University of Cincinnati
Presenters and Institutional Affiliations:

Stacie Humm, M.S., Kent State University
Mrs. Humm is a PH.D. student at Kent State University. She holds an MS in Exercise Science from Northern Michigan University. She is currently working as part of the Cardiovascular Dynamics Laboratory at Kent State University under Dr. J. Derek Kingsley. She is also the Recreation Programs and Facilities Manager at Kent State University at Stark. In her spare time she participates in ultra-endurance trail races and raises chickens.

J. Derek Kingsley, Ph.D., FACSM, Kent State University
J. Derek Kingsley, Ph.D., FACSM is an Associate Professor in the Exercise Science/Physiology program at Kent State University. He completed his doctorate in Exercise Physiology at Florida State University. He is certified by the American College of Sports Medicine and the National Strength and Conditioning Association. The research conducted in his laboratory, the Cardiovascular Dynamics Laboratory, investigates the effects of resistance exercise and resistance exercise training on autonomic and vascular health.

Learning objectives:
At the conclusion of the presentation, individuals will be able to:

1. Understand the ergogenic mechanisms of caffeine ingestion.
2. Describe the effects of caffeine on strength, endurance and power.
3. Explain caffeine's effect on delayed-onset muscle soreness, and skeletal muscle damage.
4. Describe caffeine's effect on the cardiovasculature.
5. Timing, dosing, and
6. maximizing the effects of caffeine for performance.

Symposium Description:
Caffeine is the world's most commonly consumed drug. Furthermore, caffeine has been shown to have a positive effect on aerobic exercise performance, and metabolism. However, there remains a fair amount of ambiguity when examining the literature on caffeine and resistance exercise. To date, numerous studies have explored the effects of caffeine on muscular strength, endurance, power, pain perception, and skeletal muscle damage. While the effects on the cardiovasculature are less clear, data are emerging. It is also important to understand how to maximize the effects of caffeine, as studies have utilized different timing strategies, as well as different doses. Therefore, it is the

goal of this symposium to thoroughly discuss the literature on the topic, and to provide useful, practical guidelines for the use of caffeine in conjunction with resistance exercise.

Symposium # 9: Oak Brook Room, 8:00-8:50am

CLASSROOM PHYSICAL ACTIVITY BREAKS: GOODNESS TOO GREAT TO IGNORE; PE's NOT ENOUGH ANY MORE

Session Moderator: J. Derek Kingsley, Kent State University
Presenters and Institutional Affiliations:

Nicole Mullins, Ph.D., ACSM EP, NSCA CSCS. Youngstown State University, Youngstown, Ohio.
Nicole Mullins, PhD, is a professor of exercise science, in the Department of Kinesiology and Sport Science, at Youngstown State University, where she has served since 2002. She is an ACSM Certified Exercise Physiologist (EP), and an NSCA Certified Strength and Conditioning Specialist (CSCS). She earned her B.S. in exercise science from the University of New Hampshire, and her M.A. and Ph.D. in exercise physiology from Kent State University. Her more recent research interests involve physical activity advocacy, effects of gender socialization on physical activity, and the psychology of sport, exercise, and health-related behaviors.

Learning objectives:
At the conclusion of the symposium, the audience should:
1) Understand the importance, components, and objectives of Comprehensive School Physical Activity Programs (CSPAPs)
2) Recognize CPABs as a vital component of CSPAPs
3) Understand the benefits, barriers, and recommendations relating to CPAB program implementation
4) Feel capable of establishing a collaborative CPAB program between undergraduate kinesiology departments and local schools.

Symposium Description:
Current physical activity (PA) guidelines recommend that children accumulate at least 60 minutes of PA each day and that adults should collaborate across sectors to increase opportunities for PA. Implementing brief classroom PA breaks (CPABs) is one way to help increase daily PA. **PURPOSES:** 1) To present a model of positive collaboration and effective CPAB program implementation, which can beneficially serve elementary school students, teachers, and administrators, undergraduate kinesiology students, and numerous constituents seeking to advance national PA goals. 2) To present findings on the perceptions of a CPAB program among elementary school children, in the first through fourth grades (N=254), at a suburban elementary school, and their teachers (N=18). **SPECIFIC OBJECTIVES:** To enhance awareness of: 1) the importance, components, and objectives of Comprehensive School Physical Activity Programs (CSPAPs); 2) CPABs as a vital component of CSPAPs; 3) the benefits, barriers, and recommendations relating to CPAB program implementation; 4) the benefits of increased collaboration among exercise science programs and local schools. **METHODS:** The CPAB program was implemented by university exercise science students, over the course of three academic semesters, and student and teacher perceptions were surveyed at the end of the second, following 14 consecutive weeks of the program. **RESULTS:** The children reported that the CPABs were very fun (86%), provided them with a nice break during the school day (88%), were very good for their health (94%), helped them feel more ready to learn (71%) and learn better (50%). The teachers reported that the students really enjoyed the CPABs (100%), that encouraging students to be physically active was either very important (83%), or important (17%), and that they were either very confident (72%), or confident (28%) that they themselves could lead the CPABs. No teacher reported that the CPABs hindered classroom learning. **CONCLUSIONS:** CPABs appear to be enjoyable for both students and teachers, easy to administer, and supportive of learning. Recommendations for improvements within the present collaboration were minimal and could be easily addressed with firmer entrenchment of the program. This collaboration was beneficial and fun for the vast majority involved and others are urged to implement similar programs.

<u>Symposium #10:</u> Oak Brook Room, 9:00-9:50am

Allied Health Students' Perceptions on Preparation to Administer Spiritual Care to Future Clients/Patients

Session Moderator: Brad Kendall, Taylor University
Presenters and Institutional Affiliations:

Sue Walsh PhD., ATC. Associate Professor, Exercise and Sport Science, Department Chair. Concordia University Chicago.
Sue Walsh is an Associate Professor and Chair of the Exercise and Sport Science Department at Concordia University Chicago, CUC. She has served CUC for 18 years teaching several courses including anatomy and physiology, biomechanics, fitness and wellness, kinesiology, and sports injury courses. A Certified Athletic Trainer since 1998 and an expert in the areas of athletic injuries and wellness, she also teaches first aid and CPR. Previously, Professor Walsh worked as an Athletic Training Education Program Director at Olivet Nazarene University.
Her clinical interests are in the area of sports medicine and her research interests are in the area of health and wellness in college students. She loves juggling, reading, traveling and biking in her free time. She lives in the Chicagoland with her husband KC and their two teenage boys.

April Crommett Ph.D., C-EP. Exercise Science Program Director, Kinesiology and Allied Health Department, Cedarville University
Dr. Crommett serves as the program director for the exercise science program in the Department of Kinesiology and Allied Health. She is the director of the exercise physiology laboratory and serves as faculty advisor to the student organization Health And Fitness Association (HAFA). Dr. Crommett is a member of the American College of Sports Medicine and the Christian Society of Kinesiology and Leisure Society. Her interest areas include bariatrics and the relationship between spirituality and health.

Learning objectives:
At the conclusion of the symposium, the audience should be able to:

1. Understand the current trends in spiritual care of patients
2. Understand the perceptions of Allied Health students on spiritual care of their future clients/patients
3. Gain insight on how Allied Health Students feel about their "Spiritual Care" instruction as part of their education curriculum

Symposium Description:
Allied Health programs provide students with learning environments that prepare them for their role as health care professionals and successful completion of national certification exams, boards and licensure. Allied Health Education Programs provide curriculum that often includes: emergency care, risk identification, evaluation, rehabilitation, fitness conditioning, dietary/nutritional services and prevention of diseases and disorders. Often found in the Nurse Model but overlooked within the majority of Allied Health Education Programs and of newer importance is the recognition of the link between health care and spirituality, thus serving the whole person.

In 2011, an article titled *Perceptions of Clinical Athletic Trainers on the Spiritual Care of Injured Athletes* was published in the Journal of Athletic Training. The article states that "82.4% of the respondents agreed that addressing spiritual concerns could result in a more positive therapeutic outcome for the athlete, but that the practicalities of how to evaluate, acquire skills in, and practice spiritual care were unresolved."

To shed light on this immerging topic of spiritual care in Allied Health fields, we will present the results of surveys given to Allied Health students addressing their perceptions of Allied Health Education Programs including "spiritual care" as part of their instruction and preparation for client care.

Schedule – Friday Morning: Free Communication / Slides

Free Communication/Slides #1: Mallard Room, 8-9:00am

Session Moderator: Trent Cayote

8:00-8:15am

EXAMINING PARENTING MEDIATORS IN THE RELATIONSHIP BETWEEN PARENT DEPRESSION AND CHILD ACTIVITY & BMI

Catherine Gammon[1], Christine Pacewicz[2], Amy K. Nuttall[3], Karin A. Pfeiffer, FACSM[3]. [1]Eastern Michigan University, Ypsilanti MI, [2]Saginaw Valley State University, Saginaw MI, [3]Michigan State University, East Lansing MI.

Low levels of compliance with physical activity (PA) guidelines in youth suggest a need to identify predictors of PA. One important predictor of child behavior is the family. Research reports weak or moderate associations between PA-specific parenting practices (e.g., encouragement and modelling of PA) and youth PA, yet few studies have explored the influence of parent's mental health (e.g., depression) and general parenting behaviors on youth (in)activity. **PURPOSE**: Examine if the direct association between parent depressive symptoms and child activity behaviors and BMI is mediated by maternal encouragement of youth PA and maternal modelling of pro-social behaviors. **METHODS**: Data came from the Study of Early Child Care and Youth Development. A sample of 1,081 youth (50% female) were examined. Measures were paternal and maternal depressive symptoms (Center for Epidemiological Studies Depression Scale), maternal encouragement of PA ("during a typical week, how many days do you encourage your child to exercise, or be physically active?"), maternal modelling of prosocial behaviors (Home Observation for Measurement of the Environment Inventory), accelerometer-measured PA, self-reported TV time, and clinician-measured child BMI. An indirect effects model was examined for the total sample and for males and females separately to explore if parenting variables assessed when children were 10 years old mediated the relationship between parent depressive symptoms (at 8 years) and BMI (at 11 years). **RESULTS**: There were no significant indirect effects of parent depressive symptoms on PA or TV time. There was a negative indirect effect of parent depressive symptoms on BMI, via maternal modeling of pro-social behaviors, estimated to lie between 0.001 and 0.008 with 95% confidence. This result held when boys and girls were modeled separately. **CONCLUSION**: Parent depressive symptoms played a small role in explaining increased BMI among youth via maternal modeling of prosocial behaviors. Lack of a similar indirect effect for PA and TV time indicates that dietary factors may be responsible for the effect on BMI. As the indirect effects were small, other family variables should be explored to identify additional intervention strategies to promote meaningful public health gains.

Keywords: Physical activity, TV time, longitudinal, accelerometer

8:15-8:30am

ARE PHYSICAL ACTIVITY QUESTIONNAIRES RELIABLE AND VALID IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA?

Max W. Adolphs and Anthony S. Kaleth FACSM. Indiana University Purdue University – Indianapolis, Indianapolis IN.

Efforts to encourage the medical community to prescribe exercise for disease prevention and management have increased significantly in recent years. In patients with obstructive sleep apnea (OSA), it is encouraging that exercise has been shown to improve sleep efficiency, daytime sleepiness, and disease severity. However, in order to better understand the dose-response relationship between exercise and OSA-related outcomes, accurate and reliable methods for assessing physical activity habits are needed. **PURPOSE**: To determine the test-retest reliability and validity of two self-report physical activity questionnaires [Physical Activity Vital Sign (PAVS); International

Physical Activity Questionnaire-Short Form (IPAQ-SF)] in an OSA population. **METHODS**: 39 adults with moderate-to-severe OSA wore an accelerometer for seven consecutive days and completed the PAVS and IPAQ-SF (twice within 10 d), along with questionnaires on quality of life, sleepiness, and treatment adherence. Test-retest reliability was determined using intraclass correlation coefficients (ICC). Criterion and construct validity were determined using Pearson (*r*) and Spearman correlation coefficients (*p*), respectively. **RESULTS**: PAVS and IPAQ-SF scores were reported as total min/wk of moderate-vigorous physical activity (MVPA). Test-retest reliability for MVPA was excellent for PAVS (ICC = .982) and good for IPAQ-SF (ICC = .766). MVPA assessed via accelerometry was strongly correlated with PAVS (*r* = .802) and moderately with IPAQ-SF (*r* = .569). Both PAVS and IPAQ-SF were significantly correlated with body mass index (BMI) (*p* = -.273 and -.268, respectively), but no other variables. **CONCULSION**: The PAVS and IPAQ-SD are reliable and valid PA questionnaires and may be utilized as a tool for accurately assessing physical activity levels in OSA patients.

Keywords: Accelerometry, Adults, Exercise Prescription

8:30-8:45am

IN SEARCH OF AN EXERCISE PLACEBO: ACTIVE VS PASSIVE CYCLING

Madeleine Denton[1], Jennifer Sroka[1], Carmen Orozco[1], Gabrielle Jones[1], Daniel R. Greene[2], Steven J. Petruzzello, FACSM[3], Kathryn M. Rougeau[1]. [1]Oakland University, Rochester MI, [2]Augusta University, Augusta GA, [3]University of Illinois at Urbana-Champaign, Urbana-Champaign IL.

An acceptable placebo for exercise has been elusive, particularly as it relates to affective responses. **PURPOSE:** To compare the psychological responses to motor assisted (passive) cycling (PC) vs usual (active) cycling (AC). It was hypothesized that there would be no difference in affect between conditions from Pre to Post-0 or Post-10, but AC would be perceived as more enjoyable than PC. **METHODS:** Heart rate (HR), Rating of Perceived Exertion (RPE), and affect [Calmness, Tension, Energy, Tiredness, State Anxiety (SA)] were recorded in 49 (16 male; 22.1±3.2 yrs, *M*±*SD* age) participants before, during and after each (PC, AC) 25-min cycling bout. Each session consisted of identically paced warm-ups (5-min@35 r·min^{-1}), exercise bout (15-min@60 r·min^{-1}), and cool-down (5-min@35 r·min^{-1}). **RESULTS:** Enjoyment was greater following AC (M_{diff}±*SE*= 13.64±3.42, *P*< 0.001; *d*= 0.62) relative to PC. During AC, participants had higher HR (M_{diff}±*SE* = 9.07±4.09, *P*= 0.031; *d*= 0.38) and reported greater RPE (M_{diff}±*SE* = 1.13±0.31, *P*= 0.001; *d*= 0.58) relative to PC. RPE was greater at all times during AC (all P_s< 0.001, except for warm-up and cool-down). During AC, HR increased (Ps<0.004) at 5, 10, and 15-min. HR was still increased during cool-down (*P*=0.012). HR was unchanged during PC. Energy (*P*=0.013; *P*=.003) and Calmness (*P*<.001; *P*=.001) increased, while Tension (*P*=0.001; *P*=.001) and SA (*P*<.001; *P*=.003) decreased following AC and PC respectively. There were no differences between AC and PC. **CONCLUSION:** As predicted, enjoyment was increased only following AC. Affective responses to passive exercise remain unclear. The present results revealed decreases in SA regardless of condition, which may stem from elevated perceptions of effort during both PC and AC or from expectancies of affective change. This novel study provides evidence that passive exercise may be as beneficial as active with regards to certain affective responses.

Funding: University Research Committee Faculty Research Fellowship
Keywords: affect

8:45-9:00am

RELATIONSHIPS AMONG MOTIVATION TYPE, ACADEMIC ACHIEVEMENT, AND COLLEGE ATHLETE STATUS

Reagan E. Moffit, Samantha J Deere, Rebecca A Schlaff, Meghan Baruth. Saginaw Valley State University, Saginaw MI.

Previous literature indicates a relationship between motivation type and college student GPA in the general college student population. However, college student-athletes likely experience college differently than non-athletes. Further, a student-athlete's motivation to attend college may differ from that of a non-athlete. The relationship between motivation to attend college and college student GPA has not been well studied, particularly in the college student-athlete population. **PURPOSE:** To evaluate the differences in GPA 1) between student-athletes and non-athletes and 2) among motivation types to attend college. In addition, this study aimed to 3) investigate motivation to attend college as a moderating variable in the relationship between student-athlete status and GPA. **METHODS:** Participants were recruited through a health-related college and athletic program at a NCAA Division II Liberal Arts

College in the Midwest and were asked to complete an online survey (n=209). Multiple demographic variables were assessed. In addition, students were asked to report athlete status (current athlete, yes/no), college cumulative GPA (4.0 scale), and to complete a modified version of the American Motivation Scale College Version (AMS-C). A primary motivation type was identified based on the AMS-C results. Motivation types with small sample sizes were combined together. Means, standard deviations, and percentages were calculated for all variables of interest. Independent samples t-test, ANOVA and ANCOVA were used to assess purposes 1, 2, and 3, respectively. **RESULTS:** The majority of students were freshmen (33.5%), female (75.1%), and white (90.4%). On average, students reported a college cumulative GPA of 3.42□0.43. Most students identified as extrinsically motivated (82%), 6% identified as intrinsically motivated, 12% identified as both, and no participants identified as amotivated. No differences were found in GPA between athletes (3.43□0.42) and non-athletes (3.41□0.44), p=0.70. No differences were found in GPA among motivation types, p=0.751. The interaction between motivation type and athlete status did not significantly relate to GPA (p=0.447). **CONCLUSION:** Athlete status and motivation type do not relate to self-reported college student GPA. Future research should investigate these relationships in a more heterogeneous sample. Further, it is important to continue to investigate extrinsic motivation in college students and its influence on academic success.

Keywords: GPA, student-athlete, Division II, survey

Free Communication/Slides #2: Mallard Room, 9-10:00am

Session Moderator: Paul Nagelkirk, Ball State University

9:00-9:15am

ACUTE PERCEPTUAL RESPONSES TO INDIVIDUAL AND GROUP-BASED HIGH-INTENSITY INTERVAL EXERCISE IN GIRLS

Jeanette M. Ricci[1], Todd A. Astorino, FACSM[2], Katharine D. Currie[1], Karin A. Pfeiffer, FACSM[1]. Michigan State University, East Lansing MI, California State University - San Marcos, San Marcos CA.

Engaging in vigorous-intensity physical activity (VPA), such as high-intensity interval exercise (HIIE), elicits greater health benefits than moderate-intensity PA. However, predictors of PA adherence such as affect and enjoyment are rarely assessed during HIIE in children. **PURPOSE:** To assess acute perceptual responses to single sessions of treadmill-based HIIE (TM) and body-weight resistance exercise circuit (CIRC), performed individually and in a group setting, in active girls. **METHODS:** Fifteen girls (age = 9.2 +/- 1.1 years; body mass index 52.3 +/- 28.6 percentile) completed a graded exercise test to determine maximal aerobic speed (MAS). TM and CIRC were performed separately on two days in a randomized and counterbalanced order, and then CIRC was completed in a small group (group CIRC). TM involved eight, 30s sprints at 100% MAS and 30s of active recovery at 40% MAS; whereas, CIRC consisted of 4 exercises performed twice 'all out' for 30s with 30s of active recovery. Perceived exertion (RPE, range 0-10), affective valence (Feeling Scale, range -5 to +5), and exercise enjoyment (facial scale, range 1-4) were recorded at pre-exercise, 38%, and 75% of protocol completion, and post-exercise. Participants also completed surveys encompassing exercise enjoyment (PACES, range 16-80) and positive and negative affect (10-item PANAS) prior to the exercise test and at 15 minutes post-exercise following each protocol. Differences in outcome measures were compared with repeated measures ANOVA. **RESULTS:** RPE increased significantly during exercise (p<0.001). Affective valence and enjoyment were unchanged during exercise (P>0.05) and similar between protocols (P>0.05). Mean affective valence and exercise enjoyment at post-exercise were equal to +3 +/- 2 and 3 +/- 1 (TM) respectively, +3 +/- 2 and 3 +/- 1 (CIRC), and +4 +/- 2 and 4 +/- 1 (group CIRC). Mean exercise enjoyment (PACES) at baseline was 69 +/- 10 with no significant change post-exercise for enjoyment (P=0.48) or positive and negative affect (P>0.05). **CONCLUSION:** Despite an exercise-induced increase in RPE, affect and enjoyment were unchanged during all protocols, suggesting that HIIE elicited favorable perceptual responses. Data from group-based HIIE highlights that it may be a feasible strategy to promote VPA in school or youth sport settings.

Funding: Midwest American College of Sports Medicine Student Research Project Award
Keywords: exercise enjoyment, affect, perceived exertion, children

9:15-9:30am

EXPERIENTIAL ATTITUDES ASSOCIATION WITH HEALTH MARKERS AND ABILITY TO PREDICT PHYSICAL ACTIVITY

Emily J. Van Wasshenova[1], Debra Boardley[2], Andrew L. Geers[2], Andrew T. Tull[2], Victoria Steiner[2]. [1]Oakland University, Rochester MI, [2]University of Toledo, Toledo OH.

PURPOSE: The Integrated Behavioral Model (IBM) incorporates two constructs for attitude: instrumental and experiential. Recent research has shown a direct association between positive experiential attitudes and physical activity in adults. Understanding the role experiential attitudes in older adults with chronic conditions could be used to develop effective programs to increase physical activity. The purpose of the current study was to 1) examine the association of positive experiential attitude and markers of health and 2) determine constructs from the IBM that predict physical activity behavior in older adults. **METHODS:** This cross-sectional study collected data in independent living facilities and senior citizen centers in the Midwest. The survey assessed IBM constructs and self-reported physical activity behavior in older adults (n = 98). Blood pressure, heart rate, body mass index, body fat percentage, and aerobic endurance level were objectively measured. Pearson correlations were used to determine associations between positive experiential attitudes and health markers. Multiple linear regression was performed to assess the ability of the IBM constructs to predict physical activity behavior. **RESULTS:** The majority of participants in the sample were female (69.4%) and White (93.9%) (*M* age = 77.57). Positive experiential attitudes were negatively correlated with body mass index (r= -.23), body fat percentage *(*r= -.24) and positively correlated with aerobic endurance (r= 0.63), and physical health (r= .26) (p <0.05). The model accounted for 30.9% of the variance in physical activity behavior (p<0.001). Intention was a significant predictor of physical activity behavior (β= .216, p<0.001). **CONCLUSION:** Blood pressure and heart rate did not show a correlation to positive experiential attitudes; this may be due to the use of anti-hypertensive medications. Consistent with the IBM, intentions predicted physical activity behavior. Unlike reported findings in younger populations, positive experiential attitudes.

Keywords: IBM, older adults

9:30-9:45am

STUDENT PHYSICAL ACTIVITY AT A UNIVERSITY RECREATION CENTER: UNDERSTANDING THE WHY BEHIND THE WHAT

Lauren E. Falasca, Tariq A. Amireh, Sara F. Michaliszyn, Nicole M. Mullins. Youngstown State University, Youngstown OH.

Abstract: Personality traits have been associated with various health-related behaviors, including physical activity (PA) and sports participation. Much of the previous research has been conducted under the premise that personality traits influence behaviors, but some now suggests bidirectional associations, such that behaviors may also contribute to changes in personality. **Purpose**: This study aimed to explore relationships between individuals' "big five" personality traits and their types, intensities, and durations of recreational PA engagement, and their motives and barriers to PA participation. **Methods:** Participants were undergraduate students (mean age 22.6 y ± 6.9), predominantly males (66.7%), exercise science majors (42.8%), and employed students (66.6%). Volunteers completed two questionnaires upon exit from the university recreation center: 1) the IPIP-NEO-120, a validated, 120-item questionnaire used to assess the five broad domains of personality, as conceptualized in the five-factor model, and 2) an instrument designed specifically for this study to assess demographics, PA participation and preferences, motivations, and barriers. Participants completed the electronically formatted surveys, using tablets, during the Fall 2019 academic term, at morning, afternoon, and evening times. **Results:** Consistent with previous research, those participating in PA were high in extraversion and conscientiousness, and low in neuroticism. There was a positive association between longer durations of physical activity and extraversion (r=0.44, p=.046) and agreeableness (r=0.47, p=0.034). In multiple regression analysis, friendliness (r^2= 0.46) and cheerfulness (r^2= 0.29), two of the six subdomains of extraversion, explained 75% of the variance in physical activity duration. **Conclusion:** Findings extend evidence that extraversion and conscientiousness appear to be important to PA participation. Additional research is needed to further elucidate the effects of personality traits and their subdomains on PA behaviors.

Keywords: personality, five-factor model, big five, college students

9:45-10:00am

EFFECTS OF EXERCISE DESKS ON ACTIVITY AND READING SKILLS YOUTH WITH NEURODEVELOPMENTAL DISORDERS

Megan Kulisek[1], Hannah Crites[1], Kathleen Aspiranti[2], Sara F. Michaliszyn[1]. [1]Youngstown State University, Youngstown OH, [2]University of Kentucky Lexington KY.

PURPOSE: Physical activity improves cognitive function and academic achievement, although many youth remain sedentary during school. Exercise desks may be advantageous to improving physical activity as it does not require any teacher education and does not jeopardize time spent on academic instruction. The purpose of this study was to determine the effect of exercise desks on levels of physical activity and classroom performance in 4th and 7th grade students with neurodevelopmental disorders.
METHODS: Thirty-five children (N=13 4th grade; N= 21 7th grade) were monitored with an Actigraph accelerometer (wGT3X-BT) worn on the non-dominant wrist during school hours. Derived variables were time (minutes) in sedentary, light, and moderate intensity using published cut points. Using a repeated measures cross over design, students attended school in two different environments for 8 weeks each: traditional school with chairs and desks and a classroom designed with exercise desks composed of pedaling, a stand and spin, and accordion chairs. Students reading skills were assessed using two curriculum-based measurements: Maze Reading Comprehension and Oral Reading Fluency.
RESULTS: Weight significantly correlated with time spent in sedentary ($r = .43$; $p<0.001$), light ($r = .37$; $p<0.001$) and moderate ($r = -.46$; $p<0.001$) activity. There was a significant main effect of the activity desks on decreasing sedentary activities with a proportional increase in moderate activity once controlling for weight. A main effect for grade showed that 4th graders participated in significantly less sedentary activity and greater moderate activity compared with 7th graders. Compared to the traditional classroom, the kinesthetic classroom significantly increased reading skills in both grades although there was a trend for a slightly greater increase in 7th graders.
CONCLUSION: Exercise desks improved reading skills and decreased time spent in sedentary activities in youth with neurodevelopmental disorders. The greater decline in sedentary activity and concomitant increase in physical activity among fourth graders may suggest that older youth are less inclined to use the exercise desks.

Funding: Hine Foundation
Keywords: Classroom, Children, Kinesthetic, ADHD

Free Communication/Slides #3: DuPage Amphitheater, 8-9:00am

Session Moderator: Brian Rider, Hope College

8:00-8:15am

ASSOCIATIONS AMONG INDICES OF INSULIN RESISTANCE AND VASCULAR FUNCTION IN OLDER, OVERWEIGHT ADULTS

Kevin D. Ballard, FACSM, Vincent Smith, Gabrielle Volk, Alexandra Hopun, Olivia Henderson, Kyle Timmerman, FACSM. Miami University, Oxford OH.

Insulin resistance (IR), estimated by calculating the homeostasis model assessment of IR (HOMA-IR), independently predicts incident cardiovascular disease (CVD) events. Further, HOMA-IR is inversely associated with brachial artery flow-mediated dilation (FMD) in non-diabetics, suggesting that IR impairs vascular function that increases CVD risk in this clinical population. **PURPOSE**: We sought to determine associations among indices of IR/glucose control and vascular function in older, non-diabetic, overweight/obese (OW/O) adults. We hypothesized that brachial artery FMD and hyperemic shear rate area under the curve (SRAUC) would be inversely associated with indices of IR/glucose control. **METHODS:** Data are from 30 older (range = 58-76 y), OW/O (BMI range = 27.1-45.9 kg/m^2) adults [(22 women); age = 64.2 ± 4.7 y (mean ± SD); BMI = 34.7 ± 4.8 kg/m^2] participating in an ongoing clinical study. Brachial artery FMD and hyperemic SRAUC were measured to assess macrovascular and microvascular function, respectively. Brachial artery FMD and SRAUC were assessed by a trained technician using high-resolution ultrasonography following an overnight fast. Additionally, fasting blood

glucose (FBG), serum insulin, HOMA-IR, and hemoglobin (Hb)A1c were measured to assess IR/glucose control. Partial correlations (controlling for age and sex) were used to examine associations among these variables. **RESULTS**: Participants were insulin resistant (HOMA-IR = 3.5 ± 2.0) but not diabetic (HbA1c = 5.5 ± 0.3%). Brachial artery FMD (3.7 ± 2.2%) was not correlated with FBG (101 ± 15 mg/dL; r = -0.30; P = 0.13), serum insulin (13.7 ± 6.6 µIU/ml; r = -0.05; P = 0.79), or HOMA-IR (r = -0.03; P = 0.88), but was inversely correlated with HbA1c (r = -0.51; P <0.01). SRAUC (17,705 ± 8,583 s^{-1}) was not correlated with indices of IR/glucose control (all P≥0.06). **CONCLUSIONS:** Our data show that indices of IR/glucose control are not consistently associated with measures of vascular function in older, non-diabetic, OW/O adults.

Funding: National Institute on Aging (1R15AG055923-01)
Keywords: flow-mediated dilation; glucose; diabetes; aging; obesity

8:15-8:30am

POSTNATAL GROWTH RESTRICTION IN MICE ALTERS CARDIAC MITOCHONDRIAL ENERGETICS

Joseph R. Visker, Eric C. Leszczynski, Austin G. Wellette-Hunsucker, Jason N. Bazil, David P. Ferguson. Michigan State University, East Lansing MI.

Postnatal growth-restriction (PGR) is associated with increased risk of cardiovascular mortality. We hypothesize that nutrient restriction alters metabolism leading to cardiac failure. **PURPOSE:** To determine the effect of PGR on mitochondrial respiratory capacity (JO_2) and coupling efficiency to ATP in the heart. **METHODS:** FVB mouse dams were fed a control (CON: 20% protein), or a low-protein (LP: 8% protein) isocaloric diet 2-weeks before mating. LP-dams produce 15-20% less milk and pups nursed by LP-dams undergo growth restriction. At postnatal day (PN) 1, pups born to dams fed the CON diet were crossed to LP-dams (PUN; postnatally undernourished) or a different CON-dam. At PN21, all mice were weaned to the CON-diet. On PN22 or PN80, mice were weighed, euthanized, and hearts removed. Hearts were weighed and cardiac mitochondria were isolated via differential centrifugation. Respiration was measured through high-resolution respirometry in the presence of 5 mM pyruvate and 1 mM L-malate (PM). Two-way ANOVAs were performed with the main effects of diet (CON vs. PUN) and age (PN22 vs. PN80) to compare, body-mass, heart-mass, and JO_2. An α level of 0.05 was set *a priori*, and if necessary, a Tukey's HSD post hoc test was used for multiple comparisons. **RESULTS:** PGR caused significant diet and age effects (p<.001) on final body-mass between CON (PN22: 12.01±0.83g; PN80: 23.51±2.95g) and PUN groups (PN22: 8.45±0.61g; PN80: 21.32±3.42g). Heart-mass was also significantly reduced (p<.001) in PUN (PN22: 0.06±0.01g; PN80: 0.11±0.012g) compared to CON (PN22: 0.08±0.007g; PN80: 0.12±0.01g) across the lifespan. LEAK state JO_2 was significantly higher (p<.001) at both time-points in PUN (PN22: 46.48±4.25nmol/mg/min, PN80: 48.74±8.34nmol/mg/min) compared to CON (PN22: 36.15±5.60nmol/mg/min, PN80: 38.23±2.74nmol/mg/min). The respiratory control ratio (RCR) was significantly reduced (p=0.0005) in PUN (PN22: 7.81±0.48, PN80: 7.32±1.48) compared to CON (PN22: 9.25±0.73, PN80: 9.14±0.74). **CONCLUSION:** PGR decreased body and heart-mass across the life span and increased LEAK state JO_2 in the presence of PM, indicating mitochondrial impairment at PN22 and PN80. PGR also caused reductions in RCR, which may cause CVD, thus PGR increases CVD risk through uncoupling of cardiac mitochondria with reduced respiratory capacity. Exercise may improve mitochondrial function in PGR mouse hearts.

Keywords: heart, metabolism, high-resolution respirometry, developmental origins of health and disease

8:30-8:45am

THE IMPACT OF MECHANICAL STRAIN AND IMMOBILIZATION ON THE PERICYTE CAPACITY TO SECRETE EXOSOMES

Svyatoslav Dvoretskiy, Yu-Fu Wu, Gabriela Garcia, Christian Konopka, Lawrence W. Dobrucki, Marni D. Boppart, FACSM. University of Illinois at Urbana-Champaign, Urbana, IL.

Purpose: Our laboratory recently reported a decline in muscle-resident pericyte quantity following hindlimb immobilization, and subsequently demonstrated the capacity for pericyte transplantation to accelerate recovery of skeletal muscle mass during the rehabilitation period. The purpose of this study was to determine the extent to which mechanical strain cues can regulate the capacity for pericytes to secrete extracellular vesicles (EVs) and determine the impact of pericyte-derived EVs on the regulation of muscle mass. **Methods:** CD146+CD31-CD45- pericytes were derived from mouse hindlimb muscle using FACS and subjected to a single bout of mechanical strain in

culture (10%, 1 hour, exosome-free media). 24 hrs post-strain, CD146+ EVs were isolated from media using ultracentrifugation followed by magnetic bead sorting. Both the CD146- and CD146+ EV fractions were quantified using nanoparticle tracking analysis. EV fractions were also collected from serum of mice following acute and repeated bouts of contraction using a sciatic nerve stimulation procedure, or following unilateral hindlimb immobilization for 2 weeks. Finally, CD146+ EVs were injected intravenously and intramuscularly into mice subjected to immobilization to determine therapeutic capacity. **Results:** CD146+ EV quantity was significantly increased in media in response to mechanical strain in vitro ($P<0.05$). Serum CD146+ EV quantity was not significantly altered in response to acute or repeated bouts of contraction, yet a significant decrease was observed following hindlimb immobilization ($P<0.05$). Pericyte-derived EVs demonstrated varying capacities for muscle regrowth post-disuse based on conditions used for retrieval and administration. **Conclusion:** The results from this study suggest that CD146+ serum EVs are highly responsive to mechanical cues, and transplantation of these extracellular vesicles may possess therapeutic potential.

Funding: Supported by NIH 1 R01 AR072735-01A1
Keywords: Extracellular Vesicles, Skeletal Muscle, Disuse Atrophy, Perivascular Stem Cells

8:45-9:00am

ACUTE CHANGES IN SWEAT NaCL AND BONE MINERAL DENSITY FOLLOWING 45-MINUTES OF TREADMILL RUNNING

Alyssa M. Pollard-McGrandy[1], Kevin Weisz[2], Brian Rider[3], Adam Coughlin[4], Tamara Hew-Butler, FACSM[1].
[1]Wayne State University, Detroit MI, [2]Oakland University, Rochester MI, [3]Hope College, Holland MI, [4]Saginaw Valley State University, Saginaw MI.

Previous studies demonstrate a positive relationship between blood sodium concentration ($[Na^+]$) and bone mineral density (BMD) in ultramarathon runners and a negative relationship in walkers following an oral sodium load. The purpose of this study was to assess relationships between sweat sodium chloride concentration ([NaCl]) versus total body BMD after 45-minutes of running. We hypothesized that higher sweat [NaCl] levels would positively correlate with decreases in total body BMD. **Methods:** Seven apparently healthy male runners participated in this randomized control crossover trial, ingesting either a placebo capsule or sodium tablets (3g). Baseline blood (venipuncture), sweat (pilocarpine iontophoresis) and urine (spot sample) were collected at entry into the lab (pre-run) after a 4-hour fast. A dual energy x-ray absorptiometry (DXA) scan was then performed. After 60 minutes of rest, runners completed a 45-minute self-selected speed treadmill run, with exercise-induced sweat collected using a macroduct disk affixed to the forearm (during-run). Immediately following the treadmill run, baseline testing measures were repeated (post-run). Main outcomes included pre- to post-run changes (Δ) in sweat [NaCl] and BMD. **Results:** Seven males (29±11 years; 84±15kg; 1.8±0.1m; 25.6±3.5kg/m^2) completed the placebo arm of the trial. Non-significant ($p>0.05$) differences noted between pre-run (baseline) sweat [NaCl] (56.7±14.3mmol/L), during-run sweat [NaCl] (53.4±19.1mmol/L), and post-run sweat [NaCl] (55.9±12.4mmol/L). Non-significant post-run minus pre-run differences (Δ) noted in total body BMD (0.0±0.0g/cm^2), total body fat mass (-24.1±295.1g), total body lean mass (-785.2±235.2g) and total body mass (-810.5±397.8g) as measured by the DXA scan. Non-significant increases noted in blood $[Na^+]$ Δ (1.6±1.2mmol/L), and plasma volume (0.9±2%) with a non-significant decrease noted in urine $[Na^+]$ Δ (-12.7±7.2mmol/L). Significant relationships noted between BMD Δ versus during-run sweat [NaCl] ($r=0.96$; $p=0.001$) and sweat [NaCl] Δ ($r=-0.78$; $p=0.04$). A significant inverse relationship existed between post-run sweat [NaCl] versus post-run blood $[Na^+]$ ($r=-0.76$; $p=0.04$). **Conclusions:** Higher running-induced sweat [NaCl] was positively associated with increases in BMD after 45-minutes of running. These results were opposite of our original hypothesis but confirm that total BMD and sweat [NaCl] change dynamically during treadmill running and appear homeostatically related.

Funding: OUWB School of Medicine
Keywords: bone, sodium, osteoporosis, fluid

Free Communication/Slides #4: Oak Brook Room, 10-11:00am

Session Moderator: Alex Montoye, Alma College

10:00-10:15am

FREE-LIVING COMPARISON OF TWO GENERATIONS OF HIP-WORN TRIAXIAL ACCELEROMETERS IN COLLEGE-AGED ADULTS

Katherine L. McKee[1], Kimberly A. Clevenger[1], Alexander H.K. Montoye, FACSM[2], Karin A. Pfeiffer, FACSM[1]. [1]Michigan State University, East Lansing MI, [2]Alma College, Alma MI.

Accelerometers are frequently used to characterize habitual physical activity, but cross-generational comparability of newer monitor models has not been verified in free-living adults, which is necessary to ensure comparability among studies using different models. **PURPOSE:** To compare count- and acceleration-based metrics and activity intensity classifications between two accelerometer models in free-living, college-aged adults. **METHODS:** Participants (N=70; 45 female) wore two triaxial accelerometers (wGT3X-BT, GT9X) over the right hip for four days during waking hours. Vector magnitude (VM) counts, total counts/min in each axis, VM acceleration, mean acceleration in each axis, Mean Amplitude Deviation (MAD), and Euclidean Norm Minus One (ENMO) were calculated in 60-s epochs. Non-wear time was classified (20 minutes of zero counts), and only timestamp-matched data classified as wear time from both monitors was used for analyses. Activity intensity of each epoch was classified using VM counts, MAD, and ENMO-based cut-points to determine percent of time spent in each activity intensity. At the epoch level (each 60-s interval), correlation coefficients (Pearson's *r*) were calculated for continuous variables, while weighted Kappa was used to assess agreement for activity intensity classification. Equivalence testing was used to compare VM counts, MAD, ENMO, and VM acceleration (equivalence bounds=5% of mean), and percent of time spent in each intensity between monitors (equivalence bounds ranging from 0.5 to 4.6 percentage points, depending on the intensity) ($p<0.05$). **RESULTS:** Correlations ranged from 0.91 (anteroposterior counts/min) to 0.99 (VM) for count-based metrics, and from 0.45 (mediolateral acceleration) to 0.97 (MAD) for acceleration-based metrics. Weighted Kappa ranged from 0.71 (ENMO) to 0.93 (VM counts). Monitors were equivalent for all outcomes ($p<0.05$), except ENMO and percent of time spent in sedentary-to-light and moderate intensity activity as classified by ENMO-based cut-points ($p>0.05$). **CONCLUSION:** While epoch-level data were not identical, most outcomes were strongly related between models (e.g., MAD, VM) and equivalent once reduced (e.g., to percent of time spent in each intensity). However, monitor output was not equivalent for ENMO-related outcomes, warranting caution when comparing this outcome between accelerometer models. Future research should explore the cross-generational comparability of these models for other metrics or uses (e.g., activity type classification).

Keywords: reliability, monitor, physical activity, comparability

10:15-10:30am

EXAMINING THE ACCURACY OF TWO COMMERCIALLY AVAILABLE HEART RATE MONITORS IN A DIVERSE POPULATION

Brian C. Rider[1], Scott A. Conger[2], Caroline A. Serkaian[1], Colten Stuive[3], Alyssa Pollar-McGrandy[4], Valerie Smith-Hale[4], Adam M. Coughlin[5]. [1]Hope College, Holland MI, [2]Boise State University, Boise ID, [3]University of South Carolina, Columbia SC, [4]Wayne State University, Detroit MI, [5]Saginaw Valley State University, Saginaw MI.

Many consumer activity monitors employ optical heart rate (HR) sensors to measure HR during exercise. However, the accuracy of this technology across a range of resting and exercise intensities and on various skin colors is unknown. **PURPOSE**: The purpose of this study was to determine the accuracy of the OH1 and A370 HR monitors during periods of rest, walking/running, and active/passive recovery from exercise in a diverse population. **METHODS:** Forty-two participants (females n=20, males n=22) wore an OH1 on their dominant bicep, an A370 monitor on the opposite wrist, and a previously validated chest HR monitor (RS400) that served as the criterion measurement. Participants' skin color was categorized using the Fitzpatrick Scale. After rest periods in a supine, seated, and standing position, each participant began walking on a treadmill at a speed of 1.6 kilometers per hour (kph). Treadmill speed was increased by 1.6 kph every two minutes until participants reached volitional fatigue. Then, participants walked at 4.8 kph for two minutes followed by a seated two-minute recovery stage. HR was recorded from each device in 30-second increments. Total mean difference in HR readings, percent accuracy, and a regression were used to examine the agreement between devices. **RESULTS:** Each device demonstrated a strong correlation with the RS400 (OH1 $r^2 = 0.99$ and A370 $r^2 = 0.94$) across time points and skin color groups. However, dependent paired t-tests revealed a significant difference between devices in total mean HR (RS400:102.3 vs.

OH1:101.9 and A370:106.4 bpm, $p<0.001$). The OH1 was 88% accurate during rest, 78% accurate during exercise, and 88% accurate during recovery. The A370 was 88% accurate during rest, 39% accurate during exercise, and 73% accurate during recovery. Overall accuracy of the OH1 and A370 was 83% and 61% respectively. Skin color did not impact device accuracy. **CONCLUSION:** Both devices were accurate during rest, but the A370 both over and underestimated during exercise. Although no significant difference was observed when accounting for skin color, additional research should recruit a larger number of the darkest skin color category to further investigate the impact of skin pigmentation on optical sensor accuracy.

Keywords: watch, photoplethysmography, skin pigmentation

10:30-10:45am

METABOLIC FLEXIBILITY DURING EXERCISE IN OVERWEIGHT/OBESE CHILDREN VS. LEAN CHILDREN

Brandon J. Dykstra[1,2], Dillon J. Kuszmaul[2], Anthony D. Mahon[2]. Taylor University, Upland IN; Ball State University; Muncie IN.

Metabolic flexibility (MF) is the ability of the body to alter its reliance on fat or carbohydrate for energy purposes in response to a stimulus. Metabolic inflexibility, the inability to the body to rely predominantly on one fuel depending on the stimulus, has been associated with type II diabetes and obesity. Given the prevalence of these disorders, assessing and improving MF is important. However, MF during exercise, particularly with respect to fat metabolism, in children remains poorly understood. **PURPOSE:** This study examined MF with respect to fat metabolism during exercise in lean (n=11; 10.9±0.9 years) and overweight/obese (OW/OB; n=8; 10.4±1.2 years) children. It was hypothesized that MF with respect to fat metabolism during exercise would be impaired in the OW/OB group as indicated by reduced use of fat as an energy source. **METHODS:** Participants were grouped based on BMI percentiles for age and sex (Lean <85th percentile, OW/OB ≥85th percentile). On the experimental visit, participants completed two 20-minute exercise bouts separated by a 10-minute rest. Bout 1 consisted of 10 minutes at 50% VO_{2max} and 10 minutes at 75% VO_{2max}. Bout 2 consisted of 20 minutes at 50% VO_{2max}. Absolute fat oxidation rate (FOR; [mg·min^{-1}], FOR relative to body mass [mg·kg^{-1}·min^{-1}], FOR relative to fat-free mass [mg·kgFFM^{-1}·min^{-1}]), and proportional fat use (% Fat) were measured at 10 minutes of Bout 1 and at 5, 10, 15, and 20 minutes of Bout 2. **RESULTS:** Absolute FOR was higher in the OW/OB group (range: 121.6±57.6 to 213.7±45.7 mg·min^{-1}) than in the Lean group (81.1±32.2 to 152.2±38.2 mg·min^{-1}), however there were no main effects for group or interactions for % Fat (OW/OB: 29.0±14.4 to 51.1±8.5%; Lean: 23.9±10.9 to 41.8±6.5%), FOR relative to body mass (OW/OB: 2.4±1.3 to 4.1±0.7 mg·kg^{-1}·min^{-1}; Lean: 2.5±1.0 to 4.5±1.0 mg·kg^{-1}·min^{-1}), or FOR relative to FFM (OW/OB: 4.15±1.97 to 7.12±1.17 mg·kgFFM^{-1}·min^{-1}; Lean: 3.49±1.54 to 6.29±1.13 mg·kgFFM^{-1}·min^{-1}). **CONCLUSION:** OW/OB children in this age range do not display impaired MF with respect to fat metabolism during exercise. Future research should examine a broader range of children as well as the effects of different exercise characteristics (e.g. intensity) on MF.

