2018 Program of Events

46th Annual Meeting

Midwest Chapter of the American College of Sports Medicine

November 8-10, 2018

Amway Grand Plaza

Grand Rapids, Michigan

Contents

Past-President's Welcome Letter

Dear friends, colleagues, students:

Welcome back to Grand Rapids, MI and the Midwest Chapter of the American College of Sports Medicine Annual Meeting. We are happy to be back at the Amway Grand Plaza Hotel for the second year in a row. Grand Rapids is an exciting city with lots of great energy and food, and is well known as Beer City USA. I hope you have a chance to explore the city a bit while also enjoying the meeting.

We have two amazing keynote speakers scheduled for the 46th Annual Meeting of the Midwest Chapter of the American College of Sports Medicine. In addition to the two keynotes, we will have a session on the ACSM Certification process, a wonderful student colloquium, 17 symposia, and over 120 posters and slide presentations. Safe to say, there should be something for everyone!

Friday's keynote will be delivered by Dr. Barry Braun, Ph.D., from Colorado State University on the topic of "Is Exercise Really Medicine". This will be a wonderful talk for students, faculty, and professionals, as we all need to remember how exercise can impact so many aspects of our bodies and our health. Saturday's keynote will be delivered by ACSM's Past-President, Dr. Elizabeth Joy, MD, MPH, FACSM. This presentation will focus on the Female Athlete Triad. Dr. Joy brings her considerable experience on this topic and will be a wonderful way to wrap up our meeting for the year.

I'm so very excited for all our speakers, from our keynotes to our undergraduates presenting for the first time. One of the most exciting aspects of this meeting is how student-friendly it is and that is highlighted by how many students will be presenting their research this weekend. A meeting like this could not happen without a very large village of volunteers. I can't begin to thank all those who have helped with reviewing abstracts, and those who will be acting as room moderators and judges over the next two days. MWACSM is also extremely lucky to have an amazing Board of Directors, and I thank them for all that they do throughout the year, and all the work and running around they do at the meeting to make sure things are running smoothly. I would like to specifically thank Executive Director Jodee Schaben, President Dan Carl, and President-Elect Amy Gyorkos for all their hard work and support over the last year. Thank you for joining me in all the craziness! After nine years on the Board of Directors, I can truly say that the Midwest Chapter is full of amazing people and if you wanted to get involved, this is the chapter to join!

Enjoy the meeting,

Heather H. Betz

Heather H. Betz, Ph.D.
2018 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 10, from 10:00-10:30am in the Ambassador 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

2017 Midwest ACSM Annual Meeting, Grand Rapids, MI

Course Title

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

/HEATHER BETZ

Lead Program Administrator Signature

Exhibitors

The Midwest ACSM also thanks our 2018 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.

For 40 years we have offered discounted pricing on the leading brands of fitness testing and assessing products. We give you outstanding service from our experienced and knowledgeable staff. In our authorized Polar Service Center Division, we have 20+ years experience in heart rate monitor repair, service and sales.

New York Chiropractic College combines nationally recognized academic and scientific excellence with real-world clinical experience. Diverse degree offerings and unique clinical training opportunities ensure that graduates are fully prepared to succeed in the collaborative practice model that is the future of healthcare delivery. New York Chiropractic College offers the Doctor of Chiropractic degree and Master's degrees in Human Anatomy & Physiology Instruction, Applied Clinical Nutrition & Sports Nutrition.

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.
www.palmer.edu

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.

ParvoMedics TrueOne® 2400 system is accurate, reliable and easy-to-use for exercise VO2max and resting RMR measurement. Used by NASA, U.S. Olympic Training Centers, and NIH. https://www.parvo.com

Revitalized Journey

Revitalizing Journey is a community of health-seeking individuals looking to upgrade their energy, performance, and life through primal lifestyle and connection. This program has been designed by our

evolutionary past and supported by current research. We welcome and invite you to the tribe and to begin your Revitalizing Journey today.

UNIVERSITY of INDIANAPOLIS®

The University of Indianapolis offers graduate programming that provides high-level preparation for Sports Medicine practitioners and allied professionals. Our M.S. in Exercise Science provides instruction in human performance and clinical exercise physiology, with diverse faculty research interests and well-equipped laboratories. The M.S. in Sport Management partners with working professionals in every class and offers hybrid on-campus and online learning.

Graduate Fair

On Friday from 10:00am-12:00pm and 2:00pm-5:00pm, MWACSM will sponsor a Graduate and Internship Fair in the Center Concourse. Information from the participating institutions will be available during this time, and attendees will have opportunity to speak with representatives about their programs.

Carroll University

Central Michigan University

Eastern Michigan University

Kent State University

Liberty University

Miami University

Michigan State University

Northern Illinois University

Southern Illinois University

St. Ambrose University

University of Cincinnati

Meeting Agenda

Thursday, Nov 8

Time	Event	Location
2:00-5:00pm	MWACSM Board of Directors Meeting	Emerald Room
7:00-8:00pm	Meeting check-in/registration	Center Concourse
8:00-10:00pm	Welcome Reception – hosted by Past-President, Heather Betz, PhD	Center Concourse

Friday, Nov 9

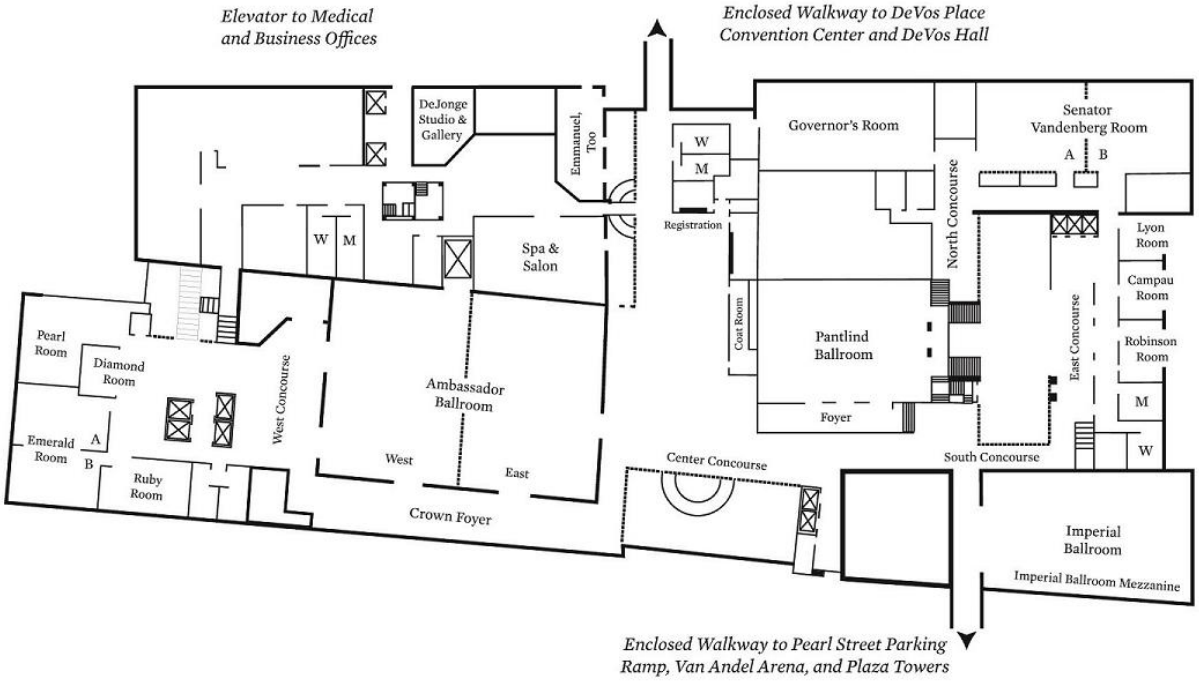
Time	Center Concourse	Gerald R. Ford Room	Pantlind Ballroom	Ambassador Ballroom	Crown Foyer	Imperial Ballroom
8:00am	7:00-9:00am Breakfast	Symposium #1	Free Comm/Slides #1		Poster Session #1 8:00-9:15am	Symposium #2
9:00am	7:00am-5:00pm Registration	Symposium #3	Free Comm/Slides #2		Poster Session #2 9:20-10:35am	Symposium #4
10:00am		Symposium #5	Free Comm/Slides #3		Poster Session #3 10:40-11:55am	Symposium #6
11:00am	10:00-5:00pm Exhibitors	Symposium #7	Free Comm/Slides #4			Symposium #8
12:00pm	Grad Fair 10:00-noon, 2:00-4:00pm	Keynote and Luncheon Dr. Barry Braun, Ph.D.				
1:00pm						
2:00pm		ACSM Certification	Free Comm/Slides #5		Poster Session #4 2:15-3:30pm	Symposium #9
3:00pm		Symposium #10	Free Comm/Slides #6		Poster Session #5 3:35-4:50pm	Symposium #11
4:00pm		Symposium #12	Student Colloquium			Symposium #13
5:00pm		Dinner on your own				
6:00pm						
7:00pm		Student Quiz Bowl 7:00-8:30pm				
8:00pm						

Saturday, Nov 10

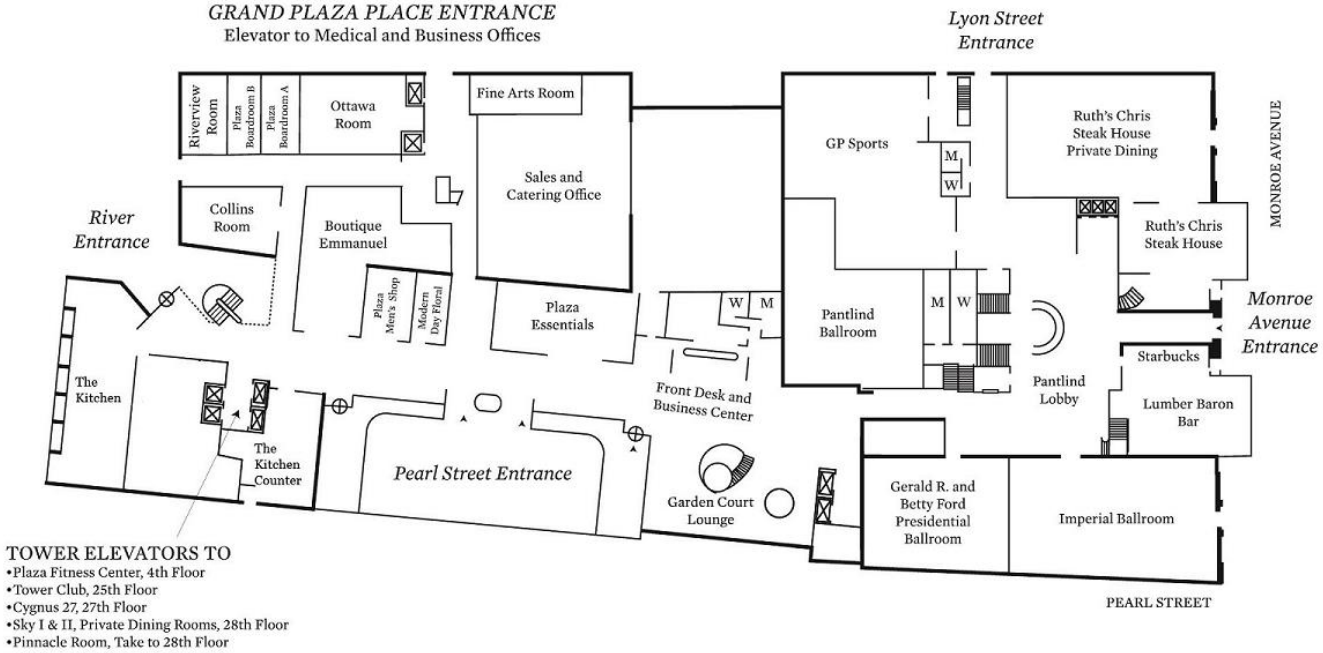
Time	Center Concourse	Gerald R. Ford Room	Pantlind Ballroom	Ambassador Ballroom	Crown Foyer	
8:00am	Registration/ Exhibitors	Symposium #14	Symposium #15		Poster Session #6 8:00-9:15am	
9:00am		Symposium #16	Symposium #17			
10:00am		Business Meeting 10:00-10:30am Keynote and Brunch – Dr. Elizabeth Joy, MD – 10:30-noon				

Conference Center Floor Plan

CONCOURSE LEVEL – 2ND FLOOR



LOBBY LEVEL – 1ST FLOOR



Keynote Speakers

Is Exercise Really Medicine?

Friday, November 9th – Noon to 2pm, Ambassador Ballroom

Barry Braun did his Ph.D. in Nutrition from the University of California, Berkeley and post-doctoral work at Stanford University Medical School. He spent 14 years as Professor and Director of the Energy Metabolism Laboratory at UMASS Amherst. Since 2014, he is Professor and Head of the Department of Health and Exercise Science at Colorado State University. Dr. Braun's research is focused on optimizing the use of exercise to prevent type-2 diabetes. He has published more than 100 peer-reviewed research articles with funding from NIH and the American Diabetes Association. He is a Fellow of ACSM and the National Academy of Kinesiology. He is most proud of his awards for undergraduate teaching including the University of Massachusetts Distinguished Teaching Award.

If exercise is to be employed as medicine, i.e. to prevent or manage or treat diseases and disorder, it should be subjected to the same scrutiny as other "medicines". Understanding the goals, mechanisms of action, dose-response relationships, interactions with food or other medications and risk for side-effects is necessary to optimize the use of exercise as a medication. In addition to more research, research should be targeted to the specific challenges and particulars of individual diseases/disorders and the characteristics of the people being treated.

The primary learning objectives are to:

- To portray the concept of "Exercise is Medicine" as a complex and intricate topic that requires careful understanding of what the phrase really means.
- To convey that in order to use exercise as medicine we need to identify the high priorities for research that advances our understanding of dose-response, minimum effective dose, exercise as prevention versus management versus treatment, etc.
- To understand the critical importance of context, particularly energy balance, dietary intake and pharmacology in modulating the effect of exercise to function as medicine.

Keynote Speakers (continued)

The Female Athlete Triad

Saturday, November 10th – 10:30am to Noon, Ambassador Ballroom

Dr. Elizabeth Joy. M.D., M.P.H. FACSM, is the Medical Director for Community Health, Nutrition Services, and the Office of Health Promotion and Wellness at Intermountain Healthcare in Salt Lake City, UT. Dr. Joy practices Family Medicine and Sports Medicine at the Salt Lake LiVe Well Center. She is an adjunct faculty member at the University of Utah School of Medicine in the Department of Family and Preventive Medicine, and in the College of Health Department of Nutrition & Integrative Physiology. Dr. Joy is the Past President of the American College of Sports Medicine (ACSM), and the Female Athlete Triad Coalition.

The Female Athlete Triad is defined as low energy availability, menstrual dysfunction and low bone mineral density. Prevention and early detection are strategies to prevent life long consequences in active females. Amongst those who are affected by the Triad, multidisciplinary team care is considered optimal. Athletes, coaches, and members of the athlete care team need to be aware and knowledgeable about the Triad to protect the health and optimize the performance of female athletes.

Learning Objectives:

- Define the pathophysiology of the female athlete triad
- Describe screening, evaluation and treatment of the female athlete triad
- Review the cumulative risk assessment for athletes at risk or affected by, the female athlete triad

Schedule – Friday Morning: Symposia

Symposium #1: Gerald R Ford Room – 8:00-8:50am

The Other Side of Blood Flow Restriction Training: Endurance Exercise Under Occlusion

Session Moderator: Kyle Timmerman

Presenters: Trent Cayot, PhD, CSCS
University of Indianapolis

Trent Cayot, PhD, CSCS currently holds a faculty position at the University of Indianapolis in the department of kinesiology's exercise science program. He has had extensive experience investigating blood flow restriction exercise methodologies including both resistance training and endurance training models. His research interests include the application of alternative strength and conditioning principles and techniques to improve human performance.

Learning objectives:
The purpose of the proposed symposium is to:

- Introduce the concept of blood flow restriction techniques used within an endurance training model (exercise protocol and training adaptations)
- Describe potential safety considerations when using blood flow restriction techniques during exercise and training
- Explain how blood flow restriction endurance training can be practically applied into a periodization program

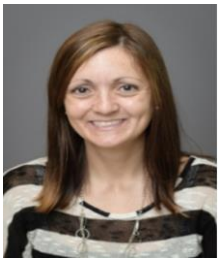
Symposium Description:
Attendees of this session will be introduced to the use of blood flow restriction techniques during endurance exercise and training programs. Methodical considerations including determination of occlusion pressure, occlusion duration, and exercise intensity with respect to blood flow restricted endurance exercise will be addressed. Additionally, potential safety considerations including peripheral blood flow changes and central cardiovascular responses when performing blood flow restriction exercise will be discussed. Lastly, the practical applications and methods of incorporating blood flow restriction endurance training into a periodization program will be discussed.

Symposium #2: Imperial Room – 8:00-8:50am

The Multi-Faceted Roles of an Exercise Professional: Current and Future Scope of our Practice and Finding Your 'Niche'

Session Moderator: Carol Weideman

Presenters: Cassandra Ledman, MS, ACSM CEP, ACSM EIM[1], Earlene Masi, MS[2]
[1]Purdue University
[2]Anderson University



Cassandra Ledman is a Clinical Assistant Professor in Health and Kinesiology at Purdue University since July 2016. Cassandra has spent over 10 years as an ACSM Clinical Exercise Physiologist. She has worked for Lutheran Hospital, Cleveland Clinic and IU Health, specializing in diagnostic stress testing, heart failure patients and cardiopulmonary rehab. Cassandra is a graduate of Purdue University and Ball State University, where she obtained her M.S. in Clinical Exercise Physiology.

An Assistant Professor of Exercise Science in the Department of Kinesiology at Anderson University since August 2018. Earlene has over 11 years of clinical experience as an Exercise Physiologist in the hospital setting, specializing in cardiopulmonary rehab and cardio diagnostic stress testing. Earlene completed her undergraduate work at St. Joseph's College of Maine and obtained her Master's Degree from Ball State University in Clinical Exercise Physiology.

Learning Objectives:

- Describe the exercise profession and the traditional associated roles.
- Analyze current and future trends in the allied health and fitness industry and how this effects the future of the exercise profession.
- Discuss how the exercise professionals scope can be more diverse than perceived.
- Identify the value of expanding one's scope of practice without neglecting the benefit of discovering one's 'niche'.

Symposium Description:

In recent years there has been exponential growth in the health and fitness industry. The continual decline in the status of our nations health and the positive impact that regular physical activity has on the primary and secondary prevention of all cause mortality and chronic conditions affirms the need for health and fitness professionals (Walburton et.al. 2013). Research and surveys show that there are inconsistent criteria and qualifications within the exercise science degree paths, certification programs, and roles in the field (Ives et.al. 2007, Elder et.al.2003). The lack of consistency, and potential overspecialization, may place the profession at a risk. Many exercise science/kinesiology programs and certification programs have narrowed the focus of the curriculum to focus on exercise physiology (Elder et.al.2003). Experts in exercise physiology is what we are, right?! Yes, but there are many more sub-disciplines that could greatly benefit an exercise professional and expand their scope of practice (Franklin et.al. 2009, Ives et.al. 2007). Currently many graduates from these programs find it difficult to find a job due to their narrow specialized skill set. These graduates often find themselves either not qualified enough or end up in positions with lower pay and inconsistent schedules alongside other fitness professionals with only online certifications, which is certainly not what they obtained a college degree and specialized certification for! So, where do we go from here? A few areas to be discussed, include: expanding our definition of an exercise professional, considering new roles that an exercise professional can employ, the need for young professionals to select an appropriate

degree program and certification for their needs, and the importance of assessing kinesiology/exercise science programs and ensuring they include comprehensive curriculum and best practices for the profession. It is vital as exercise professionals that we continue to adapt and recognize the potential areas for specialization and finding our 'niche' without narrowing the scope of our field.

Symposium #3: Gerald R Ford Room – 9:00-9:50am

Application of Evidence-based Exercise Recommendations in a Clinical Setting: Case studies from Helen DeVos Children's Hospital Healthy Weight Center

Session Moderator: Leonardo Oliveira

Presenters: Lucie Silver, MS RCEP, Adelle Cadieux, PsyD, Hanna Jaworski, MD
Helen DeVos Children's Hospital Healthy Weight Center

Lucie Silver, MS, RCEP, completed her undergraduate studies at Adrian College in exercise science, where she played volleyball. She is also a graduate of Michigan State University with a master's degree in Exercise Physiology. She has worked as a clinical exercise physiologist at the Healthy Weight Center for over six years, helping families learn more ways to be active and healthy. She also leads an exercise class for these families at the local YMCA.

Hanna Jaworski completed her BS degree in Microbiology at Michigan State University, her MD degree from Emory University School of Medicine, and her pediatrics residency at Case Western Reserve University. She is an Assistant Professor with Michigan State University College of Human Medicine. She is a general pediatrician and Section Chief o Academic General Pediatrics at Helen DeVos Children's Hospital. She is an Obesity Medicine specialist with the Helen DeVos Children's Hospital Healthy Weight Center.

Adelle Cadieux is a pediatric psychologist for the Helen DeVos Children's Hospital Healthy Weight Center and Clinical Assistant Professor for Michigan State University. She has her Master's Degree and Doctor of Psychology degree from Central Michigan University. In addition to her current role as a pediatric psychologist, she is currently the Chair of the Society of Pediatric Psychology (Division 54 of the American Psychological Association) Obesity SIG.

Learning Objectives:

- List at least three medical complexities and/or comorbid conditions of pediatric obesity.
- Cite examples of psychosocial barriers, parenting strategies, and benefits of addressing these barriers in obesity treatment and Pediatric Weight Management (PWM).
- Describe the exercise physiologist role and barriers to integrating current exercise recommendations into PWM.
- Formulate strategies to improve application of recommendations in PWM.

Symposium Description:

Pediatric Weight Management programs are becoming an essential part of outpatient treatment for childhood obesity. The role of a multidisciplinary team is central to the success of children and families in PWM. There are medical conditions as well as psychological circumstances that affect the success of implementing health behavior change such as nutrition changes, physical activity and sleep hygiene. If we can understand the barriers that families face, it is easier to help identify solutions. This symposium will allow us to approach PWM treatment from multidisciplinary angles to define best practices using case studies.

Symposium #4: Imperial Room – 9:00-9:50am

What Every Student (and Most Faculty) Need to Know about Authorship!

Session Moderator: Carol Weideman

Presenters: James M. Pivarnik, PhD, FACSM
Michigan State University

James M. Pivarnik, PhD, FACSM, is a Professor of Kinesiology and Epidemiology and Director of the Center for Physical Activity and Health at Michigan State University. As an exercise physiologist and epidemiologist, he studies the exercise responses of females, particularly during pregnancy, and children, both healthy and those with chronic diseases. In addition to his work as a faculty member, he serves as the MSU Research Integrity Officer, where he handles allegations of misconduct in research such as plagiarism, fabrication, falsification, and authorship issues.

Learning Objectives:

- Attendees will learn the rules for earning authorship on a peer-reviewed article
- Attendees will learn the facts and myths about authorship order
- Attendees will learn strategies for preventing authorship disputes that might lead to research misconduct

Symposium Description:
Every year dozens of abstracts are presented at the MWACSM annual meeting. How are authorship membership and order decided? Beyond abstracts/presentations, are authorship rules different when a paper is written? What do the journals say? My 10+ years as Research Integrity Officer (RIO) for my University indicate this is a timely and important topic. Research integrity is increasingly being questioned, and often for good reason. Authorship is the number one issue I, and other RIOs deal with on a daily basis. My experience as RIO provides a unique and well-qualified perspective to present an authorship symposium to annual meeting attendees.

<u>Symposium #5:</u> Gerald R Ford Room – 10:00-10:50am

Sports Concussion: Management from the Sidelines to Office

Session Moderator: Nate Saunders

Presenters: Leonardo Oliveira, MD, FACP

University of Chicago

Dr. Oliveira is a board certified (internal medicine & primary care sports medicine), fellowship trained sports medicine physician, Fellow of the American College of Physicians, who sees concussions related to organized athletic events in the high school and college population as well as from weekend warriors or work accidents. Dr. Oliveira has lectured at this topic at the Florida Medical Association Annual Meeting and University of Chicago's Primary Care Orthopaedic Conference as well as for physical therapy groups. Most recently, Dr. Oliveira presented at the 2017 American Medical Society Annual Meeting on the effects of omega-3 supplementation in mild traumatic brain injuries.

Learning Objectives:

- Understand basic pathophysiology of Sports Concussion and how it leads to the respective symptoms.
- Be able to assess a concussion on the sidelines of a sport event.
- Understand the in-office concussion evaluation and management
- Understand the main sign and symptoms of post-concussion syndrome and how to address them

Symposium Description:

The goal is this tutorial is to provide an overview of sports concussions and post-concussion syndrome and its pathophysiology. Subsequently explain and demonstrate how athletes can be assessed and managed in the sidelines and office for their concussion. This lectured is primarily directed for exercise & science professionals and physicians who are involved in athlete care.

Outline:

1. Sports Concussion 1.1. Pathophysiology 1.2. Epidemiology
2. Sports Concussion Evaluation at the Sidelines
   2.1. Demonstration of the Use of the Standardized Concussion Assessment Tool(SCAT)#5
      2. 2.2. Demonstration of the Use of the King-Devick Test
      3. 2.3. Demonstration on the Use of Sideline Neurological Assessment
      4. 2.4. Review of Signs and Symptoms which would warrant emergency care
      5. 2.5. Post Assessment Discussion on Management and Communication of Findings with Athletes Relatives
3. Sports Concussion Evaluation in The Office
   3.1. Demonstration of the Neurological Examination and explanation of maneuvers
      2. 3.2. Explanation and Demonstration of the Use of the Computer Based Neuropsychological Testing
      3. 3.3. Explanation of Post-Visit Discharge Instructions and Follow-up Management
         1. 3.3.1. Non-Pharmacological Management
         2. 3.3.2. Pharmacological Management
4. Post-Concussion Syndrome(PCS)
   4.1. Evaluation

2. 4.2. Non-pharmacological management
3. 4.3. Explanation of the Buffalo Concussion Treadmill Test and its use for PCS and Concussion Management

4.4. Pharmacological Management

5. Cases
   5.1. Sports Concussion
   5.2. Post-Concussion Syndrome

<u>Symposium #6:</u> Imperial Room – 10:00-10:50am

Pediatric Exercise Metabolism

Session Moderator: Tricia Pierce

Presenters: Anthony D. Mahon, PhD, Brandon Dykstra, MS
Ball State University

Anthony Mahon, PhD, is a professor of exercise science and associate dean in the College of Health at Ball State University and has been a faculty member in the Human Performance Laboratory since 1990. He teaches exercise physiology classes and conducts pediatric exercise research. Recent studies under his direction have examined heart rate variability, perceived exertion to estimate and produce submaximal exercise intensity, carbohydrate use on exercise performance, and exercise metabolism.

Brandon Dykstra, MS, is a doctoral candidate in Human Bioenergetics at the Ball State University Human Performance Laboratory. He earned a master's degree in Exercise Physiology from Ball State and a bachelor's degree in Exercise Science from Calvin College. His graduate work is in pediatric exercise physiology with a focus on pediatric exercise metabolism. He will be an assistant professor in the Department of Kinesiology at Taylor University beginning in spring, 2019.

Learning Objectives:

- To understand key differences in exercise metabolism between children and adults and changes that occur as a result of growth and maturation.
- To understand the impact of unique metabolic characteristics on exercise performance in children, particularly with respect to carbohydrate supplementation.
- To understand the various methods of assessing metabolism during exercise in children.

Symposium Description:

Exercise metabolism is a broad area of study with important implications for health and human performance. Accordingly, understanding differences in metabolism has implications for exercise prescription, sport performance and health. In addition, knowledge of exercise metabolism during childhood may provide insights into metabolic health in adulthood. The purpose of this symposium is to present a general overview of pediatric exercise metabolism and its importance for understanding health in both children and adults. Specifically, this symposium will address three areas of exercise metabolism in the growing child. The first part of the

symposium will focus on differences in metabolism between pre-pubertal children and adults. Following this, the effects of growth and maturation will be examined. Secondly, the role of metabolism on exercise and sport performance in children will be covered, with specific attention toward carbohydrate supplementation. Finally, methodologies in the assessment of the metabolic response to exercise will be presented.

Symposium #7: Gerald R Ford Room – 11:00-11:50am

Enhancing Students' Laboratory Experiences with Google Forms: An Interactive Demonstration

Session Moderator: Angela Hillman

Presenters: Nathan W. Saunders, PhD
University of Mount Union

Nate Saunders, PhD, is an exercise physiologist with a background in biomechanics who specializes in successful aging and fall prevention. His research group includes clinical career-focused undergraduate Exercise Science students, a faculty member from the University of Mount Union's Doctor of Physical Therapy Program, and several Physical Therapy students. Together they developed and presently offer the STAND Initiative (Steps Taken Against Neuromuscular Decline), a multi-decade longitudinal study of aging. Their work is disseminated regularly in form of peer-reviewed journal articles and conference presentations. Dr. Saunders is also very active in the community, offering free fitness classes for older adults and collaborating with the Department of Health to deliver an ongoing fall prevention program.

Learning Objectives:

- Create a Google Form to collect laboratory data.
- Create a QR code for students to gain access to the data entry Form.
- Complete immediate exploratory analyses.

Symposium Description:
It is often difficult to create a meaningful lab experience, especially with a large class size. As a result of insufficient lab supplies/equipment (e.g., one metabolic cart) and only one instructor, students may only see a demonstration or work in a group, rather than having the opportunity to fully participate. Additionally, data is often collected on one lab day and then analyzed at a later time. Google Forms is one of several technologies that make data collection, reporting, and analysis more efficient. To demonstrate this efficiency, we will conduct a live interactive demonstration. Get ready to be a part of some fun science using only personal knowledge and your smart phone/tablet!

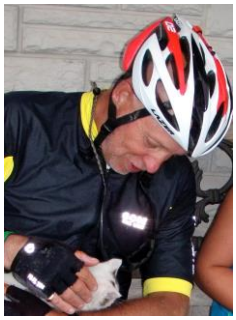
<u>Symposium #8:</u> Imperial Room – 11:00-11:50am

Oral Nitrate and Nitrite Supplementation - A Preventive Health and Athletic Performance Research Update

Session Moderator: Tricia Pierce

Presenters: Frank Wojan, MS Ed[1,2], Craig E. Broeder, PhD, FACSM, FNAASO[2]
[1]Northern Illinois University
[2]Exercising Nutritionally

I have received my Master's degree from Northern Illinois University, with aspirations of entering a doctoral program for the Fall of 2019. Upon graduation, I have been employed by NIU as a Full-Time Instructor. Additionally, I currently am the Clinical Research Coordinator for Exercising Nutritionally, LLC. Research interests: The physiological mechanisms of chronic disease and the application of interventions to aid in recovery. Special interest to cardiovascular physiology.



Dr. Broeder received his Ph.D. under 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:

- A concise and detailed current review of nitric oxide production pathways. The presenters will provide a PDF summary copy of the information presented.
- A summary review of nitrate/nitrite supplementation research in which studies either focused on preventive health or sports performance supplementation benefits. Attendees will be provided a summary bibliography they can use for enhancing their own knowledge base in this area or in future research project development.
- Finally, a summary flow chart review will be provided that highlights how past research findings in preventive health and exercise performance can be used to develop a sustainable plan for preventive health and/or sports performance nitrate/nitrite supplementation research.

Symposium Description:

This symposium's will discuss the scientific background linking how nitrate/nitrite supplementation is thought to play a role in enhancing nitric oxide production pathways as they relate to both human health and athletic performance. This symposium also will review the historical and current interventional literature regarding nitrate and nitrite supplementation across various populations and intervention settings. The research review will focus on these health related or sports performance objectives both independently and in context to each other. Finally, this review will synthesize how previous study results can help guide new and exciting research study designs in health, sports performance, or specific populations that would potentially best benefit from the use of nitrate/nitrite supplementation.

Schedule – Friday Morning: Free Communication/Slides

Free Communication/Slides #1:
Pantlind Ballroom – 8:00-9:00am

Session Moderator: Helaine Alessio

8:00-8:15am

AUTONOMIC MODULATION AFTER HIGH-INTENSITY HEAVY ROPE EXERCISE IN RESISTANCE-TRAINED INDIVIDUALS

Jason C. Parks (Kent State University), Erica M. Marshall (Kent State University), Tyler J. Singer (Kent State University), J. Derek Kingsley, FACSM (Kent State University),

Abstract: High-intensity heavy rope exercise (HI-HRE) has been utilized as a means to increase power and improve muscular strength. However, changes in autonomic modulation after performing acute HI-HRE are unknown. **PURPOSE:** To examine the effects of acute HI-HRE on autonomic modulation in resistance-trained individuals. **METHODS:** Thirteen young, healthy resistance-trained individuals (age 23±2yr; height 1.7±0.1m; body fat 14.7±5.7%; training experience 5±3yr) participated in this study. Heart rate (HR), mean arterial pressure (MAP), and measures of autonomic modulation were collected at rest, and 15 (Rec1), 30 (Rec2) and 60 minutes (Rec3) following acute HI-HRE. Heart rate variability measurements included the root mean square of successive differences between normal heartbeats (RMSSD) in the time domain, and high frequency power (lnHF) and the ratio of low frequency to high frequency power (lnLF/lnHF ratio) in the frequency domain. RMSSD and lnHF are indicative of vagal modulation while the lnLF/lnHF ratio is a measure of sympathovagal balance. The acute HI-HRE consisted of six, 15-second exercise bouts, using a double wave pattern, separated by 30-seconds of passive recovery intervals; the pace of the exercise was set at 180bpm. A one-way repeated measures analysis of variance was used to analyze the effects of HI-HRE across time (rest, Rec1, Rec2, and Rec3). Significant main effects were analyzed using paired t-tests, with a Bonferroni correction to control for alpha inflation. **RESULTS:** There were significant main effects of time ($p \leq 0.001$) for HR (rest: 62±10bpm; Rec1: 85±8bpm; Rec2: 77±11bpm; Rec3: 70±7bpm), and for the lnLF/lnHF ratio (rest: 0.84±0.12; Rec1: 1.15±0.22; Rec2: 1.10±0.16; Rec3: 1.04±0.10), such that they were augmented from rest to Rec1, Rec2 and Rec3. There were significant main effects of time ($p \leq 0.001$) for RMSSD (rest: 4.25±0.70ms; Rec1: 2.75±0.49ms; Rec2: 3.10±0.43ms; Rec3: 3.55±0.42ms), and lnHF (rest: 7.47±1.16ms2; Rec1: 4.90±1.05ms2; Rec2: 5.45±0.74ms2; Rec3: 6.22±0.79ms2), such that they significantly decreased from rest to Rec1, Rec2, and Rec3. There was no main effect of time for MAP. **CONCLUSION:** These data demonstrate that acute high-intensity heavy rope exercise results in significant reductions in vagal modulation that are maintained for up to 60 minutes, similar to that of an acute bout of resistance exercise.

Keywords: Heart rate variability, Vagal modulation, Interval training, battle rope

8:15-8:30am

DETECTING CHANGES IN FATIGUING EXERCISE EMG USING MULTIFRACTAL

DETRENDED FLUCTUATION ANALYSIS

Eric W. Slattery (Miami University) & Randal P. Claytor (Miami University)

Abstract: Multi-fractal Detrended Fluctuation Analysis (MFDFA) measures the scale invariant structure of a myo-electrical signal, describing how it fluctuates over multiple time scales. **PURPOSE:** To investigate surface electromyography (sEMG) changes in Isometric Contraction Pre-exercise (PreISO) to Post-exercise (PostISO), and during the 1st set of resistance exercise to failure. **METHODS:** 20 male subjects volunteered. Subjects presented two days for assessment: Day1 - body composition and 1-RM on dominant 1-leg Leg Extension (LE); ≥48hours later, Day2 - exercise protocol. sEMG was measured on the Vastus Lateralis (VL), Rectus Femoris (RF), and Vastus Medialis (VM). Subjects completed a 5sec PreISO, rested for ≥6mins, started 90% 1-RM LE completing as many reps and sets as possible, until failure, with 15sec rest between sets. After the failure set, subjects completed a 5sec PostISO within ≤10sec. Set one sEMG were partitioned into six equal zones, comparing Zone1, non-fatigue, to Zone6, fatigue. MFDFA was applied to raw sEMG signals. MFDFA features extracted were Singularity Spectrum Width (SSW), indicating the complexity of fluctuations, and Peak Exponent (PE), indicating sEMG spike correlation. Analysis of Variance (ANOVA) compared PreISO-to-PostISO, and Zone1-to-Zone6 MFDFA results between each muscles at α=0.05. **RESULTS:** Age=20.4±0.96, BMI=24.9±3.2, BodyFat(%)=14.0±6.4, and total # of reps (7.35±3.72). ANOVAs comparing SSW PreISO-to-PostISO and Zone1-to-Zone6 were insignificant, indicating the complexity of fluctuations are similar in both comparisons. SSW Mean±SD for PreISO: VL=1.10±0.18, RF=1.10±0.23, VM=1.12±0.22; PostISO: VL=1.17±0.23, RF=1.08±0.21, VM=1.18±0.23; Zone1: VL=1.31±0.29, RF=1.31±0.28, VM=1.26±0.27; & Zone6: VL=1.40±0.34, RF=1.47±0.14, VM=1.44±0.14. ANOVAs comparing PE PreISO-to-PostISO were significant for VL (p=0.008) and RF (p=0.03), but not VM (p=0.17); and Zone1-to-Zone6 were significant for VL (p=0.01), RF (p=0.000), and VM (p=0.003). PE Mean±SD for PreISO: VL=0.38±0.06, RF=0.38±0.06, VM=0.41±0.06; PostISO: VL=0.44±0.06, RF=0.43±0.10, VM=0.44±0.06; Zone1: VL=0.58±0.17, RF=0.56±36, VM=0.58±0.41; Zone6: VL=0.72±0.18, RF=0.78±0.22, VM=0.75±0.19. These results indicate higher correlation of the sEMG spikes as muscle fatigues. **CONCLUSION:** While SSWs were similar, PE and spectrum shifted higher in resistance (VL, RF, VM) and isometric (VL, RF) exercise, indicating α-motor units firing in a more complex pattern as a result of the physiological process of acute muscle fatigue. This more complex firing pattern is advantageous in the fatiguing muscles' attempt to maintain force.

Keywords: Resistance Exercise, Isometric Exercise, Muscle Fatigue

8:30-8:45am

INFLUENCE OF PERSONAL HEALTH ON COUNSELING ATTITUDES AND PERCEIVED BARRIERS IN MEDICAL STUDENTS

Jonathon Whipps (Ohio University), Sophia C Mort (Ohio University), Elizabeth A Beverly (Ohio University), Emily Hill Guseman (Ohio University)

Abstract: Previous research has shown physicians with positive health and lifestyle behaviors have more positive attitudes toward effective counseling, but little is known about personal health behaviors of medical students. **PURPOSE:** To determine whether the personal health status and habits of osteopathic medical students influence their attitudes towards counseling pediatric patients regarding lifestyle behaviors. **METHODS:** A cross-sectional survey was distributed electronically to first through fourth-year osteopathic medical students. The survey assessed students' top anticipated barriers to providing pediatric weight counseling, their personal lifestyle habits, and knowledge regarding pediatric obesity screening. **RESULTS:** A total of 200 finished the entire survey. Only 40.5% of participants (n=81) met physical activity

(PA) recommendations. Those meeting recommendations had significantly more positive PA counseling attitudes than those not meeting recommendations (H=-35.06, p=0.001) or those only meeting resistance training recommendations (H=40.63, p=0.021). Students with obesity had significantly lower weight management counseling scores than overweight students (H=40.77, p=0.028). Only 15.5% of participants (n=31) consumed a healthy amount of both vegetables and fruit. Those meeting fruit and vegetable intake recommendations had significantly higher dietary mean item counseling score than those who did not (H=-30.40, p=0.048). Students identified the barriers "Time" (68.5%, n=137) and "Difficult for patients to change behavior" (49.5%, n=99) most frequently. Clinical phase students identified "Poor or lacking reimbursement" (28.0%, n=21) more frequently than preclinical students (9.6%, n=12). **CONCLUSION:** Students who exhibited healthier lifestyle habits were more likely to view pediatric obesity management counseling positively.

Keywords: lifestyle behaviors; medical students; healthy lifestyle; primary care

8:45-9:00am

PERFORMANCE OF YMCA BENCH PRESS TEST IS NOT AFFECTED BY SYNCHRONOUS MUSIC

Samantha R. Lang (St. Ambrose University), Alyssa Tompkins, Abigail Hammer (St. Ambrose University), Sandra Tecklenburg-Lund (St. Ambrose University), Rhiannon Seneli (St. Ambrose University)

Abstract: Listening to music during exercise has many beneficial ergogenic effects, including the ability to enhance focus, elevate mood, increase motivation, improve performance, and decrease perceived effort. Previous research, however, has identified that types of music, exercise intensity, and mode of exercise can influence the ergogenic effect of music on performance. It is therefore unclear how synchronous music affects maximal exercise testing when a cadence is required. **PURPOSE**: The purpose of this study was to investigate the effect of synchronous music on a fatiguing resistance exercise test. **METHODS**: Nine subjects (3 males, 6 females, age 23.3 ± 4.9) performed a YMCA bench press tests at a cadence of 60 repetitions per minute under two conditions: (1) using a metronome (60 bpm) and (2) with pre-determined synchronized music (120 bpm, two beats for each repetition). Subjects performed each repetition while matching the cadence of the metronome or synchronous music. The number of repetitions completed was recorded following each test. A dependent t-test was performed using SPSS to compare completed repetitions with and without music. The alpha level of significance was set at 0.05. **RESULTS**: There was no significant difference in the number of repetitions completed during the metronome condition (32.9 ± 13.5 repetitions) and the music condition (33.6 ± 14.6 repetitions, p=.774). **DISCUSSION**: In a test where focus to hit a specific beat is important, the distractional component of music, which is thought to improve performance, did not prove to be beneficial during the YMCA bench press test for muscular strength.

Keywords: exercise, resistance training, ergogenic aids, benefits

Free Communication/Slides #2:
Pantlind Ballroom – 9:00-10:00am

Session Moderator: Adam Coughlin

9:00-9:15am

RELATIONSHIPS BETWEEN DIETARY QUALITY DURING PREGNANCY AND GESTATIONAL WEIGHT GAIN

Lauren M. Meldrum (Saginaw Valley State University), Reagan Moffit (Saginaw Valley State University), Rebecca Schlaff (Saginaw Valley State University), Samantha Deere (Saginaw Valley State University), Meghan Baruth (Saginaw Valley State University)

Abstract: Gestational weight gain (GWG), outside of recommended amounts, is associated with a number of adverse birth outcomes and pregnancy complications. Improving prenatal diet quality may promote appropriate GWG. **PURPOSE**: To examine relationships between dietary quality in the second and third trimesters of pregnancy and GWG. **METHODS**: Participants were recruited as part of a pilot behavioral intervention. Demographic variables and pre-pregnancy weight were self-reported at a baseline session. Participants were given a scale at baseline and self-reported weight throughout pregnancy. Body Mass Index (BMI) was calculated from pre-pregnancy weight and objectively measured height. To determine GWG, the difference between participant's last self-reported weight (prior to delivery) and pre-pregnancy weight was calculated. Participants' (n=41) dietary intake was assessed at 14-20 and 35 weeks gestation via the Automated Self-Administered 24-hour recall (ASA-24). Kilocalories and Healthy Eating Index (HEI-2015) scores (total and component) were calculated. Differences in mean values of diet variables at 14-20 and 35 weeks were compared using paired t-tests. Associations between diet variables and GWG were explored via linear regression, controlling for pre-pregnancy BMI. **RESULTS:** On average participants were 28.5±4.3 years of age, 18.0±2.4 weeks gestation at baseline, and had 1.1±1.0 live births prior to the study. A majority of the sample was white (80.5%), married (87.8%), and college graduates (58.5%). On average, women gained 32.7±13.6 pounds during pregnancy; 54.1% exceeded gestational weight gain recommendations. Kilocalories averaged 2,139±719 and 2,085±704 at 14-20 and 35 weeks, respectively. HEI-2015 total scores at 14-20 (55.6±12.6) and 35 weeks gestation (56.6±14.1) indicated a need for diet improvement. No significant differences were identified between 14-20 and 35 weeks gestation. A significant negative relationship was identified between the Greens and Beans component score at 35 weeks and GWG (p=0.04). **CONCLUSION:** Dietary behaviors did not differ from second to third trimester. GWG was not associated with most diet quality indices; though, vegetable intake may help to attenuate GWG. The overall diet quality of participants showed a need for improvement. Future research should (1) focus on improving the dietary quality of pregnant women and (2) continue to examine relationships between GWG and dietary quality/intake.

Funding: This project was supported by the Allen Foundation, the Ted & Ruth Braun Fellowship Program, and SVSU faculty-led research grants

Keywords: Nutrition, Trimester, BMI

9:15-9:30am

POSTPARTUM BODY SATISFACTION AND DEPRESSIVE SYMPTOMS: IS PHYSICAL ACTIVITY A MODERATING VARIABLE?

Faith C. LaFramboise (Saginaw Valley State University), Meghan Baruth (Saginaw Valley State University), Samantha J. Deere (Saginaw Valley State University)

Abstract: Postpartum depressive symptoms are common among U.S. women. Evidence suggests that postpartum body image satisfaction (BIS) is associated with depressive symptoms. The effect of physical activity (PA) on this relationship is less studied. **PURPOSE:** To examine the relationship between postpartum BIS and depressive symptoms, and to examine whether PA moderates this relationship. **METHODS:** Non-pregnant women who were ≤12 months postpartum and ≥18 years of age completed an online survey. Participants (n=256) self-reported 1) demographics, 2) pre-pregnancy height and weight, 3) current BIS, via Body Attitudes Questionnaire (BAQ) (six subscales: attractiveness, feeling fat, disparagement, strength and fitness, salience of weight/shape, and lower body fat), 4) depressive symptoms, via 10-item Center for Epidemiologic Depression Scale (CES-D), and 5) moderate and vigorous PA (MVPA) levels. Relationships between each BAQ subscale and depressive symptoms were first examined using linear regression, controlling for months postpartum. MVPA and the BAQ x MVPA interaction were added to the model to examine the moderating effects of MVPA on the BIS-depressive symptoms relationship. An alpha level of $p<0.05$ was used to determine statistical significance. **RESULTS:** On average, participants were 30.3(3.9) years of age and 5.6(3.8) months postpartum. A majority of the sample were Caucasian (96.1%), married (89.9%), and college graduates (75.2%). All BAQ subscales were significantly related to postpartum depressive symptoms (attractiveness: $p=0.0007$, disparagement: $p<0.0001$, feeling fat: $p<0.0001$, salience: $p<0.0001$, lower body fatness: $p=0.005$, and strength and fitness: $p=0.003$). MVPA did not moderate the relationship between BIS and postpartum depressive symptoms (BAQ subscale x MVPA interactions: attractiveness: $p=0.7998$, disparagement: $p=0.8842$, feeling fat: $p=0.4515$, salience: $p=0.1311$, lower body fatness: $p=0.9376$, and strength and fitness: $p=0.7429$). **CONCLUSION:** Given the relatively high prevalence of postpartum depression among U.S. women, understanding factors that predict symptoms is important. Postpartum BIS may be a significant factor that predicts maternal postpartum depressive symptoms; however, our findings indicate that MVPA may not moderate this relationship. Future intervention research should include strategies that promote positive body image during the postpartum period. Although not a moderator, efforts aimed at promoting PA should continue, as it has numerous other benefits to pregnant and postpartum women.

Funding: This project was supported by the Ted & Ruth Braun Fellowship Program and faculty-led research grants.