Funding: This study was supported by the Ball State University ASPiRE Graduate Student grant program.
Keywords: Metabolism, Pediatrics

10:45-11:00am

DOES CAFFEINE AFFECT VERTICAL JUMP PERFORMANCE AND FREQUENCY DOMAIN MEASURES OF HR VARIABILITY?

Collin T. Garner, Nicholas Hanson, Rachel Dykstra, Tyler Dundore, Timothy Michael FACSM. Western Michigan University, Kalamazoo MI

Previous research into the effect of caffeine supplementation on anaerobic performance has produced mixed results. Additionally, the effect of caffeine ingestion on the frequency domain measures of heart rate variability (HRV) are inconclusive. **PURPOSE:** To assess caffeine's efficacy as an ergogenic aid in anaerobic performance by testing vertical jump performance and frequency domain measures of HRV. **METHODS:** Eleven anaerobically trained participants (age: 23.5 ± 1.5 years; BMI: 26.9 ± 3.9 kg/m^2) visited the laboratory twice. A 5-minute resting EKG was performed prior to a 5-minute warm-up and pre-intervention assessments of static (SJ) and countermovement (CMJ) vertical jumps. Vertical jump assessments consisted of 3 jumps on a mat with each technique. Participants rested 2 minutes between each individual jump and 5 minutes between jump techniques. Next, a placebo (flavored water) or caffeine (6 mg·kg^{-1} body mass dissolved in flavored water) treatment was administered. All participants

received both treatments in a random order. After a 60-minute absorption period, a 5-minute resting EKG, warm-up, and then post-intervention vertical jump assessments were performed. Peak power outputs were calculated from vertical jump heights. Peak vertical jump height, peak power, eccentric utilization ratio (EUR), low frequency power, and high frequency power from pre and post-intervention assessments under each condition were analyzed. **RESULTS:** Repeated measures ANOVAS were used for statistical analyses. Although mean values for peak CMJ height were 2.7cm higher when assessed following caffeine ingestion, there were no main effects of treatment, time, or jump technique on peak jump height. However, a significant interaction of time*jump technique ($p=0.001$) was found. For peak power, significant main effects of time ($p<0.001$) and jump technique ($p=0.003$) were discovered. No effect of caffeine treatment was present. There were no main effects or interactions when analyzing HRV data from pre and post-treatment resting EKG. A main effect of test on EUR was found ($p=0.001$), and no significant interactions were detected. **CONCLUSION:** These results suggest that caffeine does not significantly improve anaerobic performance or alter frequency measures of HRV. However, small performance enhancements in activities involving the stretch-shortening cycle may result from caffeine supplementation; benefitting performance during athletic competition.

Keywords: vertical jump, frequency, ergogenic aid, supplementation

Free Communication/Slides #5: Oak Brook Room, 11-12:00 Noon

Session Moderator: Helaine Alessio, Miami University

11:00-11:15am

COMPARISON OF OFF-ICE AND ON-ICE PERFORMANCE TESTS IN COLLEGIATE ICE HOCKEY PLAYERS

Jonathan A. Hamil, Michael Vorkapich, Ashley N. Triplett, James M. Pivarnik, FACSM. Michigan State University, East Lansing MI.

Ice hockey is a high-intensity sport that requires optimally performing energy systems to compete at an elite level. Typically, off-ice performance tests are used to evaluate player fitness, but little is known about their relationship to on-ice tests. **PURPOSE:** To compare performance measures, blood lactate (BL), and heart rate (HR) obtained during off- and on-ice fitness tests in collegiate ice hockey players. **METHODS:** Eleven male, collegiate ice hockey players, (age=18-24 yr; ht=1.81±0.06m, wt=85.5±5.4kg) were assessed off-ice using a discontinuous, incremental treadmill (TM) test in which 3-min run stages were separated by 90-sec rest, until players reached volitional exhaustion. The on-ice test, in full gear, was a repeated shift ability (RSA) test consisting of eight, ~22-sec stages of maximal effort skating with 90-sec rest between stages. Fatigue decrement index (FDI) was calculated by subtracting fastest from slowest RSA stage times. During both tests, fingerstick BL was obtained during rest intervals and HR was measured continuously. Spearman correlations were used to assess the relationship between TM test completion time and FDI, as well as the relationships in Stage4 BL and HRrecovery between off- and on-ice tests. **RESULTS:** TM times to exhaustion averaged 20.0±1.3 min, and RSA times averaged 22.6±0.8 sec. Corrrelations revealed no relationship between TM time to exhaustion and FDI ($r=0.007$, ns). Average HRmax during the TM tests was 193±6 $b \cdot min^{-1}$ versus highest achieved HR of 176±10 $b \cdot min^{-1}$ (91% of TM HRmax) during the RSA tests. For the TM tests, Stage4 BL and HRrecovery averaged 10.0±2.1mmol and reduction to 75±9% HRmax, respectively. For the RSA tests, Stage4 BL and HRrecovery averaged 14.2±1.1mmol and reduction to 74±4%HRmax. Stage4 TM and RSA BL values were significantly related ($r=0.70$, $p<0.05$); however, no significant relationship existed between Stage4 TM and RSA values for HRrecovery ($r=0.21$, ns). **CONCLUSION:** The lack of relationship between TM time and FDI was expected given the two tests' emphasis on different energy systems and the homogeneity of the athletes' overall fitness. The moderate to high correlation found between lactate measures, regardless of test modality, supports previous research from our lab indicating the predictive value of lactate measures on player performance.

Keywords: Athletes, NCAA

11:15-11:30am

THE EFFECTS OF HOME VERSUS AWAY TRAVEL ON URINE SPECIFIC GRAVITY IN NCAA DII VOLLEYBALL ATHLETES

Olivia M. Dean[1], Alyssa M. Pollard-McGrandy[2], Brian C. Rider[3], Adam M. Coughlin[1]. [1]Saginaw Valley State University, Saginaw MI; [2]Wayne State University, Detroit MI; Hope College, Holland MI.

Urine specific gravity (USG) has historically been utilized to classify an individual's hydration status. Road trips, with decreased willingness to drink and increased "road food" selection, may affect athletes' hydration status. Athletic performance has been shown to be affected by hydration status. **PURPOSE:** To compare urine specific gravity of home versus away weekends for DII volleyball athletes. **METHODS:** Fourteen NCAA Division II female collegiate volleyball athletes (Red-shirt = 2, Freshmen = 1, Sophomore = 7, Junior = 1, Senior = 1) participated in this study. Urine was collected in sterile cups in the hours preceding games. Collections were conducted over two weekends of play with a total of five samples being collected. All samples were collected prior to the competitions. Home competitions (HM) were Friday and Saturday. Collections for away competitions (AW) were pre-trip Friday, post-trip/pre-game Friday, and post-trip/pre-game Saturday. Participants competed against the same two teams for home and away weekends. Urinalysis was conducted via reagent strips, according to manufacturer's instructions. Data were analyzed via repeated measures ANOVA (SPSS v.24) with an a priori level of 0.05. **RESULTS:** USG during HM Friday and HM Saturday were 1.015±0.008 and 1.013±0.006, respectively. USG from AW pre-trip Friday, AW post-trip Friday, and AW post-trip Saturday were 1.011±0.007, 1.012±0.005, and 1.014±0.003, respectively. Post hoc analysis revealed no significant findings (range in p-values were 0.144-0.845). **DISCUSSION:** While no statistical significance was shown from the data analysis, there were some interesting trends. Overall, USG decreased during the HM weekend and gradually increased over the AW weekend. Only 17% of the athletes increased USG during HM weekend. However, 75% of the athletes showed an increase in USG from the time they showed up to travel Friday until pre-game on Saturday. **CONCLUSION:** Following a two-hour road trip, USG did not differ significantly between home and away games. However, some athletes showed varying changes in USG across collection time points. Further analysis has yet to be done to determine the effect on game statistics and performance.

Keywords: College Female Travel Roadtrip

11:30-11:45am

PROFILE OF MOOD STATES AND PERFORMANCE IN DIVISION I SWIMMERS

Mackenzie J. Moorman, Sarah M. Zakrajsek, Carlie Perretta, John Schuessler, Dee Sopapong, Susan Kotowski, Daniel L. Carl. University of Cincinnati, Cincinnati OH.

The Profile of Mood States is a widely used and accepted measurement of mood within sport. The self-reported questionnaire measures 6 sub-categories of emotions and a Total Mood Disturbance (TMD). Competitive swimming often involves females (F) and males (M) training together with similar training loads and training cycling but often varying team success and rest cycles related to their respective championships. Although the physical demands placed upon them are similar the perception and effect of these stress levels are not clearly defined between genders. **PURPOSE:** The purpose of this study was to compare the mood profiles of F and M swimmers throughout a competitive collegiate swim season. **METHODS:** Twenty-two females (19.1 $\pm$ 0.9 yr.) and 19 males (19.5 $\pm$ 1.0 yr.) from the University of Cincinnati swim team volunteered to participate in the study. Participants completed the short version POMS survey, based on their present mood, every other Tuesday for the duration of the competitive season. A paired T-test ($p < 0.05$) was used by gender to determine differences between week one baseline measurements through each of 9 subsequent 2-week measurements. A percentage of change summary analysis was used to compare final swim performance times relative to their previously recorded best times. **RESULTS:** Male subjects expressed TMD scores that were significantly elevated during the first month of heavy training (week 1 $p = 0.046$, week 2 $p = 0.001$) compared to female TMD scores being elevated only at the first week ($p = 0.018$). Female TMD scores were significantly lower than baseline during weeks 3 & 4 respectively ($p = 0.025, 0.027$). Female championship swim performance times were on average 0.53% slower than their previous lifetime bests while M swim performance times were 0.28% faster than their recorded lifetime bests. **CONCLUSION:** TMD scores throughout the collegiate swim season are not the same between M and F even when training load and cycling of training are the same. However, the TMD score differences remain unclear as to their effect on why the males performed substantially better at championships than the females.

Keywords: Performance, POMS, Swimming, Total Mood Disturbance

11:45-12:00pm

BONE MINERAL DENSITY AMONGST COLLEGIATE MALE ATHLETES ACROSS ENDURANCE AND STRENGTH-BASED SPORTS

Matthew S. VanSumeren, Valerie Smith-Hale, Alyssa Pollard-McGrandy, Linda Jimenez, Tamara Hew-Butler FACSM. Wayne State University, Detroit MI.

Vertical loading (i.e. jumping, running) sports exert a strong osteogenic stimulus on bone. However, the effects of non-vertical loading (i.e. strength-training) on bone are less clear. The primary aim is to compare body composition, specifically bone mineral density (BMD) and associated Z-score, in male National Collegiate Athletic Association (NCAA) athletes across five different sports. Secondary measures include lean body mass (LBM) and body fat percentage (BF%). METHODS: In this observational, cross-sectional study, five collegiate sports team athletes representing endurance-dominant (soccer, running, swimming) versus strength-based sports (football, basketball) consented to participate in a pre-season whole-body dual energy x-ray absorptiometry (DXA) scan. All scans were performed and analyzed by trained operators. One-way ANOVA (Brown-Forsythe) with multiple comparisons tests were used to statistically compare BMD (and associated Z-score), LBM, and BF% values between sports, with significance set at $p<0.05$. RESULTS: A total of 165 male athletes participated in whole body DXA scans, with ANOVA tests revealing statistical differences between sports for all body composition parameters measured ($p<0.0001$). Football players (n=99) demonstrated the highest while swimmers (n=19) had the lowest BMD (1.37± 0.10g/cm^2 vs. 1.14±0.07g/cm^2, $p < 0.001$). There were no differences ($p>0.05$) in BMD between football vs. basketball (n=16) players (1.33±0.09g/cm^2) or soccer players (N=20; 1.26 ± 0.06 g/cm^2) compared to cross-country runners (N=11; 1.17 ± 0.07g/cm^2). While BMD was similar ($p>0.05$) between swimmers and cross-country runners. In comparisons between sports for Z-scores ($F=39.73$; $p<0.0001$), football players had the highest scores (1.48±0.09) followed by basketball players (0.77±0.75), soccer players (0.42±0.77), cross country (0.00±0.57) and swimmers (-0.57±0.77). Basketball players had the highest LBM (78.7±8kg) next to football (72.0±12kg) while football had the highest %BF (24±6%) across sports. CONCLUSION: Football and basketball requires greater high intensity resistance training over endurance (vertical + non-vertical loading) training, whereas cross country, swimming and soccer requires greater endurance over resistance training. Furthermore, soccer and cross-country have similar running demands and showed no significance in BMD. We thereby believe that the osteogenic contributions of resistance training on BMD are underappreciated and warrant further investigation as a robust strategy for maximizing skeletal health in young adults.

Keywords: student-athletes, bone, resistance training, football

Schedule – Friday Morning: Poster Session

Poster Session #1: Ballrooms G-J, 8:00-9:15am

Board 1

MENTAL HEALTH, CARDIOVASCULAR RISK FACTORS, AND THE COLLEGE STUDENT

Virginia M. Leadbetter, Julie Cousins, Heather H. Betz FACSM. Albion College, Albion MI.

College is a time when many health habits, both physical and behavioral, start to form that will remain throughout one's adult life (Kemper & Welsh, 2010). It has been estimated that between 12-50% of college students have one or more of the common mental health disorders (Hunt & Eisenburg, 2010). Mental health disorders in early adulthood have been associated with long-term physical health issues (cancer, cardiovascular disease, diabetes, hypertension, asthma, etc.) that appear throughout adulthood (Scott et al., 2016). The earlier these physical health issues can be identified, the earlier various treatments (such as lifestyle modification) could be started. **PURPOSE:** To analyze the relationship between mental health status and cardiovascular risk factors in college freshmen. **METHODS:** 45 college freshmen (27 females and 18 males) were recruited from a small, liberal arts college in the Midwest. Cardiovascular risk factors (blood pressure (BP) and body composition) were measured, physical activity was self-reported, and sleep was evaluated by use of the Pittsburgh Sleep Quality Index. Mental health was evaluated by the Depression, Anxiety, and Stress Survey. The cohort was divided into three categories based on their individual mental health scores: those who scored high in all three (depression, anxiety, and stress) (n=7), those who scored low in all three (n=14), and those who had some combination of high and low (mixed) (n=24). **RESULTS:** Participants in the mixed group had significantly higher systolic BP (110.8+0.1mmHg) than those in the high (102.7+5.7mmHg) or low groups (104.9+7.9mmHg) (p=0.033). No significant differences in days/week of physical activity, hours of nightly sleep, diastolic BP, fat-free mass, fat mass, skeletal mass, or visceral adipose tissue were seen between groups. **CONCLUSION:** These differences in BP could be a result of medication (such as beta blockers), which could be the cause of the reduced BP in the group with high scores on all three mental health scales. Data on medication use was not collected in this study, but should be added to future studies. Additional research should investigate this relationship in a larger cohort so additional relationships could be explored.

Keywords: Blood pressure, Anxiety, Body Composition

Board 2

PREDICTION OF OVERALL MORTALITY BY PERFORMANCE ON A 12-MINUTE WALK TEST IN PHASE II CARDIAC REHAB

Trenton D. Pilmore[1], Todd Keylock[1], Dalynn Badenhop[2], David Tobar[1]. [1]Bowling Green State University, Bowling Green OH, [2]University of Toledo Medical Center, Toledo OH.

INTRODUCTION: Phase II cardiac rehabilitation (CR) has been instrumental in the recovery and secondary prevention of CAD. Testing functional capacity in cardiac patients is done through a cardiopulmonary exercise test (CPX). The 12-minute walk test (12MWT) may be a cost-effective alternative to CPX testing to predict mortality. **PURPOSE:** To determine if the distance walked on a 12MWT is a significant predictor variable of mortality in a group of phase II CR patients. **METHODS:** 810 Phase II CR patients completed a 12MWT prior to starting rehabilitation (pre-12MWT) and after (post-12MWT). Cox regressions were completed to determine significance of pre-12MWT, post-12MWT, and distance difference between the two on prediction of mortality. A Kaplan-Meier curve was used to determine significant changes in rate of deaths based on distance walked on a pre-12MWT. **RESULTS:** Results indicate that both pre-12MWT and post-12MWT distances were significant predictor variables of mortality [($p < .001$, $\chi2 = 37.56$) and ($p < .001$, $\chi2 = 38.93$), respectively]. The Kaplan-Meier curve had two groups. The first group were patients who walked under the median distance (<3349 ft., n = 400). The second group were those who walked above the median (>3350 ft., n = 410). Those who walked above the median distance had a significantly lower risk of mortality compared to the group who walked under the median distance ($\chi2 = 23.73$, $p < .001$). Ten years after completing CR, those who walked above the median distance (pre-12MWT) had an 89.5% survival rate while those who walked below the median had a 71.8% survival rate. **CONCLUSION**: Distance walked on a 12MWT was a significant predictor variable of overall mortality in Phase II CR patients. Walking more

than 3350 feet in 12 minutes was correlated with higher survival rates. This allows CR facilities to utilize more field tests, such as walking tests, to share critical information with patients regarding their functional capacity and mortality risk.

Keywords: Cardiac Rehab, 12-Minute Walk Test

Board 3

A REVIEW OF ANATOMICAL CHARACTERISTICS AFFECTING ANTERIOR CRUCIATE LIGAMENT INJURY RATES

Kyra Waldron and Edward Nyman, Jr. The University of Findlay, Findlay OH.

As sport training has extended to a year-round cycle the number of injuries has increased, especially anterior cruciate ligament (ACL) injuries in females. **PURPOSE:** Studies have demonstrated that females experience a two to ten times greater risk than males to suffer an ACL injury while participating in the same sport. Although these injuries have become prevalent in both contact and non-contact sports, research has yet to identify a definite reason why some people experience ACL injuries while others do not; however, researchers have determined multiple factors contributing to the increasing number of ACL injuries. Factors which may make females more susceptible than males include hormonal, neuromuscular, and anatomical differences. The focus of this literature review was on anatomical differences between those who have experienced an ACL tear and those who have not, in an effort to better classify the envelope of risk factors associated with ACL injuries. **METHODS:** EBSCOHOST system search was used to curate recent articles that focused on anatomical factors and differences. **RESULTS:** After reviewing these articles, it was concluded that anatomical characteristics of the tibia, such as the lateral compartment, medial compartment, slope, height, and length were found to be one of the major commonalities. It was also clear that women who had more anatomical factors were associated with a greater odds ratio of experiencing an ACL injury. **CONCLUSION:** These findings along with further research in the area of ACL injuries in females could be useful to predict at-risk athletes earlier as well as to better fortify injury prevention programs.

Keywords: Knee, Prediction

Board 4

GENE EXPRESSION DIFFERENCES BETWEEN 3D AND 2D SKELETAL MUSCLE CELL CULTURE MODELS

Dante D. Goss II[1], Alexander Sklivas[1], Nenad Bursac[2], Alistair Khodabukus[2], George A Truskey[2], William E. Kraus FACSM[2], Monica Hubal FACSM[1]. [1]Indiana University Purdue University Indianapolis, Indianapolis IN, [2]Duke University, Durham NC.

Purpose: Traditional two-dimensional (2D) *in vitro* models of human skeletal muscle are limited in their ability to mimic *in vivo* muscle, as *in vivo* muscle exists in a complex three-dimensional (3D) structure. We used an engineered myobundle *in vitro* model to more closely represent "normal" muscle. Gene expression in skeletal muscle can capture physiological changes due to stressors such as exercise or disease. The purpose of this study was to examine the differences between our three-dimensional *in vitro* myobundle system, a traditional two-dimensional muscle cell cultures, and muscle biopsy samples to evaluate the effectiveness of the 3D system as compared to 2D and the biopsy samples. **Methods:** Previously collected skeletal muscle (vastus lateralis) biopsy samples from adult men and women (n = 6) were used. Each sample was used to generate the following groups: explant (RNA from biopsy), 2D (RNA from differentiated myotubes) and 3D (RNA from 3D myobundles seeded from each primary sample). 200ng of isolated RNA for each sample was used to generate global gene expression profiles (HumanHT-12 v4.0 Gene Expression BeadChip Arrays). Data were processed using Illumina Genome Studio and imported into Partek Genomics Suite for statistical analysis. Differential gene expression was assessed via 2-way ANOVA (group*ID) with the following *post-hoc* comparisons: 2D/biopsy, 3D/biopsy and 3D/2D. Resultant lists were filtered at $p<0.01$ and fold change $>|1.5|$. **Results:** ANOVA detected 3754 genes different between 2D/biopsy, 3273 genes different between 3D/biopsy and 488 genes different between 3D/2D cultures. Biological pathway analysis identified representation of the following canonical pathways in our gene set: calcium signaling (26 genes; z-score=1.508, -log p-value=13.9), integrin signaling (28 genes; z-score=-2.711, -log p-value=13.5), and actin cytoskeleton signaling (29 genes; -log p-value=12.3). **Conclusion:** The 3D cell myobundle system produces fewer

differences from biopsies as compared to 2D cell cultures, but still has significant differences from biopsy samples. Comparison of 3D to 2D culture systems does show differences in pathways such as calcium signaling and extracellular matrix structure, indicating that further development of the 3D model would be useful.

Keywords: Bioengineered human myobundles, extracellular matrix structure

Board 5

NUTRIENT INTAKE AND BONE MINERAL DENSITY IN CHILDREN AND ADOLESCENTS WITH DOWN SYNDROME

Morgan Cleveringa and E. Andrew Pitchford. Iowa State University, Ames IA.

Down syndrome (DS) is a genetic disorder with an estimated prevalence of 1/700 live births in the U.S. Poor bone health, high rates of obesity, and inadequate nutrient intake are common in this population. However, the relationship between these factors have not been thoroughly considered in children and adolescents. **PURPOSE:** To compare macro- and micronutrient intake in youth with DS and typically developing (TD) youth and examine the associations between calcium and vitamin D adequacy and bone mineral density (BMD). **METHODS:** Participants with DS and TD youth were between 9 and 18 years old. Parents completed a proxy-report of the Harvard Youth/Adolescent Questionnaire (YAQ) to estimate dietary intake and macronutrient distribution. Total daily energy and macro- and micronutrient intakes were calculated from estimated frequency of consumption of various foods. Each individual underwent one whole-body dual-energy x-ray absorptiometry (DXA) scan to measure body composition and BMD. Mann-Whitney U-tests, Student's t-tests, and Cohen's d effect sizes were used to examine differences between groups in energy intake, nutrient adequacy, and DXA body composition. Associations between calcium and vitamin D adequacy and BMD were analyzed using Pearson's correlation. **RESULTS:** Participants with DS reported significantly lower total daily energy intake (p=.050, d=.70) than TD participants; however, the difference was nullified after controlling for lean body mass (p=.954, d=.06). Higher carbohydrate intake (p=.024, d=.68) and added sugar intake (p=.002, d=.94) were both observed in TD participants. No significant differences were observed in micronutrient consumption with the exception of higher reported vitamin C intake by participants with DS (p=.029; d=.75). A large effect size was observed in higher Vitamin D consumption by participants with DS (p=.051, d=.84). TD youth had higher total lean mass (p=.018; d=.75), bone mass (p <.001; d=1.29), BMD (p=.004; d=.91), and BMD z-scores (p=.004; d=.91) compared to DS participants. No significant associations between calcium and vitamin D adequacy and BMD were observed in either group (p>.05). **CONCLUSION:** While there were differences in nutrient intake between groups, no associations between dietary components, body mass, or BMD were observed in either youth with DS or TD.

Keywords: Diet, Intellectual Disability, DXA, Youth

Board 6

STRESS AND OBJECTIVELY MEASURED SEDENTARY TIME IN MAJOR DEPRESSIVE DISORDER

Tristen Williams, Maria Perez, Jacob Meyer. Iowa State University, Ames IA.

Research demonstrates a bidirectional negative relationship between stress and physical activity. Recent research has also found positive associations between stress levels and total sitting time in the general population. However, the relationship between stress and objectively measured sedentary time in populations with major depressive disorder (MDD) is unknown. This is especially important given that individuals suffering from MDD typically engage in more sedentary time compared to the general population. Additionally, breaking up sedentary time appears to lessen its detrimental effects on health. However, if prolonged bouts of sedentary time are associated with stress in MDD individuals is unknown. **Purpose** To determine the association between perceived stress and sedentary time in adults with MDD. Secondly, to determine if adults with MDD who engage in more bouts of prolonged sitting report greater stress. **Methods** Eighteen adults (age 22-57 years) diagnosed with MDD and with current symptoms of depression participated in the study. MDD diagnosis was confirmed with the Mini International Neuropsychiatric Interview and current symptoms of depression were assessed with the Beck Depression Inventory II (all>14). Stress was assessed with the Perceived Stress Scale (PSS). Total average daily sedentary time and prolonged (>60 minutes) bouts of sedentary time were objectively measured with activPAL inclinometers for one week. A Pearson correlation examined the association between perceived stress and average daily sedentary time.

An independent-samples t-test was used to determine if PSS scores were greater for those who averaged two or more daily bouts of prolonged sitting (prolonged sitters; n=9) compared to those with 0 or 1 bout (breakers; n=9). **Results** Completed data were collected on 18 adults (mean age 33 ± 7; 15 women). PSS score ranged from 13-32. The relationship between sedentary time and PSS score was not statistically significant ($p>0.05$, $r=0.08$). PSS scores were not significantly different ($p>0.05$) between prolonged sitters (23.6±6.1) and breakers (22.3±3.5). **Conclusion** In populations with MDD, sedentary time may not be associated with levels of stress. Future research is needed to confirm if intervention efforts to decrease stress in MDD individuals may be better focused on increasing physical activity rather than targeting sedentary time.

Keywords: mental health

Board 7

PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR IN "GAMERS" AND "NON-GAMERS

Bryan T. Dowdell, Peter Gates, Andrew Lepp, Jacob Barkley. Kent State University, Kent OH.

Competitive video game play (gaming) has become increasingly popular in the past decade. However, behaviors of those who actively participate in gaming ("gamers") is not well understood. Gaming is typically a sedentary activity, therefore it is possible that "gamers" may be more sedentary and less physically active than their "non-gamer" peers. Additionally, if "gamers" are less physically active and more sedentary, it is possible they may be prone to outcomes associated with an inactive lifestyle (e.g., elevated body mass index (BMI), anxiety). **PURPOSE:** To compare physical activity, sedentary behavior, BMI, and anxiety in "gamers" versus "non-gamers." **METHODS:** College students (N=337, 20.92±1.81 years old) at a large, public, university in the American Midwest completed a questionnaire that assessed demographics (height, weight, age), gaming habits (reported whether or not they identified as a "gamer" and min/week of video game play), physical activity and sedentary behavior (via the International Physical Activity Questionnaire), and anxiety (via Beck's Anxiety Inventory). A Multivariate Analysis of Variance (MANOVA) was conducted comparing these aforementioned variables in "gamers" versus "non-gamers". **RESULTS:** As expected, "gamers" (n=90, 908±621 min/week) allocated significantly ($p<0.001$) more time to gaming than "non-gamers" (n=226, 67±124 min/week). "Gamers" also participated in significantly ($p\leq0.042$) less vigorous (217±282 min/week), light (634±704 min/week) and total physical activity (4938±4111 MET min/week) than "non-gamers" (296±325 min/week vigorous, 980± 012 min/week light, and 6849±5260 MET min/week total). Additionally, "gamers" (4296±1854 min/week) allocated significantly ($p<0.001$) more time to sedentary behavior than "non-gamers" (3316±1581 min/week). There were no differences ($p\geq0.29$) between "gamers" and "non-gamers" for BMI, moderate intensity physical activity, or anxiety. **CONCLUSION:** College-aged individuals who self-identified as "gamers" reported participating in a >13-fold greater amount of weekly video game play than "non-gamers." This robust difference in time allocated to gaming was associated with lower vigorous, light, and total physical activity and greater sedentary behavior in "gamers" versus "non-gamers." This is concerning as inadequate physical activity and elevated sedentary behavior are independent risk factors for cardio-metabolic disease.

Keywords: esports, video games

Board 8

WAIST TO HEIGHT RATIO: THE UP TO DATE METHOD OF PREDICTING CHRONIC DISEASE RISK

Sadie A. Engelken, Natalie Romenesko, Sydney Breitenbach, Bradley Koch, Rodney Pintang, Jessica M. Brown. Carroll University, Waukesha WI.

Approximately 60-70% of the adult population is classified as overweight or obese, and it is estimated by 2030 adulthood obesity will increase by 33%. As obesity rates increase, there have been associated increases of comorbidities such as cardiovascular disease, cancer, and type-2 diabetes. The increasing pandemic stresses the importance for individuals and healthcare professionals to efficiently and accurately measure body composition (BC), and most importantly determine chronic disease risk (CDR). Quantifiable values are important for exercise prescription; however, CDR classifications may be more understandable to patients. There are many validated ways of obtaining BC and anthropometric measures (AM). Direct-segmental bioelectrical impedance analysis (DSM-BIA) directly measures both body and visceral fat. AM aim to yield CDR by estimating fat, mainly in the splanchnic

region. Although commonly used, inexpensive, and easy to perform, the accuracy of AM has been questioned. **PURPOSE:** The purpose of this study is to compare risk classifications between BC and AM techniques against DSM-BIA VF. **METHODS:** Males and females, 18 years and older, were recruited for a total sample size of 60. AM and BC were analyzed using body mass index (BMI), two waist circumference measurements: narrowest (nWC) and umbilicus (uWC), two waist-to-hip ratios: narrowest (nWHR) and umbilicus (uWHR), narrowest waist-to-height ratio (nWHtR), body fat percent (BF%) from three-site skinfold (SK), handheld bioelectrical impedance analysis (BIA) and DSM-BIA against DSM-BIA VF. Using consistent, numerical CDR stratification, the AM and BC values were assigned a classification. Paired sample t-tests were used to compare the CDR classifications between all measurements. **RESULTS:** When compared to DSM-BIA VF (1.40 ± 0.64), there was no statistical difference in CDR for nWHtR (1.42 ± 0.59) ($p > 0.05$). All other BC and AM were statistically different ($p < 0.05$) when compared to the DSM-BIA VF. **CONCLUSION:** Abdominal fat is a key indicator of increased CDR. The DSM-BIA should be considered by clinicians due to its accuracy in measuring both body and visceral fat. Our data suggests that out of all commonly used BC and AM, only nWHtR predicts CDR with equivalency to DSM-BIA VF. All other AM overpredicted CDR in this sample.

Keywords: Disease Risk, Anthropometric Measures, Body Composition, Waist to Height Ratio

Board 9

ASSOCIATIONS AMONG PHYSICAL ACTIVITY, PROTEIN INTAKE, AND CLINICAL INDICATORS OF SARCOPENIA

Courtney P. Kemper, Daniel J. Canter, Benjamin N. Miller, Kelsie O. Newton, M. Elizabeth Miller, Kyle L. Timmerman FACSM. Miami University, Oxford OH.

Sarcopenia is characterized by age-related loss of skeletal muscle mass and function, and is associated with increased risk of falls, fractures, and mortality. Physical inactivity and inadequate protein intake are lifestyle factors that may contribute to the development and progression of sarcopenia. Weight-adjusted skeletal muscle index (wSMI), grip-strength (GRIP) and gait-speed (GAIT) are utilized clinically to diagnose sarcopenia. Phase-angle (PhA), obtained via bioelectrical impedance, is predictive of muscular strength and may also be predictive of sarcopenia. The **PURPOSE** of the study was to evaluate the relationships among indicators of sarcopenia, habitual physical activity, protein intake, and PhA in older adults. **METHODS**: In 96 subjects (68W/28 M, 68±6years) gait speed, grip strength (dynamometer), body composition (bioelectrical impedance), and habitual physical activity (7-day accelerometry) were measured. wSMI [skeletal muscle mass (SMM)÷body mass (BM)] was also calculated. In a subset of 34 subjects, habitual dietary intake was determined (3-day diet recall). Partial correlations (controlling for age and sex) were utlized to examine the relationships among variables of interest. Significance was set to $\alpha < 0.05$. **RESULTS:** Mean values were SMM: 28±6 kg; wSMI: 0.4±0.1; GRIP: 28±9 kg; GAIT: 1.5±0.4 m/s; PhA: 4.9±0.7°; moderate-intensity PA (MOD PA): 58±31 min/day; sedentary time (SED): 707±82 min/day; relative protein intake (RPI): 0.8±0.2 g protein/kg body mass. MOD PA was significantly ($p< 0.05$) correlated with wSMI ($r= 0.28$), PBF ($r= -0.25$), and RPI ($r= 0.42$). RPI was additionally correlated with PhA ($r= 0.37$) and body mass ($r= -0.44$). There was a trend towards a significant correlation between RPI and wSMI ($r= 0.29$, $p= 0.11$). GAIT was significantly correlated with activity counts per minute ($r= 0.23$), PBF ($r= -0.47$), wSMI ($r= 0.45$). GRIP was significantly correlated with SMM ($r= 0.40$). **CONCLUSIONS:** These data show that greater PA and RPI are associated with better scores for some of the clinical indicators of sarcopenia. Thus, increased PA and RPI intake may represent effective strategies for decreasing the risk of sarcopenia.

Funding: NIH grant: 1R15AG055923-01
Keywords: Older Adults, Muscle Mass

Board 10

PHYSICAL ACTIVITY AND BODY COMPOSITION OF WOMEN WITH ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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Anterior cruciate ligament reconstruction (ACLR) requires 6-to-9 months of rehabilitation, often resulting in periods of sedentary behavior during the rehabilitation process. As few as 23% and 63% of patients return to pre-injury level of sport participation at 1- and 2-years post-surgery, placing them at elevated risk of developing a physically

inactive lifestyle. Previous research indicates that individuals with ACLR are less active than those without a history of knee injury, but there is limited evidence available evaluating body composition profiles following surgery. **PURPOSE**: To compare physical activity (PA) engagement and body composition between women with ACLR and healthy controls. **METHODS**: Ten women with ACLR (<5yrs post-ACLR, age=21.4±3.8yrs) and 10 healthy women (age=21.9±3.1yrs) with no injury history completed the Tegner Activity Scale to assess current PA level. Body fat percentage (%BF) was estimated using air displacement plethysmography. Objective PA was assessed using accelerometers worn for 7 days. Body composition was compared between groups using Mann-Whitney U tests due to limited sample size. Time (minutes/week) spent in moderate-to-vigorous PA (MVPA) and step count (steps/day) were compared between groups using a one-way ANCOVA with 7-day total wear time (minutes) as the only covariate. Statistical significance was established a priori as $\alpha \leq 0.05$. **RESULTS**: Women with a history of ACLR had significantly higher %BF than controls (ACLR=32.7±6.7%, healthy=22.6±4.9%; $p<0.01$) and higher fat mass (ACLR=25.4±9.0kg, healthy=13.7±4.1kg; $p<0.01$). Healthy women participated in significantly more steps per day (ACLR=6650±3227 steps/day, healthy=9361±2626 steps/day; $p=0.02$) than women with ACLR, but no differences in MVPA time (ACLR=367.2±226.2 mins/week, healthy=448.9±164.0 mins/week; $p=0.34$) were observed. **CONCLUSION**: Women with ACLR may have greater %BF and fat mass than women who have not experienced a significant knee injury. These women also engage in lower step counts per day, which is consistent with previous studies. These findings are concerning because it is well known that lack of PA, high body fat, and overweight status early in the lifespan have adverse consequences on premature mortality and morbidity later in life. Therefore, it is crucial to assess these characteristics and determine potential interventions to promote PA and maintenance of healthy body composition in the months following ACLR.

Funding: The Michigan State University College of Education Summer Research Fellowship.
Keywords: Knee Injury, body fat, ACLR

Board 11

EVIDENCE FOR TEMPORAL PATTERNS OF PHYSICAL ACTIVITY IN THE GIRLS ON THE MOVE PROGRAM

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INTRODUCTION: Previous studies suggest that youth may follow temporal patterns of physical activity (PA). Recent research has provided evidence for both the compensatory and synergistic effects of PA among youth. It is unclear, however, how the presence of a PA intervention may play a role in children's normal patterns of physical activity. **PURPOSE:** To determine if the Girls on the Move intervention made a difference in the proportion of girls obtaining various levels of afterschool PA vs. during-school PA between intervention and control schools. **METHODS:** MVPA minutes were measured via accelerometers worn at the right hip on an elastic waist belt for 7 days (5 weekdays, 2 weekend days). Monitors were set to start recording data at 5 A.M. on the day after distribution to girls at both the intervention and control schools. Data for the vertical axis were re-integrated to 15-s epochs and processed using Evenson cut-points. Average MVPA/hr. was calculated from accelerometer data. MVPA was measured at three different timepoints (e.g. pre-intervention, post-intervention, and 9-month follow-up), and examined for two time-blocks (during school, after school). **RESULTS**: Chi-square tests were performed to assess significant differences in the proportion of girls who achieved higher average MVPA/hr. during school and girls who achieved higher average MVPA/hr. after school in the intervention schools compared to control schools. The Chi-square test was not significant at baseline ($\chi^2=1.67$, p=0.2, $\alpha=0.05$), but was significant for both the post-intervention and 6-month follow-up, with the intervention group having a higher proportion of girls getting more PA after school ($\chi^2=14.82$, p=.00014, $\alpha=0.05$, $\chi^2=9.89$, p=.0017, $\alpha=0.05$, respectively). **CONCLUSION:** The Girls on the Move intervention significantly increased the proportion of girls who achieved higher average MVPA/hr. after school compared to the girls in the control schools. These results suggest that an active event at school (intervention activity, PE, recess etc.) may lead to an increase in PA after school (synergy). Results also indicate that PA interventions may be effective in altering temporal patterns in youth PA. This study may inform future PA interventions to examine changes to temporal patterns in addition to total overall PA.

Funding: National Heart, Lung, and Blood Institute at the National Institutes of Health (R01HL109101)
Keywords: Youth, Accelerometery, Intervention, Schools

Board 12

IMPROVING RECOVERY AFTER TOTAL KNEE ARTHROPLASTY WITH BLOOD FLOW RESTRICTION EXERCISE

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Annually more than 650,000 total knee arthroplasty (TKA) surgeries are performed to treat end-stage knee osteoarthritis. TKA surgery has a profound impact on quadriceps muscle size and strength. Quadricep strength steadily improves post-surgery to ~80% of the non-surgical leg. Persistent quadriceps weakness after TKA is associated with altered gait mechanics and reduced physical function. Blood flow restriction exercise (BFRE) at low loads is an effective intervention for improving muscle size and strength in individuals with orthopedic limitations (e.g., osteoarthritis, knee surgery). There are limited studies documenting the implementation of BFRE following TKA. **PURPOSE:** To evaluate the effectiveness of a 7wk home-based BFRE program to improve strength and physical function in individuals post TKA. **METHODS:** Six adults (age: 59±9, BMI: 33±5) with a unilateral TKA (2.5±1.5 yrs post-surgery) performed body weight squats, isolated knee extension using a resistance band, and walking exercises with BFR 3x/wk for 7wk. During exercise, blood flow in the TKA limb was restricted using a 15cm width thigh cuff inflated to 50% of limb occlusion pressure which was established using Doppler ultrasound. Muscle function (maximal knee extensor isometric torque) and physical function (repetitions performed during 30s chair stand test, distance covered during 6min walk test) were measured at baseline and at 1wk post-training. **RESULTS:** Participants tolerated the home-based exercise program as joint pain (0.6±0.2cm) and muscle soreness (0.5±0.1) were minimal. After training, the number of repetitions during the 30s chair stand test increased (4±2 repetitions, $p<0.01$) and this change exceeded the minimally important clinical difference (MCID). There was a small but significant increase in distance covered during the 6min walk test (7±5%, $p=0.05$) but this improvement was below the MCID. In this small sample size, post-training knee extensor torque did not differ from baseline (9±12%, $p=0.11$). **CONCLUSION:** Home-based BFRE was tolerable and might offer an alternative approach for improving functional mobility longer after TKA surgery. Further research is needed to investigate the effect of BFRE on muscle size and strength after TKA surgery.

Funding: Blue Cross Blue Shield Foundation of Michigan
Keywords: Rehabilitation, Exercise intervention, TKA, Resistance training.

Board 13

CHANGES IN DIET COMPOSITION AND BODY COMPOSITION: A PILOT STUDY

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High-protein, low-carbohydrate (HPLC) diets promote quick weight loss. Previous research demonstrates that lower carbohydrate intakes in the long term result in a reduction in overall body fat, but there is uncertainty as to what happens in the short term. **PURPOSE**: To evaluate the acute effects of an ad libitum HPLC diet on body composition. **METHODS:** Healthy college-aged males were recruited for this cross-over trial. Subject's presented to the lab twice, separated by a 4-week wash-out period. Each participant consumed either the HPLC or high-carbohydrate low-fat (HCLF) diet ad libitum after given a list of appropriate food choices within each two-week dietary intervention period. Each participant recorded dietary food and beverage items as instructed in the booklets throughout the two 14-day dietary periods, and assessed using the Nutrition Data System for Research (NDSR) tool. Total body composition was measured using serial dual energy x-ray absorptiometry (DEXA) scans following a 4-hour fast. Three DEXA scans were performed for each diet: 1-day prior, +7-days, and +14-days following each diet (six scans total). Data presented as mean±SD, with significance set at $p<0.05$. **RESULTS**: Four males completed both trials (age=25±3years; body mass index=26±3kg/m²). Non-significant ($p>0.05$) trends for: decreased caloric intake on HPLC (2380±665kcal) vs. HCLF (2759±837kcal) diet, body weight loss on HPLC (-145±377g) vs. HCLF (+238±911g) diet, fat mass loss with HPLC (-218±234g) vs. (+196±333g), and lean mass change with HPCL (88±106g) vs. HCLF (-55±773g) diets. Ad libitum intake (HPLC vs. HCLF) of protein (456 vs 462kcals) and carbohydrate (1150 vs. 1230kcals) were similar with a trend for higher fat intakes on the low fat diet (790 vs. 1067kcals). **CONCLUSION**: Minimal body composition changes noted between the HPLC vs. HCLF diets, with small changes likely reflecting changes in total caloric intake. Ad libitum food choices do not translate into actual changes in macronutrient composition.

Keywords: fat; lean; glycogen; carbohydrate

Board 14

SELF-ASSESSED WELLNESS, ACADEMIC PERFORMANCE, ATHLETE STATUS, AND GENDER IN FIRST-YEAR STUDENTS

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Early adulthood is marked by changes, including increased autonomy, and a shift in decision making and behavioral exploration, including behaviors related to health. Wellness courses are often administered at the college level to individuals in this age range to increase positive health behaviors in all six dimensions (physical, social, emotional, intellectual, environmental, and spiritual) during this transitional period. However, data are lacking regarding the efficacy of these courses, as well as nuances in the effects of these courses on various student groups. **PURPOSE**: To investigate the influence of athlete status and gender on wellness, the relationship between grade point average and wellness, and the differences in self-reported wellness scores at the beginning and end of a school year where a wellness concepts course is taken. **METHODS:** Thirty students completed the TestWell survey and additional demographic questions in September (fall) and April (spring) of their first year of college during which they received a lecture-based wellness concepts course. **RESULTS**: Analysis of these data showed minimal differences in self-reported wellness when comparing data from before (752.7±17.8) to those collected after having received the wellness instruction (766.6±18.7). Composite TestWell scores were not found to differ between student-athletes (789.3±117.1) and non-athletes (740.6±78.2). However, student-athletes were found to report statistically higher wellness in the physical component (73.8±18.9) when compared to non-athletes (55.1±18.2). At the spring time point, student-athletes also reported a significantly higher score on the nutrition component (73.3±19.7) in comparison to non-athletes (55.7±12.7). A significant, positive correlation was found to exist between GPA and self-reported composite TestWell scores ($r_s(28)=0.381$, $p<.05$). In an examination of variations by gender, composite TestWell scores did not differ statistically between men and women. However, men were found to have statistically higher scores in the physical component of wellness in comparison to female at both the fall and spring time points. **CONCLUSION:** Recommendations include a need for a standardization of wellness courses and investigations into models of wellness education that act to improve wellness, perhaps through tailoring to the specific needs of various student groups.

Keywords: TestWell, Health Education

Board 15

THE EFFECTS OF TIME-OF-DAY ON PROPRIOCEPTION OF MOVEMENTS INVOLVING THE LUMBAR SPINE

Peyton R. Brandt. University of Indianapolis, Indianapolis IN.

This study was designed to test the effect of time-of-day on proprioception of lumbar spine movements. **PURPOSE:** To determine potential implications for sport, exercise, and occupational performance particularly in assessing the probability of injury to the lumbar spine. **METHODS:** In order to investigate time-of-day effects, a proprioception test was conducted at three time points within a day to determine if there are any changes. **RESULTS:** Data collected was analyzed with a two-way (time x angle) repeated-measures ANOVA found that time-of-day ($p = 0.574$), trunk flexion angle ($p = 0.395$), and the interaction of time and angle ($p = 0.969$) did not significantly affect proprioception of the lumbar spine. **CONCLUSION:** Based upon postural control research (Gribble, Tucker, & White, 2007), a functional capability that is partially reliant on proprioception, we expected proprioception to reach a peak during the morning hours, however the results of the study did not support this hypothesis.

Keywords: Performance, Injury Prevention

Board 16

EXAMINING AGE AND MOTIVATION IN BREAST CANCER SURVIVORS PARTICIPATING IN DRAGON BOAT RACING

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According to the Self-Determination Theory (SDT), motivation lies on a continuum from being intrinsically motivated, extrinsically motivated, to amotivated (Deci & Ryan, 1985; 2000). Yet, few studies have used the SDT to examine motivation types in breast cancer survivors (BCS) who participate in physical activity or athletics. **PURPOSE:** To investigate age-related differences in motivation sources using the SDT in BCS who participate in competitive Dragon Boat racing. **METHODS:** Overall, 18 female BCS with an age range of 41 to 73 (M = 57.5, SD = 8.95) from the Indianapolis-based *Indy SurviveOars* competitive rowing team voluntarily completed a demographic questionnaire and the 18-item Sport Motivation Scale II (Pelletier et. al, 2013) used to measure six motivation types: intrinsic (IR), integrated (INTR), identified (IDR), introjected (INT), external (EXT), and amotivation (AMR) regulation. The sample was divided into two age groups (≤ 57 years of age, n = 8; ≥ 58 years of age, n = 10). An independent samples t-test was used to analyze the differences in BCS' motivation types between these two age groups during the pre-season. An alpha level of $p \leq .05$ was set for statistical significance. **RESULTS:** Findings revealed that there were no statistically significant differences between the two age groups in IR, INTR, IDR, ITR, EXTR or AMR (p >.05) prior to the start of the rowing season. **CONCLUSIONS:** Results demonstrated that BCS participating in competitive rowing exhibited no significant differences in the six motivation types as it related to age before the season began. These preliminary findings suggest that younger and older BCS are both highly motivated to participate in competitive sport and Dragon Boat racing. Participating in competitive rowing requires discipline, teamwork, comradery and support and may contribute to overall motivation through social relationships and post-traumatic growth factors (Stefani et. al, 2015; McDonough, Sabiston, & Ullrich-French, 2011). Milne et. al (2008) discussed the SDT as a useful theoretical framework to more effectively understand motivation in their sample of BCS exercisers. Future studies will use the SDT to examine motivation sources in BCS rowers prior to the competitive season as well as the post-season.

Keywords: Motivation Breast Cancer Survivors Dragon Boat Racers Rowers

Poster Session #2: Ballrooms G-J, 9:20-10:35am

Board 1

CAFFEINE'S EFFECT ON SUBSTRATE UTILIZATION DURING ACTIVE RECOVERY FOLLOWING HIGH INTENSITY INTERVALS

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Caffeine is a highly popular ergogenic aid and has well known influences on aerobic performance, muscular endurance, and exercise metabolism. However, no published studies of caffeine's effects on metabolism during recovery from high-intensity intervals appear in the literature. **PURPOSE:** To investigate the effects of caffeine ingestion on substrate utilization during active recovery between high-intensity anaerobic intervals on a cycle ergometer. **METHODS:** Six (n = 2 women, n = 4 men) apparently healthy individuals (age 21.3 ± 1.97 yrs, BMI 22.4 ± 4.42kg/m2) completed the study. Two high intensity interval training trials, separated by one week, were conducted using a cycle ergometer. Each trial began with the consumption of a beverage containing 5 mg/kg of caffeine (CAFF) or an isocaloric placebo drink (PLAC), determined in random order and single-blind fashion, followed by one hour of seated rest. Participants then completed an interval training trial. Interval training consisted of repeated, 30-sec bouts at an intensity equal to 50 Watts above VO2max intensity, followed by 4.5-minute active recovery periods at 50 Watts. Participants were encouraged to complete as many intervals as possible. At baseline and during last 2 min of each recovery period, hematocrit, hemoglobin, and blood glucose were recorded. Respiratory exchange ratio (RER), VO2, and HR were monitored continuously. **RESULTS:** All participants completed a minimum of four intervals. Average RER trended lower in CAFF than PLAC trials during recovery from the 2nd (1.02 ± 0.09 CAFF, 1.06 ± 0.09 PLAC) and 4th (0.98 ± 0.07, 1.01 ± 0.06) intervals, and peak RER trended lower after the 3rd interval in the CAFF trial (1.20 ± 0.14) compared to PLAC (1.25 ± 0.13) but these differences were not statistically significant (all p=0.09). No significant differences were observed between blood glucose, hematocrit, or hemoglobin values between caffeine and placebo treatments. **CONCLUSION:** These preliminary data may indicate caffeine consumption reduces carbohydrate utilization during active recovery from high intensity intervals, but the small sample size in the present study limit the ability to draw definitive conclusions. Continued research is needed to elucidate the potential effects of caffeine on substrate utilization during recovery periods after high-intensity intervals.

Keywords: anaerobic, carbohydrates, fats, respiratory exchange ratio

Board 2

FUEL USE IN BOYS AND GIRLS DURING PROLONGED SUBMAXIMAL EXERCISE

Dillon J. Kuszmaul, Brandon J. Dykstra, Anthony D. Mahon. Ball State University, Muncie IN.

Some research has suggested that women may depend more on fat for energy during prolonged exercise compared to men. However, the extent to which this fuel use pattern exists in children is not as well understood. Specifically, the effect of sex on fuel use patterns in children during prolonged exercise is not well-understood. PURPOSE: This study examined fat and carbohydrate (CHO) metabolism during the latter half of a 40-minute bout of exercise in boys (n=9; 10.8±1.0 years, 148.5±6.7 cm, 46.6±17.2 kg) and girls (n=10; 10.6±1.2 years, 140.4±8.3 cm, 37.5±8.6 kg). It was hypothesized that there would be no difference between boys and girls with respect to fuel metabolism during exercise. METHODS: Participants reported to the laboratory for two separate visits. On the initial visit, body composition using dual x-ray absorptiometry and VO2max were assessed. On the experimental visit, participants completed two 20-minute exercise bouts separated by a 10-minute rest. Bout 1 consisted of 10 minutes at 50% VO2max and 10 minutes at 75% VO2max. Bout 2 consisted of 20 minutes at 50% VO2max. Fat oxidation rate (FOR) relative to fat-free mass [mg·kgFFM-1·min-1]) and carbohydrate oxidation rate (COR) relative to fat-free mass [mg·kgFFM-1·min-1]) were measured at 5, 10, 15, and 20 minutes of Bout 2 and averaged. RESULTS: There was no difference in VO2max between the boys (38.9±8.7 ml·kg-1·min-1) and the girls (37.1±5.6 ml·kg-1·min-1) nor were there any differences in the relative intensity (%VO2max) during exercise. FOR relative to FFM was 5.3±0.9 mg·kgFFM-1·min-1 in boys and 5.5±1.2 mg·kgFFM-1·min-1 in girls ($p>0.05$). Proportional fat use was 35.9±7.7% in boys and 37.9±8.4% in girls ($p>0.05$). COR relative to FFM was 24.1±4.9 mg·kgFFM-1·min-1) in boys and 23.0±4.2 mg·kgFFM-1·min-1 in girls ($p>0.05$). Proportional CHO use was 64.1±7.7% in boys and 62.1±8.4% in girls ($p>0.05$). CONCLUSION: In this age range, boys and girls do not display differences in fat and CHO metabolism relative to FFM during the latter half of a prolonged bout of exercise. Future research should investigate the influence of physical maturity on potential sex differences in metabolism.

Funding: Ball State University ASPiRE Graduate Student grant program.
Keywords: Pediatrics, Metabolism

Board 3

THE EFFECTS OF HIGH-INTENSITY CYCLING ON BLOOD FLOW

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Although acute physiological changes associated with exercise are well documented, what is unknown is the acute effect of high intensity exercise on blood flow velocity immediately post exercise. It is important to establish blood flow velocity in a normal population for later comparison to clinical populations where pathology may limit blood flow to the working tissues. **PURPOSE:** This study investigated blood flow velocity of the lower extremities immediately after a bout of high intensity cycling exercise. **METHODS:** Twenty-eight healthy males (n=14) and females (n=14) aged 20.9± 1.7 years participated in this study. After signing the informed consent, each subject was measured for resting heart rate (HR) and leg blood flow velocity. All subjects performed a single bout of high intensity cycling (70% of HRR) for 45 min. The subjects' HR and blood flow velocity were measured at baseline, immediately post-, post 15 min-, and post 30 min- intervention. A repeated measures ANOVA with a Bonferroni adjustment was used for each measure to compare the responses at each time point. **RESULTS:** Resting HR (64.9 ± 11.8 bpm) and blood flow (37.5 ± 11.3 cm/s) measures were significantly different ($p<0.05$) compared to measures of immediately post cycling (118.3 ± 17.2 bpm; 44.8 ± 13.7 cm/s), post 15 min (80.1 ± 12.0 bpm; 50.1 ± 15.0 cm/s) and post 30 min (73.9 ± 11.9 bpm; 52.7 ± 18.1 cm/s). **CONCLUSIONS:** This study indicates that lower extremity blood flow velocity was faster and HR was elevated following a single bout of high intensity cycling up to 30 minutes post activity. This has implications for individuals with intermittent claudication due to peripheral arterial disease. The standard of care includes prescribing progressive walking into pain, which may limit adherence. Thus, high intensity cycling is a potential adjunct to the exercise modality of progressive walking for improving blood flow to the lower extremities.

Funding: University of Southern Indiana's Faculty Research Creative Work Grant and University of Southern Indiana's Science, Engineering and Education Research Grant.

Keywords: leg blood flow velocity, heart rate response, high-intensity exercise

Board 4

INTER-UNIT RELIABILITY OF A CONTINUOUS GLUCOSE MONITORING DEVICE: A GENERALIZABILITY STUDY

E. Andrew Pitchford[1], Lisa M. Pitchford[1], Michael W. Schleh[2], Jenna B. Gillen[3] Morgan Cleveringa[1], Jeffrey F. Horowitz[1]. [1]Iowa State University, Ames IA, [2]University of Michigan, Ann Arbor MI, [3]University of Toronto, Toronto CAN.

Continuous glucose monitoring (CGM) technology has become a popular tool for measuring free-living glycemic control in response to dietary and exercise interventions in healthy individuals. Most research has focused on the precision and accuracy of these monitors in people with diabetes, but reliability has been largely overlooked, especially in healthy individuals. Measurement reliability is considered to be a prerequisite for measurement validity. **PURPOSE:** To analyze the inter-rater reliability of the CGM devices across settings of meals, sleep, and exercise from both relative and absolute reliability perspectives. **METHODS:** Twelve healthy young adult participants (*M* age = 27.6 years; 4/8 M/F) wore two CGM devices over the course of two days. Standardized meals were provided to each participant, and each participant completed an exercise trial consisting of cycling at 65% of their VO_{2peak} for a duration sufficient to expend 350 kcal. Differences in blood glucose (mg/dL) measurements between the two monitors were examined with both relative (intraclass correlation; $ICC_{2,1}$) and absolute (generalizability theory) analyses of reliability. Variance component analyses and Bland-Altman plots were used to identify systematic sources of error between monitors. **RESULTS:** Within specific time periods, intraclass correlations ranged from poor to moderate (≥ 0.50) reliability including Breakfast (ICC = 0.40), Lunch (0.30), Dinner (0.61), Snack (0.46), Sleep (0.44), and Exercise (0.62). G-coefficients from generalizability theory analyses also produced poor to moderate estimates of absolute reliability (Breakfast, G = 0.01; Lunch, 0.14; Dinner, 0.74; Snack, 0.70; Sleep, 0.71; and Exercise, 0.71). Across a full day, moderate reliability was demonstrated from both relative (ICC = 0.50) and absolute (G = 0.69) perspectives. When error occurred between monitors, a considerable source of variance was the interaction between monitors and participants. Visual inspections of Bland-Altman plots suggest that inter-unit errors were more likely to occur with high blood glucose readings. **CONCLUSION:** At best, moderate reliability was demonstrated between CGM devices; however, substantial errors were observed. These errors were prominent postprandially, despite standardization of meals, and for participants with higher blood glucose levels.

Keywords: Measurement, Metabolic, Precision, Glycemia

Board 5

HEAVY BATTLE ROPE EXERCISE ON AUTONOMIC MODULATION: DIFFERENCES BETWEEN THE SEXES

Sarah G. Kearney, Jason C. Parks, Erica M. Marshall, Stacie Humm, J. Derek Kingsley FACSM. Kent State University, Kent OH.

The use of heavy rope battle exercise is to increase power, muscle hypertrophy and maximal strength. The data regarding autonomic modulation in response to heavy battle rope exercise between the sexes are non-existent. **PURPOSE**: To assess sex differences in autonomic modulation in response to heavy battle rope exercise. **METHODS**: Twenty-six (men: 14; women: 12) resistance-trained individuals volunteered for the study. Hemodynamics and vagal modulation were collected at Rest, 15 (Rec1), 30 (Rec2), and 60 (Rec3) minutes after the acute bout of heavy rope battle exercise. Heart rate (HR) was taken from the electrocardiogram along with measures of vagal modulation which were assessed using heart rate variability, and included logarithmically (ln) transformed high-frequency power (lnHF), as well as the root mean square of successive differences (lnRMSSD). Sympathovagal balance was assessed using the low frequency/high frequency ratio (lnLF/HF). The acute heavy battle rope exercise consisted of six, 15-second exercise bouts, using a double wave pattern at 180bpm, separated by 30-seconds of passive recovery intervals. Two-way repeated measures analysis of variance were used to evaluate differences between the sexes (men, women) across time (Rest, Rec1, Rec2, and Rec3). T-tests were used for post hoc comparisons with Bonferroni corrections. **RESULTS:** There was no two-way interaction (sex by time) for any variable. However, heart rate (HR) demonstrated a significant main effect of time (Rest:62±10bpm; Rec1:84±10bpm; Rec2:76±9bpm; Rec3:70±8bpm; $p \leq 0.001$) in that each time point during recovery was augmented

from Rest. There were also significant main effects of time for lnHF (Rest: 7.51±1.09 ms^2; Rec1: 4.62±1.30 ms^2**;** Rec2: 5.35±1.20 ms^2**;** Rec3: 6.29±0.97 ms^2, $p \leq 0.001$), and lnRMSSD (Rest: 4.23±0.63ms; Rec1: 2.71±0.65ms; Rec2: 3.10±0.60ms; Rec3: 3.57 ± 0.51ms, $p \leq 0.001$) in which all three recovery measurements were attenuated compared to Rest. A significant main effect of time was also noted for lnLF/HF (Rest: 0.87±0.11; Rec1: 1.19±0.21; Rec2: 1.14±0.30; Rec3:1.03±0.15, $p \leq 0.001$) in which all values during recovery were significantly elevated compared to Rest. **CONCLUSIONS:** These data demonstrate that both men and women have the same responses in HR and autonomic modulation during recovery from acute heavy battle rope exercise. Collectively, all measures failed to return to resting values within 60 minutes.

Keywords: vagal, resistance exercise, recovery

Board 6

HIGH-INTENSITY HEAVY ROPE EXERCISE ON ARTERIAL STIFFNESS

Kayla R. Hare, Erica M. Marshall, Jason C. Parks, Tyler Singer, Sarah Kearney, J. Derek Kingsley FACSM. Kent State University, Kent OH.

High-intensity heavy rope exercise is utilized as a means to increase power, muscle hypertrophy and maximal strength. However, the effects of high-intensity heavy rope exercise on arterial stiffness is not known. **PURPOSE:** To investigate the effects of high-intensity heavy rope exercise on arterial stiffness in young, healthy, resistance-trained men (n=13) and women (n=11). **METHODS:** Participants completed high-intensity heavy rope exercise for six, 15 second bouts, with 30-second rest intervals, at a pace of 180bpm. Measurements of vascular function were assessed at Rest, as well as at 15 (Rec1), 30 (Rec2), and 60 (Rec3) minutes after completing the high-intensity heavy rope exercise. Blood pressure was collected using photoplethysmography. Systolic pressure diameter, carotid artery compliance and Beta stiffness were collected using a B-mode ultrasound. A one-way ANOVA was utilized to compare measurements over time (Rest, Rec1, Rec2, Rec3). **RESULTS:** Participants (Mean Age±SD=23±3yrs) showed significant (p=0.001) increases in systolic blood pressure from Rest (103±7mmHg) to Rec1 (106±9mmHg; Rec2: 106±9mmHg), and Rec3 (102±7mmHg). There was also a significant difference between Rec2 and Rec3 such that Rec3 was reduced compared to Rec2. There were also significant increases in systolic pressure diameter at Rec 1 (6.4±1.108mm) and Rec3 (6.8±1.0mm) as well as Rec2 (6.5±1.0mm) and Rec3. There was a significant ($F_{3,69}$=8.5; p=0.0001) main effect of time for carotid artery compliance such that it decreased between Rest (0.24±0.09 mm2/mmHg) and Rec1 (0.18±0.078mm2/mmHg), Rest and Rec2 (0.18±0.06mm2/mmHg), Rec1 and Rec3 (0.25±0.09mm2/mmHg), as well as Rec2 and Rec3. Beta stiffness was also significant ($F_{3,69}$=5; p=0.003) across time, such that it increased between Rest (2.90±1.09units) and Rec1 (3.8±1.50units), Rest and Rec2 (3.88±1.64unit), Rec1 and Rec3 (2.92±1.28units), and Rec2 and Rec3. **CONCLUSIONS:** These data demonstrate that an acute bout of high-intensity heavy rope exercise has a profound impact on systolic blood pressure, as well as systolic pressure diameter, carotid artery compliance and arterial stiffness in resistance-trained individuals. Specifically, these results demonstrate that high-intensity heavy rope exercise alters systolic blood pressure and carotid artery function that is sustained for at least 30 minutes during recovery that may be mediated by an increase in sympathetic activation.

Keywords: compliance, stiffness, resistance training

Board 7

ASSOCIATIONS BETWEEN SATURATED FAT AND ADDED SUGAR INTAKE WITH TRIGLYCERIDES AND INSULIN RESISTANCE

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In the United States, many adult men and women have diets high in both saturated fats and added sugars. The American Heart Association recommends getting no more than 6% of daily calories from saturated fats. Research shows that this type of diet is a risk factor for high triglycerides and that added sugars are associated with insulin resistance. Additionally, high triglyceride levels and insulin resistance are likely to increase cardiovascular disease mortality. **PURPOSE:** The purpose of this study was to determine the association between high dietary saturated fat and sugar intake, and triglyceride levels and insulin resistance. **METHODS:** A sample of 20 overweight (93.0kg ± 13.5) older adults (64.2 years ± 4.7) was used. All participants had a saturated fat (g) intake of ≥ 6% of daily calorie intake. A series of 3-24 hour dietary recalls were completed where a detailed record of the prior day's intake was analyzed using NDSR 2017 software. Bloodwork was collected and analyzed using the Cholestech LDX automated

system after a twelve-hour fast. Added sugar, saturated fat, and triglyceride levels were collected. HOMA-IR was used to measure insulin resistance. Using IBM SPSS Statistical Software, bivariate correlations were performed to compare both added sugar and saturated fat intake with triglycerides, added sugar intake with HOMA-IR, and added sugar intake with saturated fats. **RESULTS:** When comparing triglycerides with both added sugar ($r(18) = -.240$, $p = .229$) and saturated fat intake ($r(18) = -.04$, $p = .842$), there were no significant associations. The correlation between added sugar intake and HOMA-IR ($r(18) = .407$, $p = .067$) is approaching significance. There was a positive correlation ($r(18) = .482$, $p = .009$) between added sugar and saturated fat intake. **CONCLUSION:** Results of this study indicate that diets that are high in added sugars are also typically high in saturated fat. The small sample size of the study is a limitation, and further research with a larger sample size is necessary to determine if there if added sugar intake is correlated with insulin resistance.

Funding: National Institute for Health Grant 1R15AG055923-01.
Keywords: Weight Loss, Diet, Cardiovascular Disease

Board 8

ASSOCIATIONS BETWEEN VEGETABLE PROTEIN, SATURATED FAT INTAKE, AND CHOLESTEROL LEVELS

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High cholesterol and high saturated fat intake are high-risk factors for Cardiovascular Disease, which is the leading cause of death in the United States. Dietary changes such as decreasing saturated fat and cholesterol intake, which are minimal in vegetable protein, are preventative methods to reduce cardiovascular and other chronic disease risks. **Purpose:** The purpose of this study was to observe the potential association between vegetable protein and cholesterol levels in a weight loss intervention. **Methods:** A sample of 30 overweight (94.9kg ± 16.46), older adults (65 years ± 4.76) completed 3-24-hour diet recalls with specific dietary intake analyzed in NDSR 2017 software and average nutrient reports were created. Subjects were instructed to refrain from eating at least 12 hours prior to bloodwork and had fasting bloodwork profiles collected. A 20-mL blood sample was obtained from the antecubital vein and analyzed using the Cholestech LDX automated system. IBM SPSS software was used to identify potential associations using Pearson correlations between total cholesterol, LDL, HDL, vegetable protein, and saturated fatty acids. **Results:** The results of the Pearson correlation indicated there was a statistically significant positive correlation between LDL and total cholesterol ($r(28)= .957$, $p=.000$). Results indicated an inverse relation between LDL and HDL ($r(28)= -.133$, $p=.499$) but were not statistically significant. Conversely, results indicated a positive correlation between vegetable protein and total cholesterol ($r(28)=.030$, $p=.874$) however, it was not a statistically significant correlation. Continually, vegetable protein also had a positive association with saturated fat ($r(28)=.132$, $p=.488$), HDL ($r(28)=.058$, $p=759$), and LDL ($r(28)=.018$, $p=.928$) but, none were statistically significant. **Conclusion:** The results highlight the importance of LDL and total cholesterol associations especially in cardiovascular risk factors in older adults. Although the results were insignificant, future research utilizing higher amounts of vegetable protein consumption may have a significant impact on cholesterol levels, therefore, it is necessary.

Funding: NIH grant 1R15AG055923-01
Keywords: blood lipids, diet, protein, cardiovascular

Board 9

EXAMINING THE IMPACT OF FIBER AND ADDED SUGAR ON BODY FAT PERCENTAGE, BLOOD GLUCOSE AND LIPID LEVELS

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Research has shown that the benefits of fiber have the potential to counteract absorption of glucose and lipids found in high-fiber foods. Dietary Fiber has been shown to decrease blood glucose and cholesterol levels, which can have a positive impact on weight loss. For older adults (> 51 years), fiber intake recommendations are 30g (males) and 21g (females) daily. Daily recommendations include less than 35g (males) and 25g (females) of added sugar. While blood glucose levels increase at a similar rate despite the source, added sugar intake has been associated with an increased risk of many metabolic and cardiovascular diseases. **PURPOSE:** The purpose of this study was to identify if there was a significant difference in blood glucose, body fat percentage, and triglyceride levels between a high-

fiber, high-added sugar diet and a low-fiber, high-added sugar diet. **METHODS:** This study included 23 overweight (92.909kg ± 11.741) adults at least 58 years old (64.261 years ± 4.993), who consumed a high-added sugar diet. Fasting blood work and body fat percentage were collected from participants. Three 24-hour diet recalls were then collected using NDSR 2017 software. Participants were divided into two groups: G1 with a high-fiber diet, and G2 with a low-fiber diet. An ANOVA test was run using SSPS software with a grouping variable of fiber. **RESULTS:** There was no significant difference between the added sugar of the high-fiber group (75.152g ± 28.638), and the low-fiber group (89.750g ± 50.860), or the fiber intake between the high-fiber group (24.879g ± 3.236) and the low-fiber group (14.924g ± 4.587). Results of the ANOVA indicate, there was no significant difference in blood glucose ($F= (1,21) = 0.083$, $p= 0.777$) or body fat percentage ($F= (1,21) = 0.193$, $p= 0.665$) between G1 and G2. Triglyceride levels were approaching significant statistical difference ($F= (1,21) = 3.525$, $p=0.074$). **CONCLUSIONS:** The results did not show any significant difference; however, similar studies should be considered using a larger number of participants with a greater fiber intake variability.

Funding: This study was funded by a NIH Grant: 1R15AG055923-01
Keywords: Cardiovascular Disease, Weight Loss, Dietary Intake, Glycemia

Board 10

EXERCISE AND WEIGHT LOSS IMPROVED GLUCOSE CONTROL IN A 68-YEAR-OLD MAN WITH TYPE II DIABETES

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HISTORY: A 68-year-old obese [body mass index (BMI): 36.8 kg/m^2, percent body fat (PBF): 40.9%, visceral fat area (VFA): 235.8 cm^2], relatively inactive (<2 d/wk of exercise), man was screened for inclusion into a clinical trial examining the influence of weight loss and/or exercise training on skeletal muscle inflammation. **PHYSICAL EXAMINATION, TESTS, AND RESULTS:** He was excluded from study enrollment due to elevated fasting blood glucose (FBG: 178 mg/dL), HbA1c (6.7%), and an exaggerated 2-hour blood glucose response (210 mg/dL) to mixed nutrient intake [~35g dextrose + ~24 g protein (whey and casein)]. VO_2max (16.1 ml/kg/min) and brachial artery flow-mediated dilation (FMD; 1.0%) were also assessed at screening. Brachial artery FMD is a non-invasive index of vascular endothelial function that predicts future cardiovascular events. **DIAGNOSIS:** Following exclusion from the clinical study, he was referred to his primary care physician and subsequently diagnosed with type-2 diabetes. His physician recommended lifestyle modification, including increased physical activity and weight loss counseling. He was not prescribed any medications to manage his blood glucose (i.e. metformin, sulfonylureas, etc). **TREATMENT AND OUTCOMES:** Since his diagnosis, he has completed a supervised, 6-month aerobic exercise intervention (30 min/session, 3 d/wk, 40-59% heart rate reserve). He also participated in an 8-hour Diabetes Self-Management Education program through a local hospital, focusing on symptom management, lifestyle, and diet modifications. Further, a registered dietitian outlined specific macronutrient intake recommendations, mainly focusing on controlling carbohydrate intake. As a result of these combined interventions, body composition (BMI: 35 kg/m^2, PBF: 38.7%, VSA: 211.8 cm^2), VO_2max (19.7 ml/kg/min), brachial artery FMD (2.0%), and glucose regulation (FBG: 147 mg/dL, HbA1c: 5.7%, 2-h blood glucose response: 152 mg/dL) improved. The results of this case study support the inclusion of physical activity and weight loss as part of comprehensive treatment for type II diabetes.

Funding: This project was funded by an NIH grant 1R15AG055923-01
Keywords: lifestyle modifications, HbA1c, aerobic, glucose regulation

Board 11

INFLUENCE OF AGE ON INSULIN RESISTANCE AND VASCULAR ENDOTHELIAL FUNCTION IN OVERWEIGHT/OBESE ADULTS

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Aging and overweight/obesity are independently associated with insulin resistance (IR) and impaired vascular endothelial function (VEF), contributing to the increase in cardiovascular disease (CVD) risk observed in these

populations. Studies comparing IR and VEF in overweight/obese (OW/O; BMI ≥25 kg/m^2) adults differing in age are scarce. **PURPOSE**: The ***purpose*** of this investigation was to compare IR and VEF in young OW/O adults with older OW/O adults. We ***hypothesized*** that IR would be higher and VEF would be lower in older OW/O adults compared young OW/O adults. **METHODS:** The homeostasis model assessment of IR (HOMA-IR) was calculated and brachial artery flow-mediated dilation (FMD) was measured after an overnight fast in 11 (8 women) young OW/O (22 ± 4 y; BMI = 32.3 ± 5.8 kg/m^2, body fat = 39.2 ± 8.8%) and 25 (19 women) older OW/O adults (63 ± 4 y; 35.0 ± 5.2 kg/m^2, 43.9 ± 7.1%). HOMA-IR was calculated from fasting blood glucose and insulin levels. Brachial artery FMD, a non-invasive measure of VEF that predicts incident CVD events, was assessed by a trained technician using high-resolution ultrasonography. Body mass and composition were measured by bioelectrical impedance analysis. **RESULTS:** BMI and body fat percentage did not differ between groups. Compared to young OW/O adults, fasting blood glucose (92 ± 9 vs. 103 ± 15 mg/dL for young vs. older, respectively), serum insulin (8.5 ± 4.5 vs. 13.5 ± 6.9 µIU/mL), and HOMA-IR (1.9 ± 1.1 vs. 3.5 ± 2.1) were higher (P<0.05), and brachial artery FMD was lower (9.8 ± 2.2% vs. 3.3 ± 2.3%; P<0.001), in older OW/O adults. **CONCLUSIONS:** Compared to young OW/O adults, older OW/O adults displayed IR and impaired VEF. Our data are consistent with others suggesting that IR may contribute to impaired VEF that increases CVD risk.

Funding: Supported by an EHS Seed Grant, Miami University Committee on Faculty Research Grant, and National Institute on Aging (1R15AG055923-01)
Keywords: glucose; flow-mediated dilation; aging

Board 12

SLEEP QUALITY IS ASSOCIATED WITH HABITUAL PHYSICAL ACTIVITY AND HbA1C IN OVERWEIGHT, OLDER ADULTS

Alexandra I. Hopun, Daniel J. Canter, Melanie S. Ziaziaris, Kevin D. Ballard, FACSM. Miami University, Oxford OH.

Poor sleep quality has been associated with negative health outcomes. This relationship has mostly been documented in middle-age and young adults with less focus on older adults. Therefore, the **PURPOSE** of this cross-sectional study was to examine relationships between sleep duration/quality with body composition, physical activity, blood lipids, and indicators of blood glucose control. **METHODS:** In 34 overweight (BMI ≥ 27 kg/m^2) older adults (≥58 years) enrolled in a longitudinal weight-loss and exercise training study, baseline measures of body composition [skeletal muscle mass (SMM), visceral fat area (VFA) and fat mass (FM)]; cardiorespiratory fitness (VO_2max, indirect calorimetry); moderate-to-vigorous physical activity (MVPA, 7-day accelerometry); blood lipids/glucose/HbA1c (point-of-care analyzer); and sleep quality and duration (Pittsburgh Sleep Quality Index ,PSQI) were assessed. PSQI scores can range from 0-21 with higher values representing lower sleep quality. Pre-intervention relationships among these variables were analyzed utilizing partial correlations, controlling for age and sex. Significance was set at $\alpha<0.05$. **RESULTS:** Mean values were age: 64.3 ± 4.5 years; BMI: 35.3 ± 50 kg/m^2; VFA: 217.8±41.5 cm^2; sleep duration: 6.8±1.2 hours; PSQI score: 10.6±1.3; VO_2max: 15.6±3.8 ml/kg/min; MVPA: 45.6±22.8 min/day; HbA1c:5.5± 0.2%. Sleep score was correlated with MVPA (-0.41, $p< 0.05$) and HbA1c ($r= 0.57$, $p< 0.05$). Sleep quality and duration were not significantly correlated with BMI or VO_2max. **CONCLUSION:** These preliminary data suggest that higher levels of MVPA were associated with better sleep quality in older adults. Additionally, these data support and extend research indicating that sleep quality is associated with glucose regulation.

Funding: This study was supported by a grant from the National Institute on Aging (R15 AG055923-01)
Keywords: glucose regulation, exercise, blood lipids, cross-sectional

Board 13

ACUTE CARDIOMETABOLIC RESPONSES TO VARIOUS MODES OF HIGH-INTENSITY INTERVAL EXERCISE IN GIRLS

Emily N. Makowski[1], Michael W. Schwers[1], Jeanette M. Ricci[1], Todd A. Astorino, FACSM[2], Katharine D. Currie[1], Karin A. Pfeiffer, FACSM[1]. [1]Michigan State University, East Lansing MI, [2]California State University - San Marcos, San Marcos CA.

In children, there is widespread utilization of treadmills or cycle ergometers to investigate acute cardiometabolic responses to high-intensity interval exercise (HIIE). However, little is known regarding girls' responses to more feasible modes of HIIE that can be implemented in school or youth sport settings, such as body-weight resistance exercise. **PURPOSE:** To examine the acute cardiometabolic responses in girls performing single sessions of treadmill-based HIIE (TM) and a body-weight resistance exercise circuit (CIRC). **METHODS:** Eleven active girls (age = 9.2 +/- 1.2 yr, body mass index = 56.2 +/- 25.7 percentile) engaged in a graded treadmill test to determine peak oxygen consumption (VO_{2peak}), peak heart rate (HR_{peak}), and maximal aerobic speed (MAS). Subsequently, participants completed time-matched CIRC and TM protocols in a randomized and counterbalanced order. CIRC was composed of two sets of four exercises consisting of mountain climbers, squat jumps, burpees, and jumping jacks performed 'all out' for 30s followed by 30s of stepping in place for a total of 8 minutes. Time-matched TM consisted of 8 bouts of 30s running at 100% MAS followed by 30s of walking at 40% MAS. VO_2 and HR were assessed continuously using a portable metabolic analyzer and HR monitor. Cardiometabolic responses between protocols were compared using paired samples *t* tests. **RESULTS:** Mean HR responses to TM and CIRC over the entire session were 85 +/- 4 and 87 +/- 8 $\%HR_{peak}$, respectively, with no significant differences between protocols (P=0.19). Mean peak HR responses (i.e., the last 10 seconds of each work interval) were similar (P=0.28) between TM (88 +/- 3 $\%HR_{peak}$) and CIRC (90 +/- 7 $\%HR_{peak}$). There were no significant differences (P=0.88) in session mean VO_2 between TM and CIRC (75 +/- 10 and 75 +/- 11 $\%VO_{2peak}$, respectively) or in mean peak VO_2 (TM=78 +/- 11 $\%VO_{2peak}$ and CIRC=79 +/- 11 $\%VO_{2peak}$, P=0.75). **CONCLUSION:** Our body-weight resistance exercise protocol elicited responses that are representative of HIIE and provide a vigorous cardiometabolic stimulus. Future research should explore the feasibility and efficacy of similar protocols as a strategy to promote vigorous-intensity physical activity in children, especially in school-based settings.

Funding: Midwest American College of Sports Medicine Student Research Project Award
Keywords: heart rate, oxygen consumption, treadmill, children

Board 14

AFFECTIVE REACTIVITY AND RECOVERY DURING HIGH- AND MODERATE-INTENSITY INTERVAL EXERCISE

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Evidence supports the notion that people generally feel worse during high(er) intensity exercise but experience an affective rebound immediately following cessation, which often exceeds pre-exercise feeling states. Considering rest/recovery is an integral part of interval exercise, it is of interest to determine the degree of affective reactivity and recovery that may occur during interval exercise of different intensities. **PURPOSE:** To examine affective reactivity to and recovery from an acute bout of moderate-intensity (MIIE) and high-intensity interval exercise (HIIE). **METHODS:** Participants (N= 25, 13 females, 23.3±4.0 yrs, BMI= 25.7±4.1 $kg \cdot m^{-2}$) completed 4 sessions at the same time of day with at least 24-hours between each session: a baseline session to record resting affect, a graded exercise test on a stationary bike (cycle ramp protocol 25 $W \cdot min^{-1}$) to volitional exhaustion, and then completed a high- (HIIE) and moderate-intensity interval exercise (MIIE; 5-intervals of 3-min exercise & 1-min rest) session where affective valence (i.e., un/pleasantness) was recorded prior to, during, and up to 30-minutes post exercise. **RESULTS:** A repeated measures ANOVA revealed a significant Condition x Time interaction for valence (F(16, 320)= 7.002, P< 0.001, η_p^2= 0.259), with more negative feeling states during the HIIE session compared to the MIIE session as early as the second exercise interval (HIIE = 1.4±2.1, MIIE = 2.2±1.6; d= 0.44, P< 0.05). **CONCLUSIONS:** Due to the similar rebounds in affective valence following rest-periods, with the increasingly larger decline in valence across subsequent intervals, the HIIE condition resulted in an increasingly, and overall, less pleasant feeling state. For MIIE, the rebounds were equal or greater to any negative reactivity that occurred during the exercise-interval, resulting in an increasingly (albeit small) more pleasant feeling state overall.

Keywords: Feeling States, Valence, HIIT

Board 15

EFFECT OF PROLONGED, LOW-LEVEL ACTIVITY AT A NOVEL DESK STATION ON GLUCOSE TOLERANCE IN T2D

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To combat the adverse effects of a sedentary lifestyle, active desk station devices are designed to promote non-exercise activity thermogenesis (NEAT). PURPOSE: Given that sedentarism is known to decrease glucose tolerance, we examined the effects of 4 hours of low-level workstation activity on glucose tolerance in sedentary individuals diagnosed with Type 2 Diabetes (T2DM). It was hypothesized that the use of an active desk station would improve glucose tolerance, indicated by a lower area under the curve (AUC) in response to an oral glucose challenge. METHODS: Subjects (n=8; 4 males; 4 females; age: 55.1 $\pm$7.8 y; BMI: 38.9 $\pm$13.3 kg/m^2) were randomly assigned to sitting only or sitting using the SitFlow® (SF) and were tested at least two days apart (crossover design). SF is an under-the-desk swing that promotes spontaneous leg movement at low intensities and has been shown to raise metabolic rate by 10 to 20% compared to sitting. The protocol consisted of fasted subjects performing 4 hours of desk work (with or without SF use), followed by a 2-h oral glucose tolerance test (75 g of Trutol®). In addition to blood sampling for glucose using a handheld glucometer, heart rate and blood pressure were measured every hour and global vigor and affect (GVA) was assessed using a validated one-page survey. A tracker was attached to the desk swing to measure movement. Effect size is calculated using the mean and standard deviation from the two desk treatments' area under the curve for glucose response. RESULTS: Baseline blood glucose (mg/dL) was not different between trials (Con: 146.75 $\pm$40.03; SF: 152.12 $\pm$33.04; p>0.05). In response to SF, the AUC (mg•min/dL) appeared to be lower for 7 of 8 subjects (Con: 11921.25 $\pm$3734.80; SF: 10822.5 $\pm$3953.97). For this interim analysis, an effect size of 0.599 was calculated. According to Cohen, this indicates a moderate effect of SitFlow on glucose tolerance. CONCLUSION: Low-level activity sustained for a prolonged period might modestly help enhance glucose tolerance in sedentary individuals with T2DM.

Funding: Active Ideas, LLC
Keywords: NEAT, Type 2 Diabetes, Active Work Station

Board 16

BOUNCING FOR BALANCE: MINI-TRAMPOLINE TRAINING REDUCES FALL RISK IN OLDER ADULTS

Quinn Anderson, Sara Bergen, Rachel Breuer, Erik Hayes, Bradley J. Kendall. Taylor University, Upland IN.

While CVD is the leading cause of death, falls are one of the most prominent causes of accidental mortality in older adults. Unfortunately, interventions in older adults often target either cardiovascular fitness or balance, with few utilizing exercise modalities that address both at once. One modality that has shown promising results on cardiovascular fitness and balance is mini-trampoline training. However, investigations on this modality have been limited in older adults. **PURPOSE:** To compare the effects of 6-weeks of mini-trampoline training to 6-weeks of walking on fall risk and functional fitness in older adults. **METHODS:** Twenty participants (mean age 72±6.9) completed six weeks (3 sessions/week) of trampoline training consisting of aerobic (e.g., jumping jacks) and balance (e.g., tandem skips) exercises, all of which took place on a mini-trampoline. Each session was led by a trained research staff member. For comparison, a control group (n=18, mean age 66±7.4) participated in an unmonitored walking program for six weeks (3 sessions/week) with a goal of increasing average step count by 100 steps every week. At the start and conclusion of the intervention, all participants were assessed on measures of balance (i.e., fall risk and single-leg stands), mobility (i.e., 4-square step test and 8-foot up-and-go), and aerobic endurance (i.e., 6-minute walk test). **RESULTS:** Due to significant differences between the groups at baseline, change scores were calculated for all measures and were compared using independent samples t-tests. Following training, the trampoline group significantly reduced fall risk $t(36) = 2.129$, $p < .05$, $d=.87$, increased single-leg stand time, $t(36) = 7.04$, $p < .01$, $d=.87$, and decreased 4-square step test time $t(36) = 2.651$, $p < .05$, $d=1.5$ compared to the walking group. Both groups decreased their 8-foot up-and-go times and increased 6-minute walk distance after the six weeks. However, change scores were not statistically different between the groups ($p > .05$). **CONCLUSION:** As a result of this study, it appears that mini-trampoline training is a viable exercise modality for older adults to reduce fall risk and improve balance while providing similar cardiovascular benefits (i.e., improvements in walking distance) to those as a result of walking.

Funding: Taylor University Women's Giving Circle Grant
Keywords: Trampoline, Falls, Exercise Training, Balance

Poster Session #3: Ballrooms G-J, 10:40-11:55am

Board 1

FACTORS AFFECTING INJURY RISK PROFILES IN DIVISION III COLLEGIATE ATHLETICS

Chad Trudo, Carlos Estrada, Chris Pitsikoulis, Nicole Pieart, Jocelyn Ocon, Justin Rutherford, Noah Dubose. Aurora University, Aurora IL.

Advanced training technology, in addition to the NCAA injury surveillance program (ISP), has contributed data to further analyze and understand the various mechanisms associated with injuries in sport. Although this data has recognized common injury risk factors, few investigations have examined the relationship between gender and sport classifications among NCAA Division III athletics. Recent research supports that there may be moderate relationships between injuries and a variety of factors including physical, psychological, nutritional and performance measures throughout mixed populations. Furthermore, there seems to be little to no data examining injury magnitude and frequency within different sport classifications. **PURPOSE:** The purpose of this study is to identify factors that influence injury risk in Division III collegiate athletes during a traditional playing season. **METHODS:** Ninety-Three Division III athletes (Age 20.24 ± 1.41 years; Height 176.14 ± 10.15 cm; Mass 77.49 ± 11.4 kg) participating in collision and contact sports completed this study. Subject anthropometric measurements included: BMI (24.95 ± 2.86 kg/m2) and percent body fat (19.94 ± 8.46 %). Functional Movement Screening (FMS) and body composition via air displacement plethysmography (BodPod) were evaluated at the beginning of pre-season to determine movement quality baselines. A one-way ANOVA was utilized to examine differences in pre-season FMS scores between injured and non-injured athletes (alpha level of $p \leq 0.05$). **RESULTS:** Significant differences were noted in FMS assessments of shoulder mobility (SM; $p = 0.021$) and rotary stability (RS; $p = 0.026$) between injured and non-injured athletes. Though non-significant, the trunk stability (TS) assessment appeared to have approached significance ($p = 0.052$). No additional significant differences ($p > 0.05$) were observed between groups in the remaining FMS assessments. **CONCLUSION**: Although not all FMS assessments were significantly different between injured and non-injured groups, these findings suggest that practitioners should emphasize movement quality of SM, RS, and TS. Through evidence-based corrective exercise programming, we may reduce the risk of future injury.

Keywords: Injury Prevention, FMS, Sport

Board 2

REFLEXIVE PERFORMANCE RESET ENHANCES HAMSTRING ACTIVATION DURING SHORT SPRINTS IN HEALTHY MALES

Kevin A. Slowik[1], Jarod M. Burton[2], Nathaniel J. Farrell[1], Brady M. Volmering[2], James R. Sackett[1]. [1]Cornerstone University, Grand Rapids MI, [2]Decide, Act, Conquer Baseball Grand Rapids MI.