Keywords: Depression, Exercise, Body Image, Childbirth

9:30-9:45am

IMPACT OF WEIGHT RELATED VARIABLES ON POSTPARTUM DEPRESSIVE SYMPTOMS

Cierra Hessbrook (Saginaw Valley State University), Meghan Baruth (Saginaw Valley State University), Rebecca A. Schlaff (Saginaw Valley State University), Samantha J. Deere (Saginaw Valley State University), Faith Laframboise (Saginaw Valley State University)

Abstract: Postpartum mental health issues during the postpartum period are common, yet predictors are less understood. Pre-pregnancy weight and weight change during pregnancy through the postpartum period may be associated with postpartum mental health issues. **PURPOSE:** To investigate the associations between postpartum depressive symptoms and pre-pregnancy body mass index (BMI), weight gain during pregnancy, and postpartum weight retention (PPWR). **METHODS:** Women (n=323) who had given birth within the past 12 months completed an online survey assessing demographics, self-reported pre-pregnancy weight and height

(to calculate pre-pregnancy BMI), weight gain during pregnancy, weight loss at 6 months postpartum (to calculate weight retention at 6 months), and current weight (to calculate PPWR). The 10-item Centers for Epidemiological Studies Depression Scale (CES-D 10) measured postpartum depressive symptoms. Regression models examined the relationship between postpartum depressive symptoms and (1) pre-pregnancy BMI, (2) weight gain during pregnancy (controlling for pre-pregnancy BMI), (3) weight loss at 6 months postpartum (controlling for weight gain), and (4) PPWR (controlling for months postpartum). An alpha level of 0.05 was used to determine statistical significance. **RESULTS:** On average, women were 30.1±3.9 years of age and 5.5±3.7 months postpartum. The mean pre-pregnancy BMI was 27.5±6.8 kg/m^2, and weight gain was 29.8±14.1 pounds. A majority were Caucasian (97%), married (88%), and college graduates (77%). Results showed a significant, positive relationship between pre-pregnancy BMI and postpartum depressive symptoms (p=0.04), a significant positive relationship between PPWR and postpartum depressive symptoms (p=0.04), and a significant negative relationship between weight loss at 6 months postpartum and postpartum depressive symptoms (p=0.01). There was no significant relationship between pregnancy weight gain and postpartum depressive symptoms (p=0.93). **CONCLUSION:** Women with a higher pre-pregnancy BMI, lower weight lost at 6 months postpartum, and higher PPWR may be at a greater risk for postpartum depressive symptoms; pregnancy weight gain was not associated with postpartum depressive symptoms. Understanding factors associated with postpartum depressive symptoms can help develop and implement appropriate screenings/follow-ups and interventions among those at greatest risk. These findings add to the growing body of literature showing the negative mental health effects of excessive weight among women.

Funding: This project was supported by the Ted & Ruth Braun Fellowship Program and faculty-led research grants.

Keywords: Depression, Pregnancy, Weight-Gain, Women

9:45-10:00am

A NUTRITION EDUCATION INTERVENTION WITH DIVISION I WOMEN'S BASKETBALL PLAYERS

Emily N. Werner (Michigan State University), Alyssa Guadagni (Michigan State University)

Abstract: Many athletes do not have sufficient nutrition knowledge to aid them in their sport performance. Few studies have been conducted to investigate the efficacy of a nutrition education intervention on athletes' nutrition knowledge, and even fewer have done so using a validated tool.
PURPOSE: To evaluate changes in nutrition knowledge of NCAA Division I women's basketball players after a sport-focused nutrition education intervention using a validated nutrition knowledge survey. **METHODS:** NCAA Division I women basketball players completed a validated nutrition knowledge survey (Calella et al., 2017) that contained both general and sport nutrition sections. The athletes then participated in six, once weekly, 20-minute nutrition education sessions led by a Registered Dietitian that included the following topics: hydration, carbohydrates, protein, fats, meal planning, and micronutrients/supplements. At the end of the six weeks, the same survey was re-administered. Scores were summed as +1 for a correct answer and +0 for no answer, an incorrect answer, a double-answer, or the the "I don't know" option. The maximum possible score was 97. Knowledge was categorized as low (< 33rd percentile), medium (33rd to 66th percentile), and high (> 66th percentile). Frequencies per category were tallied and a paired-samples t-test was conducted to evaluate baseline versus follow-up scores. **RESULTS:** Eight athletes completed baseline and follow-up surveys. At baseline for the entire survey, frequencies of each category were 4, 2, and 2 athletes in low, medium, and high knowledge, respectively. At follow-up, frequencies shifted to 0, 2 and 6 athletes in the low, medium and high categories, respectively. This trend was similar when analyzing general and sport nutrition sections separately.

Significant score increases were found for the entire survey overall (p=0.004), within the general nutrition section (p=0.015), and within the sport nutrition section (p<0.001). **CONCLUSION:** This education intervention used in this pilot study succeeded in increasing the nutrition knowledge of Division I women's basketball players. Future research should include intake assessments that determine whether eating habits change after the nutrition education.

Funding: This research was funded by the Michigan State University College of Education via a Summer Research Fellowship.

Keywords: Nutrition knowledge, athletic performance

Free Communication/Slides #3:
Pantlind Ballroom – 10:00-11:00am

Session Moderator: Katie Clark

10:00-10:15am

MAGNITUDE OF GRIP STRENGTH DIFFERENCE BETWEEN OLDER ADULTS WITH AND WITHOUT WALKING DIFFICULTIES

Joshua Pak (Northern Illinois University), Karissa Fuerniss (Northern Illinois University), Ryan Ziebart (Northern Illinois University), Emerson Sebastião (Northern Illinois University)

Abstract: PURPOSE: The purpose of the present study was to examine the magnitude in peak muscular grip strength (PMGS) difference between older adults as a function of walking ability (i.e., non-assistive device vs. assistive device). **METHODS**: A total of 100 older adults (70% female; mean age (SD) = 84.6 (6.3); body mass index = 27.9 (5.9)) living in a retirement community in the Midwest part of the country volunteered to participate in the study. PMGS was assessed using a hand dynamometer adopting standardized procedures with values expressed as kilogram-force (kgf). Participants were given two trials with each hand (dominant and non-dominant) and the highest value registered for each hand was used to express PMGS. Enough resting period was given to each participant between trials. Walking ability was assessed based on the need for assistive device to walk and categorized as: no-assistive device, unilateral (cane) and bilateral (walker). Because of the small number of cane users (n = 7) we decided to combine cane and walker users into the same group. Participants were then allocated into one of the two groups: no-assistive device (n = 73) and assistive device (n = 27). **RESULTS**: Our findings indicated that PMGS for both dominant [22.8 (7.1) vs. 19.1 (5.9) kgf; p = .017; d = 0.56] and non-dominant [21.1 (7.5) vs. 17.4 (6.1) kgf; p = .024; d = 0.54] hand was significantly higher for those that do not use assistive device to walk. The difference in PMGS between groups for both hands was found to be moderate in magnitude based on the effect size (i.e., Cohen's d) observed. **CONCLUSION**: The present findings indicated that older adults with lower walking ability (i.e., using assistive device) had significant lower PMGS compared to their counterparts that do not need assistive device to walk independently of the hand assessed. PMGS for dominant and non-dominant hand was reduced by approximately 16% and 17.5%, respectively in those using assistive device compared to those not using any assistive aid. This findings corroborate the idea that handgrip muscle strength is a valuable predictor of general function in the older adult population.

Funding: Dean's Research Grant, 2017-2018. College of Education. Northern Illinois University.

Keywords: Elderly; Muscular strength; Walking ability

10:15-10:30am

AEROBIC FITNESS IS ASSOCIATED WITH COGNITION IN OLDER ADULTS LIVING IN A RETIREMENT COMMUNITY

Ryan Ziebart (Northern Illinois University), Joshua Pak (Northern Illinois University), Karissa Fuerniss (Northern Illinois University), Emerson Sebastião (Northern Illinois University),

Abstract: **PURPOSE**: The purpose of the present study was to examine the association between aerobic fitness and measures of cognition (i.e., processing speed, verbal learning and visuospatial memory) in older adults living in a retirement community. **METHODS**: A total of 100 older adults [70% female; mean age (SD) = 84.6 (6.3); body mass index = 27.9 (5.9)] living in a retirement community in the Midwest region of the country volunteered to participate in the study. Aerobic fitness was assessed using the stationary 2-minute step test, which is part of the Senior Fitness Test. For this test, participants were asked to raise each knee to a point midway between the patella and iliac crest top (a mark was made on the wall for reference). The representative fitness score was the number of times the right knee reaches the required height. Cognition was assessed using three different tests: the Symbol Digit Modalities Test (SDMT - oral version) was used as a measure of cognitive processing speed; the California Verbal Learning Test (CVLT) was used to measure verbal learning and; the Brief Visuospatial Memory Test (BVMT) was used to measure visuospatial memory. Cognitive tests were conducted by a trained research staff in a quiet room. Tests were not randomized and participants first undertook the cognitive tests followed by the aerobic fitness test. **RESULTS**: Pearson *r* correlation indicated a small-to-moderate positive significant correlation between aerobic fitness and SDMT (r = .35 (.16, .51); p = .001), BVMT (r = .30 (.10, .47); p = .003) and CVLT (r = .28 (.08, .46); p = .007). **CONCLUSION**: The findings suggest that higher aerobic fitness capacity is associated with better cognitive function (i.e., processing speed, verbal learning and visuospatial memory) in older adults living in a retirement community.

Funding: Dean's Research Grant, 2017-2018. College of Education. Northern Illinois University

Keywords: Elderly; Memory; Physical Fitness; Processing Speed

10:30-10:45am

FEASIBILITY & VALIDITY OF A 3 MIN ALL-OUT TEST MEASURING CRITICAL VELOCITY IN PERSONS WITH STROKE

Cassandra E. Neary (University of Cincinnati), Jenna Calvelage (University of Cincinnati), Gabby Bobadilla (University of Cincinnati), Taylor Swint (University of Cincinnati), Pierce Boyne (University of Cincinnati), Daniel Carl (University of Cincinnati)

Abstract: **Purpose:** Critical velocity (CV) is an individual's fastest gait speed that is sustainable through aerobic metabolism. This measure could be useful in stroke rehabilitation for assessing the degree to which walking capacity is limited by aerobic deconditioning and for prescribing the intensity of locomotor exercise. Based on previous lower body cycling research among healthy adults, we developed a novel treadmill CV-test

involving 3-minutes of all-out effort. This study aimed to: 1) assess the validity of the treadmill CV-test among healthy adults; and 2) evaluate CV-test feasibility post-stroke. **Number of subjects:** Fifteen healthy adults (age, 22.7+/-1.2 years; BMI, 25.3+/-4.4 kg/m^2) and ten adults with stroke (age, 59.8+/-6.8 years; 2.4+/-1.7 years post-stroke; comfortable gait speed, 0.4+/-0.3 m/s; BMI, 30.7+/-4.2 kg/m^2). **Materials/methods:** Healthy participants performed symptom-limited treadmill graded exercise testing (GXT), then the CV-test, followed by two randomly-ordered 20-minute endurance trials (10% above and below measured CV), all on separate days. CV-test validity was assessed by comparing the sustainability and metabolic responses among the endurance trials and GXT. Participants with stroke attempted the CV-test 15 minutes after a symptom-limited GXT, and repeated the visit 3 times in 4-week intervals. Feasibility was evaluated by CV-test completion and metabolic responses in relation to the GXT. **Results:** Healthy participants sustained CV-10% significantly longer than CV+10% (16.4+/-3.4 vs 6.7+/-3.0 min, $p<0.001$), with 15/15 (100%) versus 1/15 (7%) participants tolerating >10 minutes. CV-10% had significantly lower peak oxygen consumption and respiratory exchange ratio than the GXT (VO2, 43.9+/-5.5 vs 48.6+/-5.5 ml/kg/min, $p<0.001$; RER, 0.95+/-0.05 vs 1.04+/-0.06, $p<0.001$), whereas CV+10% was not significantly different from the GXT (VO2, 47.4+/-5.1 vs 48.6+/-5.5, $p=0.053$; RER, 1.02+/-0.05 vs 1.04+/-0.06, $p=0.59$). Participants with stroke completed the CVT (15 minutes post-GXT) on 24/30 (80%) attempts, with no significant peak metabolic differences from the GXT (VO2 13.7+/-3.6 vs 14.1+/-4.1, $p=0.24$; RER 0.97+/-0.09 vs 0.97+/-0.07, $p=0.77$; includes all 30 CV-test attempts). **Conclusions:** A novel 3-minute all-out effort treadmill test appears to validly measure critical velocity among healthy adults and seems to be reasonably feasible for ambulatory persons with stroke. In future studies, greater post-GXT recovery time might further improve feasibility.

Keywords: Treadmill, Gait, VO2, Healthy

10:45-11:00am

DON'T OLD WOMEN GET THAT? - AN OLDER FEMALE ISSUE IN A YOUNGER MAN

Keri L. Denay, FACSM (University of Michigan)

Abstract: HISTORY: 34 year-old male basketball player/coach with left hip pain. Pain anteriolateral for the last month. Didn't recall any preceding injury or trauma, but did have a mild fall onto his left side about 2 weeks ago. No pain at rest. Occurs with hip rotation and lying on left when increases to a 5-7/10 in severity. Improves with sitting. He denied any fever, chills, numbness, tingling, radiation, other joint involvement, swelling, erythema, catching, locking or history of trauma/injury/surgery to the hip. Past medical history of asthma (well-controlled on rescue inhaler only), seasonal allergies, and varicella as a child. No surgical history. No medications other than ibuprofen above. Works as a teacher and basketball coach, recreational basketball player. Married with no children or pets. Denies tobacco, alcohol, or drugs. No pertinent family history. **PHYSICAL EXAMINATION:** BMI 27. Trendelenburg gait, uncompensated and positive trendelenburg test on left leg standing. Internal rotation of the hip of 15 degrees with mild pain; motion symmetric on contralateral side but painless. External rotation of the hip within normal range and without pain and same on contralateral side. Neurovascularly intact. Mild pain with passive, bent knee internal rotation. No pain with passive, bent knee external rotation. 5/5 strength with resisted straight knee hip flexion with + pain. 5/5 strength with resisted bent knee hip flexion without pain. 5/5 strength with resisted hip abduction without pain. 5/5 strength with resisted hip adduction without pain. Negative FABER test for pain but decreased ROM, slightly worse than contralateral. Positive FADIR test for pain and decreased ROM. Tender only at ASIS and along IT band. Positive Ober's test. **DIFFERENTIAL DIAGNOSIS:** Early-onset osteoarthritis, Inflammatory arthritis, femoroacetabular impinegment/labral pathology, fracture, lateral hip pain/gluteus medium tendinopathy and weakness, IT band syndrome, lumbar radiculopathy, infiltrative process/mass. **TEST AND RESULTS:** X-ray: Decreased bone density within the left femoral head without fracture or mass. This

could recommend transient osteoporosis of the hip. MR arthrogram: Subchondral insufficiency fracture in the superior aspect of the left femoral head with significant bone marrow edema in the left femoral head and neck. Small left anterior superior labral tear.. Bone island noted in the left ilium. **WORKING DIAGNOSIS:** Transient osteoporosis of the left femoral head with subchondral insufficiency fracture and anterior, superior labral tear. **TREATMENT:** Crutches for pain-free guided weight-bearing and pain-free water exercise. At follow-up, He was using crutches 50% of the time and pain much improved. Wean crutches and follow-up in 4 weeks (6 weeks from diagnosis). 6 weeks after diagnosis, doing pain-free ADLs without difficulty. Physical therapy started. 6 months after diagnosis: x-ray with no fracture seen and improved bone density. Cleared for all activity without restrictions. **OUTCOME:** Full return to activity and no restriction.

Keywords: HIP, OSTEOPOROSIS, FRACTURE, LABRAL

Free Communication/Slides #4:
Pantlind Ballroom – 11:00am-12:00pm

Session Moderator: Eric Slattery

11:00-11:15am

SEX DIFFERENCES IN SYMPTOM SEVERITY CLUSTERS ACROSS CONCUSSION RECOVERY

Morgan Anderson (Michigan State University), Abigail C. Bretzin (Michigan State University), Tracey Covassin (Michigan State University)

Abstract: Previous research suggests female athletes with concussion report higher severity for total symptoms; however, sex differences for symptom severity within each symptom cluster across recovery is unknown. **PURPOSE**: To examine sex differences in post-concussion symptom clusters across concussion recovery (i.e., ≤72 hours, return-to-play, < one-month). **METHODS**: Symptoms were rated from 0 (none) to 6 (severe) on the Post-Concussion Symptom Scale (PCSS), which consists of 22 total symptoms and a total symptom severity score ranging from 0-132. The PCSS was broken into four symptom clusters: vestibular-somatic (headache, dizziness, nausea/vomiting, balance problems, neck pain, pressure in the head), sleep-arousal (fatigue, trouble falling asleep, drowsiness), cognitive-sensory (sensitivity to light/noise, feeling slowed down, fogginess, difficulty concentrating/remembering, confusion, vision problems), and affective (irritability, sadness, nervous/anxious, more emotional, "don't feel right"). A 2 sex*2 group(concussed, healthy)*3 time repeated measures ANOVA was used to analyze sex differences in symptom clusters throughout recovery of concussion between concussed and healthy athletes. **RESULTS**: There were 167(*M*=17.46 years, *SD*=2.2; male=97, female=70; concussed=78, healthy=89) total athletes. There were no significant sex differences between testing sessions at ≤72 hours(*M*=2.03 days, *SD*=0.8, *p*=.42), return-to-play(*M*=16.09 days, *SD*=11.7, *p*=.95), and < one-month(*M*=59.72 days, *SD*=21.4, *p*=.65). There were no significant within-subjects interactions for sex*group*time for total symptom severity or any symptom cluster. There was a significant between-subjects sex*group interaction for vestibular-somatic ($F_{(1,163)}$=6.89, *p*=.01, η^2=.04) symptoms and sleep-arousal ($F_{(1,163)}$=5.76, *p*=.02, η^2=.034) symptoms. Simple main effects analysis showed females with concussion (*M*=4.05, *SE*=0.26) reported significantly higher severity of symptoms for the vestibular-somatic cluster than males with concussion (*M*=2.64, SE=2.2; *p*≤.001), but there were no differences between male and female healthy athletes (*p*=.52). Simple main effects analysis revealed females with concussion (*M*=1.87, *SE*=0.2) reported significantly higher severity of symptoms for the sleep-arousal cluster than males with

concussion (*M*=1.23, *SE*=0.2; *p*=.02), but there were no differences between male and female healthy controls (*p*=.32). There were no significant between-subjects sex*group interactions for the cognitive-sensory or affective symptom clusters. **CONCLUSIONS**: These results identified females with concussion report worse severity on vestibular-somatic and sleep-arousal symptom clusters. Therefore, these findings could lead to targeted management and treatment approaches between female and male athletes with concussion.

Keywords: vestibular-somatic, sleep-arousal, cognitive-sensory, affective

11:15-11:30am

COMPARING BASELINE NEUROCOGNITIVE TEST SCORES IN HIGH, LIMITED, AND NON-CONTACT COLLEGE ATHLETES

Abigail C. Bretzin (Michigan State University), Morgan Anderson (Michigan State University), Sally Nogle (Michigan State University), Tracey Covassin (Michigan State University)

Abstract: Previous concussion history is reported to impact baseline neurocognitive scores in college athletes. However, recent evidence suggests cumulative head impacts, not resulting in a diagnosed concussion, during contact sport participation may result in structural and functional impairments. **PURPOSE**: To compare baseline computerized neurocognitive test (CNT) composite scores and total symptom scores between high, limited, and non-contact college athletes. **METHODS**: Athletes were administered baseline CNT and separated into high contact (cheerleading, football, ice hockey, soccer, wrestling), limited contact (baseball, basketball, field hockey, gymnastics, lacrosse, softball, volleyball), and non-contact (dance, diving, golf, rowing, swimming, tennis, track & field, cross-country) groups based on previously reported concussion rates. Five separate one-way ANCOVA (covariate: concussion history) analyses were performed on CNT composite scores (verbal/visual memory, visual motor speed, reaction time) and total symptoms. Post-hoc pairwise comparisons were completed when appropriate. Statistical significance was set at $p \leq .05$, with Bonferroni adjustments for multiple comparisons ($p \leq .01$). **RESULTS**: Participants included 48.8% high contact (n=745/1523; 19.0±1.4 years; freshman 66.9%; concussion history ≤1:29.8%), 22.0% limited contact (n=335/1523; 18.9±1.2 years; freshman 62.7%; concussion history ≤1:19.7%), and 29.0% non-contact (n=443/1523; 19.0±1.3 years; freshman 60.0%; concussion history ≤1:15.1%) athletes. The one-way ANCOVA revealed significant differences between high contact (39.34±6.6), limited contact (40.94±6.9), and non-contact (40.99±6.2) athletes on visual motor speed ($F_{(1,1584)}=11.34$, $p \leq .001$, $\eta^2 .015$), with high contact athletes performing worse than limited contact ($p \leq .001$) and non-contact athletes ($p \leq .001$). There were also significant differences between high contact (3.27±6.4), limited contact (3.24±5.21), and non-contact (5.56±7.7) athletes for total symptoms ($F_{(1,1519)}=21.79$, $p \leq .001$, $\eta^2 = .03$), as non-contact athletes reported more total symptoms than high contact ($p \leq .001$) and limited contact athletes ($p \leq .001$). There were no significant group differences for any other composite scores. **DISCUSSION**: Athletes participating in high contact sports with higher risks of concussion and repetitive head impacts performed worse than athletes in lower contact sports for visual motor speed, however the effect size was small. Future research should investigate CNT scores following multiple seasons of college contact sport participation.

Keywords: verbal memory, visual memory, motor processing speed, reaction time

11:30-11:45am

THE EFFECTS OF HAMSTRING AND QUADRICEPS STRENGTH AND FLEXIBILITY ON PELVIC TILT IN DANCERS

Devon A. Hagerman (Oakland University), Emily Akinfenwa (Oakland University), Christina Tasco (Oakland University)
Abstract: The tendency for modern dancers to sustain lower limb injuries could be affected by lumbar lordosis. **PURPOSE:** To 1) assess whether quadriceps and/or hamstring muscle strength contributes to increased anterior pelvic tilt in professional and collegiate dancers compared with non-dancers and 2) evaluate hip joint (sagittal plane) flexibility for potential associations with anterior pelvic tilt. **METHODS:** Thirty-two participants were recruited: 11 professional dancers, 11 collegiate dancers and 10 non-dancers. Pelvic tilt was measured using an inclinometer while standing. Isometric measurements of quadriceps and hamstring muscle strength were measured using a hand-held dynamometer. Flexibility of the quadriceps and hamstring muscle groups was measured using a goniometer while the participant performed a Modified Thomas Test and 90-90 Hamstring Test, respectively. Both lower limbs were tested. Measurements were taken three times and the average used for analyses. A 1-way ANOVA was utilized to compare the strength and flexibility measurements while simple regression (Pearson's r) assessed associations between variables. The main outcome variable was anterior pelvic tilt. Data reported as means±SD with significance set at $p<0.05$. **RESULTS:** Dancers showed a trend ($p>0.05$) towards higher anterior pelvic tilts compared to non-dancers (professional=24.8±4.61°, collegiate=24.4±4.6°, non-dancer=20.8±6.7°). Collegiate dancers displayed significantly greater right hamstring strength vs. non-dancers (10.6±4.0kg vs.6.0±2.7kg; $p<0.05$, respectively). Collegiate and professional level dancers demonstrated greater hamstring flexibility than non-dancers in both the right leg [professional (17.7±6.2°), collegiate (17.1±13.0°), non-dancer (37.3±16.2°); $p<0.05$] and left leg [professional (21.3±8.3°), collegiate (17.0±9.7°), non-dancer (43.1±16.1°); $p<0.05$]. Right vs. left hamstring strength was strongly correlated ($r= 0.91$; $p<0.05$). No statistical significance found for quadriceps strength or flexibility across groups with non-significant trends for professional level dancers to demonstrate the strongest quadriceps, followed by collegiate level dancers and non-dancers. **CONCLUSION:** There was a non-statistically significant trend for professional and collegiate modern dancers to demonstrate a higher anterior pelvic tilt and more flexible hamstrings than non-dancers. Quadriceps strength and flexibility seemed to show no difference between the three groups, or associations with increased anterior pelvic tilt. Further research is needed to confirm the clinical and aesthetic relevance of increased lumbar lordosis in dancers versus non-dancers in later life.

Keywords: dance, lumbar lordosis

11:45am-12:00pm

EFFECTS OF ACUTE HIGH INTENSITY INTERVAL TRAINING ON AN EXECUTIVE FUNCTION TASK

Elizabeth S. Bjornsen (Taylor University), Qin Lai (Wayne State University), Brad Kendall (Taylor University/Wayne State University)

Abstracts: Steady-state aerobic exercise is known to improve executive functions. However, the effects of high intensity interval training (HIIT) on executive functions (EFs) has received limited investigation. **PURPOSE**: The purpose of this study was to compare the effects of a single session of either aerobic HIIT (HIIT-A) or aerobic/resistance HIIT (HIIT-AR) to a resting control group on an EF task. **METHODS**: Participants (N=52) were randomly assigned into the HIIT-A (n=18), HIIT-AR (n=19), or the control group (n=15). EF was measured via a computerized task switch paradigm. A mixed 3 (HIIT-A, HIIT-AR, & controlled) x 2 (pre-test & post-test) ANCOVA was performed for reaction time (RT) and accuracy (ACC) on single and mixed task conditions. **RESULTS**: For RT, there was a significant interaction between group and time for single task conditions, $F_{(2, 48)} = 4.132$, $p = .022$, partial $\eta^2 = .147$. A simple main effect of group was

noted $F_{(2, 48)} = 6.779$, $p = .003$, partial $\eta^2 = .220$. Post hoc analyses revealed the HIIT-A group (M = 582ms) was significantly faster than the control group (M = 708ms). For the mixed task, there was no significant interaction between group and time ($F_{(2, 48)} = .871$, $p = .425$, partial $\eta^2 = .035$). For ACC, there was no interaction between group and time for single task conditions, $F_{(2, 48)} = .524$, $p = .596$, partial $\eta^2 = .021$. For the mixed task, there was a significant interaction between group and time, $F_{(2, 48)} = 3.535$, $p = .037$, partial $\eta^2 = .128$. There was a significant simple main effect of group allocation on the mixed task ACC, $F_{(2, 48)} = 5.570$, $p = .006$, partial $\eta^2 = .193$. Post hoc analyses revealed the HIIT-A group (M = .98) and HIIT-AR group (M = .970) had significantly fewer incorrect responses compared to the control group (M = .940). **CONCLUSION**: The findings from this study support the hypothesis that acute HIIT may lead to reduced RT and greater response ACC during EF tasks. These findings add to the literature that a single session of HIIT can significantly improve EF in young adults.

Keywords: Cognition, exercise, HIIT

Schedule – Friday Morning: Poster Session

Poster Session #1:
Crown Foyer – 8:00-9:15am

Board #1

COMPARISON OF VELOCITY-BASED RESISTANCE TRAINING TO TRADITIONAL RESISTANCE EXERCISE TRAINING

Edward Z. Pelka (Miami University), Jarod Vance (Miami University)

Abstract: Velocity-based resistance (RE) training (VBT) is a new concept that has been shown to improve sport performance by using monitoring technology to measure movement velocity, which enables training loads to be adjusted individually and in real-time. **Purpose:** Compare the effects of 4 weeks (8 sessions) of RE training for VBT and Traditional RE training (Trad) on maximal muscular strength (1-RM), total load (TL), total RE time (TT), and perceived effort (RPE) across RE training days**. Methods:** 15 females (age 21(0.9) yrs) and 12 males (age 21.3(1.1) yrs) were randomly assigned to VBT or Trad groups. Pre and Post-training testing included1-RM 1-leg knee extension for right and left legs, a series of anthropometric measurements and at posttest, a randomized series of 1-set trials at 60%, 75% and 90% 1-RM to repetition (R) failure. All subjects completed 8 1-leg knee extension RE training sessions over four weeks with the right leg. During training, VBT completed 3 sets of R until V decreased by 20-25% during each set for 2 consecutive R; Trad completed 3 sets of 12-15 R or until failure. When Subjects completed 12 reps for 2 of 3 sets, resistance was increased progressively throughout training. An ultrasound sensor, NI-cRIO and custom-built software (NI-LabView) was used to gather data. **Results:** TT and TL for Female and male VBT was significantly less as compared to female and male Trad (TT for VBT; 432.8(41.7) and 459.2(38.6) sec vs Trad; 518.2(39.4) and 548.6(134.5) sec); Grp effect - $p<0.001$. TL for female and male VBT; 19821(3339) and 29296 (6950) lbs, respectively, vs Trad; 20641(9281) and 38197(4969) lbs, respectively (Grp & Sex effects - $p<0.001$). 1-RM increased significantly for both Sex and Training groups; Female and male VBT 1-RM increased from 55.2(10.2) to 62.7(9.9) kg and 74.3(14.2) to 90.8(16) kg, respectively, versus female and male Trad 53.5(24.7) to 57.7(25.8) kg and 99.8(21.6) to 113.2(14.9) kg, respectively; Grp and Sex effects - $p<0.001$. **Conclusion:** TT, TL and RPE for men and women in the VBT was significantly lower across days of training as compared to Trad, and VBT increased 1-RM strength similar to Trad.

Funding: This was partially funded through a Miami University Faculty Research Award

Keywords: muscle fatigue, training study, leg extension

Board #2

CAN IMPULSE-RESPONSE MODELS PREDICT PERFORMANCE IN DIVISION I FEMALE RUNNERS?

Alexandra Ciccotelli (Ohio University), Josh M. Park (Ohio University), Colleen P. Murnane (Ohio University), Robert Wayner (Ohio University), Michael Clevidence (Ohio University), Sharon Perry (Ohio University)

Abstract: Wearable technology provides coaches and runners with insight into training load monitoring. Commercial platforms for athlete monitoring leverage the relationship between acute (ATL) and chronic (CTL) training loads to track performance, or fatigue responses, in an impulse-response model. These platforms calculate a stress balance score (SBS) which can be derived as the difference between ATL and CTL and is often monitored by coaches and runners to determine competition readiness. **PURPOSE:** To determine if a SBS can predict competition performance in Division I (D1) female cross-country runners. **METHODS:** Eighteen D1 female cross-country runners participated in this university IRB approved study (Project #16-X-201). The runners underwent physiological testing to determine treadmill based maximal oxygen consumption (VO_2max), ventilatory thresholds (VT_1 and VT_2), and the associated paces (min/km). Test data facilitated the monitoring of individualized ATL, CTL, and SBS for each runner. Runners were outfitted with heartrate (HR) enabled GPS watches to derive ATL, CTL, and SBS over the course of a three-month build phase. Data from training sessions was collected on a commercially available software system. At the end of the three-month build phase, runners completed a 4 km race. SBS on the day of competition was calculated. To quantify performance, the percent difference between the 4 km race pace and velocity at VO_2max (vVO_2max) was calculated. A simple linear regression was implemented to predict race performance using SBS. **RESULTS:** A significant regression equation was found ($F(1, 16) = 5.745$, $p = 0.029$), with an R^2 of 0.264. Performance = -1.300 + 0.500 (SBS). **CONCLUSION:** 26.4% of the variation in the 4 km race performance was explained by the runners' SBS. Reliance on SBS to predict race performance or training may oversimplify the complex relationship between training load, competition readiness, and fatigue. Future studies should consider the inclusion of other internal and external training markers to enhance predictions of competition readiness.

Keywords: Training Load

Board #3

INFLUENCE OF SLEEP DURATION AND QUALITY ON MEASURES OF BODY COMPOSITION AND FITNESS LEVEL

Alexandra I. Hopun (Miami University), Gabrielle A. Volk (Miami University), Victoria E. Warren (Miami University), Matthew D. Doyle (Miami University), Matthew D. McCarty (Miami University), Vincent M. Smith (Miami University)

Abstract: The relationship between poor sleep and higher body mass index (BMI) is well documented in young adults, but fewer studies have examined how sleep and indices of body composition are related in older adults. Therefore, the **PURPOSE** of this cross-sectional study was to examine possible relationships between sleep duration and quality with measures of body composition and fitness level. **METHODS:** In 21 overweight (BMI $\geq$ 27 kg/m^2) older adults ($\geq$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, accelerometry); and sleep quality and duration (Pittsburgh Sleep Quality Index ,PSQI) were assessed. For the 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 $p<0.05$. **RESULTS:** Mean values were age: 64.3 ± 4.6 years; BMI: 35.3 ± 5.2 kg/m^2; VFA: 222.8±41 cm^2; sleep duration: 6.8±1.4 hours; PSQI score: 10.4±2.5; VO_2max: 15.5±2.0 ml/kg/min; MVPA: 700±194 min/day (accelerometer). VFA and sleep score were inversely correlated ($r=-0.48$, $p< 0.05$). Sleep quality and duration were not significantly correlated with SMM, FM, or VO_2max. There was a trend for an inverse correlation between MVPA and sleep score ($r= -0.435$, $p= 0.08$). **CONCLUSION:** In contrast to previous reports, these preliminary data suggest that higher levels of visceral fat are associated with better self-perceived sleep quality. In partial support of previous studies, objectively measured physical activity level was associated with better self-perceived sleep quality. These preliminary correlational data are limited by the current sample size. However, we will be able to better evaluate these relationships as more subjects are enrolled into this study.

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

Keywords: Older adults, BMI, PSQI

Board #4

IMPACT OF KNEE CRUTCH AND BALANCE TRAINING ON BALANCE

Allison L. Zornow (Oakland University), Helen Armenta (Oakland University), John Palazzolo (Oakland University), Tom Brennan (Oakland University), Daniel Goble (Oakland University), Christopher Wilson (Oakland University), Charles R.C. Marks (Oakland University)

Abstract: Lower extremity injuries can be extremely debilitating in individuals required to avoid weight bearing on the affected ankle or foot. Axillary crutches and knee scooters are the most commonly used devices that provide ease with locomotion. The knee crutch is an alternative, purportedly allowing its users' hands to be free and accessible on stairs. Being relatively new on the market, the knee crutch (KC) has limited research regarding its effects on balance, coordination, and muscle activity. **PURPOSE**: To analyze the effects of knee crutch practice on balance. **METHODS**: Fifteen (9 females, 6 males) apparently healthy young adults were recruited. The balance (center of pressure sway in cm) of each participant was measured before (BB1) and after the KC was fitted (BKC), following after each of four five-minute practice sessions (P1KC, P2KC, etc.), and after KC was removed (BB2). A 5-minute break was provided after two practice sessions. One-Way ANOVA (alpha = 0.05) was performed to determine whether balance scores changed over time. **RESULTS:** One-Way ANOVA found a significant ($p < 0.001$) time effect. Balance performance decreased by 143 % indicated by a higher balance score (BB1: 23 $\pm$ 6 cm, BKC: 56 $\pm$ 19 cm). However, practice improved balance performance by only 29 % (same BKC, P4KC: 40 $\pm$ 9 cm). Sixty-three percent of the improvement occurred after the first

practice (P1KC 46 ± 18 cm). **CONCLUSON:** The knee crutch significantly impairs overall balance and an individual will most likely require more than four five-minute training sessions to restore normal balance.

Keywords: Stability, Assistive Ambulatory Device, Peg Leg, Hands Free Crutch

Board #5

SEX DIFFERENCES IN NUTRITION KNOWLEDGE OF DIVISION I COLLEGE ATHLETES

Alyssa Guadagni (Michigan State University), Emily N. Werner (Michigan State University)

Abstract: Appropriate nutrition is imperative for participation in, and recovery from sport. However, many college athletes lack sufficient nutrition knowledge to help them maintain peak performance and avoid illness. **PURPOSE:** To evaluate sex differences in the nutrition knowledge base of NCAA Division I college athletes using a validated nutrition knowledge survey. **METHODS:** Varsity athletes at a Division I university were recruited via word-of-mouth. A validated nutrition knowledge survey (Calella et al., 2017), that contained both general and sport nutrition-specific sections, was administered at different settings convenient to the athletes (e.g., at team meetings or training table). Participants were asked not to share answers or use any outside resources (e.g., internet). Scores were summed as +1 for a correct answer and +0 for no answer, an incorrect answer, a double-answer, or the "I don't know" option. The maximum possible score was 97. Knowledge was categorized as low (< 33rd percentile), medium (33rd to 66th percentile), and high (> 66th percentile). Frequencies of knowledge category were tallied, and an independent sample t-test was run to determine sex differences. **RESULTS:** Participants included 128 varsity athletes (n=70 female, n=58 male) from eight different sports (football, men's and women's basketball, women's golf, women's soccer, women's rowing, ice hockey, and field hockey). Frequencies within category included 42 athletes with low knowledge (n=11 female, 31 male), 24 athletes with medium knowledge (n= 7 female, 17 male), and 62 with high knowledge (n= 52 female, 10 male). Females scored significantly better than males for the survey as a whole ($p<0.001$), and for the general ($p<0.001$) and sport nutrition sections alone ($p<0.001$). **CONCLUSION:** Based on the limited results of this survey, 74% of females, compared to 17% of males fell into the high nutrition knowledge category. Future research should expand on this to assess sex differences in knowledge of specific nutrition concepts.

Funding: This research was funded by the Michigan State University College of Education via a Summer Research Fellowship.

Keywords: Nutrition knowledge, athletes

Board #6

VOLUME EQUATED HIGH VS LOW FREQUENCY RESISTANCE TRAINING: EFFECTS ON LOWER BODY STRENGTH AND POWER

Anton Simms (Northern Illinois University), Luis Hernandez (Northern Illinois University), Clayton Camic (Northern Illinois University), Peter Chomentowski (Northern Illinois University)

Abstract: Training variables such as volume and intensity have been researched heavily to determine which ranges yield optimal results. One variable that has not been studied as intensely is training frequency. Previous research has shown that training the same muscle groups biweekly yields better hypertrophic results than once a

week. Some speculate that higher training frequencies (>3 days/week) should lead to even greater increases in strength, power, and muscle mass. However, a few studies have looked at higher training frequencies reporting that 5-6 days/week do not yield better increases than 1-3. Nonetheless more research is warranted. **PURPOSE:** This study aims to investigate the effects of high frequency as compared to low frequency training on lower body power, strength, and muscle mass. **METHODS:** Nine college-aged participants with multiple years training experience (6.2 ± 2.7 yrs) were recruited. Participants were randomly allocated into a low frequency (LFG) (n=4) or high frequency (HFG) (n=5) group. Both groups underwent 8 weeks of unsupervised lower body resistance training, the LFG participating 2 days/week and HFG participating 6 days/week. Training volume was equated between groups. Training frequency was decreased by 50% every fourth week. All participants were assessed the weeks pre-and-post intervention to test lower body strength, power, and muscle mass via squat 1-repetition maximum (1RM), vertical jump height (VJH), and bioelectrical Impedance analysis, respectively. A mixed model two-way MANOVA was used to assess the effects of frequency and squatting intervention on lower body strength, power, and muscle mass. Alpha level=.05. **RESULTS:** Multivariate tests revealed a significant effect from squatting intervention (Wilks' λ=.108, $F(3,5)=13.794$, p=.007), though not from training frequency. Follow up ANOVAs revealed significant effects on 1RM ($F(1,7)=28.267$, p=.001) and VJH ($F(1,7)=7.480$, p=.027). Post-intervention VJH was significantly higher than pre-intervention (53.71 ± 13.71 cm vs 51.36 ± 12.34 cm, p=.027), and post-intervention 1RM was significantly greater than pre-intervention (282.22 ± 96.96 lbs vs 263 ± 89.95 lbs, p=.001). **CONCLUSION:** High frequency training does not result in greater lower body strength, power, or muscle mass than low frequency training. Future research should investigate potential differences between low and moderate training frequencies.

Keywords: High frequency resistance training

Board #7

CAN WIRELESS NEAR-INFRARED SPECTROSCOPY QUANTIFY MODERATE- AND HEAVY-INTENSITY RUNNING WORKLOADS?

David Lawson (University of Indianapolis), Noah Smith (University of Indianapolis), Kendra Voth (University of Indianapolis), Ericka Pursley (University of Indianapolis), Chad Odaffer (University of Indianapolis), Richard Robinson (University of Indianapolis), Trent E Cayot (University of Indianapolis)

Abstract: Near-infrared spectroscopy (NIRS) systems have been previously used to estimate the ventilatory threshold (VT). This physiological threshold is practically significant during cardiorespiratory programming as it separates the moderate- (<VT) and heavy-intensity (>VT) domains. To our knowledge, the ability of a wireless NIRS system to differentiate running exercise intensities during constant-load exercise has yet to be established. **PURPOSE:** To investigate if a wireless NIRS system can differentiate exercise intensities when running is performed in the moderate- and heavy-intensity domains. **METHODS:** During session one, five subjects (age = 22 ± 2 years, height = 1.66 ± 0.04 m, weight = 70.1 ± 6.5 kg) completed a graded exercise test on a treadmill to identify the VT (pulmonary gas exchange data) and the tissue oxygenation index (TOI, NIRS data) for the medial gastrocnemius (G) and vastus lateralis (VL) at the VT (TOI_{VT}). During the second session, the subjects completed a 15-minute moderate-intensity (70% VT) and 15-minute heavy-intensity (10%+VT) run while TOI was continuously collected (G, VL). The TOI data was analyzed for time spent in the moderate- (TOI value higher than TOI_{VT}) and heavy-intensity (TOI value lower than TOI_{VT}) domains. Repeated measures, two-way analysis of variance was used to identify potential significant differences ($p < 0.05$) between the TOI time data from the G and VL during the moderate- and heavy-intensity running bouts. **RESULTS:** TOI values indicative of moderate-intensity exercise were found in the G for 763 ± 306 sec (84.8 ± 34.0% of the run, CV = 40.1%) and VL for 640 ± 351 sec (71.1 ± 39.0%, CV = 54.8%) during the 15-minute moderate-intensity run. TOI values indicative of heavy-intensity exercises were found in the G for 710 ± 300 sec (78.9 ± 33.3%, CV =

42.3%) and VL for 893 ± 16 sec (99.2 ± 1.7%, CV = 1.8%) during the 15-minute heavy-intensity run. No significant differences were detected for the TOI time data for either muscle (G, VL) or intensity (moderate or heavy). **CONCLUSION:** According to our pilot data, the wireless NIRS system may be able to differentiate running intensities between the moderate- and heavy- domains.

Keywords: Cardiorespiratory Exercise, Microvascular Oxygenation, Constant Load Exercise

Board #8

THE EFFECTS OF WEIGHT LOSS ON CARDIOMETABOLIC RISK FACTORS

Casey R. Heindl (Miami University), Rebecca E. Bartram (Miami University), Denise Y. Chan (Miami University), Hannah N. Moland (Miami University), M. Elizabeth Miller (Miami University)

Abstract: Cardiovascular Disease (CVD) is the leading cause of death for both men and women in the United States. High blood pressure, high cholesterol, obesity, physical inactivity, diabetes and poor diet are the most common risk factors for CVD. **PURPOSE**: The purpose of this study was to highlight the effects of weight loss on cardiometabolic factors on one male participant (DEX006) in a weight loss intervention. The goal of the intervention was a 5-10% loss of total body weight in participants after a six-month period. **METHODS**: Eligibility criteria included: age ≥ 58 years and BMI ≥ 27. Over the course of the three screening visits, baseline anthropometric data measures were taken; training in recording dietary intake was conducted; REE was calculated using indirect calorimetry; and the participant received diet and exercise instruction along with a muscle biopsy and blood draws. The participant received a customized meal plan, diet instruction, and bi-weekly in person follow up with a dietitian. He completed 3-day diet records every month for 3 months and exercised 90 minutes each week during that time. After three months, midpoint data was collected. Nutrition Data System for Research 2017 was used to collect dietary information. **RESULTS**: The participant experienced a total body weight decrease of 7% at midpoint and BMI decreased from 39.9 kg/m^2 to 37.6 kg/m^2. Total cholesterol decreased from 162 mg/dL to 152 mg/dL, resting blood pressure decreased from 132/90 mmHG to 114/77 mmHG, and fasting blood glucose decreased from 116 mg/dL to 106 mg/dL. Along with these reductions, his HBA1C decreased from 5.6% to 5.3%. **CONCLUSION**: These results show the effectiveness of modest weight loss and exercise through a weight management intervention on reductions in cardiovascular risk factors.

Funding: This project was funded by an NIH grant 1R15AG055923-01

Keywords: Intervention, Cardiovascular Disease, Exercise, Diet

Board #9

A COMPARATIVE INVESTIGATION OF TRAINING LOAD MONITORING IN DIVISION I FEMALE CROSS-COUNTRY RUNNERS

Colleen P. Murnane (Ohio University), Joshua M. Park (Ohio University), Alexandra Ciccotelli (Ohio University), Robert Wayner (Ohio University), Michael Clevidence (Ohio University), Sharon Perry (Ohio University)

Abstract: 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. Numerous internal and external markers of training load exist. Selecting a method for monitoring training load is complex, with most

coaches and runners deferring to distance or time. **PURPOSE:** To determine if three independent methods of load monitoring differ in their rates of change between two training blocks in Division I female cross-country runners. **METHODS:** Eleven healthy female runners volunteered to participate in this university IRB approved study (Project #16-X-201). Runners underwent biomechanical and physiological testing to obtain components required to derive two measures of training load; a heart rate derived point system (TRIMP) and a biomechanical model of accumulated kinetic load (AKL). Runners wore heartrate (HR) enabled GPS watches to collect data over a three-month period of training including distance (DIST). Between the training blocks, percent change in training load was calculated for DIST, TRIMP, AKL, and a 2x3 within-subjects repeated measures ANOVA was conducted to assess the interaction and main effects of the type of training load (DIST, TRIMP, AKL) over training blocks. **RESULTS**: There was no significant interaction effect $F(2, 20) = 0.031$, $p > 0.05$. The main effect of the type of training load yielded an F ratio of $F(2, 20) = 3.54$, $p > 0.05$, indicating a non-significant difference between DIST, TRIMP, and AKL when monitoring change in training loads. The main effect for the training block yielded a ratio of $F(1,10) = 1.237$, $p > 0.05$, indicating a non- significant difference between the monthly training blocks**. CONCLUSION:** DIST, TRIMP, and AKL may each be implemented to monitor changes in monthly training when percent change in load is prioritized. Although absent of an indication of physiological stress or intensity, distance may continue to serve as a simple, cost-effective strategy. Insight into changes of training load on a time scale less than a month, or athletes predisposed to injury may necessitate a specific training load marker.