Reflexive performance reset (RPR) has been reported to mitigate compensation patterns to reduce pain, increase flexibility, and enhance performance during sport and exercise. However, it is currently unknown whether RPR alters muscular activation and performance during exercise. **PURPOSE:** To test the hypothesis that RPR improves hamstring activation and performance during short sprints when compared to a dynamic warm-up. **METHODS:** Ten male subjects (age: 21±1 y, BMI: 25.2±2.4 kg/m^2) completed a control visit (Control) and a RPR visit (RPR). The contribution of muscular work was assessed for the quadriceps, gluteus maximus, and hamstrings using Athos compression gear. Speed times were assessed using slow motion video capture and whole-body feeling was assessed using the feeling scale (-5=feeling very bad, 0=neutral, 5=feeling very good). Subjects performed a standardized dynamic warm-up (Control) or had RPR performed on them by a trained technician (RPR). Maximal voluntary isometric contractions for the quadriceps, gluteus maximus, and hamstrings were assessed, after which the subject ran three all-out 9.14 m sprints. The feeling scale and speed times were analyzed via a paired t-test and the contribution of muscular work for the left and right leg were analyzed via a two-way ANOVA. Data are presented as mean±SD and the p-value was set at $p<0.05$. **RESULTS:** There were no statistical differences between Control (3.1±1.2 a.u.) vs. RPR (3.1±1.4 a.u.) for the feeling scale ($p=0.50$) or between Control (2.01±0.03 s) vs. RPR (2.02±0.07 s) for sprint times ($p=0.29$). Muscular contribution for the left leg was not different during Control vs. RPR for the quadriceps (33.0±10.8% vs. 29.4±10.2%, $p=0.10$) or the gluteus maximus (7.1±2.9% vs. 8.2±2.5%,

p=0.61), but was lower during Control vs. RPR for the hamstrings (6.8±4.5% vs. 11.1±3.7%, p=0.05). Muscular contribution for the right leg was greater during Control vs. RPR for the quadriceps (37.9±11.3% vs. 30.9±6.4%, p=0.05), but not different during Control vs. RPR for the gluteus maximus (8.3±4.8% vs. 8.9±3.1%, p=0.86) or the hamstrings (7.2±5.4% vs. 11.6±5.0%, p=0.21). **CONCLUSION:** These data indicate that RPR enhances hamstring activation during short sprints in healthy males. Yet, it remains unclear whether RPR increases performance during short sprints.

Keywords: Electromyography, Performance, Muscular Contribution

Board 3

EFFECTS OF INCREASING GRIP DIAMETER DURING SOFTBALL WARM-UP SWINGS ON SUBSEQUENT SWING PERFORMANCE

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Optimizing swing performance through warm-up swings is an important component of a softball athlete's success. Utilizing post-activation potentiation may be a method to acutely enhance bat speed and power. **PURPOSE**: The purpose of this study was to compare the effects of warming up with a softball bat (SB) or utilizing a SB with the addition of fat grips (FG) on subsequent swing performance. **METHODS**: Division III female softball players (n = 18) participated in this investigation. Subjects came in for three sessions on nonconsecutive days. Session 1 consisted of gathering demographics and familiarized subjects with the protocol. During sessions 2 and 3, subjects performed five sets of five submaximal swings and two maximal swings at a softball-sized wiffle ball hung from a ceiling at a standardized height in a randomized and counterbalanced design. The sets were completed with an initial treatment set, FG or SB, a baseline measurement completed 30 s after the treatment set, and at three, six and nine minutes. During the first set of seven swings, subjects were instructed to complete maximal isometric contractions when using the FG and use normal grip pressure when using the SB while swinging at the ball. The remaining four sets were completed using no FG and normal grip pressure. Power (P), bat speed (BS), hand speed (HS), and time to contact (TC) were measured during each maximal swing in the last four sets by a commercially available swing analyzer. **RESULTS**: There were no significant main effects for treatment in regards to P (FG= 1.56 ± 0.29, SB= 1.57 ± 0.47 kW) BS (FG= 51.6 ± 7.63, SB= 51.73 ± 8.01 mph), HS (FG= 16.38 ± 2.58, SB= 16.29 ± 2.64 mph), and TC (FG= 0.17 ± 0.3, SB= 0.17 ± 0.3 s) ($p > 0.05$). There were also no main effects for timepoint or interaction effects for any variables. **CONCLUSIONS**: The use of FG to increase subsequent power production through post-activation potentiation was not found in this study. Although there were no differences between treatments, a commercially available swing analyzer can successfully provide important feedback immediately after swinging a bat.

Keywords: athletes, intramuscular

Board 4

EFFECTS OF GRIP ENHANCEMENTS ON ISOMETRIC MID-THIGH PULL FORCE AND RATE OF FORCE DEVELOPMENT

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Although it is assumed that grip enhancements like chalk and wrist strips enhance force and force development during barbell lifts, these enhancements have not been formally tested. **PURPOSE**: To test various grip enhancements on isometric mid-thigh pull force and rate of force development. **METHODS**: Thirteen recreationally trained college students (6 males, 7 females, age = 20.5 ± 0.9 years, height = 1.71 ± 0.10 m, weight = 74.2 ± 12.6 kg) performed isometric mid-thigh pulls standing on a force platform using a sampling rate of 500 Hz. The order of the grip conditions was randomly assigned (control = double over-hand pull (DO), mixed grip (MIXED), wrist straps (WS), and chalk (CHALK)) on different days with three successful attempts per condition. Overall peak force (OPF) and rate of force development (RFD) at 50-100 and 100-150 ms were measured using software. Data were analyzed using repeated measures ANOVA and Tukey's post-hoc test with significance level $p < 0.05$. **RESULTS**: There were no significant differences ($p > 0.05$) in OPF found between DO (2112.64 ± 736.03 N), MIXED (2171.35 ± 732.89 N), WS (2247.52 ± 882.66 N), and CHALK (2152.87 ± 736.57 N). There were also no significant differences ($p > 0.05$) in RFD at 50-100ms found between DO (7388.97 ± 4381.98 $N \cdot s^{-1}$), MIXED

(7171.68 ± 3221.24 $N \cdot s^{-1}$), WS (6546.30 ± 3774.32 $N \cdot s^{-1}$), and CHALK (6410.87 ± 3341.31 $N \cdot s^{-1}$), as well as RFD at 100-150ms between DO (3726.16 ± 3018.63 $N \cdot s^{-1}$), MIXED (3938.25 ± 3082.74 $N \cdot s^{-1}$), WS (3951.74 ± 4823.32 $N \cdot s^{-1}$), and CHALK (3544.22 ± 3090.39 $N \cdot s^{-1}$). **CONCLUSIONS:** Grip enhancements do not significantly alter peak force and rate of force development during isometric mid-thigh pulls in male and female recreationally trained college-age students.

Keywords: grip strength, wrist straps, chalk

Board 5

ACCURACY OF 5K RACE TIME USING A GPS SPORTS WATCH

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GPS sports watches are a convenient tool used to monitor improvement and predict race performance. Ensuring these watches are accurate allows runners to specifically plan out training to reach a desired race time. However, if predicted race time is inaccurate, an athlete may become frustrated during training or not reach their goals. **PURPOSE:** The purpose of this study was to determine if a GPS sports watch accurately predicts 5k race time. **METHODS:** Nineteen participants (26.84 ± 7.89 years) were recruited for this study. Eligibility included participants running at least 30 minutes a day, three times a week. Participants were required to visit the EMU Running Science Laboratory on two separate occasions. During the initial visit, participants completed a VO_{2max} test on a treadmill. Participants ran at a self-selected speed while grade increased 2% every two minutes until volitional exhaustion. Following the VO_{2max} test, participants were shown how to use a GPS sports watch and instructed to run three days a week for at least 30 minutes for two weeks. After two weeks, participants returned for their second visit and predicted 5k time was recorded from the GPS sports watch. Participants then completed a 5k race time trial on a 200m indoor track (measured 5k). A paired samples t-tests was used to compare predicted 5k to measured 5k ($p < 0.05$). **RESULTS:** Three participants were excluded due to failure to return for the second visit. The remaining 16 participants (5 female, 11 male) had an average VO_{2max} of 54.01±9.05 ml/kg/min, height of 172.90±7.02 cm, and weight of 69.45±8.97 kg. There was a significant difference between measured 5k race time (25.29±4.7min) and predicted 5k race time (21.12±2.5min) indicating that the GPS watch under predicted 5k time. **CONCLUSION:** The GPS sports watch under predicted 5k time by approximately four minutes. The prediction from the GPS sports watch was based on factors such as speed, heart rate, and distance measured while participants wore the watch for two weeks. Failure to accurately measure heart rate at the radial pulse, inaccuracy associated with GPS, and varied training intensity while wearing the watch could explain some of the error.

Keywords: Predictability Running VO2max

Board 6

ACCURACY OF SELF-REPORTED HEIGHT AND WEIGH

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Many sport governing bodies collect and store performance data from competitions taking place within their jurisdiction. The data can then be used by researchers to answer questions about sport and human performance. Such performance data sets are valuable in and of themselves. However, their value can be increased if basic anthropometric data can be combined with the performance data. Unfortunately, it's not always an option for researchers to take such measurements because the athletes live throughout the country, or even the world. One way around this obstacle would be to have the athletes report their own heights and weights in an online survey. **PURPOSE:** To determine whether or not collegiate athletes self-report accurate, unbiased heights and weights. **METHODS:** Competitive athletes (n=54) were met at one of the Eastern Michigan University (EMU) practice facilities. After completing an informed consent, the athletes filled out an online questionnaire in which they self-reported their heights and weights. Then, a member of the research team measured the athletes' heights and weights in a private room. The self-reported and measured values were completed on the same day. Paired samples t-tests were used to compare the self-reported heights and weights to the measured values. **RESULTS:** The mean percent error was 1.0% (s = 0.7%) for self-reported height and 1.8% (s = 1.5%) for self-reported weight. Self-reported height (174.61 ± 9.50 cm) was significantly greater than measured height (173.67 ± 9.26 cm) (t=3.44, p=0.001). Self-reported weight (72.72 ± 14.13 kg) was significantly less than measured weight (71.89 ± 13.66 kg) (t=3.40,

p=0.001). **CONCLUSIONS:** This study provides evidence that competitive athletes are capable of self-reporting accurate heights and weights. However, the athletes in this sample consistently reported being taller and lighter than they actually were. Before the self-reported heights and weights of competitive athletes are used for research purposes, more work needs to be done to better understand the factors associated with error in self-reporting.

Keywords: Accuracy, Self-report, Athlete, Anthropometry

Board 7

BODY COMPOSITION CHANGES IN MEN AND WOMEN OVER 12 MONTHS OF TRAINING

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Maintaining a healthy body composition is a key factor for the reduction of disease risk and the improvement of body satisfaction. Health club Personal- and Small-Group-Training services promote cardiovascular and resistance exercise to a wide population to achieve these ends. InBody technology utilizes bioelectrical impedance to quickly measure body composition and may be used to determine changes in muscle and body fat as a result of training over time. **PURPOSE:** To examine body composition changes over time in active, resistance training adults. **METHODS:** 293 men and women aged 18-78 (M = 40.11, SD = 13.11) who were participants in individual or group personal training served as the subjects for this research. Subjects underwent a baseline InBody assessment and then repeated the InBody assessment at least once within a twelve-month period. Skeletal Muscle Mass (SMM) and Percent Body Fat (PBF) were compared between baseline and month 1, baseline and month 2, etc. for each sex separately. Not all participants had assessments performed each month, therefore the N varies across the different timeframes. **RESULTS:** Significant changes in males only emerged in PBF, in 5 of the 12 comparisons (pretest with months 1-3, 5, 8). Effect sizes for these significant comparisons ranged from .72 (Pretest [M = 25.60, SD = 10.87] vs. Month 5 [M = 23.35, SD = 10.37]) to .36. Significant improvements in females arose in both SMM (7 of the 12 comparisons: pretest with months 4-7, 9-10, and 12) and PBF (9 of the 12 comparisons: pretest with months 1-8, and 11). Effect sizes in SMM ranged from .70 (Pretest [M = 56.14, SD = 11.78] vs. Month 10 [M = 57.30, SD = 11.71]) to .355. Effect sizes in PBF ranged from .74 (Pretest [M = 34.40, SD = 8.98] vs. Month 2 [M = 33.01, SD = 8.88]) to .47. **CONCLUSION:** Our results indicate that participation in regular personal training was effective for eliciting positive changes in body composition over time. The data suggest that while females improved both PBF and SMM over the timeframe measured, males only improved PBF.

Keywords: InBody

Board 8

COMPARISON OF UPPER AND LOWER BODY MUSCULAR STRENGTH AND ENDURANCE IN COLLEGE STUDENTS AT IWU

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There have been multiple studies that have examined the relationship between upper body (UB) and handgrip (HG) muscular fitness. The general finding of these studies is that as muscular fitness of the UB improves, the muscular fitness of the HG muscles increases, showing a direct relationship. These studies, however, fail to look for a relationship between the muscular strength and endurance of the lower body (LB) and HG muscles. **PURPOSE:** The purpose of this study was to determine how Indiana Wesleyan University (IWU) students compare to normative values for LB muscular strength and endurance (MSE) and HG MSE and to test for relationships between HG and LB muscular strength (MS) along with HG and LB muscular endurance (ME). **METHODS:** Sixty participants (38 male, 22 female; aged 20.22±0.9785 years) agreed to participate in the research and came in on two separate occasions. Each participant performed 2 maximal HG contractions per hand with a HG dynamometer, a one-leg wall sit until failure on each leg, a submaximal HG contraction to failure with each hand, and a multiple repetition leg press. **RESULTS:** Pearson Correlations were used to compare HG and LB strength tests as well as endurance tests for all participants, as well as both males and females separately. One Sample t-Tests were used to compare mean scores to normative data for all tests. A direct relationship existed for both strength (r=0.312, p=0.015) and endurance (r=0.359, p=0.005) tests. A stronger, more confident relationship existed within males for strength (r=0.419, p=0.009) while the same existed for females with the endurance tests (r=0.490, p=0.021). **CONCLUSIONS:** IWU students demonstrated overall healthy MSE levels as their mean scores were above the

normative values for healthy MSE. HG and LB MSE had exhibited a direct relationship allows for the prediction of one from the measurement of the other. This tells us that measurements of one's HG strength and endurance can be used as an indicator for LB strength and endurance. This study also found that males had a greater correlation of HG and LB strength while females had a greater correlation for HG and LB endurance. This finding supports the findings of a previous study that male muscles are more inclined for strength while female muscles are naturally more designed for endurance.

Keywords: wall sit, leg press, hand grip max, hand grip fatigue

Board 9

MODIFICATION OF THE HANG CLEAN INCREASES SPECIFICITY FOR SPRINTING

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Resistance training exercises require the development of horizontal, in addition to vertical GRF, in order to maximize the transfer of training to activities such as sprinting. The horizontal hang clean (H-HC) is a novel variation of the traditional hang clean (T-HC), with an emphasis on maximal horizontal displacement of the subject. **PURPOSE:** Evaluate the horizontal and vertical force development ratio (H:V) of the T-HC and the H-HC and compare these H:V to the H:V of the standing sprint start (SSS) and countermovement jump (CMJ). **METHODS:** Twenty subjects (age = 20.90 ± 1.9 years) were tested in the following randomized exercise conditions on a force platform: T-HC, H-HC, SSS, and CMJ. The T-HC and H-HC were performed with 70% of the subject's five repetition maximum hang clean load. Two sets of one repetition were performed for all exercise conditions. Ground reaction force for each test was obtained and horizontal displacement was determined for the T-HC and H-HC. Data were analyzed using Pearson's correlation coefficients. **RESULTS:** Results revealed that H-HC H:V is correlated with subject horizontal displacement during H-HC ($r = .58$, $p = 0.007$). The H-HC horizontal displacement is correlated with SSS H:V ($r = 0.50$, $p = 0.026$). The H-HC vertical GRF was correlated to the SSS vertical GRF ($r = .73$, $p = 0.001$). The H-HC horizontal GRF and vertical GRF are correlated with CMJ horizontal GRF ($r = .66$, $p = 0.022$) and vertical GRF ($r = .53$, $p = 0.017$), respectively. Finally, the H-HC vertical GRF is correlated with CMJ vertical GRF ($r = .70$, $p = 0.001$). The T-HC horizontal GRF and vertical GRF were correlated with CMJ horizontal GRF ($r = .48$, $p = 0.031$) and vertical GRF ($r = .58$, $p = 0.008$), respectively. **CONCLUSION:** The H:V of the H-HC is correlated with the H:V of SSS, whereas the T-HC is not. Higher horizontal force development is related to greater horizontal displacement during the H-HC. Horizontal displacement is related to a higher H:V during the SSS. The H-HC should be used to increase the transfer of training to horizontal athletic activities such as sprinting.

Keywords: Olympic Weightlifting; Kinetics; Transfer of Training

Board 10

WHICH CRITICAL VELOCITY MODEL IS THE BEST PREDICTOR OF PERFORMANCE IN COLLEGIATE TRACK AND FIELD?

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The critical velocity (CV) model describes the ability of an individual to sustain various running paces (min/km) as a function of time. The CV model facilitate individualized training plans and race pacing without the requirement for invasive laboratory measures. Models with strong predictive ability would be a useful tool for both athletes and coaches. Multiple CV models exist, including; Monod 2-Parameter CV, Monod 3-Parameter CV, and the Extended CV model. **PURPOSE:** To determine a critical velocity model that best predicts performance for middle (1.5km) and long distance (5.0km) events in track and field. **METHODS:** Sixteen runners (12 female, 4 male) volunteered to participate in this Ohio University IRB approved study (Project #16-X-201). Each athlete was equipped with a GPS enabled watch four months before the start of the track and field season. Second by second, pace (min/km) data was collected for each training session. All collected data was applied to create three distinct CV models. Each athlete's best performance in the 1.5km and/or the 5.0km race was documented during competitions. A simple linear regression was implemented to predict race performance in time (secs) using each of the three CV models. **RESULTS:** Each linear regression established that CV models significantly predicted race time for the 1.5km and 5.0km events. From the three models, the Extended CV model accounted for the largest explained variability in 1.5

km race time at 70.7%, (F (1, 12) = 828.956, p <.001), predicted race time (secs) =.627[Extended CV time (secs)] + 100.392. From the three models, the Monod 3-Parameter CV model accounted for the largest explained variability in 5.0 km race time at 90.3%, (F (1, 6) = 55.884, p <.001), predicted race time (secs) =.852[3-Parameter CV time (secs)] + 121.748. **CONCLUSION:** Based on four months of training data, the three CV models were statistically significant in predicting race performances in track and field. Based on the distance of the event, different CV models must be considered. Data collected from periodic near maximal field test at various distances may improve future modeling, specifically for shorter distance events.

Keywords: Critical Velocity Performance Models

Board 11

PHYSIOLOGIC EVALUATION OF A COLLEGIATE MASCOT DURING FOOTBALL GAMES AND RELATED ACTIVITIES

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Heart rate (HR) monitoring and accelerometry have been used to evaluate collegiate athletes' activity levels during practice and competition. This allows coaches and athletic trainers to better determine how much rest and recovery is needed between competitions so the activity does not pose undo health risk. An important, yet understudied group that also exerts substantial effort during collegiate sporting events are team mascots. We found no study that has evaluated collegiate mascots using recent wearable technology as they perform at athletic competitions and pregame related activities. Mascots frequently wear suits/uniforms that are heavy and could pose an environment not conducive to effective temperature regulation. Data are needed to determine the exercise load that a mascot endures and how much activity is actually performed during an event. **PURPOSE:** Our purpose was to collect collegiate mascot pilot data to determine physiological HR responses during two football games and pregame-related activities. **METHODS:** A physiological tracking system was used to evaluate HR and movement from individuals (N=7 [1 female]; avg ht=1.82m, wt=75.6kg) who performed mascot activities "in suit" (weighing ~14kg) before and during two NCAA Division I University football games. Both games were played at night under moderate ambient conditions (temp=22-14 °C, rh=64%, wind speed=4 mph). Prior to the study, individuals' HRmax values were determined during graded treadmill tests performed to volitional exhaustion. Variables analyzed during the games were time in suit, time in pre-established HR zones [including HRzone1 (50-59%HRmax), HRzone2 (60-69%HRmax), HRzone3 (70-79%HRmax), HRzone4 (80-90%HRmax), and HRzone5 (>90%HRmax)], and distance covered per minute. Differences in time per HRzone were evaluated using 95% confidence intervals. Differences in average HR between pre-game and game conditions were evaluated via a t-test. **RESULTS:** Sessions in suit lasted 43.5±10.5 min, and distance traveled was 47±22 m/min. HR averaged 82±8% of HRmax, with over half the time spent in HRzone4 (34±20%; $p<0.05$) and HRzone5 (23±27%), with only 2±2% spent in HRzone1. HR values were significantly lower during pregame (74±4%HRmax) compared to game (85±6%HRmax) activities ($p<0.001$). **CONCLUSION:** The mascot suit environment posed significant physiological strain on the wearer, despite relatively little activity or movement performed per session.

Keywords: Health Monitoring, College Mascot

Board 12

CONTRIBUTIONS OF STRENGTH, ANTHROPOMETRIC, AND DEMOGRAPHIC CHARACTERISTICS TO CLIMBING PERFORMANCE

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PURPOSE: The purpose of the present study was to determine the relative contributions of handgrip and individual finger strength, body size, climbing experience, and training habits for the prediction of climbing performance in a bouldering competition. **METHODS**: Sixty-seven climbers (males: n = 46, females: n = 21; mean age ± SD = 21.1 ± 4.0 yrs; body mass = 69.5 ± 9.8 kg; height = 173.5 ± 8.3 cm; climbing experience = 2.7 ± 2.6 yrs; climbing frequency = 3.0 ± 1.2 sessions·wk^{-1}) volunteered for this study. Data collection occurred immediately before an indoor bouldering competition and involved the assessment of handgrip and individual finger maximal force production using an electronic handheld dynamometer. Individual finger strength was defined as the maximal force generated using a tip-to-tip pinch between each finger and the thumb. All measures of strength were normalized to

body mass (kg). Subjects also completed a questionnaire to determine climbing experience and training habits (i.e. climbing frequency). The bouldering competition consisted of 70 routes graded V0 (easiest) - V8 (most difficult) with higher point values awarded for completing more difficult routes. Stepwise multiple regression analyses were used to examine the relative contributions of handgrip and individual finger strengths, body mass, height, climbing experience, and climbing frequency to the prediction of performance scores in the competition. **RESULTS**: The stepwise multiple regression analyses indicated there were significant [$F(3, 63)=12.499$, $p < 0.001$] predictors of climbing performance in our model. Specifically, we found that ring finger pinch strength, climbing experience, and climbing frequency significantly contributed to the model ($R^2 = 0.373$), whereas body mass, height, full handgrip strength as well as index, middle, and little finger pinch strengths did not. The β-weights showed that ring finger pinch strength ($\beta = 0.430$) was the most significant contributor followed by climbing experience ($\beta = 0.331$) and climbing frequency ($\beta = 0.244$). **CONCLUSION**: These findings illustrated the importance of ring finger pinch strength on climbing performance in a bouldering competition. Our results also suggested that increasing climbing experience and frequency of training may contribute to greater ring finger strength and thus, overall climbing performance.

Keywords: handgrip, finger, force, bouldering

Board 13

EFFECTS OF AN ECCENTRIC-INDUCED FATIGUE PROTOCOL ON MUSCLE ACTION SPECIFIC PEAK TORQUE

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PURPOSE: The purpose of the present study was to examine the effects of an eccentric-induced fatigue protocol on isometric (ISO), concentric (CON), and eccentric (ECC) peak torque of the leg extensors. **METHODS**: Twelve female subjects (mean age ± SD = 21.1 ± 1.4 years; body weight = 63.3 ± 7.4 kg; height = 166.8 ± 2.3 cm) defined as moderately-trained (2.7 ± 1.7 resistance training $hr \cdot wk^{-1}$, 4.8 ± 2.1 aerobic training $hr \cdot wk^{-1}$) volunteered to visit the laboratory on two separate days (≥72 hours apart). The first visit was structured as an orientation session to familiarize the subjects with performing ISO, CON, and ECC muscle actions of the leg extensors on an isokinetic dynamometer. For the second visit, each subject performed randomly ordered maximal ISO, CON, and ECC muscle actions to determine their pre-fatigued (PRE) peak torque values. The maximal ISO muscle actions were sustained for three seconds at a knee joint angle of 120º and the isokinetic muscle actions were assessed at $30º \cdot s^{-1}$. Subjects then performed a fatigue protocol that consisted of 30 repeated, maximal ECC muscle actions at $30º \cdot s^{-1}$. Immediately after, the same sequence of PRE maximal muscle actions were performed again for determination of the fatigued (POST) peak torque values. **RESULTS**: The two-way ANOVA with repeated measures [$F(2, 22)=9.317$, $p = 0.001$] and follow-up paired samples *t*-tests indicated that the eccentric-induced fatigue protocol resulted in significant PRE to POST decreases in ISO (186.9 ± 42.1 to 161.3 ± 37.0 N·m, $p < 0.001$) and CON (171.4 ± 25.3 to 141.3 ± 24.8 N·m, $p < 0.001$) peak torque, but not ECC (199.1 ± 61.7 to 193.7 ± 48.6 N·m, $p = 0.578$). **CONCLUSION**: These findings demonstrated that fatigue induced by repetitive, maximal, lengthening contractions is muscle action specific. It is possible that the strength loss associated with ISO and CON, but not ECC, muscle actions likely resulted from the muscle damage and mechanical efficiency related to repeated ECC muscle actions.

Keywords: isometric, concentric, isokinetic, strength

Board 14

EFFECT OF TART CHERRY JUICE ON PAIN INFLAMMATION AND MUSCLE STRENGTH

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Hundreds of thousands of athlete's train vigorously every day, whether competitively, or recreationally. A combination of the need to accelerate muscle recovery and increase nutrients to improve muscle recovery prompts the idea of using an antioxidant to assist in muscle recovery. Tart cherry juice has numerous benefits that lend its use to be optimal for assisting in sports performance. **PURPOSE**: The purpose of this double-blinded, randomized control study was to assess the impact of tart cherry concentrate on pain, inflammation, and strength in resistance-trained males ($n = 24$). **METHODS**: After being randomized into the treatment and control group, participants received their supplementation of either tart cherry concentrate (TC), one oz. of concentrate with four oz. of water or

the placebo (PL) to consume twice daily over 8 consecutive days. On day 5 of the study, participants completed an eccentric knee extension exercise with their right leg. Blood samples, maximum voluntary contraction (MVC), and pain were assessed at baseline, 48 hours and 72 hours after the eccentric exercise. Pain was measured using the Visual Analog Scale (VAS). Inflammatory markers included Serum Amyloid A (SAA) and C-Reactive Protein (CRP). MVC measured strength and was assessed using the dynamometer (CSMi Humac Norm 770). **RESULTS**: A Split- Plot ANOVA indicated there was a statistically significant difference across the main effect time period ($p < 0.01$), which accounted for 46% of the variance and this was significant at all time points ($p < 0.05$). SAA showed a statistically significant difference across the main effect time period, which accounted for 14% of the variance. Overall, the results of this study indicated there were no favorable significant differences on pain, inflammation or strength between groups or over time ($p > 0.05$). **CONCLUSION**: Although this research study did not indicate favorable evidence for consuming tart cherries as a nutritional supplement, future research should target the mechanism of short-term supplementation of TC on high-intensity anaerobic exercise.

Keywords: Muscle recovery, maximal voluntary contraction, supplementation

Board 15

THE EFFECT OF ACTIVITY LEVEL AND CALORIC INTAKE ON A BRAIN-HEALTH PROTEIN, BDNF

Makenna L Holz, Hannah J Ewing, Zach Ham, Julia Noonan Brom, Daniel Black, Daniel King FACSM, Erik Hayes FACSM. Taylor University, Upland IN.

Brain derived neurotrophic factor (BDNF) is a brain plasma protein that is key for metabolic changes in the brain and is also critical to understanding cognitive changes with exercise (Engeroff, 2018, Babaei, 2015). The production and release of BDNF has been shown to significantly increase with exercise as compared with control groups (Ghooshchi, 2018, Rasmussen 2009), and with significant periods of low caloric intake (Bastani, 2017). **PURPOSE**: To investigate the acute effect of high and low activity levels paired with eucaloric and low caloric intakes on the levels of plasma BDNF. **METHODS**: Eight males, ages 30 to 60 with a BMI between 18.5 and 24.9, participated in this study, which consisted of four randomized test condition days. Each morning, subjects came into the lab following an overnight fast to have blood drawn and to receive shakes to drink for breakfast and lunch. During the day, subjects were required to meet a step goal, greater than 10,000 or less than 1,500 measured using a pedometer, and drink a calculated amount of nutrition shake, either eucaloric or 75% of eucaloric. After 8 hours, subjects returned for the second and final blood collection of the day. The four test conditions were: eucaloric and high activity, eucaloric and low activity, low calorie and high activity, and low calorie and low activity. Approximately 1mL of blood was collected from finger sticks, allowed to coagulate, centrifuged, and the plasma BDNF was quantified by ELISA. ANOVA analysis was used to evaluate the effect of activity and caloric intake on blood plasma levels and any potential interaction between the two. **Results**: There was no statistically significant impact of activity level or caloric intake on the measured BDNF levels ($p_{values} > 0.05$). **Conclusion**: The implication of this work is that one single active or sedentary day was not enough to trigger a significant response in plasma BDNF concentration. Similarly, a single day with 75% of eucaloric intake was not enough to cause a statistically significant response in BDNF level. Consequently, longer interventions, perhaps many consecutive days, may be required to cause a noticeable increase in BDNF from low intensity movement.

Funding: FMUS grant
Keywords: ELIZA, Blood plasma

Schedule – Friday Afternoon: Symposia

Symposium #11: Monarch Room, 2:00-2:50pm

The Role of Clinical Exercise Physiology and Bariatrics

Session moderator: Kyle Timmerman, Miami University
Presenters and Institutional Affiliations:

Laura A. Richardson, PhD The University of Akron/Summa Health System
Dr. Richardson is a professor of instruction at The University of Akron in the Exercise Science program and an American College of Sports Medicine Registered Clinical Exercise Physiologist. Her research interests are obesity stigmatization and fat bias with emphasis on students' perceptions of weightism. As an educator, Dr. Richardson is dedicated to innovative pedagogy, fostering online teaching and learning initiatives, digital course materials and interprofessional collaboration. In addition to academia, she has 20+ years of clinical experience in healthcare as an RCEP practitioner working with patients diagnosed with: immunological, metabolic, pulmonary, neuromuscular, cardiovascular and orthopedic disorders using exercise as a mode of therapeutic intervention. Laura's expertise is working with Bariatric patients utilizing behavior modification strategies for lifelong weight management success.

Learning objectives:
At the conclusion of the symposium, the audience should be able to:

1. Identify obesity classification and NIH indications for surgery
2. Discuss the multifactorial components of obesity
3. Understand types of bariatric surgery procedures
4. Be able to recognize comprehensive perioperative and post-surgical exercise prescriptions
5. Recognize the importance of implementing an interdisciplinary team for long-term weight maintenance
6. Identify the balance of medical management and coordination of obesity care

Symposium Description:
Obesity is a serious and prevalent disease linked to numerous adverse health outcomes. Bariatric surgery has been proven a safe and effective treatment option for dramatic weight loss. Understating the role exercise plays in both weight loss and weight maintenance is paramount for the effective treatment of obesity. Adequately preparing the entry level clinical exercise physiologist for comprehensive bariatric care requires systematic training across a wide continuum of patient care. Clinical exercise physiologists work on an interdisciplinary team to coordinate obesity care and behavior modification. This symposium will outline the major factors associated with obesity treatment and explain how the clinical exercise physiologist fits into overall patient care. A robust discussion of obesity, the major comorbidities, types of bariatric procedures, a life after surgery will be explained.

Symposium #12: Monarch Room, 3:00-3:50pm

But I could've cheated! Innovative teaching strategies and how to handle student issues; lessons learned through decades of teaching experience.

Session Moderator: Bonnie Jobe, Henry Ford College
Presenters and Institutional Affiliations:

Heather Betz, Ph.D., FACSM. Albion College
Heather Hayes Betz, FACSM received her Ph.D. in Kinesiology in 2011 from Michigan State University. She served as the Student Representative and Member-at-Large on the MWACSM Board of Directors and is the most current past Past-President, finishing her term in 2018. Currently, Heather is the Chair of the Department of Kinesiology at Albion College. Her teaching focus is on Human and Exercise Physiology, Research Methods, and Physical Activity Epidemiology. Her research focus is on cardiovascular risk factors, mental health, physical activity, and sleep in the college-age population. Last year Heather completed a year-long course titled "Effective Teaching Practices with a concentration in Career Guidance and Readiness" offered by the Association of College and University Educators. Heather is active within the Albion College Center for Teaching and Learning and presented on teaching practices at the ACSM Annual Meeting in 2019.

Adam Coughlin, Ph.D. Saginaw Valley State University
I attended Adrian College for my undergraduate degree in Exercise Science and Michigan State University for my MS and PhD in Exercise Physiology. I taught for nine years at Adrian College, where I work exclusively with undergraduate students. I am now in my sixth year at Saginaw Valley State University. My research interests are running economy and footwear as well as athlete monitoring for performance. This includes lab-based and competition-based measurements, looking for markers that may affect performance. I teach exclusively undergraduate courses, including Ex Phys Lab, Ex Rx, and various other research and content-based courses. I have also served previously as a Member-At-Large for MWACSM and rotated out of the MWACSM Presidency in 2017.

Paul Nagelkirk, Ph.D. Ball State University
Paul Nagelkirk received his Ph.D. in Kinesiology in 2005 from Michigan State University. He has served as a member-at-large on the Midwest ACSM Board of Directors, and concluded his term as President in 2015. He currently holds the position of Director of the Integrative Exercise Physiology Laboratory and Associate Professor of Exercise Science at Ball State University. His research interests generally focus on the influence of exercise on molecular mediators of cardiovascular diseases, with particular emphasis on blood coagulation and fibrinolysis. Dating back to his time as a graduate student, Paul has accumulated a substantial amount of experience in the classroom, and his work as an educator has been acknowledged with various teaching awards.

Learning objectives:
At the conclusion of the symposium, the audience should be able to:

1. Understand that the situations they might face in the classroom are universal and that they are not alone in dealing with situations such as plagiarism, cheating, or other problems that arise when teaching.
2. Use clear and straightforward tips and suggestions on how to deal with issues that arise with students – plagiarism, cheating, etc.
3. Implement useable, concrete examples of teaching strategies to teach specific aspects of Exercise Science.

Symposium Description: No matter the size of the institution, certain student situations and teaching challenges are universal. Who hasn't dealt with plagiarism, cheating, or just an uninterested classroom? Many faculty are over burdened with committee work, their own research, and keeping current on the latest research in the field, but may not spend as much time thinking about innovative ways to present the material to a new generation of learners. Most conferences focus on the research going on in Exercise Science but not the teaching of Exercise Science. This symposium will allow faculty to hear from their peers from various sized schools and walk away with some new ideas that they can implement in the classroom right away and also know that they are not alone in dealing with the dark side of teaching.

Symposium #13: Mallard Room, 3:00-3:50pm

Applications of the Derivative and Integral to Exercise Science

Session Moderator: Abby Peairs, University of Cincinnati
Presenters and Institutional Affiliations:

Eric Slattery, Miami University, Oxford, Ohio

Eric is an Assistant Clinical Lecturer at Miami University. He is also the Kinesiology Laboratory Coordinator for the Kinesiology and Health Department.

Learning objectives:
At the conclusion of the symposium, the audience should be able to:

- Apply the Derivative and Integral to data in and beyond Exercise Science specific to a research or teaching setting. No prior calculus experience or formal calculus class required.
- Demonstrate how applying these methods will enhance student learning of concepts in Exercise Science

Symposium Description:
Attendees of this session will first be introduced to the concepts of a Derivative and Integral, from a non-technical, geometric point of view. Secondly, discuss methods of approximating the Derivative and Integral, and why we are limited to approximating it. Thirdly, discuss implementation of the Derivative and/or Integral to data in Exercise Science topics including: O_2 Deficit and EPOC, Vertical Jump Force Data, Lactate Excursion following Resistance Exercise, and Glucose Excursion for an Oral Glucose Tolerance Test. Implementation will cover computation using any spreadsheet program, and interpretation specific to each example. Fourthly, discuss implementation into a classroom setting for students to do the analyses, without needing prior knowledge of calculus. Lastly, discuss the limitations and drawbacks of these methods and things to keep in mind, from a methodology point-of-view, that affects approximation.

Symposium #14: Mallard Room, 4:00-4:50pm

Applications of Intensive Longitudinal Data Analysis in Physical Activity Research

Session Moderator: Alex Montoye, Alma College
Presenters and Institutional Affiliations:

Whitney Welch, PhD, Northwestern University Feinberg School of Medicine
Whitney Welch, PhD, is a research assistant professor in the Department of Preventive Medicine at Northwestern University Feinberg School of Medicine. She received her PhD in exercise physiology from the University of Wisconsin Milwaukee and completed a post-doctoral fellowship at Northwestern University in the Cancer Prevention and Control Research Training Program. Her research focuses on increasing physical activity in populations at high risk for inactivity, with an emphasis on preventing or managing chronic disease.

Kara Gavin, PhD, University of Wisconsin School of Medicine and Public Health
Kara Gavin, PhD MPH, is an assistant scientist at University of Wisconsin School of Medicine and Public Health in the Department of Surgery. Her background is in social and behavioral epidemiology and statistical methods. She received her PhD in 2017 from the University of Minnesota. As part of her doctoral research she focused on topics at the intersection of adult weight loss maintenance and physical activity including the role of major life events and self-monitoring gaps. She completed a post-doctoral research fellowship at Northwestern University, where she used novel quantitative methods to understand variations in health behaviors and physical activity as well as evaluate physical activity interventions for cancer survivors.

Learning objectives:
At the conclusion of the symposium, the audience should be able to:

1. Provide an overview of the advantage of intensive longitudinal data methods in physical activity research.
2. Understand the process involved in implementing a physical activity study using intensive longitudinal data through the discussion of unique examples in physical activity research.
3. Identify challenges when applying an intensive longitudinal analysis framework in physical activity research.

Symposium Description:
Technological advances have allowed for the real time capture of physical activity and other health-related physiological, patient-reported, or passive sensing outcomes such as heart rate, physical functioning, or environment. The richness of these real time data provides potential for investigation beyond average associations but allows exploration into the mechanisms underlying the relationship between physical activity and other health-related outcomes. Although collection of intensive longitudinal data has become more common, few studies have used intensive longitudinal data analysis methods when presenting their results. The purpose of this symposium will be to discuss 1) the advantage of intensive longitudinal data methods, 2) the process involved in implementing a physical activity study using intensive longitudinal data and data analysis, and 3) challenges when applying an intensive longitudinal analysis framework in physical activity research. Two presenters will discuss their experiences in applying intensive longitudinal data analyses in physical activity research through the presentation of examples from multiple populations.

Symposium #15: DuPage Amphitheater, 2:00-2:50pm

Sport-specific and wearable technology to enhance training, recovery and sport performance

Session Moderator: Jake Barkley, Kent State University
Presenters and Institutional Affiliations:

Alex Montoye, Alma College.
Dr. Alexander H.K. Montoye is an Assistant Professor of Integrative Physiology and Health Science at Alma College. His research focuses on improving the accuracy of accelerometer-based physical activity monitors and using physical activity monitoring devices as motivational tools to increase physical activity levels and improve health. Dr. Montoye is a former member of the Midwest ACSM Board of Directors and is an ACSM Fellow.

Sigrid Olthof, University of Michigan
Dr. Sigrid Olthof is a postdoctoral research fellow Sport Data and Analysis of the Exercise and Sport Science Initiative at the University of Michigan. Her research focuses on sport and performance data analytics, development, and integration. In her role at ESSI, Sigrid works with the Michigan Performance Research Lab and the U-M Athletic Department, where she aims to optimize sports performance by monitoring training and match load and studying injury data.

Pete Bodary, University of Michigan.
Dr. Pete Bodary is a Clinical Assistant Professor of Applied Exercise Science and Movement Science, and the Director of Innovative Teaching and Learning, in the University of Michigan School of Kinesiology. His research efforts include studies spanning from basic science experiments focused on arterial thrombosis to applied studies of human performance. He currently teaches an elective course focused on wearable technology that is offered to senior-level undergraduate as well as graduate students.

Learning objectives:
At the conclusion of the symposium, the audience should be able to:

- Appreciate the types of technology beyond the traditional (e.g. wrist based accelerometry) that can be used to evaluate individual and team sport data from detailed single workout metrics to full season summary analyses.
- Differentiate between the devices measuring external (accelerometry / GPS / LPS / gyroscopes) measures versus those that are evaluating internal (heart rate, muscle oxygenation, muscle activation) measures.
- Outline the use of wearable technology in power-type sports (e.g. sprinting / maximal jumps, etc.) and differentiate this from technology used in endurance-type sports.
- Recognize the types of wearable technology being used to evaluate recovery from training and the physiologic rationale that supports the devices.
- Describe the use of machine learning to enhance the metrics derived from wearable technology (e.g. counting slide tackles in soccer with Catapult devices).
- Recognize the use of a Local Position System (LPS) to integrate physical performance with tactical performance in order to obtain insights in team performance.

Symposium Description:
This symposium will discuss a variety of different wearable devices for assessing sport-specific training and recovery metrics. Some examples include:

- Blast monitor for vertical jump height
- Humon Hex monitor and Moxy Monitor for measuring skeletal muscle oxygenation
- Babolat Pop sensor for tennis stroke recognition and quality
- VO2 Master portable metabolic analyzer for field-based oxygen consumption and ventilation
- Hexoskin Smart Shirt for heart rate, ventilation, steps, and Calories
- Athos -- “smart garments” for real-time muscle activation pattern feedback
- Catapult -- team system for evaluating player load, distance, velocity, etc during individual workouts or for evaluating long-term adaptations

- Inmotio - team system for evaluating real-time tactical and performance data using local positioning measurements
- Whoop -- individual system for evaluating training stress and recovery measures incorporating sleep and heart rate variability measures.

<u>Symposium #16:</u> DuPage Amphitheater, 3:00-3:50pm

High-Intensity Functional Training: What we know, how we know it, and where we should go next.

Session Moderator: Dan Carl, University of Cincinnati
Presenters and Institutional Affiliations:

Steven J. Petruzzello, Ph.D., FACSM. University of Illinois Urbana-Champaign, Department of Kinesiology & Community Health, Urbana, Illinois
Dr. Steven Petruzzello is a professor in the Department of Kinesiology and Community Health at the University of Illinois Urbana-Champaign. He is fellow of the National Academy of Kinesiology (#578) and the American College of Sports Medicine. He directs the Exercise Psychophysiology Laboratory, with his research aimed at a more complete understanding of the affective and cognitive responses to exercise/physical activity, including the pre-to-post exercise changes that take place as well as the in-task changes that occur, along with individual differences that might lead to these changes. Ultimately, the aim is to develop a better understanding of how exercise makes people feel in order to structure the exercise stimulus to enhance adherence by either increasing positive or decreasing negative affective responses to the exercise.

Yuri Feito, Ph.D., MPH, FACSM. Kennesaw State University, Department of Exercise Science & Sports Management, Kennesaw, Georgia
Dr. Yuri Feito is an associate professor of exercise science at Kennesaw State University. He has been involved in the medical fitness industry for over 15 years working with a variety of clinical population. Dr. Feito obtained his Ph.D. from the University of Tennessee, Knoxville and has master's degrees in Movement Science and Public Health. He is fellow of the American College of Sports Medicine and is certified as a clinical exercise physiologist. His current research examines the physiological responses to high intensity functional training (HIFT), its psychosocial impact, and the incidence of injuries among HIFT participants.

Allyson G. Box, M.S., ACSM EP-C University of Illinois Urbana-Champaign, Department of Kinesiology & Community Health, Urbana, Illinois
Allyson Box is a Neuroscience PhD student at University of Illinois Urbana-Champaign (UIUC). She obtained her Master's degree from UIUC in Kinesiology and has Bachelor's degrees in Psychology and Exercise Science. She is a certified exercise physiologist, currently examining the antecedents and consequences of exercise behavior using an affective neuroscience approach.