Keywords: Injury, Athlete Performance

Board #10

INFLUENCE OF EXERCISE ON PARKINSON'S: A CASE STUDY

Courtney L. Steele (University of Indianapolis), Chandler Fields (University of Indianapolis), Trent E. Cayot (University of Indianapolis), Stephanie Combs-Miller (University of Indianapolis), Nathanial R. Eckert (University of Indianapolis)

Abstract: Recent reports have demonstrated the potential effectiveness of exercise therapy for delaying or reversing the functional decline for individuals with Parkinson's disease (PD). **PURPOSE:** To investigate the general effect of an instructor led, high intensity exercise program on the symptoms of an individual with PD. **METHODS:** One individual (69 yrs) with PD volunteered to engage in instructor led exercise 2x a week, to investigate the influence of exercise on PD symptoms. Assessment of functional decline encompassed three general areas of interest: cortical excitability, general functional measures, and cognitive function. Cortical excitability was assessed via the use of Transcranial Magnetic Stimulation (TMS) in an effort to investigate amplitude changes of motor evoked potentials (MEPs) within the motor cortex. Measures of general function included the use of VO2 peak (VO2pk), Grip Strength, 10 meter walk test (CWT), 6-minute walk test (6MWT), Functional Reach Test (FR), and Balance Evaluation (Mini BESTest – MINIbest). Cognitive assessment included the use of the Activities-Specific Balance Confidence Scale (ABC), and Trail Making Test parts A and B (TMT). All tests were performed pre-post exercise intervention. **RESULTS:** Preliminary data demonstrated a reduction in MEP amplitudes (avg difference: Rest – 2.02 mV; Active – 1.97 mV) across varying stimulation intensities within the first dorsal interossei (FDI). Relative VO2pk did not produce a noticeable difference pre-post exercise intervention (24.7– 24.6 ml/kg/min), however the data did demonstrate an increase in peak minute ventilation (Ve) (67.3– 72.5 l/min), time to ventilatory threshold (VT) (140 – 240sec), and time to exhaustion at peak workload (420 – 495sec). Additionally, Grip Strength (0.414 – 0.437 f/lb dominate hand), CWT (1.22 – 1.43m/sec), 6MWT (532 – 542m), and MINIbest (24 – 26 score) all demonstrated improvement pre-post exercise intervention. Lastly, ABC scores (94 – 88) and TMT scores (35.6 – 29.37sec) decreased pre-post exercise intervention. **CONCLUSIONS:** The results suggest that the influence of instructor led exercise 2x a

week has an overall positive influence on PD symptoms of the tested individual, ranging from the neurophysiological to cognitive.

Funding: InQuery Collaborative Grant Program (# 523425), University of Indianapolis

Keywords: Transcranial Magnetic Stimulation, Parkinsons Disease, Exercise

Board #11

ELECTROMYOGRAPHIC INDICES OF ACUTE MUSCLE FATIGUE IN RESPONSE TO RESISTANCE EXERCISE

Carter P. Gadola (Miami University), Andrew Renggli (Miami University), Jarod Vance (Miami University), Randal Claytor (Miami University)

Abstract: Muscle fatigue is multifactorial and results from central and/or a variety of peripheral mediators. **Purpose:** To determine the EMG indices of acute local muscle fatigue in response to multiple sets (S) and repetitions (R) of dynamic resistance exercise (RE). **Methods:** 41 males familiar with RE volunteered. Day 1: Body composition and 1-RM for a 1-leg knee extension RE was completed. Day 2: After at least 96 hours following Day 1, subjects performed as many S (2.8 ± 1.1) and R (4.2 ± 2.3; R/S) as possible at 90% 1-RM until failure. Prior to the first S and immediately following the final S, subjects completed a maximal voluntary isometric contraction (MVIC) at 70 degrees for 5 seconds. During MVIC, EMG data was collected from the vastus medialis (VM), vastus lateralis (VL), and rectus femoris (RF). Spectral frequency EMG measures of Total Power (TP), Median Frequency (Med F), and Mean frequency (MF) were collected along with amplitude measures of Area (A) and Mean Amplitude (MA). A 2 (Condition; Pre-Post) X 3 (Muscle) ANOVA with RM, and a-priori contrasts were used to make specific pairwise comparisons. **Results:** EMG spectral frequency measures: Med F for RF, VL, VM of active muscle decreased ($p<0.05$) from Pre-MVIC to Post-MVIC. TP ($p=0.063$) & MF ($p=0.123$) trended toward a decrease. EMG Amplitude Measures: The overall main effect for MA approached significance ($p=0.083$) from Pre-MVIC to Post-MVIC. There was a significant Pre-Post by muscle interaction ($p=0.006$); within-subjects' contrasts revealed RF & VL decreased significantly ($p=0.002$) from Pre-MVIC to Post-MVIC while VM did not. The overall main effect for A was significant ($p=0.015$) from Pre-MVIC to Post-MVIC. There was a significant condition by muscle interaction ($p=0.037$); within-subjects' contrasts revealed RF & VL muscles decreased significantly ($p=0.022$) from Pre-MVIC to Post-MVIC while VM did not. **Conclusion:** These data suggest MVIC EMG measures of spectral frequency and Amplitude significantly decrease as a result of multiple S and R of dynamic RE completed to failure and are representative of acute local neuromuscular muscle fatigue. Further, spectral frequency response differences between muscle groups warrants continued study.

Funding: Miami University Faculty Research Grant

Keywords: Fatigue, Resistance Exercise, EMG

Board #12

THE ACCURACY OF ACTIVITY TRACKERS MEASURING ENERGY EXPENDITURE WHILE WALKING

Douglas B. Oliveira (Indiana Wesleyan University), Christi Wolgemuth (Indiana Wesleyan University), Whitney Yoder (Indiana Wesleyan University), Josiah Planck (Indiana Wesleyan University), Melissa Cook (Indiana Wesleyan University), Alyne Williams (Indiana Wesleyan University)

Abstract: Activity trackers are becoming increasingly popular worldwide. As a result, the market has expanded with different brands that produce a variety of activity trackers varying in function and ability. Consumers who purchase these devices rely on the functions that are advertised, especially when cost, exercise, and lifestyle choices are considered. **PURPOSE:** The purpose of this study was to assess the accuracy of the energy expenditure function of three popular activity trackers (1, 2, and 3). **METHODS:** A sample was drawn from students attending Indiana Wesleyan University. Of those eligible, a total of 35 participants completed the study. Each participant wore the three devices and walked on a treadmill for 10 minutes at 3.0 mph with no incline. To assess accuracy, the total energy expenditure measurement obtained from each device was compared to the indirect calorimetry measurement obtained, which is considered the gold standard of energy expenditure. **RESULTS:** Among the activity trackers, energy expenditure measurements were significantly higher ($p > .05$) when compared to the indirect calorimetry measurement. Activity tracker 1, 2, and 3 overestimated by 37, 22, and 4 kcalories, respectively. Activity tracker 1 ($r = 0.667$), 2 ($r = 0.570$), and 3 ($r = 0.568$) had a moderate correlation to the indirect calorimetry measurement. **CONCLUSION:** Based on the findings of this study, consumers who purchase one of these devices will read an overestimated energy expenditure. Purchasing activity trackers can be expensive so doing research on which one is the most accurate is essential for consumers.

Keywords: calorie expenditure, fitness trackers, wearable devices, low intensity

Board #13

ESTIMATION OF THE VENTILATORY THRESHOLD USING WIRELESS NEAR-INFRARED SPECTROSCOPY

Ericka Pursley (University of Indianapolis), Kendra Voth (University of Indianapolis), Noah Smith (University of Indianapolis), David Lawson (University of Indianapolis), Chad Odaffer (University of Indianapolis), Richard Robinson (University of Indianapolis), Trent E Cayot (University of Indianapolis)

Abstract: The ventilatory threshold (VT) separates moderate intensity (<VT) and heavy intensity (>VT) domains and can be determined using a pulmonary gas exchange system in a laboratory setting. Knowledge of an exercise workload in which the VT occurs is useful when prescribing individualized cardiorespiratory exercise. If wireless near-infrared spectroscopy (NIRS) systems could estimate the VT, more environment specific testing results could be obtained. **PURPOSE:** To investigate if the VT can be estimated by using wireless NIRS from the medial gastrocnemius (G) or vastus lateralis (VL) during running exercise. **METHODS:** Five subjects (age = 22 ± 2 years, height = 1.66 ± 0.04 m, weight = 70.1 ± 6.5 kg) completed a graded exercise test on a treadmill to volitional fatigue. Every three minutes the velocity was increased by +1 km/hr (starting velocity = 5 km/hr) while the incline remained at 1%. Pulmonary gas exchange and NIRS (G and VL) data were continuously collected. The pulmonary gas exchange data was visually inspected (V-Slope, end-tidal pressures, and ventilatory equivalents) to identify the velocity at which the VT occurred (vVT). The last 15 seconds of NIRS data (G and VL) were averaged for each stage and subsequently plotted against velocity. Two blinded investigators visually identified the velocity at which NIRS breakpoints for the G (vNIRS-G) and VL (vNIRS-VL) occurred. Paired t-tests were used to identify significant differences ($p < 0.05$) between vVT and vNIRS-G or vNIRS-VL. Pearson correlation coefficients were used to assess the relationship between vVT and vNIRS-G or vNIRS-VL. **RESULTS:** Very high (ICC = 0.957, r = 0.938) and moderate (ICC

= 0.585, r = 0.584) inter-rater reliability were detected for the NIRS breakpoints from the G and VL, respectively. No significant differences ($p > 0.05$) were detected between vVT (8.0 ± 0.7 km/hr) and vNIRS-G (7.2 ± 1.5 km/hr) or vNIRS-VL (8.0 ± 1.5 km/hr). However, weak correlations were detected between vVT and vNIRS-G (r = 0.232) or vNIRS-VL (r=0.485). **CONCLUSION:** According to our pilot data, vVT may be best estimated by vNIRS-VL due to similar velocities and slightly higher correlations that were identified compared to the vNIRS-G.

Keywords: Running, Cardiorespiratory Intensity Domains, Internal Workloads

Board #14

RELATIONSHIPS AMONG OBJECTIVE INDICATORS OF HEALTH AND SELF-PERCEIVED HEALTH IN OLDER ADULTS

Emilija A. Peleckas (Miami University), Gabrielle A. Volk (Miami University), Victoria E. Warren (Miami University), Matthew D. McCarty (Miami University), Alexandra I. Hopun (Miami University) Melanie S. Ziaziaris (Miami University) Kyle L. Timmerman FACSM (Miami University)

Abstract: Clinical indicators of health status such as body composition, blood lipids, and cardiorespiratory fitness are very objective; however, self-perceived health may be influenced by multiple factors. Thus, the **PURPOSE** of this study is to explore associations among objective measures of health, self-perceived health, and habitual physical activity in overweight, older adults. **METHODS:** In twenty (F=16, M=4) overweight (body mass index, BMI≥ 27 kg/m^2), older adults (>58 years) we assessed blood lipids (Cholestech LDX analyzer); body composition (bioelectrical impedance); habitual physical activity (Actical accelerometer); cardiorespiratory fitness (VO_2max, graded exercise with indirect calorimetry); and self-perceived health (36-item short form survey, SF-36). The SF-36 includes questions that touch on 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: 64.2±4.8y; SF-36 (general health): 62±13%; SF-36 (physical function): 76±15%; BMI: 34.2±4.7 kg/m^2; body fat percentage: 44.7±0.06%; VO_2max: 15.5±2.0 ml/kg/min; moderate-to-vigorous physical activity: 51.8±24.2 min/day, LDL cholesterol: 109.8±29.7 mg/dL, HDL cholesterol: 47.8±9.5 mg/dL, triglycerides: 118.2±42.3 mg/dL, and glucose: 99.5±9.5 mg/dL. Self-perceived physical function was inversely correlated with body fat percentage ($r= -0.52$, $p< 0.05$), visceral fat area ($r= -0.47$, $p<0.05$), and positively correlated with weight-adjusted muscle mass ($r= 0.55$, $p<0.05$). Self-perceived energy and fatigue, as well as emotional well-being were positively correlated with skeletal muscle mass ($r=0.48$ & $r=0.52$, $p<0.05$). Self-perceived general health was positively correlated with skeletal muscle mass and weight-adjusted muscle mass respectively ($r=0.45$ & $r=0.43$, $p<0.05$). **CONCLUSION:** These preliminary data suggest that components of self-perceived health, as measured by the SF-36, are associated with indices of body composition, but not habitual physical activity, cardiorespiratory fitness, or blood lipids.

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

Keywords: body composition, overweight, SF-36

Board #15

DOES HIGH-CADENCE CYCLING IMPROVE DEPRESSION IN INDIVIDUALS WITH PARKINSON'S DISEASE?

Alena J. Varner (Kent State University), Bryan T. Dowdell (Kent State University), Jin Hyun Kim (Kent State University), Sara A. Harper (Kent State University), Brandon D. Pollock (Kent State University), Angela L Ridgel, FACSM (Kent State University)

Abstract: Parkinson's disease (PD) is a progressive neurodegenerative disorder that often leads to increased incidence of depression. Although high cadence cycling improves motor function in PD, depression could decrease motivation to participate in exercise. **PURPOSE:** To examine if three bouts of high-cadence cycling improves symptoms of depression in individuals with PD. **METHODS:** Individuals with PD (N=32) were divided into either a high-cadence cycling or a no-exercise (control) group. The cycling group completed three sessions of high cadence cycling, on a custom motorized stationary cycle, consisting of a 5-minute warm-up at 50 revolutions per minute (rpm), 30 minutes of high cadence cycling between 75-85 rpm, and a 5-minute cool down. Depression was assessed using Beck Depression Inventory (BDI-II) at baseline and 1 week later. BDI-II is a 21-question self-assessment that examines feelings of hopelessness, irritability and fatigue. **RESULTS:** At baseline, 31% of the individuals showed symptoms of depression. Overall, there were no significant changes in BDI scores after the intervention. However, not all of the subjects recruited had depression according to the BDI. Individuals who showed symptoms of depression (BDI score > 13) improved their depression score by 4.67 points after high-cadence cycling and the control group only improved by 2.75 points. **CONCLUSIONS:** This cohort of individuals showed a high incidence of depression. Although three high-cadence cycling sessions did not result in significant improvements in BDI-II, it is possible that additional sessions of high-cadence cycling will promote further improvements in depression amongst individuals with PD. Future studies should examine the effects of additional cycling sessions on depression in this high-risk population.

Funding: Kent State University's School of Health Sciences, Kent State University Undergraduate Student Senate.

Keywords: Exercise, neurological disorder, rehabilitation

Board #16

ACUTE PERCEPTUAL RESPONSES TO CIRCUIT AND SPRINT HIGH-INTENSITY INTERVAL EXERCISE IN CHILDREN

Emily Kryska (Michigan State University), Rami Stanbouly (Michigan State University), Jeanette M. Ricci (Michigan State University), Todd A. Astorino (California State University - San Marcos), Karin A. Pfeiffer, FACSM (Michigan State University)

Abstract: Performing high-intensity interval exercise (HIIE) involving intense, short bouts of maximal exercise interspersed with recovery periods may elicit unpleasant psychological responses as proposed by the dual mode theory. However, acute perceptual responses to various HIIE regimens in children are poorly understood. **PURPOSE:** To compare acute changes in rating of perceived exertion (RPE), affect, and enjoyment between body-weight circuit and treadmill-based sprint HIIE in children. **METHODS:** Active boys (N=14, age = 9.9 +/- 0.3 years) completed surveys assessing baseline global measures of positive and negative affect and exercise enjoyment (PACES) followed by a graded exercise test. On two subsequent occasions, participants completed a time-matched (8-minute; 30 s work: 30 s recovery) body-weight circuit and treadmill sprint regimen in a randomized order within a 1-2-week period. For each regimen, RPE (OMNI), affect (feeling scale) and enjoyment (Exercise Enjoyment Scale) were recorded pre-exercise and at 38% and 75% of session completion, and post-exercise. Affect and enjoyment (PACES) were completed 10-minutes post-exercise. **RESULTS:** Mean RPE increased from 38% to 75% of session completion for both body-weight and sprint

exercise (mean change = 1.6 +/- 1.2, p<0.001 and 1.4 +/- 1.2, p=0.001, respectively) and did not differ between regimens. Peak RPE was equal to 5.1 +/- 2.3 and 5.4 +/- 1.8 in response to body-weight and sprint exercise (p=0.7101). Affective responses declined slightly from pre-exercise to 75% completion and did not differ between regimens (p>0.05). Affect remained positive at post-exercise for body-weight (3.3 ± 1.6) and sprint (3.3 ± 1.4). No change was evident (p > 0.05) for positive or negative affect following either regimen. Exercise enjoyment responses did not differ between regimens during exercise (p>0.05), but enjoyment (PACES) was significantly lower after body-weight compared to pre-exercise (mean difference = 4.5 +/- 4.6, p=0.003, ES=0.38). **CONCLUSIONS:** Assessing perceptual responses during exercise in children is significant given that positive affect is a strong predictor of exercise adherence. Body-weight and sprint HIIE may be feasible additions to youth exercise programs since neither elicited acute unpleasant feelings, similar to previous findings. Future research should compare acute perceptual responses between fit and unfit children to various modes of HIIE.

Keywords: HIIT, RPE, affect, enjoyment

Board #17

COMPARISON OF CALORIC AND PROTEIN INTAKE IN DIET V.S. NON-DIET OLDER ADULTS AT TWO TWO-POINTS

Denise Y. Chan (Miami University), Beth E. Miller (Miami University), Rebecca E. Bartram (Miami University), Casey R. Heindl (Miami University), Hannah N. Moland (Miami University)

Abstract: Consequences of obesity among older adults are significant; however, weight loss interventions targeting older adults are limited due to concerns of loss in lean muscle mass. More research in this area is needed. **PURPOSE:** To compare the caloric and protein intake of diet vs non-diet groups at two time-points. **METHODS:** In this ongoing 6-month, randomized, control trial, seventeen obese adults age 58 or older were categorized into a diet or non-diet group. Participants completed a three-day diet record at baseline and month 1. Diet group received a customized meal plan, comprehensive diet instruction for weight loss following baseline data collection, and biweekly in-person follow-up sessions. Diet intervention aimed for protein intake of 1.2g/kg to assist in maintaining muscle mass during the weight loss phase. Independent and paired t-tests were used to compare means between and within the two groups at two time-points from baseline to month 1, respectively. **RESULTS:** At baseline, results from the independent t-test indicated no significant difference in total kcal (t(17)= -0.948, p= 0.358) between non-diet and diet (1894±567 kcal, 2127±444 kcal) and protein intake (t(17)= -1.222, p= 0.241) between non-diet and diet (76±23g, 88±19g), respectively. Results from the paired t-test indicated the non-diet group had no significant (p>0.05) change from baseline to month 1, in total kcal (1894±567 kcal, 2095±652 kcal) and protein intake (76±23g, 81±26g), respectively. Whereas, the diet group had a statistically significant (p<0.05) decrease in total kcal (2127±444 kcal, 1529±405 kcal) but not protein intake (88±19g, 76±20g) (p>0.05). Results from independent t-test at month indicated a statistically significant difference in kcal (t(17)= 2.177, p= 0.048) between the non-diet and diet (2095±652 kcal, 1529±405 kcal) group, respectively. But not statistically significant for protein (t(17)= 0.368, p= 0.718) between non-diet (81±26g) and diet (76±20g). **CONCLUSION**: This preliminary data indicated that a structured meal plan and education resulted in a reduction of calories in the diet group with maintenance of protein intake. Maintaining or increasing protein intake during weight loss is important in maintaining muscle mass in this population. More diet strategies may be needed to assist older adults in increasing protein intake during weight loss.

Funding: This project was funded by an NIH grant 1R15AG055923-01

Keywords: Weight management, diet, intervention, weight loss

Poster Session #2:
Crown Foyer – 9:20-10:35am

Board #1

THE EFFECTS OF VIRTUAL REALITY GAMING ON POST EXERCISE HYPOTENSION

Hannah A. Bennett (Franklin College), Brayton J. Allen (Franklin College), Jacob N. Leachman (Franklin College), Max Adolphs (Franklin College)

Abstract: Our previous research has demonstrated that virtual reality (VR) video gaming requires a greater intensity of exercise and is more enjoyable than moderate intensity treadmill exercise in college students. While the results of this research are promising, the clinical value of VR video gaming, by the measurement of variables such as post exercise hypotension, has yet to be explored. **PURPOSE:** This study examined the effects of VR video gaming on post exercise hypotension, heart rate reserve (HRR), and exercise enjoyment in healthy college students. **METHODS:** Ten healthy college students (7 males, age = 19.56 ± 2.20 years, weight = 82.35 ± 15.58 kg; 3 females, age = 20.9 ± 0.78 years, weight = 64.15 ± 8.78 kg) completed the study. All participants completed one experimental trial. The trial initiated with a 15-minute rest period in which resting blood pressure (BP) and heart rate (HR) measures were taken. Following the BP and HR measures, participants completed a short familiarization period with the VR system. After familiarization, participants played 15 minutes of a VR archery game. Throughout the trial, exercise HR was collected and averaged by a chest worn heart rate monitor. Directly following the trial, participants rested for 20 minutes and BP measures were taken afterwards at minutes 0, 10, and 20. Exercise enjoyment measures were also determined afterwards by the modified Physical Activity Enjoyment Scale (PACES). Systolic BP measures were statically analyzed before and after exercise using repeated measures ANOVA. Descriptive statistics were also analyzed for HRR and exercise enjoyment. **RESULTS:** A significant ($F = 15.76$, $P < .001$) difference in systolic BP was seen within the group (pre-exercise blood pressure = 118 ± 8.76 mmHg, 20 minutes post exercise = 113.6 ± 8.79 mmHg). HRR averaged 75.24 ± 15.02% throughout the 15-minute trial and post-exercise enjoyment measures averaged 32.56 ± 2.43. **CONCULSION:** Because VR video gaming required a high intensity of physical activity, was perceived as enjoyable, and elicited a decrease in systolic BP 20-minutes post exercise, it may be a clinically relevant tool for treating metabolic diseases.

Keywords: Post Exercise Hypotension, Virtual Reality Video Gaming, Exercise Enjoyment

Board #2

IMPACT OF DIET INSTRUCTION ON ADDED SUGAR AND CALORIC INTAKE IN OLDER ADULTS: PRELIMINARY RESULTS

Hannah N. Moland (Miami University), Denise Y. Chan (Miami University), Rebecca E. Bartram (Miami University), Casey E. Heindl (Miami University), M. Elizabeth Miller (Miami University)

Abstract: PURPOSE: To examine added sugar consumption and total calorie intake in older adults and compare differences between the intervention and control group following personalized diet education. **METHODS:** Nineteen older overweight adults were randomized to either diet or control. Participants

completed 3-day diet records utilizing NDSR 2017 software at baseline and one month later. The intervention group received a personalized meal plan structured to reduce approximately one pound per week along with detailed diet instruction. The control group received just instruction on keeping detailed diet records. Paired sample and independent T tests were utilized to compare means pre and post intervention using SPSS software. **RESULTS:** At baseline, there were significant differences in added sugar consumption between the non-diet group (41.9 ±19g) and diet group (48.9±38.7g) (t(15)=-0.474, p=0.030), whereas there was no significant difference in caloric intake between the diet (Mean 2127) and non-diet groups (Mean 1894) (t(15)=-0.934, p=0.289). After one month of the diet intervention, the control group showed a significant increase in added sugar consumption (Mean 57.0±32g; (t(8)=-2.702), p=0.027) and no significant difference in caloric intake (Mean 2095;(t(8)=-0.870, p=0.409); whereas the diet intervention showed a significant decrease in calorie intake (Mean 1529; t(7)=3.46, p=0.011), and a decrease in added sugar consumption, although not significant (Mean 23.9±17g; (t(7)=1.90, p=0.099). **CONCLUSION:** This preliminary data shows a positive difference in average overall added sugars and caloric intake after diet instruction. Additionally, Given that the diet group had a higher baseline added sugar intake, the mean reduction in added sugar intake of 24g per day is practically significant and likely contributed to the reduction in overall calories in the diet. More research is warranted to explore the sources of added sugar in the diets of older adults that may contribute to obesity.