Learning objectives:
At the conclusion of the symposium, the audience should be able to:
1) Have gained greater familiarity with the HIFT scientific literature
2) Identify methodological limitations and critically evaluate interpretations in current literature
3) Discuss ideas for measures and protocols for future HIFT studies to in order to provide better validity for future study findings and interpretations

Symposium Description:
High-intensity functional training (HIFT) is a 'hot topic' in the exercise science and fitness training research and practice. Indeed, over the past several years, HIFT has become an increasingly popular form of training, both occupationally and recreationally. It has also become an increasingly examined research topic from a scientific perspective. This symposium aims to examine the state of the art in HIFT in three parts. The first will provide an update of the HIFT literature, reviewing the findings related to physiological and psychological outcomes as well as risk of injury. The second portion of the symposium will review the various methodologies applied to obtain these data along with the potential dilemmas that have arisen from these methodological trends. Finally, the third portion of the symposium will focus on suggestions for improvements in the methodologies and research designs of HIFT studies along with new directions for future research that can address the critical questions of this important area.

Symposium #17: DuPage Amphitheater, 4:00-4:50pm

Vitamin D – Why we all need a little bit of sunshine

Session moderator: Sandra Knecht, Cincinnati Children's Hospital Medical Center
Presenters and Institutional Affiliations:

Tamara Hew-Butler DPM, PhD, FACSM, Wayne State University, Detroit, MI
Dr Tamara Hew-Butler is a podiatric physician and associate professor of Exercise and Sports Science at Wayne State University in Detroit, Michigan. She obtained her BS in Kinesiology at the University of California at Los Angeles, CA; Doctor of Podiatric Medicine (DPM) at Temple University in Philadelphia, PA; and Philosophy Doctor (PhD) at the University of Cape Town, South Africa. She is a Fellow of the American College of Sports Medicine (FACSM) and specializes in both sports medicine and exercise physiology. Her expertise is in exercise-associated hyponatremia and the endocrine regulation of water and sodium balance. Her scientific work has been highlighted on radio shows (Science Friday, National Public Radio), television (The Weather Channel), podcasts (CJSM), newspapers (New York Times, Washington Post, CNN), a comic strip (xkcd) and reality television show (Adam Ruins Everything).

Learning objectives:
At the conclusion of the symposium, the audience should be able to:
1) Understand how Vitamin D is synthesized
2) Understand the current state of vitamin D deficiency
3) Discuss the pros and cons of Vitamin D supplementation

Symposium Description:
This lecture will provide an overview of Vitamin D synthesis and its biological function. The proposed clinical benefits will be discussed as well as the conundrums associated with conflicting studies and recommendations. The presentation will touch upon the potential for Vitamin D to be an ergogenic aid, from the perspective of our own investigations performed on National Collegiate Athletic Association (NCAA) athletes with regards to: body composition changes, depression, and performance.

Symposium #18: Oak Brook Room, 2:00-2:50pm

Building a High Quality, Sustainable Grant And Program Funding Partnership Collaboration

Session moderator: Trent Cayote
Presenters and Institutional Affiliations:

Craig E. Broeder, Ph.D. FACSM, FNAASO. Exercising Nutritionally, LLC, Lisle, IL

Dr. Broeder's received his Ph.D. with Dr. Jack Wilmore, from the University of Texas in Austin. Dr. Broeder has served on both the SEACSM and MWACSM boards. He is a past president of the MWACSM regional chapter. In 2009, he established the ACSM based "Kay and Craig Broeder Preventive Female Cancer Fund" by being the first person to cycle the perimeter US states in 90 days.

Learning objectives:
At the conclusion of the symposium, the audience should be able to:

1. Understanding what it means to build a high quality, sustainable program i.e., exercise science or grant funding collaboration.
2. Understanding what are the requirements, similarities, and differences in program and grant funding needs.
3. No matter what type of university setting regional state institution or private college/university, this tutorial will help you understand what are the basic requirements for developing a long-term sustainable funding model that can not only help you fund your program & a variety of research studies; but, also have the greatest impact on your group's professional development and surrounding community.

Tutorial Overview:
This tutorial will show, via real-world examples, innovative ways in how students, junior researchers, and even experienced university department chairs can develop funding for a consistent, high quality sustainable program, research, and lab funding partnerships. The concepts presented within this tutorial will highlight what are the essential needs for creating sustainable program and grant funding opportunities, with a special emphasis on developing non-federally funded program support. This tutorial will also provide a sample step by step guide in how to individualize your own group's sustainable program and/or grant funding partnership program.

Student Colloquium: Oak Brook Room, 4:00-4:50pm

Networking – How to Foster Relationships in a Professional Environment

Session Moderator: Kevin Ballard, Miami University
Presenters and Institutional Affiliations:

Karin Pfeiffer Ph.D., Professor, Department of Kinesiology
Michigan State University

This colloquium will provide our students an opportunity to engage with our Keynote Presenter Dr. Karin Pfeiffer to discuss relationship building and how to network in the professional environment. The presentation will include opportunities for students to engage directly with Dr. Pfeiffer through Q & A

Schedule – Friday Afternoon: Free Communication / Slides

Free Communication/Slides #6: Monarch Room, 4-5:00pm

Session Moderator: J. Derek Kingsley, Kent State University

4:00-4:15pm
CLINICAL GAIT ANALYSIS IN CHILDREN AND ADOLESCENTS WITH AUTISM SPECTRUM DISORDER
Xinye Wu, Clark Dickin, Laura Bassette, He Wang. Ball State University, Muncie IN.

Individuals with autism spectrum disorder (ASD) often exhibit motor deficits. It is unclear how children and adolescences with ASD develop their gait patterns due to the possible motor deficits. Limited literature has revealed some variations in gait associated with children with ASD. However, there is a lack of a complete description on gait biomechanics demonstrated by children with ASD. **PURPOSE:** In order to understand the mechanism of movement coordination in children with ASD, this study aims to examine temporal-spatial parameters and three-dimensional kinematic and kinetic gait mechanics exhibited by ASD children. In addition, as leg strength is a key determinant of gait quality, this study also aims to assess and characterize ASD individuals' leg strength. **METHODS:** Nine children with ASD (age: 12.3±1.8 years; body mass: 55.8±18.9 kg; body height: 1.59±0.16 m) were recruited. Participants walked on a force-instrumented treadmill at a constant speed for five minutes (speed range, 1.1m/s ~ 1.2m/s) while motion capture was performed via a 15-camera Vicon system at 100Hz. Following the walking task, participants performed maximal voluntary isometric contractions on a Cybex dynamometer to assess their knee muscle strength. **RESULTS:** As this is an ongoing study, only preliminary temporal-spatial data and knee strength data were reported here. We found that the tested children with ASD had a cadence of 137.5±13.3 steps per minute, stride length of 1.23±0.17 meters, and stride width of 0.11±0.03 meters. In addition, children with ASD's left and right knee extensor torques were 2.22±0.64 N*m/kg, 2.39±0.70 N*m/kg, respectively. Their left and right knee flexor torques were 1.13±0.45 N*m/kg, 1.32±0.57 N*m/kg, respectively. **CONCLUSION:** Compared to healthy children's gait data in existing literature, our ASD participants demonstrated a shorter stride length (1.23 m vs. 1.28 m) and a wider stride width (0.11 m vs. 0.07 m). In addition, our ASD participants displayed a strength imbalance between their left and right legs. Specifically, their right knee extensor and flexor were 8% and 16% stronger than their left knee extensor and flexor, respectively. Further analysis on the relationship between leg strength and joint mechanics during gait is necessary.

Funding: Terry and Sandra Tucker Family Autism Research Grant
Keywords: gait analysis, autism spectrum disorder, leg strength

4:15-4:30pm
COMPARING VO2PEAK RESULTS BETWEEN A CANCER AND MODIFIED BRUCE TREADMILL PROTOCOL IN CANCER SURVIVORS
Kathryn A. Born, Jacob P. Gravenkamp, Marissa L. Allen, Karla N. Mena, Brandon T. Kane, Kris J. VanSickle, Daniel Y. K. Shackelford. Carroll University, Waukesha, WI.

INTRO: The physical decrements associated with cancer and its treatments can be attenuated with exercise. For this reason, exercise testing is essential to individual and purposeful exercise prescriptions. Currently, the only treadmill protocol validated in cancer survivors is the University of Northern Colorado Cancer Rehabilitation Institute (CANCER) Treadmill Protocol. The Modified Bruce Treadmill Protocol (MB) is widely used for exercise testing in clinical settings and has been validated in healthy populations, but not cancer survivors. It is unknown whether the MB is an appropriate assessment tool compared to the validated cancer treadmill protocol. Additionally, the validity of the MB's peak oxygen consumption (VO_2peak) predictive equations in cancer survivors is unknown.

PURPOSE: To determine whether the MB yields as accurate VO_2peak values as the CANCER protocol in cancer survivors. The secondary purpose was to examine which MB predictive equation most accurately estimated VO_2peak in cancer survivors. **METHODS:** Nineteen cancer survivors participated in the study. Two VO_2peak treadmill tests, the CANCER protocol and the MB, were utilized. One protocol was performed once per week in a randomized order. VO_2peak values were obtained via gas analysis using a research-grade metabolic cart. A paired samples t-test was performed to determine if differences occurred between the CANCER protocol and MB VO_2peak values. A repeated measures ANOVA was performed to determine differences between three MB predictive VO_2peak equations. **RESULTS:** Due to its difficulty, one subject could not complete the MB, but completed the CANCER protocol. There were statistically significant differences between VO_2peak values (mL·kg-1 ·min-1) found between the MB (25.37 ± 7.97) and CANCER protocol (28.00 ± 7.83) ($p = 0.034$). Furthermore, the American College of Sports Medicine (ACSM) walking equation from the last completed stage was the only predictive VO_2peak equation that was not statistically different than actual VO_2peak ($p = 0.763$) for the MB. **CONCLUSION:** Findings from this preliminary data suggest the MB underestimate VO_2peak in cancer survivors. Secondly, the ACSM walking equation, using the last completed stage, was the only predictive equation suitable for estimating VO_2peak in cancer survivors. This data suggests the MB is not suitable to determine VO_2peak in cancer survivors.

Keywords: Predictive, equation, assessment, cardiorespiratory

4:30-4:45pm

MOBILITY FUNCTION AND DISABILITY STATUS IN OLDER ADULTS WITH MULTIPLE SCLEROSIS

Jocelyn Cruz and Emerson Sebastião. Northern Illinois University, DeKalb IL.

Multiple Sclerosis (MS) is a neurodegenerative, unpredictable, often disabling disease of the central nervous system that disrupts the flow of information within the brain, and between the brain and the body. A common symptom of the disease is mobility impairment. Previous work in this area has focused in young adults with MS, and little is known about mobility function in older adults with this condition. **PURPOSE**: The purpose of the present study was to examine mobility function in older adults with MS as a function of disability status. **METHODS**: A total of 25 older adults with MS (mean age ± SD = 64.3 ± 4.5 years; body mass = 84.2 ± 29.5 kg; years since diagnosis = 21.1 ± 10.7 years) volunteered to participate in this study. Disability status was determined by a neurological examination (Expanded Disability Status Scale – EDSS) conducted by a trained research staff. EDSS scores were used to allocate participants into mild (EDSS = 0 – 3.5; n = 10), moderate (EDSS = 4.0 – 5.5; n = 8) and severe (EDSS = 6.0 – 6.5; n = 7) disability status groups. Mobility function was measured using a collection of measures including: Timed 25-foot Walk Test (T25FW) as a measure of walking speed, Timed Up and Go (TUG) as a measure of functional mobility, Six-minute Walking Test (6MW) as measure of walking endurance, and the Short Physical Performance Battery (SPPB) as a measure of lower extremity function. **RESULTS**: One-way ANOVAs revealed a significant difference in performance among disability groups for the T25FW ($F(2,23) = 12.42$; $P < 0.001$), TUG ($F(2,23) = 13.57$; $P < .001$), 6MW ($F(2,23) = 24.56$; $P < .001$), and SPPB ($F(2,23) = 14.74$; $P < .001$); with post hoc tests indicating that the differences were significant among all groups, with the exception of the SPPB scores where moderate and severe disability were not significant different. **CONCLUSION**: The findings of the present study suggest that as the level of disability increases, mobility function decreases. Unfortunately, we do not have physical activity data available, as physical activity may had attenuate the difference observed.

Keywords: Ambulation, Neurodegenerative disease, Walking impairment

4:45-5:00pm

DIRECT COST OF A LIFESTYLE INTERVENTION FOR CHILDREN WITH ADHD AND THEIR PARENTS

Sofia Medina and Maria Enid Santiago-Rodriguez. University of Illinois at Chicago, Chicago IL.

Psychopharmacological and psychosocial treatments for Attention Deficit and Hyperactivity Disorder (ADHD) are moderately effective for reducing symptoms. However, these treatments are often inaccessible for African-Americans and Latinos in low-income communities, resulting in unmet needs. Healthy lifestyle behaviors (sleep, nutrition, and exercise) represent an affordable and culturally acceptable adjunct to existing services, but the cost to intervene on these factors remain unknown. **PURPOSE:** To assess the cost of a pilot lifestyle program (BUILT) for

families of children with ADHD and contextualize this within the costs of conventional treatments. **METHODS:** Two families—one Latino and one African-American with three children diagnosed with ADHD—recruited from a comprehensive ADHD Clinic were enrolled in BUILT, which was offered on Saturdays for 6-weeks. Families participated in 45-minutes of exercise, 15-minutes of sleep activities, 45-minutes of cooking, and 15-minutes for wrap-up; each week families were given supplies to complete home challenges related to home routines. Direct costs of the intervention were calculated by adding supplies for each component over the 6-weeks per child. Pharmacological costs represented the average 6-weeks prescription of 18mg, 27mg, 36mg, and 54mg of Methylphenidate Hydrochloride based on the report of Eisenberg, J.M. (2012). Psychosocial costs were obtained from Jensen et al. (2005). **RESULTS:** The direct cost of the BUILT nutrition component was $142.32 per child, for the physical activity component $176.47 per child, and for the sleep component $0 because supplies were also used in the physical activity component. The BUILT total direct cost was $318.79 per child. The pharmacological direct cost was $295.50 and the psychosocial cost was $753.50 for this same time period. The summation of these two costs produced a cost of $1,048.80 for the multimodal treatment. **CONCLUSION:** BUILT may be added as an adjunct to existing treatments as a modest 30% increase for a one-time six-week period. The extent to which BUILT effectively adjusts home routines, symptom severity and functional impairment is the subject of ongoing research; however, BUILT has potential to improve the reach and effectiveness of conventional treatments by improving accessibility, cultural appropriateness, and an alternative for children unresponsive to medications or suffering from side effects.

Keywords: Behavior, Family-based, Accessible, Alternative

Free Communication/Slides #7: Mallard Room, 2-3:00pm

Session Moderator: Paul Nagelkirk Ball State University

2:00-2:15pm

ACCURACY OF YOUTH RESTING METABOLIC RATE PREDICTION EQUATIONS

Alexandra N. Grbcich[1], Emily Anderson[1], Sofiya Alhassan[2], Rebecca Hasson[3], Cheryl A Howe[1]. [1]Ohio University, Athens OH, [2]University of Massachusetts Amherst, Amherst MA, [3]University of Michigan, Ann Arbor MI.

BACKGROUND: Resting metabolic rate (RMR) fluctuates in youth with growth and maturation. Accurately determining RMR as a major component of total daily energy expenditure is vital for combating childhood obesity. This study compared the accuracy of multiple youth BMR (Schofield, Harris-Benedict, Institute of Medicine1, Institute of Medicine2, Henry) and RMR (FAO/WHO/UNU, Kim, Molnar, Maffeis, and Lazzer) prediction equations to measured RMR obtained from a portable metabolic analyzer overall and by sex, age, and weight status. **METHODS:** Data from five studies with identical RMR protocols were combined and stratified by sex (male vs. female), age (young, 7-9 y; middle, 10-12 y; older, 13-17 y), and weight status (healthy weight, BMI<85th %ile; overweight, BMI=85th to <95th%ile, obese, BMI≥95th %ile). Accuracy was determined by calculating the percentage of individually predicted BMR/RMR values that were within ±10% of measured RMR values. Ten percent was subtracted from measured RMR to estimate measured BMR for comparison. Main effects of sex, age, and weight status were assessed using 2- and 3-way repeated measure ANOVAs. **RESULTS:** Data from 215 youth (Mean±SD:10.8±2.3 y) were used in these analyses. For all youths combined, 47.9 to 65.6% of the estimated BMR/RMR values were more than ±10% different from measured RMR, and this range increased to 42.0 to 79.1% when analyzing by main affects. The difference between each estimated and measured BMR/RMR comparison ranged from -128.9±15.0 to 194.0±17.2 kcals/day. Statistically, all estimated BMR/RMR values were similar to measured RMR values for females, overweight and obese youths, and middle and older youths, whereas most equations over- or under-estimated RMR values for males, healthy weight and younger youths. The Lazzer equation, which was developed on overweight and obese youths, consistently overestimated RMR values across all groups, whereas the Institute of Medicine2 equation, also developed on overweight and obese youths, consistently aligned with measured RMR values. **DISCUSSION.** Using 10% difference between measured and estimated BMR/RMR values could account for the 100 kcal/day energy surplus associated with childhood obesity. Inaccuracies associated with youth BMR/RMR prediction equations stress the importance of measuring RMR, rather than estimating, for accurate calculations of total daily energy needs.

Keywords: children, daily energy expenditure, equation, RMR

2:15-2:30pm

COMPARATIVE ANALYSIS OF MAJOR JUNIOR HOCKEY ATHLETES DURING PRE-SEASON OFF-ICE PERFORMANCE TESTS

Justin A. Tavormina, Haley L. McVannel, Christopher C. Winter, Brandon M. Fjerstad, Jeremy L. Knous. Saginaw Valley State University, Saginaw MI.

Physiologic components of ice hockey include aerobic and anaerobic metabolic systems, power, speed, agility, muscular strength and endurance. These components are commonly assessed with off-ice performance evaluations featured at the National Hockey League (NHL) combine. **Purpose:** Evaluate preseason, off-ice combine assessments in major junior ice hockey athletes. **Methods:** During 2018 and 2019 pre-season training camps, prospective athletes participated in NHL combine style assessments. Tests included vertical jump via Vertec, broad jump via meter tape, electronically timed 20m dash, stopwatch or electronically timed pro-agility run, hand timed 300m shuttle, hand timed 2-mile run, hand-grip dynamometer, pull-up repetitions, and 135lbs bench press repetitions. Height and weight were measured via stadiometer and electronic scale, respectively, with values used to calculate body mass index (BMI). For data analysis, athletes were categorized into offense, defense, and goalies. Descriptive statistics and comparative analysis, mixed methods regressions, were performed using SPSS (version 22.0) with significance at $p \leq 0.05$. **Results:** Athletes selected (n=49) had significantly higher bench press repetitions (18±1; F=26.023, P<.00005), pull-up repetitions (11±4.; F=11.810, P=.001), faster 300m shuttle times (n=21, 57±2 sec., F=18.761, P<.00005), faster pro-agility values (4.78±.23 sec. right, 4.75±.23 sec. left; only left was significantly different (F=5.473, P=.022), and had greater grip strength values (59±10 right, 55±9 left; only left was significantly different; F=5.489, P=.022) than athletes dismissed (n=27; 11±7 rep, 8±3 rep, 60.19±2.01 sec, 4.89±.22 right sec, 4.88±.25 left sec, 55±9 kg right, 55±11 kgs. left). Further, athletes selected were significantly older (17.8±1.4 yrs.; F=13.904, P=.000) than athletes dismissed (16.6±1.0 yrs.). Defensive athletes were significantly taller (72.5±2.4 in.; P=.001) and had significantly greater left (63.5±10 kgs.; P=.009) and right (63±9 kgs.; P=.000) grip strength values than offensive athletes (70.5±2.5 in., 57±9 kgs. Left, 54±10 kgs. Right). Additionally, defensemen achieved significantly higher vertical jump (25.5±2.2 in., P=.000), 135lbs-bench press repetitions (18±6), right grip strength (63±9 kgs.; P=.028) and greater broad jump values (98.5±21.9 in.; P=.016) than goalies (18.6±2.2 in., 55.4±6 kgs. Right, 79.7±42.3 ins). **Conclusion:** Selected athletes were older and exhibited superior power output, muscular endurance, and anaerobic capacity. Defensive athletes were taller, and displayed higher values in muscular strength, endurance, and power.

Keywords: Combine, Position, Power, Measures

2:30-2:45pm

YOGA INCREASES LEAN MASS IN MIDDLE AGED ADULTS

Brooke M. Kunkel, Ann M. Larson, Monica M. Radtke, Jeffrey C. Cowley. University of Wisconsin-Platteville, Platteville WI.

With a relatively low intensity, and potential positive effects on physical and mental health, yoga has become a popular exercise among aging adults. In 2017 13.4 % of adults aged 45 – 64 participated in yoga. **PURPOSE:** While yoga may have several health benefits, the effects of yoga on body composition are not well documented. The purpose of this study was to determine if an eight-week yoga class would improve the body composition of sedentary adults. **METHODS:** Sedentary, otherwise healthy adults between 35 and 65 years old were invited to participate in a free yoga class (8 weeks x 2 days/week). Body composition was measured using DEXA scans at baseline and 8 weeks. Total body mass, lean mass, fat mass, percent fat, and bone mineral density at baseline and 8 weeks were compared using paired samples *t*-tests. **RESULTS:** Thirteen participants completed the pre and post-tests (12 female; age: 52.2 ± 5.2 years; age range: 44 – 61 years; height: 1.64 ± 0.12 m; mass: 88.6 ± 25.4 kg). Participants' total body mass increased by an average of 1.5 ± 2 kg ($p = 0.017$), while lean mass increased by an average of 1.3 ± 1.6 kg ($p = 0.011$). There were no significant changes in fat mass (post – pre = 0.6 kg ± 1.9 kg; $p = 0.26$), percent fat (post – pre = -0.44 ± 1.3%; $p = 0.24$), or bone mineral density (post – pre = 0.005 ± 0.03 g/cm^2; $p = 0.27$). **CONCLUSIONS:** The eight-week yoga class helped to increase lean body mass by over 1 kg in sedentary adults. If the yoga class had continued, it is possible that further positive changes in fat mass and body composition

would have accrued. Overall, yoga class had a positive effect on the body composition of sedentary middle-aged adults.

Keywords: body composition, exercise, aging, fat

2:45-3:00pm
INTERNAL LOAD IN FOOTBALL PLAYERS: CAN THE MIND SEE WHAT THE HEART SAYS?
Valerie G. Smith-Hale, Joshua Sabou, Ruben Mendoza, Alyssa Pollard-McGrandy, Matt VanSumeren, Linda Jimenez, Tamara Hew-Butler, FACSM. Wayne State University, Detroit MI.

Rating of perceived exertion (RPE) is a simple, validated, measure of physical effort, largely reflecting heart rate. RPE is now being replaced by more complex technologies such as continuous heart-rate (HR) monitoring to quantify "internal" (stress) loads which maximize performance while enhancing recovery. **PURPOSE:** The primary aim of this study is to critically assess relationships between RPE (athlete and coach) versus HR during long duration football practice. Secondary aims include quantifying internal load via HR assessments of training impulse (TRIMP) and recovery. **METHODS:** Data represent baseline (Time 1) within a longitudinal study. Twenty-nine collegiate male football players (age=20±2years; body mass index= 34±6kg/m^2; weight=118±20kg), plus three coaches volunteered to participate. Each athlete was pre-assigned a HR monitor. During the first seven days of football camp, athletes were instructed to lay supine on the floor for a 3-minute quick recovery test (QRT). All HR monitors were then worn during practice. Athlete HR, TRIMP, % heart rate reserve (%HRR), % heart rate max (%HRmax) were recorded and visible only to researchers. Immediately following practice, all athletes and coaches were asked to assess RPE for the entire training session (sRPE) using the Borg CR-10 scale. %HRmax and %HRR were transformed to scale from 1-10, to match the Borg CR-10 scale. Significance set at $p<0.05$. **RESULTS**: Training session lasted 145.75±33.74 minutes. When weekly data were combined, **s**ignificant overall correlations (pairwise, N=187) were noted between %HRR versus: %HRmax ($r=0.84;p<0.0001$), athlete sRPE ($r=0.30;p<0.0001$) and head coach RPE ($r=0.30;p<0.0001$). Athlete sRPE was correlated with head coach sRPE ($r=0.30;p<0.0001$). The 29 players were then subdivided into Big (n=21), Combo (n=3), and Skill (n=5) position groups. Two-way ANOVA for sRPE between athletes, coaches and %HRR demonstrated a significant interaction effect ($F=15.2;p<0.0001;22.8\%$), time effect ($F=36.4;p<0.0001;13.6\%$), and position effect between Big, Combo, and Skill groups ($F=26.1;p<0.0001;6.5\%$). TRIMP decreased over time, with a significant time effect ($F=23.7;p<0.0001;33\%$) and position effect ($F=5.4;p=0.005;2.5\%$). No significant effects for QRT noted. **CONCLUSION:** Athletes plus one sport coach were able to significantly predict training effort (HR) during practice. But, the variance was small (9%) and sRPE remained steady despite decreased training load over time.

Keywords: Football, Heart Rate, TRIMP, Recovery

Free Communication/Slides #8: Oak Brook Room, 3-4:00pm

Session Moderator: Andrew Jagim, Mayo Clinic Health System

3:00-3:15pm
SEX DIFFERENCES ON AUTONOMIC MODULATION IN RESPONSE TO WEIGHT MACHINES
Alena J. Varner, Sarah Kearney, Meredith Paskert, Stacie Humm, Erica Marshall, Jason Parks, J. Derek Kingsley, FACSM. Kent State University, Kent OH.

It has been suggested that an acute bout of resistance exercise reduces vagal modulation for at least 30 minutes after an acute bout of resistance exercise. To date, few studies have evaluated differences between the sexes on autonomic modulation in response to an acute bout of resistance exercise. **PURPOSE**: We sought to evaluate how autonomic modulation during recovery from an acute bout of resistance exercise differs between the sexes. **METHODS**: Twenty-three participants (men: 11; women: 13) volunteered for this study, completing an acute bout of resistance exercise (RT) consisting of 3 sets of 10 reps at 75% of 1-repetition maximum on the squat, bench press, and deadlift, and a quiet control (CON). Heart rate variability (HRV) was assessed at rest, 15 minutes (Rec1), and 25

(Rec2) during recovery from weight machines. Vagal modulation was assessed using HRV and included logarithmically (ln) transformed high-frequency power (lnHF) and the root mean square of successive differences (lnRMSSD). Sympathovagal balance was assessed using the low frequency/high frequency ratio (lnLF/HF). Three-way repeated measures analysis of variance were used to evaluate differences between conditions (RT, CON), time (Rest, Rec1, and Rec2), and between sexes (men, women). T-tests were used for post hoc comparisons. **RESULTS:** There were no three-way interactions (condition by time by sex) for any of the variables. There were no time by sex interactions for any of the variables, but there were significant condition by time interactions for each. There was a significant main effect of time for each variable such that both recovery time points following RT differed from Rest, and for lnHF and lnRMSSD Rec3 differed from Rec2. There was also a main effect of condition for vagal modulation, such that recovery following RT differed from CON. **CONCLUSIONS:** These data suggest that an acute bout of weight machine exercise results in the same vagal modulation and sympathovagal balance between men and women. Further, vagal tone during recovery was attenuated compared to rest up to 30 minutes. Sympathovagal balance was sustained at all-time points during recovery from the weight machines.

Keywords: parasympathetic, vagal, resistance exercise

3:15-3:30pm

SEX DIFFERENCES ON MEASURES OF PULSE WAVE REFLECTION RESPONSE TO HEAVY BATTLE ROPE EXERCISE

Emily K. Erb, Erica M. Marshall, Jason C. Parks, Stacie M. Humm, J. Derek Kingsley FACSM. Kent State University, Kent OH.

High-intensity interval exercise has been shown to increase measures of pulse wave reflection. Heavy battle rope exercise (HRE), a form of high-intensity interval exercise, has increased in popularity, but to date, no studies have investigated the effects of HRE on measures of pulse wave reflection. Furthermore, no studies have explored sex differences. **PURPOSE:** To determine if there are sex-specific responses to HRE on measures of pulse wave reflection. **METHODS**: Twenty-seven resistance-trained individuals (Men n=13, Women n=13) volunteered to participate. Measures of pulse wave reflection were collected at rest, 15 (Rec1), 30 (Rec2), and 60 (Rec3) minutes after an acute bout of HRE. Subendocardial viability ratio (SEVR), Augmentation Pressure (AP), Augmentation Index (AIx), Augmentation Index at heart rate 75bpm (AIx@75bpm), and wasted left ventricle energy (EW) were recorded at all time points via applanation tonometry. A two-way repeated analysis of variance (ANOVA) was used to analyze the effects of sex (men, women) across time (rest, Rec1, Rec2, Rec3) in response to HRE. Post-hoc analysis utilized t-tests with a Bonferonni correction. **RESULTS**: Men and women were similar for all measurements at rest. There was no significant (p= 0.06) sex by time interaction for SEVR. However, there were significant sex by time interactions AP (p=0.0001), AIx (p=0.001), AIx@75bpm (p=0.029), and EW (p=0.0001). AP was higher for men compared to women at Rec1 (M:14.7±5.8mmHg; W:8.1±4.3mmHg), Rec2 (M:8.2±5.1mmHg; W:4.5±2.9mmHg), and Rec3 (M:8.3±3.6mmHg; W:2.1±1.8mmHg). In addition, men had a higher AIx compared to women at Rec1 (M:32.7±12.8%; W:21.1±10.6%), and Rec3 (M:19.8±7.3%; W:7.1±5.7%), but not Rec2 (M:18.9±12.7%; W:12.6±7.3%). Men also had a greater AIx@75 greater than women at Rec1 (M:35.62±10.3%; W:23.8±10.3%), Rec2 (M:21.5±12.7%; W:10.7±6.9%), and Rec3 (M:17.7±7.1%; W:5.1±6.2%). EW was also augmented in men compared to women at Rec1 (M:2223.6±859.7dynes/sec/cm-2; W:1257.2±656.7dynes/sec/cm-2), Rec2 (M:1278.0±794.2dynes/sec/cm-2; W:706.1±461.0dynes/sec/cm-2), and Rec3 (M:1290.2±537.7dynes/sec/cm-2; W:331.9±287.2dynes/sec/cm-2). **CONCLUSION**: These data demonstrate that there is a significant difference between the sexes regarding the effect of recovery from acute high-intensity heavy rope exercise on pulse wave reflection that lasts up to 60 minutes.

Keywords: Augmentation Index, Augmentation Pressure, Cardiac Workload

3:30-3:45pm

ACUTE ENDOCRINOLOGICAL RESPONSES TO VEGAN AND NON-VEGAN HYDROLYZED PROTEIN SUPPLEMENTATION

Ellis John McCullough. Leeds Beckett University, Northern Michigan University, Marquette MI.

With the rise of the vegan diet in health and wellbeing in the athletic community, consuming adequate quality protein is a key nutritional consideration. Athletes have used hydrolyzed whey protein to develop and sustain lean

body mass (LBM). Due to whey's amino acid profile with a particular focus on leucine content, a 25g ingestion post-resistance training augments optimal muscle protein synthesis rates (MPS). However, a vegan athlete is limited to plant-based protein sources and therefore could be disadvantaged in nutritional optimization of MPS. Previous research has established that similar LBM accretion can be attained over time with an increased dosage of plant-based protein (>25g) supplements compared to 25g of whey. However, the holistic considerations to long-term MPS includes that of sleep quality, regular feeding intervals and a prolonged calorie surplus to facilitate the anabolic response. Evidence of acute endocrinological responses to substantiate higher amounts of plant-based protein can augment similar adaptations to whey would serve as novel support of this. **PURPOSE:** This review aimed to systematically address current research investigating acute endocrinological responses (i.e., mTORC1 phosphorylation and fractional synthetic rate [FSR] changes) to protein ingestion from varied vegan and non-vegan protein supplements combined with resistance training. **METHODS:** This systematic review followed the PRISMA-P reporting guidelines to minimize reviewer bias and to ensure methodological rigor. Data from studies that met the pre-defined search criteria were extrapolated. Key data pertaining to the percentage changes in FSR and mTORC1 phosphorylation following a bout of resistance exercise and protein ingestion were contrasted and evaluated. **RESULTS:** The findings of this study support that a higher dosage of soy (22g) can induce higher FSR than a lower dose of whey (18g). **DISCUSSION:** To date, literature addressing the aforementioned interests of higher dose-responses (>25g) of plant-based proteins is lacking. Future research comparing higher doses of plant-based sources with high relative leucine ratios per 25g of raw product, such as corn, brown rice, wheat, potato and pea based with increases in dosages to match the EAA and leucine content of 25g of whey protein is warranted. This information provides sports dieticians and strength and conditioning specialists with scientific backing should they support a vegan athlete.

Keywords: mTORC1, Inter-set Rest, Biopsy

3:45-4:00pm

ASSOCIATION BETWEEN PHYSICAL ACTIVITY, INFLAMMATORY PROTEINS, AND ADIPONECTIN IN OLDER ADULTS

Callen R. Conroy, Adam D. Mandrell, Alexandra I. Hopun, Kevin D. Ballard FACSM, Kyle L. Timmerman FACSM. Miami University, Oxford OH.

Chronic low-grade inflammation (CLGI) is a hallmark of aging and significantly contributes to the development and progression of numerous chronic diseases including cardiovascular disease (CVD) and diabetes. CLGI is frequently defined as elevated serum levels of inflammatory proteins including C-reactive protein (CRP) and interleukin-6 (IL-6). Physical activity has been reported to have anti-inflammatory effects. **PURPOSE:** To explore the relationships among habitual physical activity, inflammation, and cardiometabolic risk factors in older adults. **METHODS:** In 82 subjects (23 male / 59 female) body composition was determined (bioelectrical impedance) and physical activity was measured objectively (7-day accelerometry) as well as subjectively (Community Health Activities Model for Seniors (CHAMPS)). Enzyme-Linked Immunosorbent Assays (ELISA) were used for the quantitative measurement of IL-6, CRP, and an anti-inflammatory, adipose tissue derived hormone, adiponectin. Blood lipids were also measured utilizing a point-of-care analyzer. Partial correlations (controlling for age and sex) were used to analyze associations. **RESULTS:** Mean values included: age (68.5 ± 6.3 yr); body fat percentage (31±11%); accelerometry (cts/min: 114.1±56.5, sedentary-to-moderate ratio: 12.8±6.1); CHAMPS (2,328±1658 kcal/wk); CRP (1.5±1.6 mg/dL); IL-6 (4.2±1.0 ng/mL); adiponectin (11.2±6.0 µg/mL); LDL (114±28 mg/dL); and HDL (62±17 mg/dL). CRP was significantly ($p < 0.05$) correlated with body fat percentage ($r = 0.54$), HDL/LDL ($r = 0.42$), IL-6 ($r = 0.37$), and adiponectin ($r = -0.25$). IL-6 was significantly correlated with body fat percentage ($r = 0.24$), activity counts/min ($r = -0.27$), and LDL/HDL (0.29). Adiponectin was significantly correlated with body fat percentage ($r = -0.35$), CHAMPS ($r = 0.28$), and HDL ($r = 0.51$). **CONCLUSION:** The average CRP value for this population of older adults is indicative of moderate risk for the development of CVD. The correlations reported here are supportive of previous research suggesting that body composition and physical activity level are important determinants of inflammatory profile and disease risk.

Funding: NIH grant 1R15AG055923-01
Keywords: CRP, IL-6, cardiovascular

Schedule – Friday Afternoon: Poster Session

Poster Session #4: Ballrooms G-J, 2:15-3:30am

Board 1

THE EFFECT OF THE COLD PRESSOR TEST AND GTN ADMINISTRATION ON THE HIERARCHY OF VASCULAR TONE

Alexandra Fluent and Timothy R. Rotarius. Adrian College, Adrian MI.

Vascular tone is the balance between sympathetic vasoconstriction (decreasing vessel diameter) and humoral vasodilation (increasing vessel diameter) in the periphery. The cold pressor test (CPT) enhances resting vascular tone by increasing sympathetic outflow, while Glyceryl trinitrate (GTN) elevates resting arterial diameter and blood flow without affecting central hemodynamic measures (i.e. mean arterial pressure), creating a mismatch between oxygen delivery and demand. By combining CPT and GTN, it could possible to offset the neural vasoconstriction caused by CPT by administering GTN to cause local vasodilation. **PURPOSE:** The purpose of the study was to observe the effect of GTN administration on blood velocity and mean arterial pressure during the cold pressor test. **METHODS:** 4 healthy males completed 3 separate visits: GTN, CPT, and GTN + CPT. Two minutes of baseline were completed prior to each protocol. GTN was administered and MBV was measured for 4 minutes until a new steady-state diameter was achieved. For CPT, subjects placed their contralateral foot in an ice slush for 2 minutes. Mean arterial pressure was measured using finger plethysmography, while Doppler ultrasonography was used to measure blood velocity of the brachial artery continuously. The last 10 s of each condition were averaged for statistical analysis. A one-way analysis of variance (ANOVA) with repeated measures was used to analyze mean differences in MBV. **RESULTS:** Mean arterial pressure (MAP) was significantly greater during CPT and GTN + CPT (95.2 ± 10.5 mmHg; 101.7 ± 8.9 mmHg) compared to Rest and GTN (86.5 ± 10.7 mmHg, 87.1 ± 11.1 mmHg; $p < 0.05$), respectively. Mean blood velocity was not significantly different between Rest, GTN, CPT, and GTN + CPT (17.5 ± 8.2 cm/s, 15.0 ± 16.4 cm/s, 11.2 ± 8.5 cm/s, and 10.9 ± 6.2 cm/s; $p > 0.05$), respectively. **CONCLUSION:** Mean blood velocity, although not significantly, was lower following of GTN + CPT compared to resting values. This may indicate a greater peripheral resistance resulting from the CPT which was not offset by the administration of GTN. Thus, it is possible that central sympathetic mediation is more responsible for regulating vascular tone than local vasodilation (i.e. NO production).

Keywords: Vascular tone, GTN, Mean blood velocity

Board 2

PREDICTED ENERGY EXPENDITURE FROM A WRIST-WORN ACTIVITY MONITOR DURING LONG DURATION EXERCISE

Cailyn A. Van Camp, Andrea Workman, Rebecca W. Moore. Eastern Michigan University, Ypsilanti MI.

Usage of wearable activity monitors is proposed to increase to one in five people by 2021 (Maslakovic, 2017). Current devices are able to measure step count, heart rate, and energy expenditure (EE). Previous research has shown that during short duration, aerobic exercise predicted EE of wrist-worn devices is significantly correlated to indirect calorimetry (Kendall, 2019). However, accuracy of predicted EE during long duration exercise protocols is unknown. **PURPOSE:** The purpose of this study was to determine the accuracy of predicted EE reported by a wrist-worn activity monitor compared to measured EE during long duration exercise. **METHODS:** Eleven participants were recruited to come to the Running Science Laboratory on two occasions. During the initial visit, a VO_{2max} treadmill test was completed. The test involved participants determining a self-selected pace maintained throughout the test, while grade increased by 2% every 2-minutes until volitional exhaustion. Upon completion of the test, running speed at approximately 65% of VO_{2max} was determined. The second visit was comprised of a 30-minute run on a treadmill at the same speed determined during the first visit. A wrist placed activity monitor was worn throughout the test to predict EE and metabolic measures (VO_2 and EE) were recorded by a metabolic cart. A Pearson correlation and paired samples t-test were performed to compare predicted and measured EE ($p<0.05$). **RESULTS:** Of the eleven participants, nine completed both visits (6 males and 3 females, aged 25.8 ± 4.4yrs,

VO_{2max} 47.1 ± 3.4mL/kg/min). A positive, significant correlation was found between predicted EE and measured EE (R=0.847, p=0.004). There was no significant difference between predicted EE and measured EE (p=0.250). **CONCLUSIONS:** Based on the VO_{2max} test, participants in this study were of moderate-fitness (45^{th}-75^{th} percentile) based on ACSM norms (ACSM, 2018). Speed was determined as a percent of VO_{2max}, which was similar for all participants (5.8±0.21 mph). At this speed, a wrist-worn activity monitor accurately predicted EE. However, these results should be interpreted with caution due to the small sample size. Future research should include a wider range in aerobic fitness to determine if the wrist-worn activity monitor is accurate at higher speeds.

Keywords: activity tracker, prolonged exercise

Board 3

TNFR1 and TNFR2 EXPRESSION ON MONOCYTE SUBSETS FOLLOWING CONTINUOUS AND INTERVAL EXERCISE

Emily C. Tagesen[1], Eliot Arroyo[1], Tricia L Hart[2], Brandon A Miller[1]. [1]Kent State University, Kent, OH, [2]Lipscomb University, Nashville, TN.

PURPOSE: To examine tumor necrosis factor receptor (TNFR) 1 and 2 response on monocyte subsets to interval and continuous aerobic exercise. **METHODS:** Six men (22.5±3.9 yrs; 180.8±5.0 cm; 80.5±6.6 kg; 11.8±4.3 %BF; 44.2±2.4 $ml \cdot kg^{-1} \cdot min^{-1}$) participated in three cycling protocols: moderate continuous (MCT), sprint-interval (SIT), and high-intensity-interval (HIIT), in a randomized order. Visit 1 consisted of a maximal graded exercise test (VO2max) on a cycle ergometer. HIIT consisted of 15 90s bouts at 85% VO2max and 90s active recovery. SIT consisted of 15 20s bouts at 130% max wattage and 160s active recovery. MCT was continuous exercise at 65% VO_2max. Each trial duration was 53 min, including a 5-min warm-up and a 3-min recovery. Blood was collected before (PRE), immediately (IP), 30 minutes (30m), 2 (2H), 6 (6H) and 24 (24H) hours post-exercise. Changes in surface expression, measured by median fluorescent intensity (MFI) of TNFR 1 and 2 on monocyte subsets (classical: $CD14^{++}CD16^{-}$; intermediate: $CD14^{++}CD16^{+}$; and non-classical: $CD14^{+}CD16^{++}$) were analyzed via flow cytometry. Changes in TNFR1 and 2 expression were determined using a mixed model regression with fixed effects on time and condition. Differences in total work were analyzed via one-way repeated measures ANOVA. **RESULTS:** Analysis indicated a time effect for TNFR1 expression on classical (F=4.450, p=0.001) and intermediate (F=3.517, p=0.006) monocytes. TNFR1 expression on classical monocytes decreased ($p < 0.05$) from PRE (6637 ± 704 MFI), at 6H (5934±814 MFI) and 24H (6156 ± 516 MFI). TNFR1 expression on intermediate monocytes decreased ($p < 0.05$) from PRE (6391±649 MFI), at 6H (5912±814 MFI) and 24H (5936±443 MFI). Also, a time effect (F= 4.079, p=0.002) was observed for TNFR2 expression on intermediate monocytes, with a decrease ($p < 0.05$) from PRE (25528±3188 MFI) at 30M (22327±4067 MFI), 2H (21008±5113 MFI), and 6H (20515±5918 MFI). Repeated measures ANOVA indicated that total work was different (F=561.43, $p<0.01$) in all conditions (MCT: 472,620±50,186 J; SIT: 234,387±46,283 J; HIIT: 387,277±44,401 J). **CONCLUSION:** Changes in TNFR1 and TNFR2 expression were observed across time, with no differences between conditions. TNFR1 and 2 expression on monocytes may be dependent on duration rather than intensity, but more investigation is necessary.

Funding: NSCA Doctoral Research Grant
Keywords: Immunology; cycling; HIIT; SIT

Board 4

BENCH PRESS WITH BLOOD FLOW RESTRICTION ON AUTONOMIC MODULATION

Madeline R. Reich[1], Yun Lun Tai[2], Erica M. Marshall[1], Jason C. Parks[1], J. Derek Kingsley FACSM[1]. [1]Kent State University, Kent OH, University of Texas- Rio Grande Valley, Edinburg TX.