Funding: This project was funded by an NIH grant 1R15AG055923-01

Keywords: Weight management, diet, intervention, weight loss

Board #3

HEAVY ROPE EXERCISE ON HEMODYNAMICS AND ARTERIAL STIFFNESS IN RESISTANCE-TRAINED INDIVIDUALS

Jacqueline Sandor (Kent State University), Jason C. Parks (Kent State University), Erica M. Marshall (Kent State University), J. Derek Kingsley (Kent State University)

Abstract: Heavy rope exercise is utilized as a means to increase power, muscle hypertrophy and maximal strength. However, the effects of heavy rope exercise on cardiovascular hemodynamics and arterial stiffness is not known. **PURPOSE:** To evaluate the effects of an acute bout of heavy rope exercise on cardiovascular hemodynamics and arterial stiffness. **METHODS:** Fifteen resistance-trained individuals volunteered to participate. Cardiovascular hemodynamics and arterial stiffness were collected at rest, 15 (Rec1), 30 (Rec2) and 60 (Rec3) minutes after an acute bout of heavy rope exercise. Cardiovascular hemodynamics were determined through the use of photoplethysmography, and included heart rate (HR), mean arterial pressure (MAP), cardiac output (CO), stroke volume (SV), and total peripheral resistance (TPR). Arterial stiffness was measured via carotid-femoral pulse wave velocity (cfPWV). The acute heavy rope exercise consisted of six, 15-second exercise bouts, using a double wave pattern, separated by 30-seconds of passive recovery intervals; the pace of the exercise was set at 180bpm. One-way repeated measures analysis of variance were used to evaluate the main effect of time (rest, Rec1, Rec2, and Rec3) on all variables. Paired t-tests, in conjunction with a Bonferroni correction, were used for post-hoc comparisons. **RESULTS:** There were no significant main effects of time on MAP or SV. There were significant (p=0.0001) main effects of time for HR (rest: 64±11bpm; Rec1: 86±10bpm; Rec2: 78±10bpm; 72±9bpm), CO (rest: 6.8±0.7L/min; Rec1: 8.3±1.1L/min; Rec2: 7.9±0.9L/min; Rec3: 7.5±0.9L/min) and TPR (rest: 12±1.2mmHg/L/min; Rec1: 9.8±1.1mmHg/L/min; Rec2: 10.6±1.1mmHg/L/min; Rec3: 11.3±1.1mmHg/L/min . HR, and CO were elevated at all times post-exercise, and was higher at Rec1 compared to Rec2, and Rec3, and was lower at Rec3 compared to Rec1 and Rec2. TPR was reduced at Rec1, Rec2 and Rec3 compared to rest. There were also significant main effect of time for cfPWV (rest: 5.6±0.8m/s; Rec1: 5.9±0.7m/s; Rec2: 5.7±0.8m/s; Rec3: 5.5±0.7m/s; p=0.003) such that it was

attenuated at Rec3 compared to Rec1 and Rec2. **CONCLUSIONS:** These data demonstrate that acute heavy rope exercise increases cardiovascular workload for at least 30 minutes, as demonstrated by recovery of HR, CO and cfPWV back to resting values by one-hour post-exercise.

Keywords: pulse wave velocity, cardiovascular workload, cardiac output, total peripheral resistance

Board #4

COMPARISON OF PHYSIOLOGIC RESPONSES BETWEEN PRACTICE AND GAMES IN A COLLEGE FEMALE FIELD HOCKEY TEAM

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Abstract: Heart rate (HR) monitoring, GPS tracking, and accelerometry are used to evaluate players' activity levels during competition. However, few data are available from NCAA varsity women's field hockey. **PURPOSE:** We determined descriptive information related to players' game performance and compared game physiologic responses to practices. **METHODS:** Study participants included members (N=20) of an NCAA Division I female field hockey team. Data were collected from 8 games and 14 practices. Differences in practices versus games were evaluated using dependent sample t-tests. Prior to the study, HRmax was determined through a continuous graded treadmill test with increases in intensity every 2 minutes. Variables analyzed were time spent in HRzone 4 (80-90% HRmax) and HRzone 5 (>90% HRmax), maximum speed achieved, total distance, and number of sprints performed. A sprint was defined as any movement greater than 2.4m/s^2. Sprints and distance were calculated per minute to control for playing time and the difference in duration of games and practices. Games are played in two 35-minute halves, resulting of a maximum of 70 minutes of playing time. The midweek practices ranged in duration from 90-120 minutes with a mixture of coaching and running. **RESULTS:** Players spent significantly more time in HRzone 4 (30%) and HRzone 5 (50%) during games compared to practice (16% in HRzone 4 and 17% in HRzone 5) ($p<0.001$). Significant differences were seen between distance traveled (m/min) in games (101.8±12.6) versus practices (45.7±5.7) ($p<0.001$). Players performed more sprints per minute in games (0.55±0.19) compared to practices (0.24±0.05) ($p<0.001$). Maximum speed (km/hr) between games (26.2±1.8 km/hr) and practices (26.3±2.0 km/hr) was not significantly different. **CONCLUSION:** Heart rate data show that field hockey is an intense aerobic sport, with high burst interval runs being performed throughout competition. Our data suggest that game intensity is higher than practice intensity. The data in this study is a team average, therefore, individual differences exist. It is useful for coaches to see the team as a whole, and asses their training plans so that the players physiologic responses more closely match game conditions. Coaches can use these results to help tailor practice schedules and game strategies.

Keywords: Division I, sport, heart rate

Board #5

A FITNESS FIELD TEST TO PREDICT VO2MAX IN FEMALE COLLEGIATE FIELD HOCKEY PLAYERS

Jennifer M. Morton (Ohio University), Elise Katz (Ohio University), Zach Glay (Ohio University), Ian E. Klein (Ohio University)

Abstract: Field hockey is a competitive, fast paced sport requiring aerobic fitness. The current standard method for determining aerobic fitness is a maximal oxygen consumption (VO_2max) test performed in a laboratory on a motorized treadmill (LAB) by a trained professional. The 30-15-intermittent fitness test (FIELD) is a new maximal effort running test that has been designed to predict VO_2max on the field as compared to a traditional treadmill graded exercise test (GXT) performed in a controlled laboratory setting. **PURPOSE**: To compare the predicted VO_2max using the 30-15-intermittent FIELD test to the measured VO_2max LAB test in collegiate female field hockey players. **METHODS**: Nine (N=9) experienced female collegiate field hockey players (mean age=19.78±1.56 yrs., field hockey experience=8.80±2.49 yrs.) were classified as healthy via a health assessment consisting of height (ht), weight (wt), and body fat (BF%). Each participant completed a LAB GXT test in a temperature-controlled laboratory using a metabolic cart and motorized treadmill, followed by the FIELD test on a standardized turf field as a group under the same conditions. The FIELD test consists of a series of 30 second shuttle runs with 15 second intermittent walking breaks with an increase in speed every shuttle run of 0.5 km/hr. The FIELD test uses an equation to predict VO_2max. Both tests were completed to exhaustion. All results are reported as mean±SD. Statistical significance was accepted at α=0.05. Paired *t*-tests (α=0.05) were utilized to compare means between groups. **RESULTS**: There was no significant difference between predicted VO_2max (FIELD 46.15±3.22 mL/kg*min) and measured VO_2max (LAB 48.68±6.94 mL/kg*min) (p=0.102). The percent difference between the LAB test and FIELD test averages was -4.25±8.37. There was a significantly greater percentage difference between the most fit participants (n=4) (-11.23±5.84) compared to the least fit participants (n=4) (+2.46±5.21) (p=0.011). **CONCLUSION**: The predicted VO_2max values using the FIELD test were similar as compared to the measured LAB test. However, greater percentage differences were seen in higher fit athletes. Coaches and athletes should consider the 30-15 intermittent field test as a potentially inexpensive and time efficient test for predicting VO_2max in a large group.

Keywords: Athletics, Running, Health

Board #6

DIFFERENCES BETWEEN NCAA DIVISION II MALE AND FEMALE ATHLETES' MULTI-DIMENSIONAL WELLNESS LEVELS

Jordan Ellis (University of Indianapolis), Kerigan Ertel (University of Indianapolis), Mindy Mayol (University of Indianapolis), Urska Dobersek (University of Southern Indiana)

Abstract: Few studies have targeted NCAA Division II student-athletes (SAs) as it relates to multi-dimensional wellness. **PURPOSE:** To investigate differences in wellness levels between male and female SAs competing at this level. **METHODS:** Overall, 530 SAs (n_{males} = 355, $n_{females}$ = 175) with an age range of 18 to 23 (M = 19.40, SD = 1.33) from 21 teams voluntarily completed the paper-based Multi-Dimensional Wellness Inventory (MDWI) (Mayol, Schreiber & Scott, 2017). The 45-item MDWI measures one's perceived behavior with respect to personal wellness orientation within nine dimensions: physical wellness exercise (PWE), physical wellness nutrition (PWN), mental (MW), social (SW), spiritual (SPW), intellectual (IW), environmental (EW), occupational (OW) and financial (FW). A factorial MANOVA was used to analyze the differences in male and female SAs' wellness levels. An alpha level of $p \leq .05$ was set for statistical significance. **RESULTS:** Findings revealed a statistically significant multivariate effect in SAs, $F(9, 451) = 6.75$, $p < .001$, Wilk's $\Lambda = .88$, partial $\eta 2 = .12$, with five significant univariate main effects seen for PWN, $F(1,$

459) = 9.92, p =.002; SW, $F(1, 459) = 14.17$, $p < .001$; SPW, $F(1, 459) = 8.11$, $p = .005$; EW, $F(1, 459) = 8.43$, $p = .004$; and OW, $F(1, 459) = 5.24$, $p = .023$. Female SAs showed higher means for PWN ($M = 14.43$, $SD = 3.29$; $M = 13.36$, $SD = 3.40$), SW ($M = 17.08$, $SD = 2.14$; $M = 16.18$, $SD = 3.32$), SPW ($M = 15.44$, $SD = 1.83$; $M = 14.87$, $SD = 2.03$), EW ($M = 15.08$, $SD = 2.65$; $M = 14.24$, $SD = 2.70$), and OW ($M = 16.34$, $SD = 2.30$; $M = 15.81$, $SD = 2.36$). No statistically significant findings were demonstrated for the remaining wellness dimensions (PWE, MW, IW, and FW) ($p > .05$). **CONCLUSIONS:** Results demonstrated higher scores for female SAs in five wellness dimensions when compared with male SA scores. Future studies are recommended to better understand well-being in collegiate SAs relating to sex differences and the possible impacts on athletic performance and personal development through the emerging adulthood phase.

Funding: UIndy Internal InQuery Collaborative Grant

Keywords: holistic wellness; college athletes

Board #7

A COMPARISON OF THE METABOLIC COST OF RUNNING IN SUB 2-HOUR MARATHON RACING SHOES

Jordan Juzwiak (Grand Valley State University)

Abstract: A sub 2-hour marathon requires an average velocity that is 2.5% faster than the current world record of 2:02:57 and could be accomplished with a 2.7% reduction in metabolic cost (VO_2) during running. Footwear mass, cushioning, and longitudinal bending stiffness each affect VO_2 during running. Recently, major shoe companies have developed racing shoes to help runners break the 2-hour marathon barrier. **PURPOSE:** To determine if these new marathon racing shoes reduce VO_2 compared with established marathon racing shoes in well-trained runners. **METHODS:** 25 highly-trained male and female runners ran 5×5-min trials at 16 and 15 $km \cdot h^{-1}$, respectively in Vaporfly (NVF), Sub2 (SUB2), and Adios 3 (ADI) shoes in a randomized counterbalanced design, followed by a maximal aerobic capacity test. Subjects' VO_2, heart rate, lactate, and biomechanical stride characteristics (contact time, stride length, and stride rate) were measured throughout each trial. **RESULTS:** Compared to all other shoe models, the NVF shoe decreased VO_2 in all subjects tested. For men, the NVF shoe decreased VO_2 by 2.8 ± 0.8% compared to SUB2 ($p < 0.001$, ES = 0.78) and 2.7 ± 0.8% compared to the ADI ($p < 0.001$, ES = 0.75). For women the NVF shoe decreased VO_2 by 2.6 ± 1.2% compared to SUB2 ($p < 0.05$, ES = 0.43) and 1.5 ± 1.1% compared to the ADI ($p < 0.05$, ES = 0.28). There were trivial differences ($p > 0.18$, ES < 0.15) between SUB2 and ADI. The NVF shoe was associated with 1.1% increase in stride rate and a 1.8% increase in stride length when compared to SUB2 in men. The NVF shoe was also associated with a 1.8% decrease in contact time compared to SUB2 in women. Other measures of running mechanics between NVF and SUB2 were not found to vary significantly between shoes. **CONCLUSION:** The NVF shoes substantially reduced metabolic cost compared to SUB2 and ADI. While this is the first study to examine the differences between two shoes both designed for athletes to break the 2-hour marathon barrier, the magnitude of effect on marathon racing time is difficult to predict based on metabolic cost alone.

Funding: Grand Valley State University Student Summer Scholars program

Keywords: Running economy; energetic cost; running shoes; running performance

Board #8

THE EFFECT OF LOW AND HIGH - ACTIVITY WORKDAYS ON BLOOD SERUM LEVELS OF LEPTIN AND GHRELIN

Julia A. Noonan (Taylor University), Zach Ham (Taylor University), Erik Hayes (Taylor University), Daniel King (Taylor University)

Abstract: Many jobs in our country are performed while sitting at a desk, encouraging much of working America to lead highly sedentary lives. Still, diet in addition to activity determines an individual's energy balance. **PURPOSE:** To learn more about the effects of inactive work behavior on the blood levels of leptin and ghrelin, hormones related to energy expenditure and appetite regulation, seven subjects participated in a low-activity workday and a high-activity workday while collecting blood samples before and after each day. **METHODS:** The low activity intervention required subjects to take fewer than 1,000 steps while the high activity intervention required subjects to take more than 10,000 steps between 8am and 5pm. Finger pricks were used to collect approximately 2 mL of blood from each subject at the beginning and end of each workday. Blood samples were spun down, and serum was stored frozen until analyzed by ELISA. **RESULTS:** The cohort's average morning blood serum leptin concentration was approximately 8.7ng/mL. Using a paired t-test, the subjects' blood serum leptin levels did not undergo a statistically significant change (p_{value}=0.35) during the low activity workday, decreasing by only 3%. The high activity workday, however, yielded an average decrease of 18% in blood serum leptin levels that was nearly statistically significant (p_{value}=0.064). Furthermore, there was a statistically significant difference between the post-low activity and post-high activity workdays (p_{value}=0.046). The cohort's average morning blood serum ghrelin concentration was approximately 7.8ng/mL. The subjects' blood serum ghrelin levels did not undergo a statistically significant change during either the low activity workday (p_{value}=0.16) or the high activity workday (p_{value}=0.19), increasing by 29% and 25%, respectively. Similarly, there was not a statistically significant difference between the post-low activity and post-high activity workdays (p_{value}=0.51). **CONCLUSION:** The activity level of the subjects had little effect on the blood serum concentration of ghrelin. However, a 10,000 step workday was sufficient to significantly impact the blood serum concentration of leptin. Perhaps equally important, an inactive workday results in virtually no change in leptin levels from the beginning to the end of the workday.

Keywords: treadmill desk, ELISA

Board #9

ASSOCIATIONS AMONG OBJECTIVELY AND SUBJECTIVELY MEASURED PHYSICAL ACTIVITY IN OLDER ADULTS

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Abstract: Less than thirty-percent of older adults (>65y) meet the physical activity (PA) requirements outlined by Centers for Disease Control and Prevention. PA has been reported to reduce the risk of diseases/conditions such as hypertension, type II diabetes, coronary heart disease, depression, and cancer—highlighting its importance as a modifiable, health-related factor. Consequently, it may be clinically useful for physicians to be able to assess PA in their patients. Thus, the **PURPOSE** of this study was to evaluate the validity of the Community Healthy Activities Model Program for Seniors (CHAMPS) questionnaire compared to a more objective measure of PA using accelerometry. **METHODS:** In 36 adults (≥ 58y) we assessed physical activity

via questionnaire (CHAMPS) and 7-day accelerometry (Actical); and body composition (bioelectrical impedance). For accelerometry, subjects were advised to continue their habitual activity level. Pre-established cut-points for accelerometry interpretation were: sedentary (<100 counts/min); light PA (100-431 counts/min); moderate-to-vigorous PA (MVPA) (>431 counts/min). MVPA for CHAMPS included activities with MET values ≥ 3.0 METs). Associations were examined utilizing partial correlations (controlling for age and sex). **RESULTS:** Mean values for these subjects included: age= 67.3±6.4y; BMI= 29.6±7.2 kg/m^2; body fat percentage (36.2±11.7%); CHAMPS MVPA= 1410±1257 kcal/wk. Mean values for accelerometry were: wear time: 14.2±2.0 h/day; counts/min: 102±53; accelerometer MVPA= 56.2±28.2 min/day. CHAMPS MVPA was significantly correlated with accelerometer counts/min (r= 0.48, p= 0.008) and accelerometer MVPA (r= 0.40, p= 0.026). CHAMPS MVPA was inversely correlated with body fat percentage (r= -0.38, p= 0.036). **CONCLUSION:** These preliminary data suggest that the CHAMPS questionnaire may provide clinicians with a suitable estimation of their patients' habitual physical activity level.

Funding: Supported by a grant from the National Institute on Aging: 1R15AG055923-01.

Keywords: accelerometer, CHAMPS, actical, physical activity

Board #10

VALIDITY OF A CELL PHONE APPLICATION FOR THE ASSESSMENT OF FUNCTIONAL FITNESS OUTCOMES

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Abstract: We developed a cell phone application (App) to improve the feasibility of fitness test data collection, and to automatically calculate outcomes. **PURPOSE**: To validate the App against slow motion video analysis for the 30-s Chair Stand, 8-ft Up-and-Go, and 400 m Walk Test. **METHODS**: Fifteen subjects were randomly selected from our Steps Taken Against Neuromuscular Decline (STAND) Initiative cohort for this validity assessment. Each subject completed a single trial of the 30-s Chair Stand, 8-ft Up-and-Go, and 400 m Walk Test (in that order). One investigator assessed the subject using the App, while another filmed the test at 240 frames per second. The videos were played back frame-by-frame to manually timestamp the same events that were timestamped live using the App. The mean difference between the App and video was assessed with paired *t*-tests, and 95 percent Limits of Agreement were established to represent the random error between the two measures. **RESULTS**: No significant mean difference between the App and slow motion video was detected for any 30-s Chair Stand or 400 m Walk Test outcome, or for total time to complete the 8-ft Up-and-Go. The mean difference between the App and video was relatively small for the number of chair stands (0.1 stands), total time to complete the 8 foot Up and Go (0.08 s), and steady-state gait speed during the 400 m Walk Test (0.002 m/s). Additionally, the 95 percent Limits of Agreement were narrowest for the 30-s Chair Stand and 400 m Walk Test components, and total time on the 8-ft Up-and-Go. **CONCLUSION**: The App validly assessed all 30-s Chair Stand and 400 m Walk Test outcomes, and total time to complete the 8-ft Up-and-Go. Given that the App is as or more valid than existing technologies, with respect to the outcomes it reports, its greater feasibility may make it an appropriate addition to clinical and fitness settings.

Keywords: Senior Fitness Test; gait; 30-s Chair Stand; Up-and-Go

Board #11

ASSESSMENT OF THE RELIABILITY OF PRACTICAL BLOOD FLOW RESTRICTION SQUAT EXERCISE

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Abstract: During practical blood flow restriction (pBFR) exercise, elastic wraps are applied proximally to the exercising limb at a perceived tightness of "7/10". Significant increases in muscular strength and hypertrophy have been reported following pBFR resistance training. However, the reliability of the pBFR technique across multiple exercise sessions remains elusive. **PURPOSE:** To investigate the reliability of the pBFR technique during squatting exercise by assessing potential changes in internal workloads (surface electromyography, EMG; rating of perceived exertion, RPE). **METHODS:** Four subjects (age = 21 ± 1 years, height 1.73 ± 0.11 m, weight = 65.8 ± 11.2 kg, 1 RM = 100.6 ± 47.2 kg) completed a one repetition maximum (1 RM) squat and pBFR familiarization during session one. During session two and three, subjects completed four sets (30, 15, 15, 15 repetitions) of squat exercise with a load of 30% 1RM and elastic wraps applied to the proximal thighs at a perceived tightness of "7/10" (pBFR). Exercising muscle activation was recorded from the vastus lateralis using EMG and RPE was record after each exercise set. Exercising EMG data from the concentric phase was analyzed using root means squared and normalized to a maximal voluntary contraction (MVC). Repeated measures, two-way ANOVA was used to examine the effect of session and repetition on EMG. Repeated measures, two-way ANOVA was used to determine the effect session or exercise set had on RPE. **RESULTS:** Session1 resulted in higher EMG compared to session 2 during exercise set 3 (Session 1 = 89.6 ± 27.0% MVC, Session 2 = 54.0 ± 20.9% MVC) and set 4 (Session 1 = 94.3 ± 29.4% MVC, Session 2 = 54.3 ± 10.4% MVC, p = 0.001 – 0.008). Session 1 (8.0 ± 1.0) resulted in higher RPE compared to session 2 (7.0 ± 1.2, p = 0.002). **CONCLUSION:** According to our pilot data, it does not seem that the perceived tightness used during pBFR exercise provides reliable internal workloads during multiple sessions. Furthermore, our data showed a decrease in internal workloads (EMG and RPE) during session 2 compared to session 1.

Keywords: Resistance Training, Muscle Activation, Rating of Perceived Exertion

Board #12

KINEMATIC DIFFERENCES BETWEEN KNEE SCOOTER AND CRUTCHES

Kristen Mazzola (Oakland University), John Palazzolo (Oakland University), Thomas Brennan (Oakland University), Raven Semma (Oakland University), Christopher Wilson (Oakland University), Charles R.C. Marks (Oakland University)

Abstract: PURPOSE: This study analyzed the variations in lower extremity joint kinematics between axillary crutch gait and knee scooter gait. **METHODS:** Nineteen apparently healthy young adults were recruited to act as their own comparison group across three modalities: natural walking, axillary crutches, and knee scooter. The first day involved fitting and practice with the assistive devices while on the second day, forward movement along a 9 m straight path was done and the middle third distance was video captured. Sagittal plane Range of Motion (ROM, negative value is extension) for the hip, knee, and ankle joints was analyzed per affected limb (AL, simulated injured foot) and unaffected limb (UAL) (order randomized). An overall alpha = .05 was used for 2 (limb) x 3 (modality) Repeated Measure (RM) ANOVA and paired t-testing for post hoc analysis with a

Bonferroni and Holms sequential adjustment. **RESULTS:** RMANOVA for both the Hip and Knee had significant main effects and interaction while the Ankle had only a significant limb main effect and interaction. ROM for the HIP: UAL: -6.5 ± 6.3^{O} (Walk), -22.7 ± 8.5^{O} * (Crutches), -9.7 ± 7.6^{O} * ** (Knee Scooter); AL: -5.9 ± 8.3^{O} (Walk), -20.4 ± 8.7^{O} * (Crutches), 4.9 ± 10.0^{O+}* ** (Knee Scooter). ROM for the KNEE: UAL: 31.2 ± 8.3^{O} (Walk), 15.8 ± 9.9^{O} * (Crutches), 10.3 ± 5.7^{O} * ** (Knee Scooter); AL: 30.5 ± 9.0^{O} (Walk), 1.4 ± 10.3^{O+} * (Crutches), 4.7 ± 5.3^{O+} * (Knee Scooter). ROM for the ANKLE: UAL: -12.2 ± 6.7^{O} (Walk), -17.4 ± 7.2^{O} * (Crutches), -20.9 ± 8.4^{O} * (Knee Scooter); AL: -11.1 ± 5.2^{O} (Walk), -2.7 ± 5.1^{O+} * (Crutches), -.8 ± 2.3^{O+} * (Knee Scooter). Significantly different from *walking, ** crutches, $^{+}$UAL. **CONCLUSION:** Compared to Crutches**,** the Knee Scooter requires less hip and knee ROM for the UAL, possibly relying, in part, on "coasting" to move. In addition, the Knee Scooter had the Hip switch to flexion in the AL, possibly in response to trunk "rocking" during push off with the UAL.

Funding: Funded, in part, by an Oakland University Honors College Grant

Keywords: Joint Angles, Ambulatory Assistive Devices, Video Capture, ROM

Board #13

NEUROMUSCULAR AND MECHANICAL INDICES OF RESISTANCE EXERCISE-INDUCED MUSCLE FATIGUE IN WOMEN

Kristen Pleasant (Miami University), Valerie Schmitz (Miami University), Lauren Estes (Miami University), Jarod Vance (Miami University)

Abstract: It has been previously shown that spectral-frequency electromyographic (EMG) measurements are indicative of local acute muscle fatigue during dynamic resistance exercise. Our research attempts to determine if external mechanical measurements can also demonstrate muscle fatigue from resistance exercise. **Purpose:** To examine women's neuromuscular & mechanical indices of acute local muscle fatigue (MF) during high-intensity resistance exercise (RE) across the first 4 repetitions (R_1 to R_4) of the first set (S) to failure. EMG measurements of median frequency (MedF), mean frequency (MeanF) & total power (TP) & external mechanical variables of concentric work (ConcW), concentric power (ConcP), & concentric velocity (ConcV) of the vastus lateralis (VL), rectus femoris (RF), & vastus medialis (VM) were analyzed during a 1-leg knee extension (1-LKE) RE at 90% of 1-repetition maximum (1-RM) of the right leg. **Methods:** Two testing days were completed by 31 women (age=20.4 ± 1.6 yrs; percent fat=21.9% ± 5.2). Day 1: participants completed a 1-RM of the 1-LKE RE. Body composition & anthropometric data were collected. Day 2: subjects performed 90% 1-RM for as many S & R as possible until failure to complete another R occurred. An ultrasound sensor (NI-cRIO & custom-built software (NI-LabView) was used to collect mechanical data. A series of 4 (reps) X 3 (muscles) ANOVA with repeated measures & specific pairwise comparisons were made with *a-priori* contrasts to assess EMG data; a series of 1-way (R) ANOVA's assessed mechanical variables. **Results:** ConcV & ConcP for R_1-R_2 was significantly greater than R_3-R_4 ($p<0.001$). ConcW significantly decreased for R_4 vs R_1-R_3 ($p<0.05$). EMG for VM, VL & RF exhibited similar patterns of activation across all R. TP, MedF, & MeanF during R_1-R_2 was significantly less than R_3-R_4 ($p<0.05$). **Conclusion:** EMG responses representative of local neuromuscular fatigue begin to occur after R_2 during 90% of 1-RM 1-LKE RE. Similarly, ConcV & ConcP significantly decrease after R_2, with a small decrease in ConcW at R_4. This data suggests that external measures of ConcV & ConcP can be used as proxy measures of local neuromuscular fatigue during high-intensity knee extension RE.

Funding: This project was partially funded through a Miami University Faculty Research Award and the Miami University Undergraduate Summer Scholars Program.

Keywords: knee extension, resistance training, EMG, work

Board #14

ASSOCIATIONS BETWEEN WEIGHT-BEARING HIP ROTATION DEFICITS AND PARTICIPATION IN ROTATIONAL SPORTS

L. Remski (Grand Valley State University)

Previous studies have established that hip related pathologies (such as low back pain) are present in athletic and non-athletic populations with asymmetric hip rotation range of motion (ROM), however, it is unknown if participation in sports that require repetitive, weight-bearing (WB) hip rotation may increase an individual's odds of developing asymmetric hip rotation. **PURPOSE:** To determine if there is an association between participation in rotational sports and WB hip rotation ROM asymmetry. **METHODS:** Participants' sport history and WB hip rotation ROM, measured using Functional Footprint® devices, were analyzed to assess if rotational sports were associated with clinically relevant ROM deficits (defined as ≥20% Symmetry Index). Odds ratios and Chi-Square tests were used to determine if rotational sports were associated with inter-limb hip rotation asymmetry. Two-sample t-tests were used to compare average symmetry indexes between groups. Follow-up one-proportion z-tests were used to determine whether it was the dominant or non-dominant limb that was affected among participants with clinically relevant inter-limb deficits. **RESULTS:** Participation in rotational sports was related to clinically relevant inter-limb ROM asymmetry for external rotation ($p=0.0008$) and similarly for total rotation, although it did not reach statistical significance ($p=0.0503$). Of those with inter-limb external rotation asymmetry, the majority of deficits were associated with the non-dominant limb ($p=0.0016$). Inter-limb deficits in internal rotation were primarily seen in the dominant limb; however, this did not reach significance ($p=0.0593$). **CONCLUSION:** Participation in rotational sports appears to be related to inter-limb external rotation asymmetry and total rotation asymmetry for WB hip rotation ROM. External rotation inter-limb asymmetry was related to deficits in the non-dominant limb while internal rotation inter-limb asymmetry appears to be related to deficits in the dominant limb.

Keywords: range of motion

Board #15

NEUROMUSCULAR INDICES OF EXERCISE-INDUCED FATIGUE IN QUADRICEPS MUSCLES OF MALES AND FEMALES

Lauren E. Estes (Miami University), Andrew Renggli (Miami University), Kristen Pleasant (Miami University), Jarod Vance (Miami University), Randal Claytor (Miami University)

Abstract: Current developments in technology suggest the next generation of resistance exercise (RE) machines will enable a real-time, feedback-control mechanism to continuously modify an external resistance load based on changes in the neuromuscular and physiological response patterns that occur during RE. **Purpose:** To examine neuromuscular indices of acute, local fatigue in the quadriceps muscles of healthy men and women. Specifically, to identify possible implications of dissimilar hip anatomy and potential resultant differences in EMG patterns of muscle activation between men and women with respect to the rectus femoris (RF), vastus lateralis (VLO) and vastus medius (VMO) muscles during high-intensity RE. **Methods:** 33 females (F) (age=20.42(1.6) yr.) and 39 males (M) (age=20.34(.94) yr.) underwent anthropometric, body composition, and one-repetition maximum (1-RM) testing for a single-leg, leg extension RE. At least 96 hours

later, subjects performed multiple sets (S) of a single-leg, leg extension RE at 90% 1-RM until complete acute muscular fatigue (failure to complete a single repetition). Spectral-frequency measures of Total Power (TP), Median Frequency (MedF), and Mean Frequency (MF) were analyzed for repetitions (R) 1-4 and the last R (Rf) of S1. A 3(Muscle) X 5(Reps) GLM-ANOVA with Repeated Measures and *a-priori* contrasts for Sex and dependent variables was used to make specific comparisons. **Results:** TP, MedF and MF for R1-2 compared to R3-4 and Rf differed significantly in each muscle (VLO, RF, VMO) for both F and M (F-RF-TP-R2=61143(17499) V2/Hz; M-RF-TP-R2=131062(17505) V2/Hz vs F-R4=123212(48406) V^2/Hz; M-R4=253704(48507) V^2/Hz; F-RF-MedF-R2=63.4(1.3) Hz; M-RF-MedF-R2=71.2(1.2) vs F-R4=57.5(1.1) Hz vs M-R4=64.8(1.0) Hz; F-RF-MF-R2=70.6(1.6) Hz; M-RF-MF-R2=82.9(1.6) Hz vs F-R4=62.8(1.4) Hz; M-R4=75.6(1.3) Hz; ($p<0.001$, respectively). However, there was a significant Muscle-by-R-by-Sex interaction ($p<0.05$). MedF & MF for R3-4 & Rf in VMO decreased significantly less in F as compared to M (F-VMO-MedF-R4=56.7(1.3) Hz vs M-VMO-MedF-R4=61.8(1.2) Hz; F-VMO-MF-R4=62.5(2.2) Hz vs M-VMO-MF-R4=72.3(2.2) Hz). **Conclusion:** These data suggest males and females exhibit a different pattern of muscle activation as fatigue progressed in order to maintain work (i.e., force) necessary for movement. Specifically, MedF and MF of the VMO in females is suggestive of less acute muscle fatigue as compared to males - a possible implication of dissimilar hip anatomy.

Keywords: Electromyography, Leg Extension

Board #16

THE ACUTE PHYSIOLOGICAL EFFECTS OF ELEVATION TRAINING MASKS

Luke Kraeszig (Franklin College), Donald Deiwart (Franklin College), Christian Amonett (Franklin College), Kyra Noerr (Franklin College)

Abstract: Elevation training mask products claim that exercisers can achieve greater benefits in shorter bouts of exercise because the masks simulate a hypoxic stimulus similar to exercising at high altitudes. These claims can be disputed as the masks do not directly affect the pressure of the air being consumed. However, the restriction of ambient airflow intake during exercise may still provide a unique acute physiological stimulus during exercise that has yet to be explored. **PURPOSE:** To investigate the acute effects resulting from exercising with an elevation training mask compared to exercising without. Specific variables of interest in this study were heart rate (HR), spirometry values (FVC, FEV_1), blood lactate accumulation (BLA), blood pressure (BP) and rating of perceived exertion (RPE). **METHODS:** 12 college age males (ages 18 to 23 years old) volunteered for this study. The study employed a cross-over design where all participants performed both control and experimental protocols running without the mask (NoMASK) and running with the mask (MASK). Resting values of HR, FVC, FEV_1, BLA, BP, and RPE were taken then the participants were randomly assigned to run with or without the mask on a treadmill at 7 mph for 12 minutes. Physiologic variables and RPE were measured immediately after the conclusion of the exercise. A paired sample t-test was used to evaluate differences between the variable data for each protocol. **RESULTS:** The percent difference between start and finish HR for the MASK protocol (M = 0.694, SD = 0.182) was higher than that of the NoMASK protocol (M = 0.642, SD = 0.21271); t(11) = 2.468, p = 0.31. RPE was also higher for the MASK protocol M = 13.75, SD = 2.832) compared to the NoMASK protocol (M = 12.00, SD = 0.738); t(11) = 3.656, p = 0.004. **CONCLUSION:** The elevation training mask elicited a greater acute cardiovascular response and perceived exertion during a 12-minute bout of exercise. While these masks do not simulate a hypoxic environment, they may still provide a unique training tool for those wishing to increase cardiovascular demand for specific training purposes.

Keywords: performance, elevation, spirometry, perceived exertion

Board #17

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

Matthew D. Doyle (Miami University), Vincent M. Smith (Miami University), Gabrielle A. Volk (Miami University), Kevin D. Ballard, FACSM (Miami University), Kyle L. Timmerman, FACSM (Miami University)

Abstract: 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 may contribute to vascular dysfunction that increases CVD risk. **PURPOSE**: We sought to determine associations among indices of IR/glucose control and brachial artery FMD in older, overweight adults. We hypothesized that brachial artery FMD would be inversely associated with indices of IR/glucose control. **METHODS:** Data are from older, overweight adults [n = 20 (16 women); age = 64.2 ± 4.8 y; BMI = 35.3 ± 5.3 kg/m^2] participating in an ongoing clinical study. Brachial artery FMD was assessed by a trained technician using high-resolution ultrasonography following an overnight fast. Additionally, fasting blood glucose (FBG) and serum insulin concentrations, HOMA-IR, hemoglobin (Hb)A1c, and blood glucose responses (i.e., 2 h area under the curve ($AUC_{0\text{-}2\ h}$)) to mixed meal ingestion (0.3 g protein/kg lean body mass + 0.5 g glucose/kg lean body mass) 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 = 3.7 ± 2.2) but not diabetic (FBG = 99.5 ± 9.5 mg/dL, HbA1c = 5.5 ± 0.2%). Brachial artery FMD (3.4 ± 1.6%) was not correlated (all $P \geq 0.44$) with FBG (r = -0.18) or serum insulin (r = -0.07), HOMA-IR (r = -0.13), HbA1c (r = -0.19), or blood glucose $AUC_{0\text{-}2\ h}$ (r = -0.23). **CONCLUSION:** Preliminary data from our ongoing clinical study show that indices of IR/glucose control are not associated with brachial artery FMD in older, overweight adults. Continued recruitment of participants will more definitely determine the potential contribution of IR to vascular dysfunction.

Funding: Supported by National Institute on Aging (1R15AG055923-01)

Keywords: Glucose Control, Flow-Mediated Dilation, Diabetes, Obesity

Poster Session #3:
Crown Foyer – 10:40-11:55am

Board #1

COMPARISON OF MAXIMAL EXERCISE BETWEEN ELLIPTICAL BICYCLE AND TREADMILL RUNNING IN MALE RUNNERS

Moore D. Alexis (Ohio University), Dunn C. Tyler (Ohio University), Klein E. Ian (Ohio University)

Abstract: Running is an effecting way to improve cardiovascular function, overall health, and fitness. Impact-related injuries can occur in runners. Alternative methods of training such as the running-similar, non-impact elliptical bicycle (EBIKE) have been developed with the purpose of providing non-impact, running-similar exercise while eliciting maximal intensities. Research has provided that the EBIKE can maintain physiological variables over a 4-week period. **PURPOSE:** To compare maximum oxygen consumption (VO_2max) levels on a treadmill versus an elliptical bicycle in male distance runners. **METHODS:** Nine male participants (N=9) were selected through a preliminary screening process consisting of health history and running questionnaires. Age (19.89±1.36yrs), BMI (22.2±1.93) and running experience (6.67±1.80yrs) were all collected during this screening process. Participants were randomly assigned to two groups: EBIKE or treadmill (TM). Participants performed a graded exercise test (GXT) to exhaustion while heart rate (HR), VO_2, ventilation (VE), respiratory exchange ratio (RER), and rate of perceived exertion (RPE) were measured throughout via a HR monitor and a metabolic cart. Following the completion of testing session one, each participant switched modality. These sessions were separated by 2-7 days. The TM experiment utilized speed and grade whereas the EBIKE GXT increased cadence and gears. All results were reported as mean±SD. Paired *t*-tests ($\alpha<0.05$) were utilized to compare the physiological variables between groups. For non-parametric data, Wilcoxon signed-rank tests were used. **RESULTS:** The TM group had a significantly greater VO_2max of 70.25±6.76 (ml/kg/min) as compared to the EBIKE group, 64.94±6.61 (ml/kg/min) (p=0.003). Maximal values for the TM were also significantly greater for RERmax (p=0.004), VEmax (p=0.026), and lactate (p=0.043). Despite no significant difference between whole body RPE, (EBIKE [19.11±0.78] and TM [18.89±0.78]) (p=0.480), there was significant difference for lower body RPE with values of, (EBIKE [19.44±0.73] and TM [18.67±0.87]) (p=0.008). **CONCLUSION:** In this study the comparison of VO_2max using a TM produced greater VO_2max values than those obtained on the EBIKE. However, coaches and athletes interested in competitive physiological alternatives to running, should be aware that VO_2max levels obtained on TM were not met on the EBIKE. A higher number of participants from both genders are needed to confirm these results.

Funding: ElliptiGO

Keywords: Physiological response, VO2max

Board #2

COMPARISON OF WEIGHT LOSS TRAJECTORIES AND STRATEGIES AMONG TWO PARTICIPANTS IN A DIET INTERVENTION

Rebecca E. Bartram (Miami University), Beth E. Miller (Miami University), Denise Y. Chan (Miami University), Casey R. Heindl (Miami University), Hannah N. Moland (Miami University)

Abstract: PURPOSE: To compare weight loss trajectories and strategies utilized in two older adult female participants enrolled in a weight management longitudinal study. **METHODS:** Adults 58 years and older in this study were randomized to one of four 6-month intervention groups: control, diet only, diet and exercise, and

exercise only. Participant one (P1) was randomly assigned to diet only and participant two (P2) to diet + exercise. Following baseline assessment of anthropometric values and resting energy expenditure (REE), participants received a customized meal plan based on their REE minus 500 kilocalories for weight loss of one pound per week. Participants also received a detailed diet instruction. Baseline and bi-weekly weights were measured using the bioelectrical impedance. Three-day diet records were collected at baseline and monthly using the Nutrition Data System for Research (NDSR) 2017. P2 exercised 90 minutes a week while P1 was restricted to minimal exercise. Waist circumference was measured at baseline and at midpoint.
RESULTS: Using the Mifflin St-Jeor equation, weight loss energy requirements for P1 and P2 were calculated to be 1300 and 1500 kilocalories, respectively. Over the first four months, P1 had an average caloric intake of 1180 kilocalories and a weight loss of 11.42% of body weight (BW), whereas P2 had an average intake of 1645 kilocalories and a 1.39% BW loss. At the midpoint screening, P1 had a decrease of 13 cm in her waist circumference compared to a 1.5 cm reduction for P2. Weight loss strategies reported by P1 and P2 indicated multiple efforts by both to manage their weight. **CONCLUSION:** Despite both participants reporting high efforts to lose weight, P1 showed greater reduction overall compared to P2. These results show that weight loss is most successfully achieved with diet as opposed to exercise. These results are consistent with previous findings that diet only is the most successful in achieving weight loss, while diet and exercise are effective in maintaining the weight loss.

Funding: This project was funded by an NIH grant 1R15AG055923-01

Keywords: Diet, Weight Loss, Weight Management, Diet Intervention

Board #3

A PROGRESSIVE TRANSITION TO BAREFOOT RUNNING PROGRAM INCREASES RUNNING PERFORMANCE AND ECONOMY

Rebecca L. Brummel (Taylor University), Matthew S. Renfrow (Taylor University), Phebe Biggar (Taylore University)

Abstract: Barefoot (BF) running has had a recent surge in popularity and while running BF may reduce the risk of certain running-related injuries, the effects of BF running on running economy (RE) and performance is unclear. **PURPOSE**: To investigate the effects of a 6-week progressive BF vs. shod running program on RE and running performance in college-aged recreational runners. **METHODS**: Seven male and female recreational runners completed a 6-week training program where participants were randomly assigned to BF and shod groups. Testing involved a timed 1-mile run (running performance) and oxygen consumption at 75% of the pace of participants' mile time (RE). The training protocol progressed in running pace as well as frequency, beginning with 3 days/wk at 60% of assessed mile time and increased to 5 days/wk at 80% of mile time. The BF group gradually transitioned into BF running, beginning with 1 run/wk BF (with the other days running shod), progressing to all 5 runs completed BF. **RESULTS**: Statistical differences in RE between groups over time were observed using RMANOVA. The running intervention resulted in an improved RE (pre-test: 32.45±8.53 ml/kg/min; post-test: 30.95±8.64 ml/kg/min; $p<.05$) in the BF group while no difference was observed in the shod group. The timed 1-mile run for both groups improved as a result of the intervention (BF pre-test: 8.36±1.40 min, post-test: 7.93±1.19 min; shod pre-test: 7.86±0.59 min, post-test: 7.32±0.73 min; $p<.05$). **CONCLUSION**: The progressive BF running program resulted in improvements in RE and performance over a 6-week training period. These findings may be due to reduced mass from shod running and/or improved use of stored elastic energy in the lower extremities. As running performance and RE resulted from the progressive running program, the findings suggest that recreational runners may be able to transition to this BF style of running while simultaneously improving performance.

Keywords: oxygen consumption, training, improvements

Board #4

COMPARISON OF HEART RATE, VO2 MAX, SPEED, AND SPRINTS PERFORMED BY A DIVISION 1 FIELD HOCKEY TEAM

Samantha Gregoire (Michigan State University), Jane Groetsch (Michigan State University), James Pivarnik (Michigan State University)

Abstract: Heart rate (HR) monitoring and accelerometry are used to evaluate players' activity levels during athletic competition, but little data are available from these tracking modalities for NCAA varsity women's field hockey. **PURPOSE:** Our purpose was to determine descriptive tracking information related to players' game performance, and analyze results by player position and aerobic fitness. **METHODS:** A physiological tracking system was used to evaluate in-game HR responses and movement patterns of women field hockey players from a single NCAA Division I team. Aerobic fitness (treadmill time to exhaustion; TM_{time}) and maximal heart rate (HR_{max}) were estimated from an incremental treadmill run. Data were collected and averaged among 24 women who played in a maximum of 11 games. Players were divided into three groups based on position (forward(n=10), midfield(n=7), back(n=7)). Groups were analyzed using 95% confidence intervals. Variables of interest included time spent in HR_{zone4} (80-90%HR_{max}) and HR_{zone5} (>90%HR_{max}), maximum speed (km/h), distance traveled (m/min), and sprints (any movement with acceleration >2.4m/sec^2) per minute performed. We also evaluated TM_{time} differences among position groups. **RESULTS:** On average, players spent 32.7% of game time in HR_{zone4}, and 53.4% in HR_{zone5}. There were no significant differences among player position groups. Likewise, maximum speed (26±1.9 km/h) and distance traveled (100.6 m/min) were similar among groups. However, forwards performed more sprints (1.4±0.3 sprints/min) compared to midfielders (0.6±0.2 sprints/min) and backs (0.5±0.2 sprints/min), $p<0.05$. TM_{time} averaged 710±40 sec and did not differ significantly among player position groups, as there were similar fitness ranges in each (forwards: 666-752 sec, midfielders: 615-766 sec, backs: 660-721 sec). **DISCUSSION:** Heart rate data show clearly that field hockey is played at a very high intensity, with burst interval runs being performed throughout. Our data suggest that position groups have similar aerobic fitness, which is consistent with their closely matched playing intensity, speed and distance traveled throughout a game. However, forwards completed more quick sprint bursts, likely because they are the primary scorers who are constantly attacking the opponents' goal. These data should be utilized by the coaching staff to insure practices mimic game conditions whenever possible.

Keywords: NCAA GAME DATA ANALYSIS

Board #5

RELATIONSHIP BETWEEN PHYSICAL FUNCTION, DIET, AND BODY COMPOSITION WITH POSTURAL LIMITS OF STABILITY

Sarah E. Heaven (Miami University), Dean L. Smith (Miami University), Gabrielle A. Volk (Miami University), Denise Y. Chan (Miami University), Hannah N. Moland (Miami University), Victoria E. Warren (Miami University), Kyle L. Timmerman FACSM (Miami University)

Abstract: Approximately one out of four older adults will fall each year. Falls are the leading cause of fatal and non-fatal injuries among older adults and represent a significant public health problem. Body composition,

diet and physical function are modifiable through lifestyle and may represent potential targets to improve postural stability. However, little is known about the relationships between these variables and limits of stability (LOS) in overweight, older adults. LOS is a reliable test that incorporates maximum center-of-gravity excursion, which is associated with fall risk. **PURPOSE:** To investigate the associations between body composition, physical activity/performance and diet to components of LOS. LOS includes measures of reaction time (RT), movement velocity (MVL), maximum excursion (MXE), endpoint excursion (EXE), and directional control (DCL). **METHODS:** In twenty overweight (body mass index $\geq 27 kg/m^2$), older adults ($\geq 58y$), we obtained measures of stability (force plate), habitual physical activity (7-day accelerometry), habitual dietary macronutrient intake (3-day dietary recall), cardiorespiratory fitness (graded exercise test to volitional exhaustion with indirect calorimetry), gait speed from a 4-meter walk test, and body composition (bioelectrical impedance, InBody720). Associations among variables were determined using partial correlations (controlling for age and sex). Statistical significance was set at $p \leq 0.05$. **RESULTS:** Subjects (16 female, 4 male) were 64.2 ± 4.77 years old and had a body mass of 95.34 kg ± 15.55 kg, a body mass index of 34.7 ± 4.68, and a maximal cycle ergometer VO_2 of 15.64 ± 2.26 ml/kg/min. Significant partial correlations were noted for DCL and gait speed, r =-0.49, p =.039 as well as MVL and height, r =-0.60, p =0.008. **CONCLUSION:** Height and gait speed from a standard 4-meter walk test were both significantly correlated to postural limits of stability. Prospective studies are needed to examine the influence of gait speed, DCL and lifestyle interventions on fall risk.

Funding: Supported by a grant from the National Institute on Aging: 1R15AG055923-01.