Traditional resistance exercise (>70% 1-repetition maximum (RM)) decreases vagal tone up to 30 minutes. This may not be true of resistance exercise with blood flow restriction (BFR), due to the low level of resistance (30% 1RM) that is utilized. However, currently there are no data that has investigated the effects of resistance exercise with BFR on autonomic modulation. **PURPOSE:** To evaluate autonomic modulation after resistance exercise with and without BFR in resistance-trained men. **METHODS:** Eleven young, resistance-trained men (Mean±SD: Age: 23±3yrs, Ht: 1.77±0.01m, Wt: 80.2±9.3kg) volunteered for the study. Autonomic modulation was assessed at rest, 15 (Rec 1), and 25 (Rec 2) minutes after low-load bench press with BFR (LL-BFR: 4 sets of 30-15-15-15 repetitions at 30%1RM and 30 second rest breaks), traditional high-load bench press (HL: 4 sets of 8 repetitions at 70%1RM

and 60 second rest breaks), and a control (CON). The two resistance exercise protocols were matched for volume. Autonomic modulation assessments were expressed as natural logarithm (Ln), and included total power (LnTP), low-frequency power (LnLF), high-frequency power (LnHF), sympathovagal balance (LnLF/HF ratio), root mean square of the successive differences (LnRMSSD), and the proportion of intervals differing by >50 ms from the preceding intervals (LnPNN50). A repeated measures ANOVA was used to evaluate conditions (LL-BFR, HL and CON) across time (Rest, Rec1, and Rec2) on autonomic modulation. **RESULTS:** There were significant condition by time interactions for LnTP (LL-BFR: Rest: 8.3±0.9ms-2, Rec1: 7.8±0.9ms-2, Rec2: 8.5±1.6ms-2: HL: Rest: 8.5±1.6ms-2, Rec1: 7.6±0.8ms-2, Rec2: 7.3±1.0ms-2, p=0.015), LnHF (LL-BFR: Rest: 7.0±1.4ms-2, Rec1: 6.3±1.5ms-2, Rec2: 6.3±1.3ms-2; HL: Rest: 7.4±1.8ms-2, Rec1: 5.7±1.4ms-2, Rec2: 5.6±1.3ms-2, p=0.001), and LnRMSSD (LL-BFR: Rest: 4.1±0.7ms, Rec1: 3.8±0.8, Rec2: 3.6±0.7ms; HL: Rest: 4.4±1.0ms, Rec1: 3.4±0.7ms, Rec2: 3.3±0.7ms, p=0.001) such that they were reduced during recovery after LL-BFR and HL compared to Rest and CON. There were no interactions in the LnLF, LnLF/HF ratio, or LnPNN50. **CONCLUSION:** These data suggest that LL-BFR and HL significantly reduce vagal modulation up to 30 minutes after resistance exercise. In addition, the vagal responses to HL compared to LL-BFR were similar when exercise volume was equated.

Keywords: vagal, resistance exercise, sympathovagal

Board 5

EXPLORING SEX DIFFERENCES ON ARTERIAL STIFFNESS IN RESPONSE TO HEAVY ROPE EXERCISE

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High-intensity heavy rope exercise (HI-HRE) is suggested as a means to improve muscular strength and increase power. To date, no studies have examined the effects of HI-HRE on arterial stiffness, or carotid artery compliance. Furthermore, there have been no studies that have investigated differences in arterial stiffness, or carotid artery compliance, between the sexes. **PURPOSE:** To evaluate sex differences on aortic and carotid arterial stiffness (CAS), as well as carotid artery compliance, following an acute bout of HI-HRE. **METHODS:** Twenty-seven resistance-trained individuals (men: n=14, women: n=13) volunteered to participate in the study. To determine aortic arterial stiffness, carotid-femoral pulse wave velocity (cf-PWV) was collected at Rest and 15 (Rec1), 30 (Rec2), and 60 (Rec3) minutes following HI-HRE. Additionally, CAS, via beta stiffness, as well as carotid artery compliance, were collected via Doppler ultrasound at the same time periods. The HI-HRE intervention consisted of six 15-second exercise bouts using a double wave pattern set at a pace of 180bpm, with 30-second seated recovery intervals between each bout. A two-way repeated measures ANOVA was used to analyze the differences of the effects of HI-HRE on aortic stiffness and CAS, as well as carotid artery compliance, between sexes (men, women) across time (Rest, Rec1, Rec2, Rec3). **RESULTS:** There were no significant sex by time interactions for cf-PWV (p=), or beta stiffness (p=0.08). For carotid artery compliance there was a significant sex by time interaction (p=0.05). At rest, women had elevated carotid artery compliance compared to men (M: 0.22±0.07mm^2/mmHg; W: 0.26±0.10mm^2/mmHg). At Rec1, women had a larger decrease in carotid artery compliance than men (M: 0.18±0.09mm^2/mmHg; W: 0.16±0.06mm^2/mmHg). Women during Rec2 experienced a significant reduction in carotid artery compliance compared to rest, whereas men increased (M: 0.20±0.06mm^2/mmHg; W: 0.16±0.06mm^2/mmHg). However, during Rec3, women had a higher carotid artery compliance at Rec3 compared to men (M: 0.23±0.09mm^2/mmHg; W: 0.16±0.06mm^2/mmHg). **CONCLUSIONS:** These data suggest no difference in aortic or CAS between sexes following an acute bout of HI-HRE. However, carotid artery compliance was different between the sexes, such that women had greater changes in carotid artery compliance between the time points compared to men.

Keywords: compliance, beta stiffness, pulse wave velocity, battle rope

Board 6

CAFFEINE COMBINED WITH RESISTANCE EXERCISE ON PERFORMANCE AND CARDIOVASCULAR FUNCTION IN WOMEN

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It has been demonstrated that resistance-trained women who consume caffeine prior to performing resistance exercise may increase resistance exercise performance, as well as increase hemodynamics. However, no study has included measures of pulse wave reflection, which are known to reflect left ventricular function. **PURPOSE:** To examine the effects of caffeine alone, or in conjunction with acute resistance exercise, in resistance-trained women on resistance exercise performance, cardiovascular hemodynamics, and measures of pulse wave reflection. **METHODS:** Eleven resistance-trained women (Mean Age±SD=24±4yrs) consumed either a placebo (PL) or caffeine (4mg/kg) seventy-two hours apart, in a double-blind, crossover fashion. Forty-five minutes following supplementation, participants performed two sets of 10 repetitions at 75% 1-repetition maximum (1RM), and one set with repetitions to failure at 70% 1RM on the squat and bench press. Heart rate (HR), mean arterial pressure (MAP), and measures of pulse wave reflection were assessed at rest (Rest1), 45 minutes post-consumption (Rest2), immediately post-exercise (Post1), and 10 minutes post-exercise (Post2). Total loads (sets x resistance x repetitions) for the squat and bench press across conditions (PL or caffeine) were evaluated with a paired t-test. For hemodynamics, and measures of pulse wave reflection, a 2 x 4 repeated measures ANOVA was used to determine the effects of condition (caffeine and PL) across time (Rest1, Rest2, Post1, Post2). **RESULTS:** There was no statistical differences for total volume between the two conditions on the squat (p=0.9) and bench press (p=0.4). There were no significant two-way interactions for any variable. There were significant main effects of time for HR [F(1,3)=57.1, p=0.0001], augmentation index [F(1,3)=47.3, p=0.0001], and AIx normalized to 75bpm [F(1,3)=75.2, p=0.0001]. Each of these variables demonstrated no difference between Rest1 and Rest2. Both Rest1 and Rest2 were attenuated compared to Post1 and Post2, with no differences between Post1 and Post2. There was no main effect of time for MAP (p=0.09). **CONCLUSIONS:** These data demonstrate that 4mg/kg of caffeine provides no ergogenic effect in resistance-trained women. Furthermore, these data demonstrate that caffeine consumption, when performed in conjunction with resistance exercise does not further alter hemodynamics or measures of pulse wave reflection in resistance-trained women.

Funding: Kent State University Research Council
Keywords: hemodynamics, augmentation index, pulse wave reflection, blood pressure

Board 7

CARDIOVASCULAR RESPONSE TO STIMULATED ROWING IN AN INDIVIDUAL WITH LEUKODYSTROPHY: A CASE STUDY

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Leukodystrophy (LD) encompasses an array of rare and progressive diseases that affect the brain, spinal cord, and peripheral nerves. LD presents from a gene abnormality causing destruction of the myelin sheath rendering this individual paraplegic. FES utilizes epidermal electrodes to artificially activate muscle tissue. This allows a paralyzed individual to engage in physical activity with upper and lower extremity muscle mass. P**urpose:** The purpose of this investigation was to assess exercise the cardiovascular response to functional electrical stimulation rowing (FES). Findings from the case study may provide important information to support further investigation of the benefits of FES in paraplegics. **Methods:** One participant with LD participated in FES for 28 sessions over 4 months; with assessments done before (PRE) and after (POST) intervention. The participant completed one of two training protocols during each training session. The PRE protocol consisted of FES for 10, two-minute bouts. The POST session was four, 10-minute bouts. **Results:** VO2 was significantly increased ($t = 2.81$, $p = 0.048$) from PRE (795.82 mL min) to POST (973.14 mL min). Heart Rate (HR) was significantly different form PRE to POST ($t = 6.44$, $p = 0.003$). Heart rate increased from 64 (PRE) to 82 beats per minute (POST). There was no significant difference in the respiratory exchange ratio (RER) from PRE to POST ($t = 1.05$, $p = 0.354$). **Conclusion:** These data indicate that FES can be utilized as a mode of physical activity for individuals with LD and shows potential use for other diseases that cause paralysis of the lower limbs. Furthermore, FES has shown to increase the functional capacity of the participant demonstrated by the increase in VO_2 and HR during the FES sessions. Therefore, leading to greater calories expended per session and potentially driving further beneficial cardiovascular adaptation.

Keywords: Special, Populations, Spinal, Cord

Board 8

EFFECT OF A HYPERTHERMIC ENVIRONMENT ON SELECTED PHYSIOLOGICAL VARIABLES DURING SIMULATED OCCUPATION

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First responders (e.g., police) may be exposed to physical occupational stressors in the line of duty, which may place them at risk for acute cardio-metabolic events (e.g., myocardial infarction). Environmental challenges may exacerbate this risk. **PURPOSE:** To observe the impact of a hyperthermic versus thermoneutral environment on physiological responses in police cadets performing a simulated occupational task. **METHODS:** Using an environmental chamber, 10 police cadets (22.2±2.3 years), completed two occupational task exercise conditions in hyperthermic (HT, 38^{0}C) and thermoneutral (TN, 22^{0}C) environments on separate days. During each condition, participants completed a 10-minute treadmill walk at 70%-80% of their maximal heart rate followed by a 5-minute 50lb sandbag lift. Participants had 10 seconds to lift the sandbag onto a table then another 10 seconds to place it back on the ground. The walk and lift were completed two times each per condition. Heart rate (HR), ratings of perceived exertion (RPE), and core temperature (T) were recorded immediately before entering the chamber (baseline), in the chamber at the conclusion of the occupational task (post-exercise), and outside the chamber after 10 min of rest (recovery). Two condition (HT, TN) by three-time point (baseline, post-exercise, recovery) repeated measures ANOVAs were utilized to assess all dependent variables. Post-hoc analyses were performed using t-tests. **RESULTS:** Significant ($F \geq 8.6$, $p \leq 0.003$) condition by time interactions were observed for all dependent variables. There were no differences ($t \leq 2.0$, $p \geq 0.07$) across conditions in HR (76±11 bpm TN, 82±14 HT), RPE (6.4±1 TN, 7.1±2.4 HT), or T (37.2±0.3^{0}C TN, 37.5±0.2^{0}C HT) at baseline. However, each of these variables were significantly ($t \geq 2.3$, $p \leq 0.05$) greater post-exercise (104±12 bpm TN, 146±16 bpm HT; 8.9±2.4 RPE TN, 13.4±3.1 RPE HT; 37.6±0.3^{0}C TN, 38.3±0.3^{0}C HT) and during recovery (78±12 bpm TN, 92±13 HT; 6.7±1.2 RPE TN, 7.7±2.2 RPE HT; 37.4±0.2^{0}C TN, 38.0±0.3^{0}C HT) in the HT versus the TN condition. **CONCLUSION:** Concomitant occupational tasks and heat stressors increased physiologic and perceived measures of exertion and body temperature in police cadets beyond that of the occupational tasks alone.

Keywords: tactical

Board 9

SELF-PERCEIVED HEALTH AND PHYSICAL FUNCTION ARE ASSOCIATED WITH BODY COMPOSITION AND BLOOD LIPIDS

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Clinical indicators of health status such as body composition, blood lipids, and cardiorespiratory fitness are objective; however, self-perceived health may be influenced by multiple factors. Thus, the **PURPOSE** of the present study was to explore associations among objective measures of health, self-perceived health, and habitual physical activity in overweight, older adults. **METHODS:** In 35 (27 F/8 M) overweight (body mass index, BMI≥ 27 kg/m^2), older adults (>58 years) we assessed blood lipids (point-of-care analyzer); body composition (bioelectrical impedance); habitual physical activity (7-day accelerometry); cardiorespiratory fitness (VO_2max); and self-perceived health (36-item short form survey, SF-36). The SF-36 includes questions that assess eight health concepts including perceptions of physical function and general health. Scores for each concept can range from 0% (poor) to 100% (excellent). Associations were assessed utilizing partial correlations (controlling for age and sex). Significance was set to $p < 0.05$. **RESULTS:** Average values for these subjects included: age: 64±5y; SF-36 (general health): 63±14%; SF-36 (physical function): 77±16%; BMI: 35±5 kg/m^2; body fat percentage: 44.7±0.1%; VO_2max: 16±3 ml/kg/min; moderate-to-vigorous physical activity (MVPA): 47±23 min/day, LDL cholesterol: 105±27 mg/dL, HDL cholesterol: 49±11 mg/dL, triglycerides: 113±40 mg/dL, and glucose: 100±15 mg/dL. Self-perceived physical function was significantly ($p < 0.05$) correlated with indices of body composition and blood lipids [body fat percentage (r= -0.42), visceral fat area (r= -0.42), and LDL cholesterol (r= -0.51)], but not habitual MVPA. Self-perceived general health was significantly correlated with LDL/HDL (r= -0.60), but not indices of body composition or physical activity level. **CONCLUSION:** These preliminary data suggest that perception of general health and physical function are more closely related to indices of body composition and blood lipids than habitual physical activity level.

Funding: This study was supported by a grant from the National Institute on Aging (R15 AG055923-01)

Keywords: SF-36, activity, overweight, well-being

Board 10

THREE MONTHS OF AEROBIC EXERCISE TRAINING IMPROVES VASCULAR ENDOTHELIAL FUNCTION IN OVERWEIGHT/OBESE

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Aging and overweight/obesity (OW/O) are associated with impaired vascular endothelial function (VEF), potentially increasing cardiovascular disease (CVD) risk. Aerobic exercise training is an effective intervention to improve VEF. **PURPOSE**: The ***purpose*** of this investigation was to determine changes in VEF following aerobic exercise training in older OW/O adults. We ***hypothesized*** that 3 months of aerobic exercise training would improve VEF, independent of weight loss. **METHODS:** Preliminary data are from 11 (8 women) older OW/O adults participating in a randomized clinical trial: 4 control (CON) (64±8 y; BMI=32.7±3.3 kg/m^2, body fat=41.5±8.0%) and 7 exercisers (EX) (62±4 y; 32.2±5.5 kg/m^2, 40.2±10.2%). Supervised aerobic exercise training consisted of moderate-intensity (40-60% heart rate reserve) cycling performed 3 d/wk for 3 months. Body mass and composition were measured by bioelectrical impedance analysis following an overnight fast. Brachial artery flow-mediated dilation (FMD), a non-invasive measure of VEF that predicts incident CVD events, was assessed by a trained technician using high-resolution ultrasonography. Insulin resistance, estimated by calculating HOMA-IR from fasting blood glucose and insulin, and HbA1c were measured. Data were analyzed using t-tests. **RESULTS:** No between group differences were detected at baseline. Compared to baseline, no changes were found in CON at 3 months (all $P \geq 0.19$). However, percent body fat (40.2±10.2% vs. 38.9±10.4% for baseline vs. 3 months, respectively ($P<0.05$)) and brachial artery FMD (3.2±3.0% vs. 5.1±2.8% ($P<0.05$)) improved at 3 months in EX. No other time effects were found in EX. **CONCLUSIONS:** Preliminary data from our ongoing clinical study show that 3 months of moderate-intensity aerobic exercise training improves body composition and VEF in OW/O older adults. Continued recruitment of participants will more definitely determine the beneficial impact of aerobic exercise training on VEF and related cardiometabolic risk factors.

Funding: Supported by National Institute on Aging (1R15AG055923-01).
Keywords: VEF, FMD, HOMA-IR, HbA1c

Board 11

CARDIOVASCULAR, METABOLIC, AND PERCEIVED EFFORT IN SIMULATED COMMUTE ON REGULAR AND ELECTRIC BICYCLE

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Use of electric bicycles (e-bikes) with battery powered assist when pedaling may incentivize active transport for people not fit enough to ride several miles to school, work, or for leisure. E-bikes may create a cardiovascular and metabolic health benefit and be an environmentally friendly transportation option. PURPOSE: To compare metabolic, cardiovascular, and ratings of perceived effort (RPE) when riding an e-bike for 3 miles at two different assist levels (boosts varying in intensity), in comparison with a regular bicycle. METHODS: Male (n=16) and female (n=14) subjects, aged 19-61 yr, completed a YMCA submaximal test and three outdoor 3-mile bike rides, simulating a typical commute, at their own pace on a standard bicycle and on an e-bike at both E-2 assist, and E-3 assist levels. The rides took place between August and October and between April and June. Weather conditions were dry with temperatures ranging between 16°C and 27°C. Participants wore a heart rate (HR) monitor and device that recorded HR and oxygen consumption (VO2). RPE on a 6-20 Borg scale was reported at the end of each 3-mile ride. RESULTS: In every model, for every variable, a significant difference ($p<0.05$) existed between riding a regular bicycle compared with an e-bike at both assist levels: HR (Reg=133 vs E-2=124 and E-3=114 beats•min-1), % of VO2 max (Reg=56 vs E-2=48 and E-3=40%), RPE (Reg=12.3 vs E-2=9.8 and E-3=8.4), respiratory quotient (Reg=.89 vs E-2= .85 and E-3=.85), METS (Reg=6.7 vs E-2=5.8 and E-3=4.8), caloric expenditure (Reg=519 vs E-2=436 and E-3=359 kcal•hr-1), time (Reg=13.7 vs E-2=11.8 and E3=10.3 min) and VO2 (Reg=23.6 vs E-2=20.3 and E-3=16.8 ml•kg•min-1). CONCLUSIONS: Compared with regular bicycles, riding e-bikes at assist levels 2 and 3 resulted in 2.5 - 3.9 min faster 3-mile times and lower perceived efforts from somewhat hard for a regular bicycle to very light for either e-bike assist levels. Speed and lower RPE may incentivize people to ride e-bikes, potentially

contributing to environmentally friendly active transport. Compared with regular bicycling, 10-20% lower metabolic and cardiovascular responses associated with e-bikes, if performed regularly, may benefit fitness and health.

Keywords: Health, Eco-friendly, Activity, Incentivize

Board 12

RACIAL DIFFERENCES IN RESPONSES OF CIRCULATING ANGIOGENIC AND CIRCULATING ENDOTHELIAL CELLS TO HIIT

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Circulating angiogenic cells (CAC) contribute to endothelial repair in vascular disease and vascular adaptations to exercise training. Circulating endothelial cells (CEC) are markers of integral damage to the endothelium. African Americans (AA) have a higher prevalence of cardiovascular disease compared to Caucasian Americans (CA). Little is known about racial differences in resting numbers or the effects of exercise on CAC and CEC. **PURPOSE:** To determine the effects of a bout of high-intensity interval cycling exercise on CAC and CEC in young, healthy AA compared with CA men. **METHODS:** Young (22±2 yr), healthy AA (n=5) and CA (n=4) men completed two separate visits. Participant's individual peak power output (ppo) was first determined using an incremental exercise test on a cycle ergometer. Participants then performed a 30-minute bout of high-intensity interval cycling exercise consisting of four 3 min bouts at 85% ppo each separated by 4 min intervals at 40% ppo. Venous blood was obtained immediately before and after exercise for isolation of peripheral blood mononuclear cells. CEC and CAC subtypes were stained for specific cell markers and quantified using flow cytometry. **RESULTS:** All cell counts are presented as number of events per 500,000 total events. There were no significant differences in any cell type between AA and CA. In response to exercise, the number of CEC ($CD146^+/45^-/34^+$) was not significantly changed in AA (30±5 − 28±6, p=0.64) or CA (57±23 − 36±8, p=0.35). The number of $CD34^+$ CAC was not significantly changed in AA (486±115 − 413±99, p=0.17) or CA (302±53.14 − 270±60, p=0.42). The number of $CD34^+/45^{dim/-}$ CAC was not significantly changed in AA (337±100 − 308±77, p=0.40) or CA (227±57 − 208±67, p=0.66). The number of $CD31^+/34^+/45^{dim/-}$ CAC was numerically decreased but did not reach statistical significance in AA (149±17 − 122±19, p=0.05), while there was no change in CA (126±31 − 92±24, p=0.12). **CONCLUSION:** There were no racial differences or significant effects of exercise on CEC, $CD34^+$ or $CD34^+/45^{dim/-}$ CAC in men. A decrease in $CD31^+/34^+/45^{dim/-}$ CAC approached statistical significance only in AA, and this could underlie differences in the vascular response to exercise compared with CA men.

Funding: Supported by NIH R2HL092604 and R25AG045063 to J.M.H
Keywords: Vascular response

Board 13

SEX DIFFERENCES IN THE TEST-RETEST RELIABILITY OF BLOOD PRESSURE RESPONSES TO EXERCISE

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Blood pressure (BP) responses during exercise are associated with an increased risk of cardiovascular events. Due to the potential clinical utility of exercise BP, it is important to determine the reliability of this measurement. **PURPOSE:** This study assessed whether BP responses to a standard exercise test were reliable across repeated tests. **METHODS:** Twenty healthy, normotensive adults (8 males: 21±1 years, 12 females: 21±1 years) completed two identical exercise tests on separate days. BP was measured using an automated motion-tolerant auscultatory device. Participants completed a modified Bruce treadmill exercise test where BP was measured at rest (i.e., standing on treadmill) and during the last minute of each stage. Maximal systolic BP (SBP) and diastolic BP (DBP) during exercise were identified. Total exercise time and maximal heart rate were analyzed using a Wilcoxon signed ranks test and paired t-test, respectively. Test-retest reliability of BP responses were assessed using intraclass correlation coefficients (ICC), with an ICC > 0.60 considered reliable. **RESULTS:** Data are presented as mean±SD. The average seated BP across visits was 116±6 mmHg and 71±4 mmHg for SBP and DBP, respectively. Total exercise time (1000±123 s vs. 1005±128 s, *P*=0.33) and maximal heart rate (191±6 bpm vs. 191±7 bpm, *P*=0.84) were similar between visits. Reliability of BP responses are presented as (ICC; 95% confident intervals). Resting SBP (0.62; 0.26-0.83) and DBP (0.61; 0.23-0.83) were reliable, while maximal SBP (0.45; 0.02-0.74) and DBP (0.18; -

0.27-0.57) were not reliable. Participants were then separated based on sex. Both resting SBP (0.88; 0.51-0.97) and maximal SBP (0.85; 0.44-0.97) were reliable in males. In females, resting SBP (0.29; -0.31-0.72) and maximal SBP (0.05; -0.52-0.59) were unreliable. For DBP, only resting measures were reliable in females (0.65; 0.16-0.89); all other DBP measures were unreliable in both sexes (ICCs <0.35). **CONCLUSION:** SBP measurements were only reliable in males, while exercising DBP measures were unreliable in both sexes. Given the prognostic value of exercise BPs, further investigation is warranted to understand sex differences in the SBP responses and the possible explanations for unreliable DBP measurements.

Keywords: Cardiovascular. Exercise testing.

Board 14

THE IMPACT OF CARDIOTOXIC CHEMOTHERAPY ON PEAK OXYGEN UPTAKE IN FEMALES

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Individuals undergoing chemotherapy undergo drug infusions that powerfully alter physiological function. Chemotherapy targets cancerous cell growth, but unfortunately it also has widespread ramifications on normal cellular function. Among chemotherapy drugs, cardiotoxic chemotherapies are particularly detrimental to patients' health. Cardiotoxic chemotherapy that damages heart muscle affects quality of life. **PURPOSE:** To assess the impact of cardiotoxic chemotherapy on peak oxygen uptake. We hypothesized that the calculated peak oxygen consumption (VO2 peak) of the female patients who have undergone cardiotoxic chemotherapy would be lower than that of, the female caretakers in the same age range who have not undergone cardiotoxic chemotherapy. **METHODS**: We accessed patient files from the SIUC- SIH Strong Survivor program and gathered data on cancer survivors (mean age= 55.5) and caregivers (mean age= 57.8). 10 female cancer survivors were randomly selected based on their cardiotoxic treatment. 10 female caregivers of similar age were randomly selected, they had not undergone any chemotherapy. Participants' VO2 peak was calculated using data from a previously administered submaximal VO2 assessment. Utilizing their recorded heart rate, age, treadmill walking speed and gender, an estimated VO2peak was calculated using the Ebbeling et al. (1991) prediction equation, VO2peak (ml. kg-1.min-1) = 15.1 + (21.8 * Speed in mph) - (0.327 * HR) - (0.263 * Speed * Age) + (5 .98 * Gender) + (0.00504 * HR * Age). **RESULTS:** An independent-samples t-test comparing the VO2 peak of cancer survivors (M= 24.373 ml/kg/min, SD= 4.867) and their healthy counterparts (M= 25.276 ml/kg/min, SD= 3.252) revealed no significant difference; t (18) = -.488, p=.632, p > .05. However, the Cohen's D effect size revealed a small effect of the cardiotoxic chemotherapy (d= .218). The caregiver's peak oxygen consumption is 0.218 standard deviation units above the cancer survivors VO2 peak – this shows a small, yet meaningful group difference. **CONCLUSION:** Although the group difference in VO2 peak was small, these findings suggest that VO2peak may be negatively impacted by cardiotoxic chemotherapy. Medical and exercise professionals should implement exercise programs prior to and during chemotherapy to help strengthen heart function and to limit such harmful effects.

Keywords: cardiorespiratory fitness, cancer, wellness

Board 15

MICROVASCULAR OXYGENATION RESPONSES DURING EXERCISE IN BREAST CANCER SURVIVOR DRAGON BOAT RACERS

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Cancer treatment is associated with numerous peripheral pathologies including altered blood flow and vascular dysfunction. A pilot study was conducted to measure the peripheral microvascular oxygenation response during maximal exercise in a group of cancer survivors. **PURPOSE:** To investigate the differences that paddling side (paddling side, PS; non-paddling side, NPS) and treatment side (treatment side, TREAT; healthy side, HEAL) has on the near-infrared spectroscopy (NIRS) responses during a unilateral paddling graded exercise test in breast cancer survivor dragon boat racers. **METHODS:** Thirteen breast cancer survivors/racers (56 ± 9 years, 1.65 ± 0.06 m, 76.5 ± 11.0 kg) performed a unilateral, discontinuous graded exercise test (2-minute exercise, 1-minute rest) on a stationary rowing ergometer to volitional fatigue. Tissue oxygenation saturation (StO_2) and total hemoglobin concentration ([THC]) were measured via NIRS from the posterior deltoid muscles during the graded exercise test. StO_2 and [THC] responses were averaged during the last 30 seconds of each exercise stage and normalized to

baseline exercising data. Paired t-tests were used to examine if treatment side had an effect on StO_2 or [THC] and if paddling side had an effect on [THC] responses at maximal intensity. Due to non-normally distributed data, a Wilcoxon Signed Rank Test was used to determine if paddling side had an effect on StO_2 at maximal intensity. Significance was established *a priori* at $p < 0.05$. **RESULTS:** Paddling side did not significantly affect the StO_2 (PS = -5.2 ± 15.7%, NPS = -13.5 ± 21.7%, p = 0.094) or [THC] (PS = 0.14 ± 0.19, NPS = 0.15 ± 0.21, p = 0.425) responses. Treatment side had a significant, moderate (ES = 1.12) effect on the StO_2 response (TREAT = -0.006 ± 16.1%, HEAL = -18.7 ± 17.3%, p = 0.008). Treatment side did not significantly affect the [THC] response (TREAT = 0.13 ± 0.20, HEAL = 0.16 ± 0.19, p = 0.313). **CONCLUSION:** Based upon the pilot results, it would suggest that the exercising muscles on the breast cancer treatment side may have a residual impaired ability to use oxygen for energy production during maximal intensity exercise.

Keywords: Near-Infrared Spectroscopy, Vascular Function, Paddling Exercise, Maximal Intensity

Board 16

PLASMA ENDOTHELIN-1 LEVELS ARE NOT ELEVATED IN OVERWEIGHT/OBESE YOUNG ADULTS

Valerie M. Wiseman, Olivia Henderson, Caitlyn Thomas, Craig Berry, Conlan Varty, Kyle Timmerman FACSM, Kevin Ballard FACSM. Miami University, Oxford OH.

More than two-thirds of U.S. adults are considered overweight/obese (OW/O), which increases one's risk of cardiovascular disease (CVD). The vasoconstrictor molecule endothelin-1 (ET-1) is implicated in the development of CVD and circulating ET-1 levels are increased in both older adults and obese middle-aged adults. Studies examining circulating ET-1 levels in young adults who are OW/O are lacking. **PURPOSE**: The ***purpose*** of this investigation was to compare circulating ET-1 levels in OW/O (body mass index (BMI) >25 kg/m^2) young adults with their age-matched, lean counterparts. We ***hypothesized*** that plasma ET-1 levels would be higher in OW/O young adults compared to non-obese controls. **METHODS:** Body mass and composition (bioelectrical impedance analysis) and plasma ET-1 levels were measured following an overnight fast in 22 lean (8 women; 21 ± 1 y (mean ± SD); BMI = 22.4 ± 1.8 kg/m^2; body fat = 18.4 ± 7.8%) and 17 OW/O adults (13 women; 22 ± 5 y; 31.7 ± 5.4 kg/m^2; 37.5 ± 8.5%). One-way ANOVA was used to evaluate differences between groups. Partial correlations (controlling for age and sex) were performed to examine associations among plasma ET-1 levels, BMI, and body fat percentage. **RESULTS:** BMI and body fat were higher ($P<0.001$) in OW/O adults. Plasma ET-1 levels did not differ between lean (1.81 ± 0.59 pg/mL) and OW/O adults (1.77 ± 0.56 pg/mL) ($P = 0.83$). Further, neither BMI ($r = -0.30$, $P = 0.08$) nor body fat ($r = -0.20$, $P = 0.25$) were related to plasma ET-1 levels. **CONCLUSIONS:** In contrast to data in obese middle-aged adults, plasma ET-1 levels were not increased in OW/O young adults compared to their lean counterparts. These findings suggest the potential negative influence of excess body mass and/or adiposity on this specific circulating CVD risk marker is not present in young adults.

Funding: Supported by an EHS Seed Grant, Miami University Committee on Faculty Research Grant, and Miami University Undergraduate Research Award
Keywords: obesity; body mass index; body fat; vasoconstriction

Poster Session #5: Ballrooms G-J, 3:35-4:50am

Board 1

EFFECTS OF RESPONSIVE EQUINE SIMULATOR THERAPY DEVICE ON BIOMECHANICS OF SITTING & BALANCE CONTROL

Brian Fox, Rachel McCormick, Crystal Hajek, Henry Wang, D. Clark Dickin. Ball State University, Muncie IN.

The Responsive Equine Simulator Therapy device (RESTD) is an active sitting apparatus designed to replicate horse ambulation. Prior literature suggests many benefits from active sitting: increased burning of fat tissue, reduced pressure on the vertebrae, increased core muscle activation (MA), increased spatiotemporal awareness, and improved spinal positioning during sitting. **PURPOSE:** Quantify metabolic changes, core and leg MA, postural stability, and trunk motion (TM) patterns while sitting on a RESTD compared to sitting on a stationary chair (SC). **METHODS:** Participants (10 male, 10 female; age= 21.9 ± 2.0 years; mass= 75.1 ± 10.1 kg; height= 170.8 ± 7.9

cm) sat on both the RESTD and SC for 20 minutes while breathing was monitored by a metabolic cart. The Limits of Stability (LOS) and Sensory Organization Test (SOT) were performed immediately following each condition. The order of the conditions was randomized to all participants, and conditions were separated by a 10-minute break. Electromyography sensors were placed on trunk and leg muscles, and reflective markers on anatomical landmarks for motion capture. **RESULTS:** In the RESTD condition, center of mass distance, anteroposterior and longitudinal angular speeds were all significantly greater than the SC condition ($p<.001$; $p<.001$; $p=.011$, respectively). Average combined left and right MA of the external oblique ($p=.037$), soleus ($p=.018$), and tibialis anterior ($p=.007$) were higher in the RESTD compared to the SC condition. Average energy expenditure and average heart rate were also significantly higher in the RESTD condition ($p=.020$; $p=.028$; respectively). Following the SC condition, participants exhibited greater SOT composite scores compared to the RESTD condition ($p<.01$). In the LOS test, participants exhibited greater endpoint excursion (EPE) following the RESTD compared to SC ($p=.022$). **CONCLUSION:** In the RESTD condition, participants exhibited greater trunk motion and muscle activation compared to the SC, which resembles other active sitting devices. After RESTD, SOT scores decreased acutely, likely due to the consistent motion of the REST device, while LOS scores improved which may suggest more confidence while moving to the target. Future studies should observe the long-term effects of the REST device on balance, and how it affects individuals with autism spectrum disorder.

Funding: Gait, LLC.
Keywords: postural stability, hippotherapy, active sitting

Board 2

ENJOYMENT OF LIFE AND CONTRIBUTION TO SOCIETY FOR HABITUAL RUNNERS

Kara E. Martin, Sherry S. Williams, James R. Sackett. Cornerstone University, Grand Rapids MI.

The amount of physical activity in a person's life is positively correlated with an improved quality of life. However, it is unknown if habitual running has an impact on a person's enjoyment of life and contribution to society. **PURPOSE:** We tested the hypothesis that habitual Runners experience a greater enjoyment of life and contribution to society than Non-runners. **METHODS:** One hundred and forty-nine adults completed a survey that measured their enjoyment of life and contribution to society. The subjects reported to be either Runners (n=69) or Non-runners (n=80). Runners were defined as anybody who runs two or more times per week with no more than a month or two off at a time. Both groups answered three questions related to their enjoyment of life and three questions related to their contribution to society. For enjoyment of life, subjects were asked how much they enjoy life, how much they enjoy work, and how much daily stress they experience (1=very little, 3=average, 5=very much). For contribution to society, subjects were asked if they regularly donate personal financial resources, if they volunteer regularly, and if they advise/mentor somebody. Enjoyment of life data were analyzed using an unpaired t-test and contribution to society data were analyzed using a Chi-square and Fisher's exact test. Data are presented as mean±SD and the p value was set at $p<0.05$. **RESULTS:** There were no statistical differences between Runners (3.9±0.8 a.u.) vs. Non-runners (4.0±0.8 a.u.) for enjoyment of life ($p=0.86$). Runners (3.5±0.8 a.u.) reported to enjoy work less than Non-runners (3.9±0.9 a.u., $p=0.01$). There were no significant differences between Runners (3.4±1.0 a.u.) vs. Non-runners (3.4±1.0 a.u.) for stress ($p = 0.72$). More Runners (57%) reported to regularly donate personal financial resources than Non-runners (46%; $p<0.01$). However, there were no statistical differences between Runners vs. Non-runners for volunteering (54% vs. 43%, $p=0.19$) or advising/mentoring (67% vs. 60%; $p=0.50$). **CONCLUSION:** These data indicate that Non-runners enjoy work more than Runners and that Runners donate more financial resources than Non-runners. However, it remains unclear if a causal relationship exists between running, enjoyment of life, and contribution to society.

Keywords: Running, Quality of Life

Board 3

THE USE OF HANDRAIL SUPPORT AND COST OF TRANSPORT DURING INCLINED WALKING

Jodie C. Hutchins, Paulo G. Aco, Dominique M. Page, Pat Babington, Brian Wright. DePauw University, Greencastle IN.

Previous literature presented that the optimal cost of transport during unloaded and loaded treadmill walking exists at 1.3 $m \cdot s^{-1}$ (Bastein et. al., 2005). Few empirical studies have reported cost of transport while walking at a 10%

incline using handrail support (HRS) in a variety of instructed body postures. **PURPOSE:** To examine the cost of transport in young adults during treadmill walking on a flat grade and a 10% incline while using handrail support in a variety of instructed body postures. **METHODS**: Energy expenditure was measured in 29 participants walking at 1.3 $m \cdot sec^{-1}$ during four walking conditions; a) flat grade, b) 10% incline w/ no HRS, c) 10% incline with HRS upright, and d) 10% incline with HRS while leaning backwards. Cost of transport (CoT) was calculated using mean values of energy expenditure once steady-state was reached for each condition. A one-way repeated measures ANOVA was used to compare walking conditions for CoT. A Bonferroni correction factor was to examine pairwise comparisons. **RESULTS:** The repeated measures ANOVA indicated significance ($p < 0.05$). Pairwise comparisons revealed that walking at 10% without HRS elicited a significantly higher CoT than all other conditions (6.60 $\pm$ 1.24 $J \cdot kg^{-1} \cdot m^{-1}$; $p < 0.05$). Walking upright with use of HRS yielded a significantly higher CoT than walking at a 10% incline with HRS and lean (4.65 $\pm$ 0.54 vs 3.81 $\pm$ 0.50 $J \cdot kg^{-1} \cdot m^{-1}$; $p < 0.05$). CoT during the flat grade and 10% incline w/ HRS and lean conditions did not differ significantly (3.58 $\pm$ 0.51 vs 3.81 $\pm$ 0.50 $J \cdot kg^{-1} \cdot m^{-1}$; $p > 0.05$). **CONCLUSION:** The use of handrail support and body posture influence the CoT while walking in an inclined position at 1.3 $m \cdot s^{-1}$.

Keywords: Posture, Metabolic Rate, Treadmill

Board 4

THE INFLUENCE OF HANDRAIL USE AND BODY POSTURE ON RPE DURING INCLINED WALKING

Paulo Aco, Dominique Page, Joanna Hutchins, Pat Babington, Brian Wright. DePauw University, Greencastle IN.

Previous literature has concluded that the use of handrail support (HRS) and various body postures while walking on an inclined treadmill influences metabolic cost (Hofmann, 2014). Specifically, that metabolic cost while walking when using HRS while leaning backwards on a 10% grade did not differ from the same condition walking at a 5% grade. One limitation from this investigation was that no comparisons were made with flat grade walking. **PURPOSE:** To examine metabolic cost and perceived exertion during treadmill walking on a flat grade and a 10% incline while using handrail support in a variety of instructed body postures. **METHODS:** Measures of oxygen consumption, heart rate, energy expenditure, and rating of perceived exertion were measured while walking at 80.5 $m \cdot min^{-1}$ during five walking conditions; a) flat grade, b) 10% incline w/ no HRS, c) 10% incline with HRS upright, and d) 10% incline with HRS while leaning backwards. Data for analyses was recorded once steady state exercise was reached for each walking condition. A repeated measures of ANOVA was used to compare dependent measures between walking conditions. A Bonferroni correction factor was used to examine pairwise comparisons (using an alpha level of 0.05). **RESULTS:** Repeated measures ANOVA revealed significance for VO_2, HR, EE, and RPE ($p<0.05$). Pairwise comparisons displayed no difference ($p > 0.05$) between flat and 10% incline w/ HRS while leaning backwards for HR (105.1 ± 15.5 vs 109.7 ± 15.3 BPM), VO_2 (1.0 ± 0.1 vs 1.1 ± 0.2 $l \cdot min^{-1}$), and EE (4.9 ± 0.8 vs 5.3 ± 1.2 $kcal \cdot min^{-1}$). RPE while walking on a 10% incline w/ HRS while leaning backwards displayed significantly higher values than flat grade walking (8.7 ± 1 .5 vs 7.8 ± 1.4; $p < 0.05$). **CONCLUSION:** Walking while leaning backwards using HRS at a 10% incline did not elicit changes in physiological stress, yet participants reported a difference in perceived exertion.

Keywords: treadmill, energy expenditure, body position

Board 5

THE EFFECT OF TRANSITIONING TO A GRADE ON THE ENERGETIC COST OF WALKING

Dominique M. Page, Jodie Hutchins, Paulo Aco, Pat Babington, Brian Wright. DePauw University, Greencastle IN.

Walking conditions that present a change in grade are common during daily physical activity. Previous literature has investigated the optimal speed of unloaded walking (1.3 $m \cdot s^{-1}$) on a flat grade to minimize energy cost per unit distance traveled (Bastien, 2005). However, there are little empirical data available that have investigated cost of transport (CoT) while transitioning from flat grade walking to walking in an incline position during this optimal speed of 1.3 $m \cdot s^{-1}$. **PURPOSE:** The purpose of the study is to investigate the cost of transport when transitioning from a flat grade to an inclined position while walking at constant velocity. **METHODS:** Twenty-six participants completed a walking trial at a 1.3 $m \cdot s^{-1}$ velocity. Once steady state was achieved (via indirect calorimetry) during flat grade walking the treadmill was raised to a 10% inclined position and walking continued until three minutes of

steady state exercise were completed. CoT was calculated using data sampled from 30s averages throughout the walking trial. A repeated ANOVA measures was used to compare CoT between each of the 30s segments throughout the trial. A paired sample T-test was used to further compare flat and incline conditions for CoT once in a steady state exercise. **RESULTS**: Paired sample T-test indicated a significance difference between flat grade and inclined CoT (3.37 ± 0.51 and 6.21 ± 0.73 $J \cdot kg^{-1} \cdot m^{-1}$ respectively; $p < 0.05$). The RM ANOVA revealed significance ($p < 0.05$). Pairwise comparisons displayed that a significant increase in CoT took place between 30 and 60 seconds following the increase in treadmill incline (3.46 ± 0.59 and 4.70 ± 0.88 $J \cdot kg^{-1} \cdot m^{-1}$ respectively; $p < 0.05$). This change corresponds to 35.8% increase in CoT. **CONCLUSION:** There is a significant increase in CoT when presented with a 10% incline while walking at an optimal speed.

Keywords: incline, expenditure, optimal speed

Board 6

BARRIERS TO PHYSICAL ACTIVITY PARTICIPATION AT THE STUDENT FITNESS CENTER IN REFERRED EIMOC CLIENTS

Alex DiSerio, Teadora Markovski, Kaitlin Mindiola, Kristen M. Lagally. Illinois State University, Normal IL.

PURPOSE: The purpose of this study was to examine the barriers to being physically active at the student fitness center for clients in an Exercise is Medicine on Campus (EIMOC) program. **METHODS:** Student health services refers students who would benefit from increased physical activity to an EIMOC program implemented by Kinesiology faculty and students in the Exercise Physiology Laboratory. Referred students respond to 12 items concerning potential barriers to participating in physical activity at the student fitness center using a scale of 1 (strongly disagree) to 5 (strongly agree). **RESULTS:** Sixty-five college-aged students (Women=53, Men=12) responded at the onset of the EIMOC program. Forty-two (65%) of the 65 indicated that they do not use the student fitness center while 23 indicated that they do. Means ($\pm$SD) for all 65 subjects indicated that the top three barriers to using the student fitness center were "I don't know what exercises to do" (3.6 ± 1.3), "It's too crowded" (3.6 ± 1.2), and "I compare myself to others frequently at the rec center" (3.5 ± 1.3). Other items resulting in mean values >3 included "I am embarrassed to be physically active around other students", "I feel like others are evaluating me", and "I don't know how to work the equipment." Separate one-way ANOVAs were used to compare 1) those who were and weren't using the student fitness center and 2) males and females. ANOVA indicated significant differences between those using (U) and not using (NU) the student fitness center for "I don't feel comfortable" (U=2.6 ± 1.1; NU=3.2 ± 1.2, p=0.04), "I am embarrassed to be physically active around other students" (U=3.0 ± 1.1; NU=3.7 ± 1.1, p=0.03), and "I feel competitive with others" (U=2.6 ± 1.4; NU=1.8 ± 1.1, p=0.02). When men and women were compared, significant differences were noted with "I don't feel comfortable using the locker rooms" (Women=2.3 ± 1.3; Men=3.3 ± 1.4, p=0.03), "I don't know what programs are offered" (Women=2.5 ± 1.3; Men=3.8 ± 1.2, p=0.002), and "The Rec doesn't offer programs that interest me" (Women=1.7 ± 0.9; Men=2.8 ± 1.0, p=0.001). **CONCLUSION:** Identifying barriers specific to this population may help to develop programs that can increase physical activity levels for these individuals. The results identify barriers that can be meaningfully addressed by qualified exercise professionals.

Keywords: Exercise is Medicine, campus recreation

Board 7

EDUCATION LEVEL INFLUENCES COGNITIVE FUNCTION POST EXERCISE IN DEPRESSED INDIVIDUALS

Sara C. Bennett and Jeni E. Lansing. Iowa State University, Ames IA.

Individuals with major depressive disorder (MDD) often suffer from cognitive dysfunction. Acute exercise appears to improve cognitive function in healthy adults and those with major depressive disorder (MDD). The cognitive response to exercise, however, may vary based on education level. **Purpose:** To compare changes in cognitive function following a 30-minute exercise session in individuals with MDD with or without a college degree. **Methods:** Individuals (n=11) with MDD completed a demographic survey, the Patient Health Questionnaire and Stroop task before completing a 30-minute moderate exercise session (RPE=13) on a stationary bike. After the exercise session, the Stroop task was administered again. Changes in reaction time and accuracy in the incongruent Stroop task were compared before and immediately after exercise. Participants were grouped based on completion

of a college degree (with: n = 6, without: n = 5). Independent-samples t-tests were conducted to compare change in incongruent Stroop test accuracy and reaction time between groups. Effect sizes (Cohen's *d*) were calculated to evaluate the magnitude of difference between the two groups. **Results:** There was a significant difference (t(9)= 4.29 p=0.001) in the change in accuracy for individuals with a college degree (M=0.10, SD= 0.17) compared to individuals without a college degree (M= 0.02, SD=0.05), with a medium to large effect size (*d*=0.64). There was not a significant difference (t(9)= -0.43, p=0.38) in the change in reaction time for individuals with a college degree (M=-45.54, SD=84.73) compared to individuals without a college degree (M=-74.61, SD=139.43), and a small effect size (*d*= 0.25) for reaction time. **Conclusion:** While there were no differences in improvements in reaction time between groups, having a college degree was associated with a greater improvement in incongruent Stroop accuracy across exercise in individuals with MDD. Individuals with MDD who have a higher education level may have a better cognitive response to exercise which may be associated with the benefits of using exercise as a treatment for MDD by influencing symptoms associated with cognitive dysfunction.

Keywords: Exercise, Cognitive Function, MDD, Education

Board 8

CHANGES IN COGNITIVE FUNCTION AFTER EXERCISING IN PATIENTS WITH MDD WITH GOOD vs POOR SLEEP QUALITY.

Marisol Meza, Jeni Lansing, Maria Perez, Gabriel Cruz-Maldonado, Jacob Meyer. Iowa State University, Ames IA.

Cognitive impairments are present in sleep-deprived people and most patients with major depressive disorder (MDD) suffer from impaired sleep which may influence their memory and cognitive function. Exercise training can treat MDD and improve cognitive function, and cognitive function may affect the efficacy of exercise as a treatment for MDD. It is unclear whether sleep quality influences changes in cognitive responses following exercise in individuals with MDD. **PURPOSE:** To examine how cognitive function changes in response to an acute exercise session in adults with MDD who report good sleep quality compared to poor sleep quality. **METHODS:** Adults with MDD (n=20) completed the Pittsburgh Sleep Quality Index (PSQI) prior to performing a 30-minute moderate intensity (Rating of perceived exertion = 13) exercise session on a stationary bike. Cognitive function (accuracy and reaction time) was assessed before and immediately after exercise with the Stroop test, which measures executive function. Individuals were split into groups based upon responses on the Subjective Sleep Quality subscale of the PSQI (0-1 = good, 2-3 = poor). Independent samples t-tests were used to compare change (post-pre) in accuracy and reaction time after exercise between groups. Effect sizes (Cohen's *d*) were calculated to evaluate the magnitude of the group differences. **RESULTS:** No significant difference (t(18)=1.12, p=0.28) was found in change in accuracy between individuals with good (mean = 0.07 [standard deviation = 0.11]) and poor sleep quality (0.02 [0.07]), with a medium effect size (*d* = 0.56). No significant difference (t(18)=0.06, p=0.95) in reaction time between individuals with good (-56.41 [101.40]) and poor sleep quality (-59.48 [117.22]), with an effect size of 0.03. **CONCLUSION:** Although there were no significant differences between groups, the effect size for accuracy suggests sleep quality may be associated with changes in cognitive function after acute exercise in MDD. Improving sleep quality patterns may be useful when using exercise as a treatment for individuals with MDD. However, larger studies are needed to further explore the potential influence of sleep quality on cognitive response to exercise.

Keywords: exercise, depression, sleep

Board 9

DOES STIMULATION OF THREE-DIMENSIONAL MYOBUNDLES SIMULATE EXERCISE-RELATED GENE EXPRESSION?

Alexander B. Sklivas[1], Dante Goss II[1], Nenad Bursac[2], Alastair Khodabukus[2], George A. Truskey[2], William E. Kraus[2], Monica J. Hubal[1]. [1]IUPUI, Indianapolis IN, [2]Duke University, Durham NC.

Purpose: Traditional two-dimensional (2D) skeletal muscle cell culture models have lacked robustness, responsiveness, and anatomical accuracy compared to biopsies of *in vivo* human muscle, which impacts the ability to model conditions like exercise. Here, we use a newly developed three-dimensional (3D) skeletal muscle engineered myobundle model to determine if stimulation of the myobundles in culture can mimic changes seen in exercised muscle. These myobundles exhibit similar chemical and electrical responses to native human muscle, as well as anatomically accurate architecture. The purpose of this study was to examine the effects of electrical

stimulation on human skeletal myobundle gene expression. **Methods:** Myobundles were formed from isolated myogenic cells taken from previously collected human muscle biopsies (N=6) using a hydrogel molding technique. Myobundles were electrically stimulated (STIM) over 24 hrs in culture, using a 1 Hz frequency of stimulation for 1 hr then 7 hrs rest between stimulation bouts (3 hrs total stimulation) to mimic the effects of exercise and compared myobundles that received no intervention (CON). Samples were collected 3 hrs after stimulation (or control) and extracted RNA was profiled using Illumina HumanHT-12 v4.0 Gene Expression BeadChip Arrays. Data analysis workflow included Illumina Genome Studio, Partek Genomics Suite and Ingenuity Pathway Analysis software packages. ANOVA (group*ID) tested differences ($p<0.05$) between groups. **Results**: A total of 3034 genes (1935 annotated; 1819 unique genes) were differently expressed between groups. Of the genes represented, 938 increased expression following stimulation, while 881 decreased. Examples of individual differentially expressed genes included insulin-induced gene 1 (INSIG1; +2.2-fold change; $p=0.008$) and matrix metalloproteinase 1 (MMP1; +2.4-fold change; $p=0.003$). Biological pathway analyses identified several pathways represented in the gene set, including cyclic AMP (cAMP)-mediated signaling (27 genes; ratio=0.12; z-score=3.2; -log p value=1.9). Similarly, the mammalian target of rapamysin (mTOR) pathway signaling was altered (25 genes; ratio=0.12; z-score=-0.9; -log p value=1.8) by STIM as compared to CON. **Conclusions**: Results from a 3D myobundle model produce some gene expression changes like those seen in exercised *in vivo* muscle. However, large differences still exist between this model and classic exercise-related gene expression patterns, meaning the 3D model needs further development.

Keywords: skeletal muscle, cell culture, bioengineering, transcriptome

Board 10

HEALTH PERCEPTION, PHYSICAL ACTIVITY, AND PHYSICAL FUNCTIONING IN OLDER ADULTS

Holly Flentge, Shaine Henert, Emerson Sebastiao. Northern Illinois University, DeKalb IL.

Several factors are related to health self-perception in independent-living older adults. Research is needed to better understand these factors in order to develop health-related programs to promote active and healthy aging in this population. **PURPOSE:** To examine differences in physical activity and physical functioning among independent-living older adults differentiated by health self-perception. We hypothesized that older adults perceiving their health as excellent would have higher physical activity counts and better physical functioning than their peers reporting lower health self-perceptions. **METHODS:** Ninety-nine residents (84.3 ± 6.03 years) living in independent apartments, duplex living, and personal care apartments voluntarily provided demographic, BMI, perceived health (PH), physical activity (PA) level, and physical function (PF) information. PH was measured with a one-item questionnaire. Based on their responses, they were categorized as either Excellent, Good, or Fair (41, 42, and 16 participants, respectively). PA was measured using the 10-item Physical Activity Scale for the Elderly (PASE). Physical function (PF) was measured using the Short Physical Performance Battery (SPPB), which is an objective tool assessing lower extremity functioning in older persons. One-way ANOVAs were used to examine potential differences in PA counts and PF among categories of perceived health (i.e., excellent, good, fair). **RESULTS:** There were significant differences between the PH groups in PA counts ($F = 6.18$, $p=.015$). Those older adults reporting Excellent perceived health reported higher PA counts (66.1 $\pm$ 45.7) than those reporting Good perceived health (55.7 $\pm$ 43.7) and Fair perceived health (34.7 $\pm$ 18.4). There were also significant differences between the PH groups in PF ($F = 10.05$, $p=.002$). Those older adults reporting Excellent perceived health scored higher on the SPPB (9.3 $\pm$ 2.7) than both those reporting Good perceived health (7.5 $\pm$ 2.9) and Fair perceived health (6.9 $\pm$ 3.0). **CONCLUSION:** Older adults perceiving their health as excellent report higher physical activity counts and score better on physical functioning assessments than their peers perceiving their health as only good or fair. Programs focusing on increasing physical activity in older adult populations should consider strategies to enhance one's health self-perception.

Keywords: Active Aging, Quality of Life, Independent Living

Board 11

PUNISHMENT IMPAIRS RETENTION AND DECREASES FEEDBACK RELATED POTENTIALS DURING MOTOR LEARNING

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PURPOSE: Reward and punishment have demonstrated dissociable effects on motor learning, with punishment enhancing the learning rate and reward increasing retention. However, these findings have been primarily demonstrated at the level of behavior, and no study has presented the neural correlates. The aim of this research is to determine whether reward and punishment feedback produces a different cortical neural response associated with motor learning and retention. **METHODS:** Participants were placed into one of three groups [Reward (n=14), Punishment (n=14), Control (n=14)] and performed 680 trials of a visuomotor rotation task under five conditions [Baseline (80 trials), Adaptation (200 trials), No Vision (200 trials), Washout (100 trials), and Readaptation (100 trials)] with a Wacom pen and tablet. Adaptation (learning), No Vision (retention), and Readaptation featured an incongruent position between the cursor and the target, with the cursor trajectory rotated 30-degrees counterclockwise to the target, requiring the participant to adapt their movement to hit the target. After each trial, feedback based on error magnitude was provided during the learning phase in the form of a positive number (Reward), negative number (Punishment) or two vertical lines (Control). Positive and negative numbers represented a monetary gain and loss, respectively. EEG was recorded throughout all task conditions from 28 electrodes. Reach angle and event-related potentials (ERPs) time locked to feedback presentation (Reward, Punishment or Control) were calculated for each participant during the learning and retention phases. **RESULTS:** All feedback groups displayed similar changes in reach angles throughout the learning phase of the task, suggesting reinforcement feedback does not alter task adaptation and performance. However, the Punishment group did not maintain the learned reach angle during the retention phase (13.28 ±3.11˚), while Reward (19.65 ±0.59˚) and Control (19.34 ±1.59˚) groups preserved their performance ($F(2,39)=4.157$, $p=0.023$, RMANOVA). Moreover, punishment significantly decreased the peak amplitude of the feedback ERPs during the retention phase compared to the learning phase ($F(2,35)=3.361$, $p=0.009$, RMANOVA). ERP changes were not found in the Reward and Control groups. **CONCLUSIONS:** We propose that punishment feedback does not adequately engage motor cortical areas during task learning retain the adaptive behavior necessary to perform the task.

Keywords: Reinforcement, EEG, Neuromotor, Visuomotor

Board 12

THE EFFECT OF TART CHERRY SUPPLEMENTS ON SLEEP TIME AND QUALITY

Olivia Trickett and Christopher Brodsky, Ohio University, Athens OH.

INTRO: Tart cherry supplements have been investigated for their use in improving sleep, due to their melatonin content and antioxidant and anti-inflammatory properties. Melatonin is an important phytochemical that helps regulate circadian rhythm and sleep, while anti-inflammatory and antioxidant properties might also help modulate sleep. Interestingly, data suggests tart cherry capsules contain greater amounts of melatonin vs. juice concentrate. **PURPOSE**: The aim of our investigation was to compare the impact of tart cherry supplementation in juice or capsule form on sleep and subjective sleep quality over 30 days. **METHODS**: 33 participants (Age: 28 ± 10, Height: 169.65 ± 8.54, Weight: 71.23 ± 13.25) consumed either tart cherry supplement or placebo for 30 days. Active supplements consisted of juice concentrate (TCJ) or powdered tart cherry (CAP), while placebo consisted of color, sugar and flavor matched juice (JuicePLA) or cornstarch (CapPLA). Participants consuming juice drank two 8 oz. bottles per day, approximately 8 hours apart and not within an hour of exercise; capsule groups consumed two capsules with breakfast. Participants tracked their sleep daily via an online survey that asked about time in bed, time to sleep, length of sleep (hours) and subjective rating of sleep quality (100 mm VAS). **RESULTS**: There was a weak positive relationship between total sleep time and sleep quality ($r = 0.35$, $p < 0.01$). Although sleep changed over time ($p = 0.04$), nightly sleep time between groups was not significantly different ($F = 0.48$, $p = 0.70$; JuicePLA: 7.5 ± 1.3, TCJ: 7.6 ± 1.5, CAP: 7.7 ± 1.2, CapPLA: 7.5 ± 1.3) nor was subjective sleep quality ($F = 1.24$, $p = 0.31$; JPLA: 80.7 ± 11.9, TCJ: 81.0 ± 14.3, CAP: 74.1 ± 19.9, CapPLA: 74.7 ± 18.1). **CONCLUSION**: Sleep diary entries indicate that tart cherry supplements do not significantly increase sleep time or sleep quality. These results suggest that participant's sleep patterns were not impacted by the supplementation, which may in part be due to our study population (university-based individuals).

Funding: This study was supported by funding from the Cherry Marketing Institute.
Keywords: melatonin, antioxidant, anti-inflammatory

Board 13

EFFECT OF TART CHERRY SUPPLEMENTS ON INFLAMMATORY MARKERS IN HEALTHY INDIVIDUALS

Christopher Brodsky and Olivia Trickett. Ohio University, Athens OH.

INTRO: Tart cherry is known to possess antioxidant, anti-inflammatory and analgesic properties. Additionally, animal models suggest tart cherry supplementation can reduce weight, however human data is lacking. Furthermore, it is not known if these properties differ based on the type of tart cherry supplement, such as juice or freeze-dried powder. **PURPOSE**: To investigate tart cherry supplement use on markers of inflammatory over the course of 30 days in healthy individuals. **METHODS**: 44 participants (Age: 28 ± 10, Height: 169.44 ± 7.91, Weight: 70.61 ± 12.36) consumed either tart cherry supplement or placebo for 30 days. Active supplements consisted of juice concentrate or powdered tart cherry, placebo consisted of color, sugar and flavor that matched juice or cornstarch powder colored to match the powder. Participants consuming juice drank two 8 oz. bottles per day, approximately 8 hours apart and not within an hour of exercise. Capsule groups consumed two capsules with breakfast. Participants completed 4 trial visits: baseline, 7 days, 14 days and 30 days of supplementation. At each visit participants gave a blood sample and had their weight and body composition assessed via BIA. Blood was assessed for inflammatory markers (uric acid, C-reactive protein and erythrocyte sedimentation rate) at each time point. **RESULTS**: There was no significant difference between treatment ($F = 1.50$, $p = 0.23$) or time for CRP ($F = 1.55$, $p = 0.21$), UA ($F = 0.23$, $p = 0.84$ and $F = 2.12$, $p = 0.10$) or ESR ($F = 0.19$, $p = 0.91$ and $F = .010$, $p = 0.96$). Body mass did not change over time ($F = 2.00$, $p = 0.14$) and was not different between groups ($F = 0.41$, $p = 0.75$). Body composition did not change over time ($F = 1.25$, $p = 0.29$), however it was significantly greater in pill placebo vs. juice placebo ($p = 0.01$). **CONCLUSION**: The results of this study indicate that tart cherry supplementation does not change inflammatory markers in a group of healthy individuals without inflammatory conditions. Additionally, tart cherry consumption did not significantly change weight or body composition.

Funding: This study was supported by funding from the Cherry Marketing Institute
Keywords: erythrocyte sedimentation rate, c-reactive protein, uric acid

Board 14

EFFECTS OF ACUTE EXERCISE ON MOTOR SKILL ACQUISITION

Molly Pile, Jon Kelley, Bradley J. Kendall. Taylor University, Upland IN.

Acute exercise has been shown to significantly improve a wide range of cognitive abilities such as attention, working memory, and executive functions. However, far less research has investigated the effects of acute exercise on cognitive-motor tasks. Moreover, research thus far has primarily focused on young adults. **PURPOSE:** To compare the effects of a single session of moderate-intensity (55-60% heartrate reserve) treadmill walking and seated rest on an upper extremity force control task in middle-aged adults. **METHODS:** Participants (N=19, mean age = 55±6.3) provided consent and then were randomly assigned to an order of testing conditions. After visit 1, all participants had a 1-week washout period before completing visit 2. Testing sessions took place at the same time each day and participants refrained from caffeine intake at least 4 hours prior to their visits. Motor skill acquisition was measured on a Biopac MP100 system with customized Acqknowledge software. Participants attempted to replicate an inverted U in real time by squeezing a dynamometer with their dominant hand. The target force curve apex was set 70% of their peak maximum voluntary contraction. Participants performed 5 blocks (50 total trials) following exercise and 5 blocks (50 trials) following rest to measure motor skill acquisition. Root mean square error (E), temporal error (TE), and peak amplitude error (PE) were calculated for each curve compared to the standardized target curve. **RESULTS:** E, TE, and PE were analyzed via paired samples t-tests. Following exercise, participants displayed a significantly lower E compared to rest on blocks 4, $t(18) = -2.065$, $p < .05$, $d = .60$ and 5, $t(18) = -2.477$, $p < .05$, $d = .57$. Additionally, after exercise participants had significantly lower PE on block 1, $t(18) = -2.428$, $p < .05$, $d = .52$. For TE, there were no significant differences between exercise and rest ($p > .05$). **CONCLUSION:** Lower total E during the skill acquisition phase appeared to be a result of the preceding exercise. Findings from this study support previous research in that an acute bout of moderate-intensity aerobic exercise does not improve overall performance but may facilitate the maintenance of motor performance during skill acquisition phase.

Keywords: Cognition, Motor Control, Force Control

Board 15

FIDELITY AND SATISFACTION WITH A HEALTHY LIFESTYLE INTERVENTION FOR FAMILIES OF CHILDREN WITH ADHD

Jared D. Ramer, Maria Enid Santiago-Rodriguez, Eduardo E. Bustamante, FACSM. University of Illinois at Chicago, Chicago IL.

Consistent evidence demonstrates that healthy lifestyle behaviors (i.e., sleep, nutrition, physical activity, and recreational screen time) are related to neurocognitive development and daily functioning of children with Attention-Deficit/Hyperactivity Disorder (ADHD). However, adopting and sustaining healthy home routines can be difficult for families. Interventions that effectively alter healthy home routines have potential to influence physical and mental health among children with ADHD. **PURPOSE**: To develop and beta-test the Building Unstoppable families through Intergenerational Lifestyle Transformation (BUILT) program; and assess fidelity, adherence, and satisfaction via attendance rates, activity monitor records, descriptive and reflective staff notes, and post-intervention semi-structured interviews. **METHODS**: BUILT was offered at the University of Illinois at Chicago campus for six consecutive Saturdays. Two families from a Comprehensive ADHD Clinic enrolled, three children with ADHD, were enrolled in the program, participated in sleep, physical activity, and nutrition activities during Family Fun Days and were provided weekly home challenges related to cooking, physical activity, sleep, and screen time to complete at home during the week. Children earned tickets for completing home challenges, and these were redeemable for prizes. Attendance was taken at each session, staff took notes during each activity, and semi-structured interviews were conducted with parents at post-intervention. Interviews were audio-recorded, transcribed, and coded using a thematic analysis approach. **RESULTS**: Participating families each attended 5 out of the 6 total sessions (83.33%). Thematic analysis of interviews showed positive aspects of the program included: improving routine structure, showing children their ability, keeping kids active, pursuing goals, relating accelerometer measures to activity, and associating nutrition with being strong and sports performance. Aspects of the program that need improvement included: more time ratio spent in fun and engaging activities in nutrition opposed to cognitive learning, technical difficulty with the technology component, location of the program, and level of difficulty of some activities for older guardians. **CONCLUSION**: Providing equipment, between session goals, and technology-based physical activity between sessions were beneficial to participant adherence. These findings will inform refinement of the intervention in a second iteration.

Keywords: ADHD, Physical Activity, Nutrition

Board 16

THERAPEUTIC POTENTIAL OF DIFFERENT PERICYTE POPULATIONS IN SKELETAL MUSCLE RECOVERY FOLLOWING DISUSE

Samuel Lapp, Yu-Fu Wu, Svyatoslav Dvoretskiy, Gabriela Garcia, Amanda Tannehill, Marni Boppart FACSM. University of Illinois at Urbana-Champaign, Urbana, IL.

Significant loss in skeletal muscle mass and function occurs following periods of extended bed rest or immobilization. Recovery through physical therapy may be incomplete in special populations due to injury and functional limitations. Our lab recently demonstrated the capacity for pericytes, or vascular stromal cells, to accelerate recovery of skeletal muscle following disuse in a mouse model. Different pericyte populations exist in skeletal muscle based on localization and unique cell surface markers, yet the most therapeutic population has not been identified. **PURPOSE:** To identify the pericyte population with the greatest therapeutic benefit when transplanted into muscle following a period of disuse. **METHODS:** Twenty-four 4-month old C57BL/6 mice were randomly divided into four groups (n=6/group). Mice hindlimbs were immobilized in full dorsiflexion via a surgical staple inserted through the center of the foot and body of the gastrocnemius for 2 weeks. At 2 weeks post immobilization, staples were removed and either pericytes ($CD146^+Lin^-$, $CD146^+NG2^-Lin^-$, $NG2^+Lin^-$) or saline (control) were injected into the tibialis anterior (TA) muscle. TA muscles were excised for analysis after 2 weeks of remobilization and the extent of recovery was assessed. One-way ANOVA was used to compare the extent of improvement between treatment groups. **RESULTS:** There was no significant improvement in TA muscle weight or myofiber CSA with pericyte transplantation in the current study ($p>0.05$). However, a trend toward significant improvement in myofiber CSA was noted for fibers ranging 2000-3000 μm^2 in mice receiving $CD146^+NG2^-Lin^-$ pericytes ($p=0.072$). Significant improvements in capillarization were detected in mice receiving $CD146^+NG2^-Lin^-$ ($p=0.012$) and $CD146^+Lin^-$ ($p=0.043$) pericytes compared to controls. **CONCLUSION:** $CD146^+Lin^-$ and $CD146^+NG2^-Lin^-$ pericyte transplantation effectively recovered capillary quantity following a period disuse

compared to controls, with a recovery trend in myofiber size also observed. $NG2^{+}Lin^{-}$ pericytes likely do not contribute to regrowth following a period of disuse.

Funding: NIH grant NIAMS R01 AR072735
Keywords: limb immobilization; disuse atrophy; cell therapy; perivascular stromal cell

Schedule – Saturday Morning: Symposia

Symposium #19: Monarch Room, 8:00-8:50am

Job Searching in Academia

Session Moderator: Amy Gyorkos, Revitalization Journey, Western Michigan University
Presenters and Institutional Affiliations:

Jacob E. Barkley, Ph.D., Professor, Kent State University (jbarkle1@kent.edu)
My name is Jacob E. Barkley, Ph.D. and I am Professor of Exercise Science at Kent State University in Kent, OH where I have worked for the past 13 years. My primary research interests focus upon factors that may influence physical activity and sedentary behavior. In my career, I have published >70 manuscripts in peer-reviewed scientific journals which have been cited over 2,600 times. Additionally, my research has received extensive national and international media attention (e.g., Chicago Tribune, NPR, TIME). I have also successfully directed or co-directed 14 doctoral dissertations and served as a doctoral dissertation committee member for a further 26 students. With many of these doctoral candidates I have helped navigate the often murky waters of academic job hunting. I am hopeful that my symposium will shed some light on this process to the audience.

Learning objectives:
1.) Provide a description of the various positions (e.g., Assistant Professor, Post-Doctoral Fellow) available to graduate students (Doctoral and Master's) in academia.
2.) Provide a description of the various types of colleges and universities in which academics work (i.e., Carnegie Classification) and what the expectations may be for new faculty at these varying institutions.
3.) Provide a description of the academic job search and application process and the materials needed (e.g., CV, research statement) to apply.
4.) Provide a description of the interview process for academic positions.

Symposium Description:
Background
Many graduate students, especially those pursuing a PhD, aspire to a career in academia. More specifically, these students are hoping to become faculty at a college or university. While graduate students spend countless hours studying in their disciplines and being trained as scientists and scholars, there is little formal education about the process of finding, applying for and obtaining an academic position. Instead this process is often discussed between the student and faculty mentor as that student nears the end of their studies. As a result, newer graduate students (i.e., those in their first two years) can remain ignorant of the process or be exposed to misinformation circulating among their fellow students (Vick, 2016; Yoder, 2017, University of California Berkley, 2015).

In recent years, I have begun to offer formal lectures on the academic job search and interview process to our first- and second-year Exercise Science graduate students at Kent State University. When I first gave these lectures I was struck by the dearth of understanding our students possessed regarding this process. Clearly, this was a gap in the education our students have been receiving. However, our students' experience is not unique. In The Academic Job Search Handbook, Vick et al (2016) describe the informality of job search training in academia and an overreliance on the student-mentor relationship. While mentors are an invaluable resource for understating the

job search process, this education often takes place towards the conclusion of the students' program of study. This renders students at the beginning of their studies uninformed (or possibly misinformed) regarding what is needed to find and procure an academic position. Clearly, this is not an ideal situation. The sooner students understand the academic job search process and their career options within academia, the better prepared they will be when they are finally ready to apply for their first position.

The purpose of this proposed symposium is to provide a brief overview of the academic job search process. This includes discussing the various types of academic positions and institutions, how to find these positions, how to apply and what the interview process is like. As part of the symposium attendees will be encouraged to ask questions and provide discussion throughout the presentation. Lastly, attendees will be given a brief description of the MWACSM Leadership Program as this program can provide additional guidance and mentorship throughout the academic job search process.

Description of the symposium

The proposed symposium will consist of four primary topics. A brief description of those four topics follows below.

1.) Academic positions available to new graduates.

There are a variety of entry-level positions in academia for new graduates. A description of a selection of the positions will be provided with an emphasis on the Assistant Professor position and what the tenure-track process consists of. Other positions which will be discussed include, post-doctoral fellowships, lecturer and other non-tenure track positions.

2.) Differences in academic institutions.

Just as there are a variety of academic positions available to newly-graduated students there are also varying classifications of institutions of higher education. The Carnegie Classification is a system for organizing universities and colleges based upon the types of degrees these institutions offer (e.g., MS, PhD) and the amount of research activity at each school (Carnegie Commission on Higher Education, 2015). Using the Carnegie system, examples of the varying types of academic institutions will be discussed. Understanding the differences of these types of institutions is important to the prospective applicant as the expectations (e.g., teaching load, scholarly productivity) of the applicant will differ across these schools.

3.) How to perform the job search and apply?

Searching for an academic position is unique from other professions. There are websites specifically designed for listing academic positions by field and geographic area. A discussion and demonstration of how to use two such websites (chronicle.com, higheredjobs.com) will be provided. The materials required to apply for an academic position will also be discussed. These materials will include the curriculum vitae, cover letter, teaching and research statements, writing samples and letters of recommendation.

4.) The interview process.

The interview process for an academic position is a lengthy one. Typically, this consists of phone interviews followed by an on-campus interview which can extend over multiple days. These various steps will be discussed as well as what questions the prospective candidate could expect to hear and those they should ask.

Attendees will be encouraged to ask questions and promote discussion throughout the presentation of these topics. Additionally, at the end of the presentation, there will be a brief description of the MWACSM Leadership Program. Potential mentees will be encouraged to consider the Leadership Program as an avenue for additional mentorship on the academic job search process.

References

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Vick, JM, JS Furlong, R Lurie (2016) The Academic Job Search Handbook, Fifth Edition. Philadelphia, PA, Penn Press.

Yoder, J (2017, April) I Found a Tenure-Track Job. Here's What it Took. Retrieved from: https://chroniclevitae.com/news/1775-i-found-a-tenure-track-job-here-s-what-it-took

Symposium #20: Monarch Room, 9:00-9:50am

Integration of CPET and 6MWT into a Cardiac Rehab Program: Application of AACVPR/ACSM Guidelines to Individual Treatment Plan Results

Session Moderator: Brad Kendall, Taylor University
Presenters and Institutional Affiliations:

Sandra K. Knecht, MS, RCEP, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio
Sandy Knecht, MS, RCEP, completed her bachelor's degree in Sports Medicine at the University of Evansville, Indiana and her master's degree from California University of Pennsylvania, Pennsylvania. She has been a Clinical Exercise Physiologist at Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio for 20 years and is involved with the testing of pediatric and adult congenital heart patients, research projects and publications, and the Cardiopulmonary Lab's educational and internship programs.

Carol Weideman, PhD, Exercise Physiology, Western Michigan University, HPHE Department, Kalamazoo, Michigan
Carol Weideman is a 20yr faculty at Western Michigan University where she teaches senior level courses in the undergraduate Exercise Science program. She is the Health and Wellness Coordinator and supervisor of the Graduate Assistants for the Human Performance and Health Education Department. She also serves as the faculty adviser of the Exercise Science Student Organization. She is the proud gigi of two grandsons.

Statement of Purpose:
A cardiac rehabilitation program has components of initial and ongoing assessments /testing, collaborative self-management education, exercise training, psychosocial support, and outcome measurements. Cardiac rehabilitation is not a "one size fits all" therapy for patients with cardiopulmonary disease (acquired or congenital), it should be tailored to the needs of each patient and thus, require active collaboration among the patient and an interdisciplinary team of professionals. We describe a case study of a young adult patient with congenital heart disease. Surgical intervention proved successful in infancy; however, heart function deteriorated throughout adolescence, ultimately requiring cardiac transplantation. A cardiac rehabilitation program was initiated soon after transplant.
Discussion will include:

1. Case study style: patient diagnosis and medical/surgical management
2. Clinical Exercise Testing and Interpretation -CPET and 6MWT
3. Flexibility/Strength: Arm-curl, hand grip, circumference, sit to stand
4. Exercise Prescription and Sessions
5. 30 Day Assessments/ Individualized Treatment Plan (ITP)
6. Final Assessments and Home Exercise Program
7. Performance Limitations

Learning objectives:

- Describe the intake process and testing for the cardiac rehab program
- Discuss "setting goals" for cardiac rehab

- Describe and identify exercise program progression and outcome measures -including exercise sessions and monthly assessments
- Discuss guidelines and adaptations to ITP
- Discuss home exercise options for adolescents/ early adulthood

Symposium #21: DuPage Amphitheater, 8:00-8:50am

Blood Flow Restriction Exercise: Acute Responses, Training Adaptations, and Considerations for Clinical Use

Session Moderator: Andrew Jagim, Mayo Clinic Health System
Presenters and Institutional Affiliations:

Symposium Chair – Steven Elmer, PhD. Department of Kinesiology and Integrative Physiology, Michigan Technological University
Introduction to Blood Flow Restriction Exercise
Dr. Elmer is an Associate Professor in the Department of Kinesiology and Integrative Physiology at Michigan Technological University. His research goals are to find better ways to restore musculoskeletal function, maintain health, and improve performance in healthy and clinical populations. Specifically, his research is focused on three key areas: 1) skeletal muscle contraction, 2) metabolic cost of locomotion, and 3) exercise interventions to improve physical conditioning and mobility. Applications for his research range from basic aspects of muscle contraction to applied human performance in a variety of settings including injury, rehabilitation, ergonomics, and sport.

Speaker 1 – Tyler Singer, MS. School of Health Sciences, Kent State University
Acute Responses to Blood Flow Restriction Exercise

Tyler Singer received his BS in Exercise Science and MS in Kinesiology from Indiana University of Pennsylvania. He is a currently pursuing his PhD in Exercise Physiology at Kent State University. In collaboration with the Cleveland VA Medical Center, Tyler has been involved in research utilizing functional electrical stimulation and blood flow restriction exercise to promote exercise in individuals with complete and incomplete spinal cord injury. His dissertation aims to promote exercise in individuals post stroke using single-leg cycling After completing his dissertation Tyler will pursue a career academia.

Speaker 2 - Benjamin Cockfield, BS. Department of Kinesiology and Integrative Physiology, Michigan Technological University
Training Adaptations to Blood Flow Restriction Exercise

Benjamin Cockfield received his BS in Exercise Science in 2018 and is currently a master's student in the Department of Kinesiology and Integrative Physiology at Michigan Technological University. His thesis aims to investigate the acute physiological responses to upper-body aerobic exercise with blood flow restriction. Ben is also working on a clinical research project to implement a home-based blood flow restriction exercise program for individuals who have undergone total knee arthroplasty. Additionally, he works as the department's science outreach liaison to increase awareness and promote health-based careers for K-12 students. After completing his thesis, Ben will begin physical therapy school at Central Michigan University. His long-term goal is to help bridge the gap between research and clinical practice.

Speaker 3 – Alicia DenHerder, MS. Department of Physical Therapy, Central Michigan University
Translation of Blood Flow Restriction Exercise into Clinical Practice

Alicia DenHerder completed her BS and MS in Exercise Science at Northern Michigan University. She is currently a 3rd year doctoral student in the Department of Physical Therapy at Central Michigan University. For her research she collaborates with students and faculty in the Department of Kinesiology and Integrative Physiology at Michigan Technological University. Alicia is working to complete a 14-week clinical rotation at Superior Physical Therapy, an outpatient orthopedic physical therapy clinic in Traverse City, MI. Her next clinical rotation will be at Mary Free Bed Rehabilitation Hospital in their spinal cord injury unit. Alicia enjoys working in all physical therapy settings and has a special interest in neurological physical therapy. Her research interests are in return to play protocols post-ACL repair, blood flow restriction in post-surgical populations, and exercise effects on Parkinson's Disease. After completing her physical therapy licensure and graduation requirements next spring, she plans to work as a traveling physical therapist.

Learning Objectives:
At the conclusion of the symposium, the audience will be able to:

1. Describe differences in physiological responses (metabolic, cardiorespiratory, perceptual) to acute exercise with and without blood flow restriction
2. Explain the benefits of performing blood flow restriction exercise training
3. Identify possible mechanisms associated with blood flow restriction training adaptations
4. Connect blood flow restriction to real-world scenarios in rehabilitation

Symposium Description:
Exercise with blood flow restriction (BFR) is emerging as an effective modality to improve muscular function in a broad range of healthy and clinical populations. The novelty of BFR is that it couples low-intensity exercise with a pressurized cuff to provide a metabolically stressful workout for muscles without overtaxing the heart, lungs, and joints. While there is considerable evidence to support the use of BFR exercise, its application is not without challenges for the researcher and practitioner. The purposes of this symposium are threefold:
1) describe acute physiological responses to BFR exercise
2) highlight the use of BFR as a training modality to improve muscular function
3) identify next steps for the translation of BFR into clinical practice
For this symposium, three graduate students focused on exercise physiology and physical therapy will present preliminary BFR work from their respective laboratories. During the presentation, student presenters will also discuss the underlying mechanisms of BFR, provide recommendations for researchers and practitioners, and raise questions that remain to be answered. Finally, this symposium will reinforce the evidence-based guidelines summarized in the recent 2019 position stand on BFR exercise prescription.
Symposium Organizer Dr. Steven Elmer is an Associate Professor in the Department of Kinesiology and Integrative Physiology at Michigan Technological University. His goals are to find better ways to restore musculoskeletal function, maintain health, and improve performance in healthy and clinical populations. Specifically, his research is focused on: 1) mechanics of muscle contraction, 2) coordination of locomotor tasks, and 3) exercise interventions to improve physical conditioning. This research has been supported by grants from the National Science Foundation, American College of Sports Medicine, and Blue Cross Blue Shield Foundation of Michigan. Applications for his research range from basic aspects of neuromuscular function to applied human performance in settings including sport, injury, and rehabilitation.

The following publications form the basis for this proposal 1. Patterson et al. Blood flow restriction exercise position stand: considerations of methodology, application, and safety. Front Physiol, Epub May 15 2019. doi: 10.3389/fphys.2019.00533.

Symposium #22: DuPage Amphitheater, 9:00-9:50am

The effect of alternative exercise modes and non-traditional exercises on the cardiovascular system.

Session Moderator: Phil Anton, Southern Illinois University
Presenters and Institutional Affiliations:

Erica M. Marshall, M.S., Kent State University
Erica M. Marshall is a Ph.D. candidate studying Exercise Physiology at Kent State University. She is a Certified Strength and Conditioning Specialist through the National Strength and Conditioning Association and an American Red Cross Instructor. Her current research interests include investigating the effects of resistance exercise modalities on the cardiovascular and autonomic systems.
Email: emarsh14@kent.edu

Jason C. Parks, M.A., Kent State University.
Jason C. Parks is a Ph.D. candidate studying Exercise Physiology at Kent State University. He is a Certified Strength and Conditioning Specialist through the National Strength and Conditioning Association. His current research interests include examining the effects of high-intensity interval exercise on vascular function and autonomic modulation.
Email: jparks20@kent.edu

Learning Objectives:
At the conclusion of the presentation, individuals will be able to:

1. Understand the use and application of alternative exercise modes and non-traditional exercises on increasing muscular strength and power.
2. Understand the methods used to assess the cardiovascular system in regard to hemodynamics as well as central arterial stiffness, autonomic modulation, and baroreflex sensitivity.
3. Understand the acute effects of alternative exercise modes and non-traditional exercises on the cardiovascular system. Specifically, their effects on hemodynamics, central arterial stiffness, autonomic modulation, and baroreflex sensitivity.
4. Consider how acute exercise using alternative exercise modes and non-traditional exercises may lead to chronic alterations in the cardiovascular system and their effect on cardiovascular risk.

Symposium Description:
The use of alternative exercise modes and non-traditional exercises have become popular among those seeking to improve strength and power, as well as overall health. Specifically, alternative modes of exercise such as machine weight exercise may be preferable for beginners in that it reduces the risk of musculoskeletal injury. Additionally, machine weight exercise increases the ability to target specific muscle groups. Other alternative modes of exercise such as blood flow restriction, have been shown to produce similar increases in strength and muscle size compared to traditional high-intensity exercise at a reduced exercise load. Further, non-traditional exercises, such as the heavy/battle rope or kettlebell exercises, have been used to perform high-intensity exercise in order to increase strength, power, and energy expenditure. These non-traditional exercises performed at a high-intensity may be both time and cost-effective. Therefore, understanding their effect on the cardiovascular system is pertinent.

However, despite the limited literature available regarding the muscular and metabolic effects of alternative exercise modes and non-traditional exercises, few studies have reported their effects on the cardiovascular system.

Currently, alternative exercise modes and non-traditional exercises have demonstrated transient alterations on cardiovascular function. It is possible that these acute alterations may have long-term consequences, as some studies have reported negative cardiovascular alterations in response to a chronic resistance exercise training stimulus, but the data are not conclusive. Therefore, the purpose of this symposium is to highlight not only the methods used to assess cardiovascular function, but also the impact of alternative exercise modes and non-traditional exercises and their potential impact on the cardiovascular system.

Schedule – Saturday Morning: Free Communication / Slides

Free Communication/Slides #9: Mallard Room, 8-9:00am

Session Moderator: J. Derek Kingsley, Kent State University

8:00-8:15am

RELATIONSHIP BETWEEN INSULIN RESISTANCE, BODY COMPOSITION, AND PHYSICAL ACTIVITY IN OLDER ADULTS

Adam D. Mandrell, Callen R. Conroy, Alexandra I. Hopun, Kevin D. Ballard FACSM, Kyle L. Timmerman FACSM. Miami University, Oxford OH

Approximately 27 million adults in the United States have type II diabetes mellitus. Diabetes is associated with significant morbidity and mortality, with an estimated medical cost of $245 billion annually. Existing medical management of diabetes can be costly, exert undesirable side effects, and may not achieve adequate disease control. Lifestyle modification is a helpful adjunct to medical management of diabetes. Therefore, it is useful to identify lifestyle factors such as physical activity (PA) that mitigate insulin resistance. Key clinical indicators of insulin resistance include fasting blood glucose (FBG), hemoglobin A1c (HbA1c) percentage, and the homeostatic model assessment of insulin resistance (HOMA-IR). **PURPOSE**: To evaluate the relationships among insulin resistance indicators, body composition, and objective and subjective measures of habitual physical activity in older adults. **METHODS:** In 82 generally healthy nondiabetic adults (≥58 years, 23 m/59 f), body composition (bioelectrical impedance), blood glucose (glucometer), serum insulin (enzyme-linked immunosorbent assay), HbA1c (HbA1c Analyzer), objective PA (7-day accelerometry), and subjective PA (Community Healthy Activities Model for Seniors (CHAMPS)) were measured. Controlling for age and body fat percentage, correlations between insulin resistance indicators and biometrics were determined (Significance was set as $\alpha < 0.05$.) **RESULTS:** Mean values were (mean±sd): age (68.5±6.3 y), BMI (26.2±6.0 kg/m^2), visceral fat (119.2±68.4 cm^2), FBG (96.9±8.3 mg/dL), HOMA-IR (2.6±0.8), HbA1c (5.3±0.2%), and Accelerometry (cts/min: 114.1±56.5; sedentary-to-moderate PA ratio: 12.8±6.1). FBG was significantly correlated with serum insulin (r = 0.26), visceral fat area (r = 0.40), cts/min (r = -0.29), and sedentary-to-moderate ratio (r = 0.24). HOMA-IR was significantly correlated with visceral fat (r = 0.41). No significant correlation was found between HbA1c and any measured variable. **CONCLUSION:** These preliminary data support previous findings that serum markers of insulin resistance are associated with physical activity and body composition. These findings suggest a potential role for using body composition and physical activity as clinical end points when managing patients with insulin resistance. Randomized controlled studies are needed to more rigorously assess physical activities impact on clinical indicators of diabetes mellitus in older adults.

Funding: NIH grant 1R15AG055923-01
Keywords: Diabetes, Blood glucose, Habitual physical activity.

8:15-8:30am

EFFECTS OF A HIGH VELOCITY RESISTANCE TRAINING PROGRAM ON CHAIR STAND PERFORMANCE AMONG OLDER ADULTS

Sally Paulson[1], Ashley Binns[2], Michelle Gray[2]. [1]Mount St. Joseph University, Cincinnati OH, University of Arkansas, Fayetteville AR.

Age-related decreases in muscular strength and power have been shown to negatively impact functional fitness and activities of daily living among older adults. The use of high velocity resistance training (HVRT) programs, designed specifically for this age group, have been shown to increase muscle power, which may translate to an increase in functional performance. **PURPOSE:** To assess chair stand performance following a 12-week HVRT program in a sample of community-dwelling older adults. **METHODS:** A total of 33 older adults volunteered to participate in the study. However, only 25 subjects completed the 12-week study. Subjects were randomly assigned to a control (CON, n = 12, M±SD: age: 68.62±8.92 yrs; mass: 74.12±17.43 kg, height: 169.82±9.95 cm) or HVRT program (HVRT, n = 13, M±SD: age: 67.50±4.38 yrs; mass: 79.91±19.46 kg, height: 169.30±21.00 cm). Chair stand performance was assessed before and after the 12 weeks using the following tests: power chair stands (PCS), 30-s chair stand (CS), and eight foot up and go (U&G). Average (Avg) and peak (Pk) velocity (Vel) and power (Pwr) were measured during the PCS. Repeated measures ANOVAs were used to examine differences between groups over time. **RESULTS:** There were no significant interactions yielded between the groups over time ($p > .05$). The number of CS (Pre = 15.28±2.84 and 12wk = 17.52±3.86), AvgVel (Pre = 0.54±0.12 m/s and 12wk = 0.58±0.13 m/s), PkVel (Pre = 0.97±0.20 m/s and 12wk = 1.04±0.19 m/s), AvePwr (Pre = 416.49±123.96 W and 12wk = 443.94±136.93 W), and PkPwr (Pre = 916.94±316.98 W and 12wk = 988.28±329.71 W) during the PCS showed a significant main effect for time, but no main effect for group. There were no significant findings for the U&G. **CONCLUSION:** The 12-week HVRT program did not yield statistically significant improvements in the selected measures of chair stand performance in this sample of older adults. While HVRT programs have been shown to improve functional fitness, there may be limited functional benefits for those classified as highly functional.

Keywords: Power Chair Stands, Training, Up and Go

8:30-8:45am

HANDGRIP STRENGTH PERFORMANCE IS NOT PROTOCOL DEPENDENT AMONG OLDER ADULTS: PRELIMINARY FINDINGS

Micheal Baumann, Maricela Garcia, Emerson Sebastião. Northern Illinois University, DeKalb IL.

Handgrip strength is used for the diagnosis of conditions such as sarcopenia and frailty. Numerous factors have been shown to influence handgrip strength values during measurement. The use of different protocols to assess handgrip strength may be an influencing factor. **PURPOSE**: The purpose of the present study was to examine potential differences in handgrip muscle strength performance in older adults using two different measuring protocols. **METHODS**: A total of 22 subjects (mean age ± SD = 81.3 ± 7.8 years; body mass = 77.0 ± 17.3 kg) volunteered to participate in this single session visit study. Handgrip muscle strength assessment was measured for both dominant and non-dominant hands using two different protocols: standing and seated. Assessments were conducted using an analogical handheld dynamometer adopting standardized procedures. **RESULTS**: No significant differences in handgrip muscle strength between protocols were observed for either dominant (standing vs. seated: 26.8 (8.9) vs. 26.6 (9.5) kgf; $t(21) = -.312$; $P = .758$) or non-dominant (standing vs. seated: 25.4 (8.7) vs. 25.3 (9.4) kgf; $t(21) = -.250$; $P = .805$) hands. **CONCLUSION**: The present findings suggest that handgrip muscle strength performance in older adults is not protocol dependent; meaning that assessing grip strength among this population using the standing or seated protocol may engender similar results.

Keywords: Assessment, Elderly, Physical test

8:45-9:00am

BODY MASS INDEX DOES NOT IMPACT PERFORMANCE IN PHYSICAL FUNCTION TESTS IN ACTIVE OLDER INDIVIDUALS

Vitor Antonio Assis Alves Siqueira[1], Dalmo Roberto Lopes Machado[1], Emerson Sebastião[1,2]. University of São Paulo, Brazil, Northern Illinois University, DeKalb IL.

PURPOSE: The purpose of the present study was to examine the impact of body mass index (BMI) on functional tests performance in active older individuals. **METHODS**: A sample of 64 old active individuals (mean age ± SD

65.0 ± 6.06 years; body mass = 71.4 ± 11.5 kg) volunteered to participate in this study that was conducted at the Laboratory of Kinanthropometry and Human Performance of the School of Physical Education and Sports of Ribeirão Preto - University of São Paulo. Participants were engaged in at least 3 months of regular exercise for at least 3 times per week by the time of the assessments. During the first visit, anthropometric measures of height, weight, and waist were obtained along with questionnaires and the assessment of peak torque muscular strength. Height and weight were further used to calculate BMI in order to allocate participants into three different categories: normal weight (≤25 kg/m^2), overweight (≥25 kg/m^2) and obese (≥30 kg/m^2). During the second visit, 7 days apart, participants underwent the field mobility tests. Physical function tests included: a) Peak torque extension (PTE) and flexion (PTF) measured by an isokinetic dynamometer following standardized protocols for familiarization and assessment; b) 30-second Sit and Stand (30SST), c) Timed Up and Go (TUG), and d) 6-minute Walk (6MW) tests. **RESULTS**: No significant differences were detected by the one-way ANOVAs in the PTE (F(2,61) = 1.11; P = 0.336) and PTF (F(2,61) = 1.22; P = 0.303), 30SST (F(2,61) =1.28; P = 0,285), TUG (F(2,61) = 0.238; P = 0.789), and 6MW (F(2,61) = 2.52; P = 0.089) among the three different BMI categories analyzed. **CONCLUSION**: The present findings suggest that BMI does not negatively impact performance in physical function tests of active older individuals. Despite the non-significant impact on physical function performance observed in this sample, it is important to note that high BMI values have been associated with a large array of adverse health outcomes in the older adult and other populations.

Keywords: Body fatness, Elderly, Fitness assessment

Free Communication/Slides #10: Mallard Room, 9-10:00am

Session Moderator: Kyle Timmerman, Miami University

9:00-9:15am

TIMING OF HEART RATE VARIABILITY MEASUREMENT: WAKING VERSUS FREE-LIVING CONDITIONS

Kathryn E. Ferris[1], Taylor K. Whitling[1], Shannon M. Maloney[1], Jacob D. Mechling[1], Kyle R. Barnes1, Daniel J. Plews[2], Ross A. Sherman. [1]Grand Valley State University, Allendale, MI, [2]Auckland University of Technology, Auckland, New Zealand.

Heart rate variability (HRV) can identify the association between exercise and parasympathetic modulation, and the reactivation can be used as an index of physiological recovery. There are recommended conditions for HRV measurement, however it is often measured at different times and/or in sub-optimal conditions with team or individual athletes. **PURPOSE:** To investigate the difference in supine HRV upon waking and after exposure to free-living conditions (FLC). **METHODS:** Nine healthy people (21 ± 2 years) volunteered for this study. Normative waking (NW) HRV was measured daily for two weeks, including a minimum of three mornings each week that followed training days. After 48 h rest, participants completed a race-pace 10-km treadmill run (within 5% of their best time). The next morning, post-10 km waking (PW) HRV was measured, and then after 3 h of FLC, a second HRV measurement was taken in the lab (271 ± 55 lx; 54 ± 10 dB). HRV was determined by measuring log-transformed square root of the mean sum of squared differences (Ln rMSSD) between R-R intervals across a 60 s period. Change between conditions was expressed as standardised difference (ES) and 95% confidence intervals. Individual's daily HRV variance was calculated from NW data using 50% coefficient of variation. **RESULTS:** The 10-km run was completed in 47:30 ± 9:17 and at a HR of 174 ± 7 b·min^{-1} (88 ± 4% age-predicted HR_{max}). The Ln rMSSD was moderately higher (ES = 0.64, -0.47 to -0.06 ms) after NW (4.18 ± 0.39 ms) compared to FLC (3.91 ± 0.42 ms). Furthermore, the observed difference was greater after PW (ES = 0.81, -0.52 to -0.16 ms). However, there was no difference between NW and PW. Five of nine FLC HRVs were outside expected daily variance. **CONCLUSIONS:** Measurement of FLC HRV is not the same as upon waking, which is indicative of altered autonomic balance. Therefore, it is recommended that HRV is taken immediately upon waking when making critical decisions about physiological state. Further research is warranted to better understand the potential impact of prior autonomic disturbance, duration of prior FLC, and number or magnitude of stimuli during FLC.

Keywords: Autonomic nervous system, athlete, recovery, physiological readiness

9:15-9:30am

SHOULDER ROM IN YOUTH BASEBALL PITCHERS: PAIN VS. NO PAIN

Gunnar L. Whealy[1], Justin Ling-LeBlanc[1], Ghulam Mujtaba[1], Xue-Cheng Liu[1], Shayne Fehr MD[1,2]. [1]Medical College of Wisconsin, Milwaukee WI, Children's Hospital of Wisconsin, Milwaukee WI.

INTRODUCTION: Baseball participation in America is at an all-time high with 6.7 million children aged 6-17-year-old playing annually, making it the most popular youth sport. Pitching injuries, however, are also increasing. Previous studies have identified multiple causes for these injuries including improper mechanics, culture of "playing through pain", and number of pitches thrown. Research is lacking regarding ways to identify players at risk. Thus, our study aims to determine (1) average internal and external rotation range of motion (ROM) in a pediatric pitching population, (2) if history of throwing injuries (non-surgical) or pain is related to increased and easily identifiable differences in joint ROM. **METHODS:** IRB approval was granted prior to the study. Informed consent and assent were obtained for each subject. 52 male pitchers 9-14 years-old were recruited from Milwaukee baseball clubs. Participants indicated current elbow or shoulder pain or arm injury or pain that has kept them out of at least one practice or game in the past year. Anthropometric data for each subject which includes height, weight, BMI was gathered. A licensed physical therapist (blinded to pain category) measured maximum passive internal and external rotation angles of the shoulder with the shoulder at 90-90 abduction/flexion. Joint mobility was assessed using the Beighton hypermobility scale. Stratified by pain and no-pain, subjects were compared via unpaired two-tailed heteroscedastic t-test. BMI-for-age percentile was calculated using the CDC growth chart calculator. Exclusion Criteria: Children who have fractured a bone in their throwing arms that required surgery, sustained ligament tears or other injuries in their throwing arms that required surgery, have current arm pain were excluded from the study. **RESULTS:** When dominant arm was compared with non-dominant arm: external rotation was greater ($p<0.01$), and internal rotation was reduced ($p<0.01$). There was no significant difference between pain and no-pain groups': maximal passive ROM, Beighton hypermobility score ($p=0.25$), BMI-for age percentile ($p=0.14$), total ROM ($p=0.05$). **CONCLUSION:** Variation exists in passive range of motion between dominant and non-dominant arms in male youth baseball pitchers. Measuring external and internal rotation has poor utility for identifying history of arm pain in male youth baseball pitchers.

Keywords: injury prevention, kinematics, biomechanics, pediatric

9:30-9:45am

MEANINGFUL KNEE MASS?

Keri L. Denay FACSM. University of Michigan Medicine, Ann Arbor MI.

HISTORY: 40 yo F runner with bilateral, right > left, knee pain. Intermittent for years. Anterior aching, constant 3-10/10 pain. Wakes at night. Worse with going down stairs, running, fast walking. Better with rest and ibuprofen. No fever, chills, erythema, warmth. The right knee swells minimally and both can feel weak. No locking, catching, giving way.
PMHx: DVT in left leg x2 (2005 from trauma and 2007 which seems unprovoked and accompanied by PE); INR 2.9 recently, depression, endometriosis, sleep apnea.
PSHx: C-section, IVC filter
Meds: acetaminophen with codeine (prn endometriosis pain), citalopram, fluticasone nasal spray, Coumadin
FHx: DVT in father
SocHx: current smoker; no alcohol or drug use; desk job; recreational runner. No recent immobilization/long travel.
PHYSICAL EXAMINATION:
BMI 38, other vitals stable. Well-appearing.
Bilateral Knee Exam:
Standing: No malalignment, bruising, erythema, or obvious swelling on initial inspection; gait normal.
Seated: Full active range of motion with knee flexion and extension without pain; + patellar j sign; + patellar crepitus; 5/5 strength without pain; Neurovascular intact
Supine: No skin changes/swelling. Negative patellar apprehension; equivocal patellar inhibition bilaterally; positive patellar grind bilaterally. Full AROM. Forced flexion full without pain. Negative bounce test. Negative McMurray. Minimal tenderness of medial joint space on the left only. No other tenderness. Large, palpable, firm mass in the right popliteal fossa that is mildly uncomfortable to palpation and measures maybe 4 cm in largest

diameter. No overlying skin changes. No ligamentous instability. No calf pain, swelling, tenderness, warmth, erythema. Negative Homan's sign.

DIFFERENTIAL DIAGNOSIS:

For mass: synovial/baker's cyst, ganglionic cyst, meniscal cyst, DVT, aneurysm, muscular deformity,

TEST AND RESULTS:

- 2-view knee x-ray: There is ill-defined soft tissue sclerosis in the posterior medial right knee which could be a bone forming soft-tissue tumor, MRI is recommended. Moderate bilateral tricompartmental knee OA.
- Knee MRI with and without contrast: Round, lobular mass measuring 3 x 3 x 3.6 cm adjacent to the distal semimembranosus myotendinous junction. Central hypointense signal consistent with ossification and a thin rim of peripheral enhancement. There is an adjacent Bake. A bone forming tumor, benign or malignant, is a possibility. Appearance is atypical for sequela of prior trauma. Recommend biopsy. Incidentally noted distal quadriceps tendinosis and small osteochondral abnormality involving the medial femoral condyle posterior articular surface.

Keywords: knee, mass, joint

9:45-10:00am

EXERCISE-BASED CARDIAC REHABILITATION IMPROVES COGNITIVE FUNCTION AMONG CVD PATIENTS

Terence A. Moriarty[1], Kelsey Bourbeau[2], Chrstine Mermier[2], Len Kravitz[2], Ann Gibson[2], Nicholas Beltz[3], Micah Zuhl[4]. [1]University of Northern Iowa, Cedar Falls IA, University of New Mexico, Albuquerque NM, University of Wisconsin - Eau Claire, Eau Claire WI, Central Michigan University, Mt Pleasant MI.

Purpose: To investigate the effects of cardiac rehabilitation (CR) exercise training on cognitive performance and if the changes are associated with alterations in prefrontal cortex (PFC) oxygenation among patients with cardiovascular disease (CVD). **Methods:** Twenty (M=15, F=5; 64.8±11.6 yrs) participants from an outpatient CR program were enrolled in the study. Each participant completed a cognitive performance test battery (the NIH Fluid Cognition test battery which measured 5 cognitive constructs) and a submaximal graded treadmill evaluation (a measure of cardiorespiratory capacity) on separate occasions at pre and again upon completion of 18 individualized CR sessions (approximately 6 weeks later). A functional near-infrared spectroscopy (fNIRS) device was used to measure left - and right- PFC (LPFC and RPFC) oxygenation parameters (O_2Hb = oxyhemoglobin, HHb = deoxyhemoglobin, tHb = total hemoglobin, Hbdiff = oxyhemoglobin difference) during the NIH Fluid Cognition evaluation. **Results:** Patients showed improvements in cardiorespiratory capacity (increased by 1.4 METs) and various cognitive constructs (processing speed, attention, executive function, and working memory scores). A significant increase in PFC oxygenation, primarily in the LPFC region, occurred at post-CR test (in four of the five cognitive tests). Correlation analyses revealed negative associations between changes in cognition (executive function (LPFC O_2Hb: r = -0.445, p = 0.049; LPFC tHb: r = -0.487, p = .030) and fluid composite score (RPFC Hbdiff: r = -0.467, p = 0.038; LPFC Hbdiff: r = -0.447, p = .048)) and PFC changes. The change in cardiorespiratory capacity was positively associated with the change in working memory score (r = 0.546, p = 0.016). **Conclusions:** CVD patients enrolled in CR showed significant improvements in multiple cognitive domains along with increased cortical activation. The negative associations between cognitive functioning and PFC oxygenation suggest an improved neural efficiency, which is identified as higher cognitive performance for a given (or reduced) amount of cortical activation.

Keywords: oxygenation, prefrontal cortex

Schedule – Saturday Morning: Poster Session

Poster Session #6: Ballrooms G-J 8:00-9:15am

Board 1

NEUROMODULATION DOES NOT ENHANCE ADAPTATIONS TO STRENGTH TRAINING IN PREVIOUSLY TRAINED INDIVIDUALS

Carlos A. Estrada[1], Masoud Moghaddam[2], Micheal J. Luera[2], Tyler W.D. Muddle[2], Cameron S. Mackey[2], Jason M. DeFreitas[2], Bert H. Jacobson[2]. [1]Aurora University, Aurora IL, [2]Oklahoma State University, Stillwater OK.

Introducing resistance training to an initially untrained population induces rapid, early strength gains from neural adaptations. After this early phase, subsequent gains are believed to be solely due to morphological adaptations within the musculotendinous unit. However, transcranial direct current stimulation (tDCS) is a method of neuromodulation that has been speculated to elicit further neural adaptations in already trained individuals. Nevertheless, the efficacy of tDCS to do so remains unsubstantiated. **PURPOSE:** To examine the effect of tDCS on performance following a short-term resistance-training protocol. **METHODS:** Forty-three males and females (Age = 20.7 ± 1.4yrs) with previous resistance-training experience participated in this investigation. Participants reported on 12 separate occasions for pre- and post-testing and lower-body resistance training. During the initial visit, participants performed submaximal lower-body strength (predicted 1RM) and power testing (countermovement jump height [CMJ], peak power [PP], and peak velocity [PV]), and familiarization of isometric strength testing procedures (maximal voluntary isometric contractions of the knee extensors). Participants reported 48-72hrs later for isometric testing to evaluate knee extensor peak torque (PT) and peak rate of torque development (pRTD), and were randomly assigned to either a control (CON), stimulation (tDCS), or sham (S-tDCS) condition. Each condition engaged in identical training procedures 2x/wk for four weeks. Individuals in the tDCS and S-tDCS condition wore a headset designed to deliver tDCS to the primary motor cortex for a duration of 21 minutes prior to engaging in each training session. Post-intervention assessment occurred within the 3-7 days following the final training session. Six separate 2x3 (Time x Condition) repeated-measures ANOVAs were conducted to assess between-condition differences in pre- to post-training measures of strength and power. **RESULTS:** No significant Time x Condition interaction effects were observed within any of the dependent variables (DV). However, a main effect of Time was observed in measures of CMJ, PP, PV, PT, and predicted 1RM strength ($p < 0.05$). When collapsed across condition, follow-up paired samples t-tests confirmed significant improvements ($p = 0.000 – 0.048$) in these DVs. **CONCLUSION:** These results suggest that tDCS did not elicit superior improvements in lower-body strength and power compared to CON and S-tDCS conditions.

Keywords: tDCS, Neural Adaptations, Power

Board 2

MOTION CAPTURE VS WEARABLE TECHNOLOGY TO MEASURE MOVEMENT VELOCITY DURING RESISTANCE EXERCISE

Edward Z. Pelka, Ryan Mullen, Antonio Williams, Carter Gadola, Daniel McLaughlin, Randal Claytor. Miami University, Oxford, OH.

Introduction: Recently, wearable technology has become commercially available to monitor and track movement velocity (MV) during resistance exercise. Velocity-based resistance training has been shown to be an effective training methodology to individualize and optimize training for performance enhancement. **Purpose:** To compare MV measured with a commercially available wearable device (WD) to the criterion standard of motion capture (MC) during the squat (SQ) and bench press (BP) resistance exercises (RE) completed at 50% and 75% of 1-repetition maximum (1-RM). Additionally, we compared MV at 4 device positions (dp); one arm and three bar positions. **Methods:** 10 experienced resistance trained males were randomly assigned to perform either the BP or SQ, first. Anthropometric measurements of segment lengths and circumferences were taken, as well as body composition using bioelectrical impedance. WDs were attached to the right side of the barbell (RB), center barbell (CB), left side of the barbell (LB) and right arm (arm). MC markers were placed on top of all WD. Subjects performed 10 repetitions at 50% 1-RM and 6 repetitions at 75% of 1-RM, with ≥5 min rest between sets for the BP

and SQ. RE was performed in a 2-dimensional free-motion apparatus. Concentric MV was measured each repetition across RE, INT, and dp. Linear Mixed Model, with least-squares means post-hoc, was performed to compare MC and WD velocities with α=0.05. Error, accuracy, and bias were also calculated comparing MC and WD. **Results:** Of 320 repetitions (2560 measurements), WD captured 98.75% and MC captured 98.5%. Least-squares means suggested velocity measures were not different (p=0.09); Mean±Standard Deviation was WD (0.61±0.19m/s) and MC (0.60±0.17m/s). Mean absolute error between WD and MC ranged from 0.03 m/s (BP75arm) to 0.11 m/s (BP50LB) and accuracy ranged from 85.8% (BP50LB) to 93.8% (BP50arm). Arm dp was the most accurate, across RE and INT. Measures of bias across RE, INT, and dp were not systematic in nature. **Conclusion:** The WD provides an accurate measurement of RE MV for the BP and SQ RE, across INT and dp compared to MC. The arm dp was the most accurate measurement of MV for RE, INT, and dp.

Funding: Miami University CRF grant and College of Education, Health & Society Research Grant
Keywords: Accelerometer, Weightlifting, Monitoring

Board 3

IS DISTANCE AN APPROPRIATE MEASURE OF CUMULATIVE BIOMECHANICAL LOAD IN FEMALE COLLEGIATE RUNNERS?

Hallie A. Barnhart, Alexandra Ciccotelli, Samantha Zishka, Abbey Frenville, Rachel Robinson, Robert Wayner, Michael Clevidence. Ohio University, Athens, OH.

Runners experience a high rate of overuse injury. Training load monitoring is a common strategy used to minimize the risk of overuse injury and optimize potential training adaptations. Selecting a method for monitoring training load is complex, with most coaches and runners favoring distance (DIST) for ease of use. **PURPOSE:** To determine if changes in DIST predict changes in Cumulative Impulse (CI), a novel measure of biomechanical training load, in Division I female runners. **METHODS:** Seventeen female runners volunteered to participate in this Ohio University IRB approved study (Project #16-X-201). Runners underwent biomechanical testing on an instrumented treadmill to determine an individualized relationship between pace (min/km) and vertical impulse (Body Weight(kg)*sec). GPS enabled watches collected second by second DIST (km) and pace (min/km) data for each run over a year, inclusive of summer, cross country, and track and field seasons. Logarithmic regression formulas relating pace to impulse were modeled for each athlete. From the impulse data, a weighted CI (Body Weight(kg)*sec) was calculated for each run and summated per week. DIST and CI were converted to percent changes from week to week, and a simple linear regression was implemented to predict weekly change in CI from DIST across the year and seasons. **RESULTS**: A linear regression established that DIST significantly predicted CI across the year ($F(1, 728) = 828.981$, $p < .001$), $R^2 = .532$. DIST accounted for 53.2% of the explained variability in CI. DIST significantly predicted CI in the seasons as well; summer ($F(1, 157) = 284.180$, $p < .001$), $R^2 = .644$, cross country ($F(1, 165) = 151.633$, $p < .001$), $R^2 = .479$, and track and field ($F(1, 283) = 217.779$, $p < .001$), $R^2 = .435$. **CONCLUSION:** Considering the consequences of injury, DIST may not adequately explain the variability in CI across seasons, although statistically significant. CI is proposed as a better training load monitor, as it is specific to the biomechanics of each athlete and models the mechanism of injury in soft tissues. Future studies will aim to validate CI as a monitoring tool for injury.

Keywords: Running, training load, biomechanics

Board 4

FIELD TEST COMPARISON TO PREDICT VO2MAX BETWEEN POSITIONS IN FEMALE COLLEGIATE FIELD HOCKEY PLAYERS

Natalie Hosmer, Emma-Leigh Lamonde, Angela Hillman, Ian Klein. Ohio University, Athens OH.

The 30-15 intermittent fitness test (FIELD) is commonly utilized to test a multitude of athletes in aerobic capacity sports. Field hockey has become a fast-paced intermittent sport that requires high aerobic capacity. Using an established predictive equation, this FIELD test is designed to predict maximal oxygen consumption (VO_2max). Typically, VO_2max is measured in an indoor laboratory setting using a motorized treadmill (LAB). Minimal research has compared the FIELD test between two distinct groups, offense and defense field hockey players. **PURPOSE:** To evaluate the physiological differences between positions using the LAB and FIELD tests in collegiate female field hockey players. **METHODS:** Twelve (N=12) female collegiate field hockey players (average

age 19.83 yrs, body fat percentage 24.71%). Following collection of anthropometric data, the participants performed the LAB conducted VO_2max test on a motorized treadmill using a metabolic cart. Next, the participants completed the FIELD test on a turf field. The FIELD test mimics a VO_2max test by having participants increase their speed by 0.5 km/hr, with 15 second breaks in between 30 second shuttle sprints. Participants stopped voluntarily, after reaching maximal effort. All results are reported as mean ± SD. Statistical significance was accepted at $\alpha = 0.05$. Paired t-tests were utilized to compare between groups. **RESULTS:** The predicted VO_2max (45.67±2.28 mL/kg/min) from the FIELD test was significantly greater than the measured VO_2max from the LAB test (41.62±3.81 mL/kg/min) (p=0.001). However, when comparing position specific groups, only the defense group (n=6) displayed a significant difference between predicted VO_2max (45.41±1.53) and measured VO_2max (39.32± 3.22) (p=0.001). **CONCLUSION:** Overall, the predicted VO_2max values using the FIELD test was not similar to the actual VO_2max values using the LAB test. However, when data was categorized based on athlete position, the predicted VO_2max values were indicative of the actual VO_2max for the offense group, but not the defense. The FIELD test could be used as a cost-effective alternative to the lab VO_2max test for field hockey offense players, while it is not as reliable for defense players.

Keywords: athletes, fitness

Board 5

EVALUATION OF LONGITUDINAL COMBINE PERFORMANCE ASSESSMENTS IN NCAA DIVISION II FOOTBALL ATHLETES

Haley L. McVannel. Saginaw Valley State University, Saginaw MI.

INTRODUCTION: Strength and conditioning programing support the development of athletes to better tolerate physical demands and/or improve performance. Combine style assessments of football athletes can provide information regarding weaknesses, strengths, and ability. Values allow the strength and conditioning professionals and athletes to assess training objectives and method of operation. **PURPOSE:** To evaluate longitudinal combine performance assessments in NCAA Division II football athletes. **METHODS:** One hundred fifty-four football athletes participated in a combine style assessments over three years using six time points (16WI,16SU,17WI,18WI,18WU,19SU). Tests included vertical jump via Vertec, broad jump via meter tape, electronically timed 40-yard dash, stopwatch or electronically timed pro-agility run, and maximal power clean, back squats, and bench press. For data analysis, positions were condensed into categories of Bigs (offensive lineman, defensive lineman) Skill (wide receivers, running backs, defensive backs) and Big Skill (quarterbacks, tight ends, linebackers). Descriptive statistics and comparative analysis, mixed methods regressions, were performed using SPSS (version 22.0) with significance set at $p \leq 0.05$. **RESULTS:** Athletes displayed significant increases in back squat ($F=4.965$, $p<0.0005$), power clean ($F=3.164$, $p=0.008$), and bench press ($F=4.329$, $p=0.001$) as they participated in subsequent assessment. Athletes displayed significant decreases related to subsequent assessment in broad jump ($F=3.889$, $p=0.002$), vertical jump ($F=3.146$, $p=0.009$), pro-agility right ($F=2.555$, $p=0.028$) and left ($F=2.797$, $p=0.017$). Squat and power clean performance improved with subsequent assessments ($F=4.931$, $p<0.0005$; $F=2.806$, $p=0.017$) and was significantly related to position category ($F=35.202$, $p<0.0005$; $F=16.532$, $p=<0.0005$). Bench press performance was significantly related to subsequent test ($F=4.827$, $p<0.0005$) and position category ($F=42.424$, $p<0.0005$). Subsequent tests were significantly related to broad jump ($F=4.415$, $p=.001$) and vertical jump ($F=3.707$, $p=0.003$) with position categories being significantly different (Bigs<Big Skill<Skill). Subsequent tests were significantly related to improvements in 40-yard dash ($F=4.369$, $p=0.001$), pro-agility left ($F=4.509$, $p=0.001$), and pro-agility right ($F=4.329$, $p=0.001$) times with significant differences between athlete categories (Skill<Big Skill<Bigs). **CONCLUSION:** Subsequent assessment had an impact on combine results. This could be the impact of training and/or learned procedures for the assessment. Further, athlete position category has an impact on the athlete values.

Keywords: Vertical, Power clean, Agility

Board 6

EFFECTS OF VENTILATORY TRAINING MASK ON SPIROMETRY VARIABLES OF FEMALE COLLEGIATE SWIMMERS

Anthony L. Schneider, Malik T. Scales, Brian Miller, Brian Peresie, Ronald Otterstetter FACSM. The University of Akron, Akron OH.

INTRODUCTION: Previous research has shown conflicting findings regarding the effects of training using a ventilatory training mask (VTM) in regards to spirometry measures. Competitive swimmers have previously demonstrated increased lung function compared to an average adult, however, little research has examined the effects of VTM training on lung function in swimmers. **PURPOSE:** Examine the effects of using a VTM during dry land training on spirometry variables in collegiate swimmers **METHODS:** Nineteen collegiate age (18-22 yrs.) female competitive swimmers were recruited for this study. Two spirometry tests were performed; prior to VTM training and following VMT training. Baseline measurements of height and weight were obtained prior to each spirometry test. Spirometry tests were performed following American Thoracic Society/European Respiratory Society Task Force recommendations. Variables compared included expiratory forced vital capacity (FVC), forced expiratory volume in 1 second (FEV1), FEV1/FVC, maximal voluntary ventilation (MVV), and frequency of breaths (Freq). VTM was utilized during 2/3 of each dry land exercise session 3 times per week for 6 weeks following the first spirometry test. Exercises included aerobic, plyometric, and body weight activities. After the training period, the swimmers underwent a second spirometry test. A two-tailed t test was used to determine if significant differences existed between FVC, FEV1, FEV1/FVC, MVV, or Freq following training with the masks. Significance was set at $p < 0.05$ for all comparisons. **RESULTS:** A significant difference were observed in Freq (Pre 92.25 ± 26.76 bpm vs Post 121.94 ± 26.35 bpm) $p \leq 0.001$. No significant differences were found between Pre and Post-VTM results for FVC (Pre 5.56 ± 0.73 L vs Post 5.44 ± 0.63 L), FEV1 (Pre 4.44 ± 4.51 L/S vs Post 4.44 ± 0.63 L/S), FEV1/FVC (Pre 79.94 ± 7.29 % vs Post 81.63 ± 5.56 %), or MVV (132.81 ± 21.06 L/min vs Post 130.06 ± 29.85 L/min). **CONCLUSION:** These findings suggest that female collegiate swimmers utilizing ventilatory restricting training methods show an increase in breathing frequency, possibly as a result of increased strength or endurance of muscles of inspiration.

Keywords: Respiratory Muscle Training, Exercise, Athlete, Pulmonary

Board 7

EXPLORING THE FUSION OF AEROBIC AND RESISTANCE EXERCISE

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Circuit training has been used as an exercise training methodology for years. However, alternating 1 set of resistance exercise (RE) with a short bout of aerobic exercise (AE) has not been studied to determine viability and effectiveness. **PURPOSE:** to examine the cardiovascular, metabolic, and perceptual responses to microcycles of aerobic and resistance exercise (AR) as compared to bouts of AE and RE only, of similar exercise routine structure and volume. **METHODS:** Five females (age = 20.0± 1.0 yrs; Ht = 166.2± 5.4 cm; Wt = 68.1± 7.6 kg; % fat = 24.0± 4.5; VO_2max 35.8± 2.2 ml/kg/min; HRmax = 198± 5.8 b/min) volunteered. Anthropometric, body composition, VO_2 max, and eight 1--RM RE tests were completed initially. On Day 3 participants completed the AR routine. AR consisted of 8 microcycles of 1 set of RE (12 reps; 65% 1-RM) followed by 3 minutes of AE (65% VO_2-R). 5 min Rest (R) and 3 min AE warm-up preceded AR. HR and metabolic measures were collected continuously with a Cosmed K5. Blood lactate (La) was measured following each bout of AE. RPE was taken after each AE and RE. On Days 4 and 5 subjects were randomized to complete microcycles of AE, only (A) or RE, only (R) - completed within the framework of AR. **RESULTS:** A 3-way (AR, A, and R) ANOVA with repeated measures suggested Time for AE and RE, across conditions was not significantly different. VO_2 (ml/kg/min) during AE for AR and A was greater than R (AR = 26.7(22.1-31.4); A = 25.0(20.0-29.9); R = 7.6(5.2-10.9).VO_2 during R was similar (AR = 15.3(10.1-20.5); A = 12.9(6.4-19.4); R = 10.3(5.1-15.5). HR (b/min) during AE for AR and A was greater than R (AR = 26.7(22.1-31.4); A = 25.0(20.0-29.9); R = 7.6(5.2-10.9). However, AR-HR was significantly greater during R compared to A-HR and R-HR (AR = 135.9(97.0-155.8); A = 139.9(104.4-175.5); R = 90.9(63.8-117.9). LA (mmol) was greater for AR 5.7(2.8-8.6) compared to A-LA 4.8(2.6-6.8) and R-LA 4.2(2.8-5.9). **CONCLUSION:** The metabolic load is moderated by alternating AE and RE compared to A and R, only.

Funding: Undergraduate Summer Scholars Program at Miami University and through a Research Initiative Grant from Miami University's Honors Program
Keywords: physical activity, training methodology

Board 8

EFFECTS OF DEHYDRATION ON BODY FAT PERCENTAGE DETERMINED BY ADP IN ATHLETES
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It has been shown that hydration level impacts body composition results determined by underwater weighing, but previous studies have been less clear in the effects that hydration has using air displacement plethysmography (ADP). PURPOSE: To determine whether body composition measurement using ADP in college athletes would be altered after short duration exercise that induced modest dehydration. It is hypothesized that there will be an apparent decrease in body fat percentage post-practice compared to pre-practice measurement due to sweat loss during the workout. METHODS: The participants were 4 male college Division 1 basketball players (age: 19.2 $\pm$1.5 y; height: 199.2 $\pm$9.1 cm). The first measurements were taken immediately before off-season conditioning practice using the BodPod(Cosmed, Chicago, IL), the players returned directly after ~1 hour of practice for the post measurements. The clothing worn by the athletes was approximately the same for both instances. Thoracic lung volume was estimated per BodPod equations. The mean $\pm$SD are presented as descriptive data and paired t tests were used for testing the hypothesis (alpha = 0.05). RESULTS: Body weight changed by 0.9% (94.4 $\pm$7.1 kg vs. 93.6 $\pm$7.3 kg; $p<0.05$). The mean body fat percentage pre-practice was 10.1 $\pm$5.0% compared to the post practice mean of 8.7 $\pm$ 4.9%. The effect of acute dehydration induced by exercise was statistically significant ($p<0.05$). CONCLUSION: Since the total body water resides primarily in the lean tissues, a reduction (dehydration) would increase the density of the fat-free mass and total body, and produce an underestimate of percent body fat. It is possible that part of the change is due to the athlete's body being heated up post-practice and affecting the volume-pressure relationship. Regardless, the implications for the findings suggest athletes should be tested before exercise and when fully hydrated for body composition measurements using air displacement plethysmography. Future studies are recommended to look for a dose response effect with exercise-induced dehydration and account for core body temperature.

Keywords: Hydration, Body Density, BodPod®

Board 9

RELIABILITY AND VALIDITY OF A WIRELESS INERTIA SENSOR DURING UNLOADED COUNTERMOVEMENT JUMPS
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Technology use in sport to measure athletes' physical status has grown immensely. Wireless inertia sensors (WIS) may be useful in measuring athletes' physical status because of the freedom of movement, transportability and relative cost. However, to our knowledge the reliability and concurrent validity of a WIS has yet to be determined during unloaded countermovement jumps (CMJ). **PURPOSE**: The study aims were to assess the reliability and concurrent validity of a WIS for determining average velocity (AV), peak velocity (PV), average power (AP), and peak power (PP) during unloaded CMJ. **METHODS**: 22 participants (age = 23 ± 2 years, height = 1.75 ± 0.08 m, weight = 77.3 ± 12.6 kg) completed two sessions on separate days. Each session participants performed 3 trials of a single CMJ (SINGLE) followed by one trial of 10 continuous CMJ (10JUMP). The WIS was secured on the center of the lumbar region during testing. During all CMJ trials, AV, PV, AP, and PP were measured simultaneously by the WIS and a force plate. The WIS inter-session reliability was assessed using intraclass correlation coefficients (ICC). Concurrent validity was tested against a force plate using the Pearson's correlation coefficient (r) and typical error estimate (TEE). **RESULTS**: High to very high inter-session reliability were found for AV (ICC_{SINGLE} = 0.92, ICC_{10JUMP} = 0.92), PV (ICC_{SINGLE} = 0.96, ICC_{10JUMP} = 0.97), AP (ICC_{SINGLE} = 0.97, ICC_{10JUMP} = 0.92), and PP (ICC_{SINGLE} = 0.89, ICC_{10JUMP} = 0.94). Strong correlations were observed between the WIS and force plate for AV (r_{SINGLE} = 0.82, r_{10JUMP} = 0.93), PV (r_{SINGLE} = 0.92, r_{10JUMP} = 0.93), AP (r_{SINGLE} = 0.87, r_{10JUMP} = 0.94), and PP (r_{SINGLE} = 0.89, r_{10JUMP} = 0.94). The TEE was calculated for AV (TEE_{SINGLE} = 0.09 m/s, TEE_{10JUMP} = 0.07 m/s), PV (TEE_{SINGLE} = 0.12 m/s, TEE_{10JUMP} = 0.12 m/s), AP (TEE_{SINGLE} = 245 W, TEE_{10JUMP} = 174 W), and PP (TEE_{SINGLE} = 456 W, TEE_{10JUMP} = 323 W). **CONCLUSION**: Based upon the present findings, the WIS is a reliable and valid method in collecting velocity and power measurements during unloaded CMJ.

Keywords: Power Velocity Force Plate

Board 10

MANAGEMENT OF SPORTS INJURIES AMONG ELITE ATHLETES IN UGANDA

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The aim of this study was to examine sports injury management practices in Uganda. Using a descriptive case study approach, this investigation focused on a sample of injured athletes from four main sports (soccer, track and field, basketball and rugby). Using our previously validated best medical practice framework participants were observed during various framework phases of; emergency, intermediate, rehabilitative, and return to sports participation during this study. Seventy- five lost-time injuries in male and female athletes who sustained different types of sports-related injuries were observed. In addition, athletes were also interviewed for post-injury management from the emergency phase until the return-to-sports participation phase. The results revealed a lack of specific pre-season screening as a measure for physical readiness to participate. Furthermore, the administered treatment for the injuries did not fully conform to the best practice principles for management of sports-related injuries. Evidenced best medical practices can mitigate the risk of injuries and improve athlete, and team performance in Ugandan sports. The findings of the study suggest barriers and lack of knowledge among personnel involved in the management of sports-related injuries in Uganda, thus warranting routine training in key injury areas such as sports related concussion.

Keywords: Sports injuries, Best medical practices, Uganda, Management

Board 11

THE EFFECT OF STROBOSCOPIC VISION TRAINING ON VISION-RESTRICTED STRAIGHT-LINE WALKING

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Stroboscopic vision training has shown to improve visual-motor control and dynamic visual acuity in sport performance; however, no studies have considered using this training to enhance kinesthetic awareness during walking, applicable to high fall-risk populations. **PURPOSE**: The purpose of this study was to assess the effect of stroboscopic vision training on vision-restricted straight-line walking. **METHODS**: Thirty-seven college-aged healthy participants (age: 20.14 ± 1.23 years; females: N = 32, males: N = 5) completed this study. In this pre-posttest quasi-experimental investigation, participants with no epileptic or balance disorder history completed a four-week progressive stroboscopic vision training protocol. PRE and POST blind-folded straight line walk tests were completed and deviations from endpoint were measured. A paired-samples *t-test* was used to analyze the calculated deviation angles. **RESULTS**: Significant difference was noted from PRE (14.48 ± 5.95) to POST (11.60 ± 6.78) deviation angles ($t(36) = 2.71$, $p = 0.01$). **CONCLUSION**: This is the first study to examine the effects of stroboscopic training on a vision restricted walking task, which demands feedback re-weighting. With generalized stroboscopic training twice per week for 30-min bouts, our results suggest individuals improve their vestibular and kinesthetic sense for straight-line walking. Therefore, this study not only supports previous research on performance benefits of this easily transportable eyewear technology, it also provides a new scope of application for this device in a clinical setting for at risk populations, where reliance on non-visual systems may be beneficial.

Keywords: sensory re-weighting, proprioception, eyewear

Board 12

YOGA AFFECTS STATIC BALANCE IN SEDENTARY ADULTS

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Exercise reduces the risk of falls in sedentary adults. Older adults increasingly participate in yoga which emphasizes balance and flexibility and could mitigate fall risk. **PURPOSE:** The purpose of this study was to analyze the effects of an eight-week yoga class on balance and flexibility in sedentary adults. **METHODS:** Sedentary, otherwise healthy adults aged 35 – 65 were recruited to participate in a free yoga class (8 weeks x 2 days/week). Flexibility and balance were tested at baseline and 8 weeks. Hip/trunk flexibility was assessed using the sit-and-reach test,

while shoulder flexibility was assessed using Apley's scratch (reach) test. Static balance was assessed using single-leg balance (eyes open and eyes closed). Dynamic balance was assessed using the functional reach test and walking speed. Flexibility and balance measurements at baseline and 8 weeks were compared using paired samples *t*-tests. **RESULTS:** Thirteen participants completed the study (1 male; age: 52.2 ± 5.2 years; age range: 44 – 61 years; height: 1.64 ± 0.12 m; mass: 88.6 ± 25.4 kg). Single-leg standing balance time with the eyes open increased (pre: 24.9 ± 18.3, post: 29.6 ± 16.3 s; $p = 0.031$) while balance time with eyes closed did not (pre: 3.3 ± 2.7, post: 5.9 ± 8.9 s; $p = 0.160$). There were no significant changes in dynamic balance (functional reach: post – pre = 2.2 ± 5.9 cm, $p = 0.2$; walking speed: post – pre = 0.03 ± 0.18 m/s, $p = 0.558$) or flexibility (sit-and-reach: post – pre = -0.03 ± 7.81 cm, $p = 0.989$; right arm up: post – pre= -1.06 ± 3.17 cm, $p = 0.249$; left arm up: post – pre = -2.66 ± 4.58 cm, $p = 0.058$). **CONCLUSIONS:** The standing single leg balance time of sedentary, middle-aged adults improved after 8 weeks of yoga. Shoulder mobility did not change significantly. However, 4 subjects saw improvements of > 3 cm, and none saw a decrease in shoulder flexibility. For individuals with low baseline flexibility, participation in yoga had a large impact. Yoga had a positive effect on both flexibility and stability in sedentary middle-aged adults.

Keywords: exercise, aging, physical function, flexibility

Board 13

EFFECTS OF VERBAL ENCOURAGEMENT AND HR DECEPTION DURING A FUNCTIONAL THRESHOLD POWER CYCLING TEST

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Heart rate (HR) deception, a form of biofeedback deception, is where subjects are misinformed that their HR is lower than actual. This is a novel way to manipulate effort perception by creating a mismatch between their perceived and actual HR. In conjunction with verbal encouragement, which has been linked to extended exercise duration and higher maximal heart rate values, this could potentially enhance performance. **Purpose:** To investigate whether or not verbal encouragement, in conjunction with HR deception, improves performance during a functional threshold power (FTP) cycling test. **Methods:** Sixteen healthy, active subjects (age 23.3±2.2 years, 5 females, BMI 24.7±2.6 kg/m^2) participated in the study. Subjects were asked to come to the lab three times, separated by a minimum of 24 hours. The first visit included a self-paced VO_2max (SPV) test on a cycle ergometer. During each of the following visits, subjects were asked to completed a 20-minute FTP test, a cycling performance metric where the goal is to cover as much distance as possible. For each visit, HR deception was used: subjects were able to view their HR, but unknown to them, it was 10 bpm lower than their actual HR. Ratings of perceived exertion and emotional status were assessed every two minutes. The only difference between these sessions was the inclusion or absence of verbal encouragement, which was also unknown to the subjects. For the session including verbal feedback, encouragement was given every 90 seconds, which included affirmation of subject's work (e.g. "you're doing a great job!"). The order of conditions was counterbalanced. Paired samples t-tests were used to compare conditions. **Results:** Mean power with feedback was 150.3±35.3W and 145.3±36.4W with no feedback (p=0.165); mean HR with feedback was 154.5±9.4 bpm and 152.1±11.5 bpm without feedback (p=0.251). **Conclusion:** There were no differences in power or HR between conditions. This suggests that subjects did not use the verbal encouragement to significantly increase power output during the test. Future research should consider screening subjects based on HR monitor use, using open-looped protocols or shorter time-trials to explore whether or not those, in conjunction with verbal encouragement, could augment performance.

Keywords: biofeedback, RPE

Board 14

INTERVAL TRAINING USING THE LACTATE RETENTION METHOD: PRELIMINARY RESULTS

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Interval training (IT) is routinely used to improve aerobic capacity and increase tolerance to lactate accumulation. However, few studies to date have focused on trapping lactate in the muscles using a squatting position during recovery periods of IT, a method called "lactate retention", or LR. **PURPOSE:** To determine if LR can produce greater improvements in lactate threshold (LT) and a faster rate of decline in blood lactate concentration ([BL]) compared to IT with active recovery (AR). **METHODS:** Three trained male subjects (age 24.7±8.1 years)

participated; each came to the lab twice per week. Visit 1 included an LT test to exhaustion. Visit 2 involved three Wingate anaerobic tests (WAnTs) with measurements for [BL] directly following each (A, B, and C). Changes in relative peak power (rPP) and relative average power (rAP) were also measured. This test sequence was used to mimic repeated sprint performance during an athletic event. Visits 3-10 involved IT performed twice per week using undulating periodization, for four weeks. The last two visits involved retesting visits 1/2 in the same order. Since only preliminary data has been collected, descriptive data is presented. rPP, rAP and [BL] are presented as the change in peak power, average power, and blood lactate (respectively) from the first to third WAnT. **RESULTS:** Subject 1 and 3 were in the LR group. Subject 1 had very little change in all values following training. Subject 3 increased his power output at LT from 199.34W to 219.36W, rAP from -0.68W/kg to -0.3W/kg, rPP from -0.85W/kg to -0.09W/kg, and [BL] between WAnT A and B from 0.6 mmol/L/min to 0.1 mmol/L/min. Subject 2 was in the AR group; he improved his power output at LT from 151.08W to 169.34W and increased his rPP from -0.41W/kg to 0.72W/kg from Wingate A to C. rAP and [BL] did not improve following training. **CONCLUSION:** Further data collection is in progress to determine the effect of the LR on the variables of interest. If the LR method elicits better results than the AR method, this would be a novel stimulus that strength & conditioning professionals can use with athletes.

Keywords: Conditioning; Recovery; Lactate Threshold