Keywords: activity, force plate, accelerometer

Board #6

SPORTS NUTRITION KNOWLEDGE, EDUCATION, AND BELIEFS OF A DIVISION II ATHLETIC STAFF

Savanah J. Feldpausch (Saginaw Valley State University), Collin T. Garner (Western Michigan University), Jeremy Glaser (Saginaw Valley State University), Rachel L. Darr (Saginaw State University)

Abstract: Nutrition plays a vital role in athletic performance and recovery. Registered Dietitians with a specialty in Sports Dietetics, are the ideal healthcare providers, but are not always present on college campuses or have limited access to athletes. For staff members who do provide education to student-athletes, it is beneficial to understand their nutrition knowledge and beliefs in relation to the well-being of student-athletes. **PURPOSE:** To examine a Division II athletic staff's level of nutrition knowledge and examine the relationship between that knowledge, level of education and their personal nutrition beliefs. **METHODS:** After extracting response rates from 20 general nutrition (percent correct was calculated) and 5 lifestyle questions, Spearman Rank Order Correlation was utilized to determine the relationship between how participants felt about their eating habits, understanding the importance of a healthy diet for their athletes, and understanding their athlete's diet needs (0 being the worst/least important; 10 being the best/most important). **RESULTS:** From surveys completed, 19 athletic staff were male and 7 were female, with an overall age 39.07 ± 13.33 years. Participant's sports nutrition knowledge percent score (65.58 ± 11.86) did not correlate with any other measures examined. The amount of reported nutrition (0.65 ± 0.89) and health (3.50 ± 4.80) courses previously taken represents a moderate correlation (r= 0.76, p<0.001). How participants felt about their eating habits (5.69 ± 2.21) and the importance of a healthy diet for their athletes (5.42 ± 1.65), yielded a moderate correlation (r= .500, p=0.009). A strong correlation was seen between the importance of a healthy diet for their athletes (5.42 ± 1.65) with understanding their athlete's dietary needs (5.42 ± 1.65), (r= 1.00, p<0.001). **CONCLUSION:** The more health

classes participants took, the more likely they acquired nutrition courses combined with nutrition knowledge. Professionals that are aware of healthy lifestyles, believe and understand that their athletes require the same. Ideally, this will be encouraged and supported directly to the athletes, ultimately resulting in proper nutrition habits, optimal performance, and adequate recovery for student-athletes. Future research should include the implementation of athletic professional's nutritional knowledge into everyday practice for the benefits of their athletes.

Keywords: health, questionnaire, athletes

Board #7

BARRIERS TO PROMOTING ACTIVITY IN CHILD CARES NOT MEETING PHYSICAL ACTIVITY ENVIRONMENT GUIDELINES

Shannon L. Bradley (Michigan State University), Kimberly A. Clevenger (Michigan State University), Karin A. Pfeiffer, FACSM (Michigan State University)

Abstract: The child care physical activity (PA) environment impacts children's PA participation. It is of interest to identify what barriers prevent child care staff from promoting PA, specifically in programs that do not meet established best-practice guidelines regarding the PA environment. **PURPOSE:** To compare reported barriers to promoting PA in child cares with PA environments classified as "low" versus "high". **METHODS:** An electronic survey was sent to home and licensed child cares including items from the Environment and Policy Assessment and Observation Self Report (EPAO-SR) instrument. Respondents indicated whether 11 barriers were "not a barrier," "somewhat of a barrier," or "a major barrier" to promoting PA. A composite score of 13 items was calculated, indicating whether the program met best-practice guidelines based on the Nutrition and Physical Activity Self-Assessment for Child Care (NAPSACC) (e.g., provision of ≥120 min of active playtime, limited television time, indoor space for PA, staff training about PA). A median split was used to classify programs as either low or high PA environment. An independent sample *t*-test was used to compare total number of reported barriers, and Fisher's exact test was used to identify if there were differences in reported barriers between programs with a low or high PA environment ($p<0.05$). **RESULTS:** Child care providers (N=123) were categorized as low (n=45) or high (n=78) PA environment. Respondents from low PA environment programs reported more barriers to PA compared to high PA environment programs (5.5±2.3 vs. 4.0±2.1, $t(121)=3.684$, $p<0.001$). Two barriers, time spent reviewing PA information ($p=0.018$) and fitting PA in to the existing schedule ($p=0.001$), were more often reported as somewhat of a barrier in low PA environment programs, while high PA environment programs reported these were not barriers. The cost of new materials and PA equipment was the most commonly reported barrier in both low and high PA environment programs (53 and 39%). **CONCLUSION:** Low PA environment programs may benefit from strategies to overcome barriers to promoting PA, specifically finding time and money for PA promotion. As surveys are subjective, future research could use in-person interviews to further understand barriers in low PA environment programs.

Funding: Supported by the Blue Cross Blue Shield of Michigan Foundation

Keywords: preschool, early childhood, health

Board #8

VAGAL RESPONSES TO ACUTE RESISTANCE EXERCISE BETWEEN RESISTANCE-TRAINED

AND UNTRAINED INDIVIDUALS

Therese M. Smith (Kent State University), Erica M. Marshall (Kent State University), Jason C. Parks (Kent State University), J. Derek Kingsley FACSM (Kent State University)

Abstract: Data have demonstrated that an acute bout of resistance exercise reduces vagal modulation. However, only a handful of studies have evaluated differences between resistance-trained (RT) and untrained (UT) individuals in response to an acute bout of resistance exercise (ARE). **PURPOSE:** To compare alterations in vagal modulation during recovery from AREin RT and UT individuals. **METHODS:** Eighteen RT individuals (Mean±SD; Age: 23±3yrs; Ht: 1.7±.01m; Wt: 75.2±15.6kg) and eight UT individuals (Age: 24±3yrs; Ht: 1.6±0.09m; Wt: 61.9±108kg) volunteered to participate. Vagal modulation was assessed using heart rate variability in the frequency domain [High-frequency power (lnHF)], as well as heart rate complexity [sample Entropy (SampEn) and Lempel-Ziv entropy (LZEn)]. Data were collected at rest, 15 minutes (Rec1) and 30 minutes (Rec2) during recovery from ARE The acute bout of resistance exercise utilized 3 sets of 10 repetitions at 75% 1-repetition maximum (1RM) and 2 minutes of rest between sets and exercises on the chest press, leg press, lat pulldown, leg curl and leg extension. A 2x2x3 repeated measures ANOVA was used to examine groups (RT, UT) across conditions (CON, acute resistance exercise) on the repeated factor of time (rest, Rec1, Rec2). **RESULTS:** The groups were similar ($p>0.05$) for age, and height, but not weight. The 1RMs on all the exercises, except leg extension, were different ($p<0.05$) between groups. The total volume lifted during the acute bout of resistance exercise was significantly different between groups (RT: 11982±3073kg; UT: 8204±2998kg; $p=0.01$). At rest, all measures of vagal modulation were similar between groups. In addition, there were no 3-way interactions for any measures of vagal modulation. There were significant time x condition interactions for lnHF (ARE: rest: 7.5±1.2ms2; Rec1: 5.8±2.2ms2; Rec2: 4.5±1.2ms2; $p=0.0001$), SampEn (ARE: rest: 1.5±0.4; Rec1: 1.3±0.4; Rec2: 1.4±0.4; $p=0.022$), and LZEn (ARE: rest: 0.8±0.08; Rec1: 0.7±0.1; Rec2: 0.7±0.2; $p=0.001$). Each of these variables were reduced at Rec1 and Rec2 compared to rest, with similar responses between the resistance-trained and untrained groups. **CONCLUSIONS:** These data demonstrate that both resistance-trained and untrained individuals respond similarly to an acute bout of resistance exercise using weight machines.

Keywords: autonomic, heart rate variability, heart rate complexity, weight machines

Board #9

DOES YOUR FACE AFFECT YOUR PACE? THE IMPACT OF FACIAL EXPRESSION ON RUNNING ECONOMY

Thomas J. Sprys-Tellner (Hope College), Brooke T. Hedglen (Hope College), Grace L. Ditzenberger (Hope College), Brian C. Rider (Hope College)

Abstract: Running economy (RE) is an important performance metric for runners. Defined as the energy required to maintain a given running speed, it is determined by measuring an individual's oxygen consumption. A recent study examined the physiological impact facial expressions (smiling and frowning) had on RE compared to more traditional cognitive relaxation techniques. Smiling, while running, resulted in a 2.8% improvement in RE among a group of recreational adult runners. **PURPOSE:** The purpose of this study was to determine if the previous findings were replicable and whether facial expression would impact RE in a group of aerobically trained collegiate athletes. **METHODS:** Twenty-four Division III collegiate athletes (females n=14) completed four 6-minute running blocks at 70% of VO_2max. The order of bouts was determined using a balanced Latin square design with each participant serving as his/her own control. Participants completed running blocks while smiling (Smile), frowning (Frown), relaxing their hands and upper bodies (Relax), and

running as they "normally" would (Control). Cardiorespiratory responses were recorded continuously and participants reported perceived effort (RPE), affective valence (FS), and activation (FAS) after each condition. Blood lactate was measured at the end of each block. Repeated measures analysis of variance was run on all primary variables with a significance level set a prior at 0.05. **RESULTS:** There were no significant differences in RE between conditions (Smile 33.72 ± 4.4, Frown 34.15 ± 4.08, Relax 34.17 ± 4.12, Control 34.16 ± 3.91 ml/kg/min, $p > 0.05$). Additionally, unlike previous research, there were no significant differences in RPE during smiling and frowning conditions (11.71 ± 2.56 vs. 11.82 ± 1.97, $p = 0.71$). There were also no significant differences in affective valence, activation, or blood lactate between all conditions. **CONCLUSION:** Among a group of aerobically trained collegiate athletes running at 70% VO_2max, smiling does not improve RE. Therefore, our findings do not support the recent research on facial expression and running performance. However, future research should be conducted in order to discern what meaningful effect, if any, facial expression could have on psycho-physiological markers associated with running performance across a more diverse population.

Keywords: Performance, Perceptual Response, Effort

Board #10

EFFECTS OF EXERCISE IN DIFFERENT ENVIRONMENTAL CONDITIONS ON LEUKOCYTE COUNTS AND SUBSETS

Tricia L. Hart (Kent State University), Eliott Arroyo (Kent State University), Brittany N. Followay (Kent State University), Jeremiah A. Vaughan (Bemidji State University and Kent State University), Ellen L. Glickman, FASCM (Kent State University), Adam R. Jajtner (Kent State University)

Abstract: PURPOSE: To observe the effects of exercise in different environmental conditions on leukocyte counts. **METHODS:** Recreationally active Caucasian men (n=7; 23.9±2.4 yrs; 182.9±5.6 cm; 12.8±3.6 %BF; 47.3±5.9 $ml \cdot kg^{-1} \cdot min^{-1}$) volunteered to complete four exercise trials; a maximal graded exercise test, and an aerobic exercise protocol in low temperature (LT; 5°C), moderate temperature (MT; 22°C), and high temperature (HT; 35°C). The exercise protocol consisted of a 60-minute cycling trial at 60% VO_2max, a 15-minute rest period, and a time to exhaustion trail at 90% VO_2max (TTE). Blood draws were completed before (PRE) and after (60P) the 60-minute trial; immediately after TTE (90P), and one hour post-TTE (REC). Leukocyte count (WBC); lymphocyte number and ratio (LY# and LY%); monocyte number and ratio (MO# and MO%); and granulocyte number and ratio (GR# and GR%) were analyzed via hematology analyzer. Changes were analyzed using a two factor (time×trial) within-subjects repeated measures ANOVA. **RESULTS:** A significant time effect was observed for WBC ($F=2.68$, $p=0.046$, $\eta^2_p = 0.348$). Post hoc tests indicated WBC increased at all time points relative to PRE in all trials combined (*p's*=0.001-0.026). A significant interaction was observed for LY# ($F=6.59$, $p=0.001$, $\eta^2_p = 0.568$). Post hoc analysis indicated LY# significantly increased from PRE to 60P during HT ($p=0.015$), but not during LT or MT (p's > 0.05). Additionally, LY# was significantly elevated at 90P relative to PRE in all trials (p's=0.002-0.011). A significant time effect was observed for MO# ($F=4.09$, $p=0.026$, $\eta^2_p=0.45$) and GR# ($F=25.51$, $p<0.001$, $\eta^2_p=0.836$). With all trials combined, MO# increased from PRE to 90P ($p=0.019$) and GR# increased at all timepoints relative to PRE (*p's*=0.001-0.008). A significant time effect was observed for LY% ($F=21.31$, $p<0.001$, $\eta^2_p=0.81$), MO% ($F=8.73$, $p=0.001$, $\eta^2_p=0.636$), and GR% ($F=27.37$, $p<0.001$, $\eta^2_p=0.846$). With all trials combined, LY% decreased at REC ($p>0.001$) relative to PRE, MO% decreased at all timepoints relative to PRE (p's<0.001-0.015), and GR% increased at all timepoints relative to PRE (p's<0.001-0.047). **Conclusion:** Temperature may not impact acute exercise-induced increases in total leukocytes, however, exercise in the heat (35°C) may increase circulating lymphocyte counts when compared to exercise in moderate (22°C) and cold (5°C) temperatures.

Funding: Partially Funded by Kent State University Research Council

Keywords: Immunology, Environmental

Board #11

HANDGRIP STRENGTH AS A SCREENING ASSESSMENT FOR FUNCTIONAL LIMITATIONS

Uriel Ibarra-Moreno (University of Mount Union), Meghan E. Hess (University of Mount Union), Alyssa K. Braun (University of Mount Union), Valerie Russell (University of Mount Union), Joshua C. Lawhorne (University of Mount Union), Megan D. Salvatore (University of Mount Union), Nathan W. Saunders (University of Mount Union)

Abstract: There appears to be an undisputed strong relationship between isometric handgrip strength (HGS) and functional fitness test performance, ability to perform activities of daily living (ADLs), and mortality, but the extreme diversity in how HGS data are interpreted make it difficult to utilize the assessment in a meaningful way. **PURPOSE**: To simplify this interpretation by establishing a single and meaningful universal HGS cutoff that would inform the test administrator whether or not additional functional fitness testing was warranted. **METHODS:** Eighty-three subjects (24 males, 62.3 ± 14.3 years, and 59 females, 64.7 ± 13.0 years) participated in this cross-sectional assessment. Subjects self-reported their perceived ability to complete the variety of ADLs included in the Composite Physical Function (CPF) Scale. They additionally completed a battery of functional fitness assessments, which included HGS, 30-s Chair Stand, 8-ft Up-and-Go, 10 lb and 25 lb lift and carry, and a 400 m Walk Test. A self-developed cell phone application was utilized to assess steady-state gait speed and cadence during the 400 m Walk Test. Independent samples *t*-tests were used to compare the perceived and actual functional fitness test outcomes between subjects with a grip strength < 30 kg and those with a grip strength ≥ 30 kg. **RESULTS:** Subjects with a HGS ≥ 30 kg scored significantly higher on the CPF Scale, compared with subjects with a HGS < 30 kg (23.9 +/- vs. 22.4 +/- 3.3, respectively). Likewise, subjects with a HGS ≥ 30 kg performed significantly better on every fitness test outcome, compared with subjects with a HGS < 30 kg. However, when assessing the subcomponents of gait speed during the 400 m Walk Test, HGS significantly predicted step length, but not cadence. **CONCLUSIONS:** A HGS ≥ 30 kg appears to be an appropriate cutoff to rule out current functional limitations in males and females of any age. It is suggested that individuals with a HGS < 30 kg undergo additional functional tests to identify any limitations that may exist.

Keywords: Activities of daily living; 30-s Chair Stand; 8-ft Up-and-Go; 400 m Walk Test

Board #12

NEUROMUSCULAR AND MECHANICAL ASSESSMENT OF MUSCLE FATIGUE DURING 1-LEG KNEE EXTENSION EXERCISE.

Valerie N. Schmitz (Miami University), Kristen Pleasant (Miami University), Andrew Renggli (Miami University), Jarod Vance

Abstract: Purpose: Typically, resistance exercise related acute local muscle fatigue (MF) is demonstrated through one set completed to failure to execute a full repetition. Therefore, we aimed to examine the neuromuscular and mechanical indices of MF across multiple sets (S) & repetitions (R) of high-intensity RE done to repeated failure. Spectral frequency and amplitude EMG measures of vastus lateralis (VL), rectus femoris (RF),

& vastus medialis (VM) and mechanical measures of work, power, and movement velocity for the exercising leg were assessed for all R in each S during a 1-leg knee extension RE at 90% of 1-repetition maximum (1-RM). Data from the first R of the first S (S_1R_1), final R of the first S (S_1R_F), the first R of the final S (S_FR_1) & final R of the final S (S_FR_F) were compared. **Methods:** Twenty young men (20 $\pm$ 0.2301 yrs) underwent body composition analysis, anthropometric assessments and determination of right leg 1-RM (Day 1). Day 2 (approximately one week later) subjects completed cycles of R to failure followed by 15 sec of recovery until failure to complete 1 R occurred. External mechanical data was collected via an ultrasound sensor, NI-cRIO and custom-built software (NI-LabView) to measure weight-stack movement (time & distance). A series of 4(conditions) X 3(muscles) ANOVA with Repeated Measures and *a-priori* contrasts were used to make specific pairwise comparisons. **Results:** For each S & R pair, RF, VL, & VM responded similarly. Amplitude (A), mean frequency (M) and total power (TP) significantly increased for S_1R_1 vs S_FR_1 ($p<0.05$) and S_FR_1 vs S_FR_F ($p<0.05$). Work (avW & concW) were maintained across all pairs, except S_1R_F vs S_FR_F where avW was significantly decreased ($p<0.05$). avW & concW, Power (avP & concP) and movement velocity (concV) were significantly decreased between S_1R_1 vs S_1R_F ($P<0.05$) and between S_FR_1 vs S_FR_F ($p<0.05$). **Conclusion:** Spectral-frequency and Amplitude EMG and mechanical measures of work, power and movement velocity are indicative of MF and recovery. These data suggest mechanical power and movement velocity are sensitive to MF during high-intensity RE and can be used as indicators of MF.

Funding: This project was partially funded through a Miami University Faculty Research Award and the Miami University Undergraduate Summer Scholars Program.

Keywords: Resistance exercise, recovery, quadricep, movement velocity

Board #13

THE ACUTE EFFECT OF DAILY ACTIVITY LEVEL ON PLASMA BDNF and TNF-ALPHA

Zach Ham (Taylor University), Julia Noonan (Taylor University), Dan King (Taylor University), Erik Hayes (Taylor University)

Abstract: Lack of exercise and a sedentary lifestyle are independent risk factors for chronic disease, mortality, and morbidity. Though fundamentally different, exercise and light activity both have positive effects on cognitive function and inflammatory status. These benefits may be due in part to improvements in the levels of plasma proteins brain-derived neurotrophic factor (BDNF), a neurotrophin involved in preserving plasticity and memory and maintaining energy balance, and tumor necrosis factor alpha (TNF-alpha), a marker of whole body inflammation. Both BDNF and TNF-alpha levels are improved by exercise, both acutely and chronically, but the acute effect of light activity has not been examined. **PURPOSE:** The purpose of this study is to determine the effect of high or low activity level on plasma BDNF and TNF-alpha. **METHODS:** Seven males took part in the study. Each participated in one high-activity day, where they recorded at least 10,000 steps in an eight-hour period, and one low-activity day, where they recorded less than 1,500 steps in the same eight-hour period. Blood samples were taken each day before and after the eight-hour period. Protein concentrations were determined using ELISA kits and photospectrometry. **RESULTS:** The low-activity day resulted in a 0.573 absorbance (abs) increase in BDNF while the high-activity day resulted in a 0.114 decrease. The difference in change between days was significant ($p<0.006$). TNF-alpha increased 1.85 abs on the low-activity day and only 1.16 on the high-activity day. The difference between days trended towards significance ($p<0.095$). **CONCLUSIONS:** The difference in BDNF levels was unexpected given the known cognitive benefits of exercise and physical activity. However, higher levels of BDNF are also thought to play a role in increasing energy expenditure. Consequently, one plausible explanation may be that the high step count day created a negative caloric balance resulting in a decrease in BDNF in order to facilitate energy balance. The trend towards

a difference in TNF-alpha due to an increase in activity agrees with previous research indicating that activity decreases whole-body inflammation. Further research is needed to determine how chronic high levels of physical activity influence BDNF and the role of BDNF in energy regulation.

Keywords: Walking, Inflammation, Brain health

Board #14

DIFFERENT RESTRICTIVE DEVICES TO ACHIEVE BLOOD FLOW RESTRICTION ON PULSE WAVE REFLECTION

Zoe L. Bates (Kent State University), J. Derek Kingsley, FACSM (Kent State University), Jason C. Parks (Kent State University), Erica M. Marshall (Kent State University)

Abstract: Blood flow restriction (BFR) has mainly been achieved with an automated blood pressure cuff. However, knee wraps to restrict flow are used as a form of practical BFR (pBFR). The effects of resistance exercise with BFR and pBFR on pulse wave reflection is unclear. **PURPOSE**: To examine the effects of BFR, pBFR, and traditional high-intensity (HI) bench press resistance exercise on pulse wave reflection in resistance-trained individuals. **METHODS**: Twenty-three (Age: 23±3yrs) resistance-trained men underwent either bench press with BFR, pBFR [30% 1-repetition maximum (1RM), 4 sets, 30-15-15-15 repetitions, 30sec of rest], HI [70% 1RM, 4 sets, 8 repetitions, 60sec of rest] or a control. Measurements were taken at rest and 10mins postexercise. A 4x2 ANOVA was used to evaluate condition (BFR, pBFR, HI, Control) across time (rest, recovery) on pulse wave reflection. **RESULTS:** There were significant (p=0.0001) increases in heart rate [(BFR: rest: 60±7bpm; recovery: 69±7bpm), (pBFR: rest: 58±10bpm; recovery: 64±11bpm), (HI: rest: 58±12; recovery: 72±13bpm)] such that all three conditions were different compared to rest and the control. There was a significant interaction (p=0.0001) for the augmentation index (AIx) in that during recovery from BFR (rest: 117.9±8.2%; recovery: 126.2±9.0ms), pBFR (rest: 114.9±4.9ms; recovery: 127.9±9.8ms) and HI (rest: 115.6±6.2ms; 122.8±6.4ms) it was elevated compared to rest, and the control. There was also a significant (p=0.0001) interaction for the AIx normalized at 75bpm (AIX@75) [BFR: rest: 8.8±13.3%; recovery: 25.9±9.5%; pBFR: rest: 2.7±8.5%; recovery: 23.3±14.2%; HI: 4.4±12.1%; recovery: 21.2±9.9%)] in that it was augmented during recovery to rest and the control. The subendocardial viability ratio (SEVR) for BFR (rest: 138.4±19.5; recovery: 111.2±11.3), pBFR (152.2±27.5; recovery: 125.5±33.5), and HI (rest: 152.9±37.9; recovery: 111.9±28.7) also demonstrated a significant (p=0.0001) condition by time interaction such that they were elevated above rest in all three resistance exercise conditions, which were different than the control. **CONCLUSION**: These data demonstrate that BFR using an automated cuff or knee wraps has similar effects as traditional high-intensity resistance exercise on pulse wave reflection in resistance-trained men after the bench press.

Funding: This study was funded by School of Health Sciences at Kent State University

Keywords: knee wraps, heart rate, augmentation index, subendocardial viability ratio

Board #15

MUSIC DOES NOT IMPROVE VO2MAX MEASURED DURING A GRADED EXERCISE CYCLING

TEST

Abigail C. Hammer (St. Ambrose University), Alyssa Tompkins (St. Ambrose University), Samantha R. Lang (St. Ambrose University), Sandra Tecklenburg-Lund (St. Ambrose University)

Abstract: Music has performance benefits during cardiovascular exercises, like decreasing rate of perceived exertion and enhancing motivation. In maximal graded exercise testing, motivation and perceived exertion are strong components in assisting the participant to reach their highest physiological capability. Synchronous music in group exercise has been shown to be beneficial for reducing perceived exertion, and therefore, may assist in maintaining a cadence during cyclic endurance activities at high intensities. **PURPOSE**: The purpose of this study is compare maximal oxygen consumption (VO_{2max}) from a cycling graded exercise test while listening to music that is synchronized with their pedal cadence, with that of listening to a metronome to maintain pedal cadence. **METHODS**: Seven healthy subjects (23 ± 4.89 years, 66.4kg ± 11 kg and 170 cm ± 6.95 cm, males= 1, females= 6) performed a modified Astrand-Stalin cycle ergometer maximal graded exercise test at a cadence of 60 rpm while under two conditions: (1) using a metronome (60 bpm, one beat every full revolution) and (2) listening to predetermined synchronized music (120 bpm, one beat for the down stroke of each foot). Oxygen consumption was measured using breath-by-breath analysis and maximal oxygen consumption (VO_{2max}) was determined by averaging the last 15 seconds of the last completed stage of the cycle test. A dependent *t*-test was conducted to identify differences between the metronome and music conditions. The alpha level of significance was set a 0.05. **RESULTS**: There was no significant difference in VO_{2max} between the metronome condition (37.9 ± 10.9 $mL \cdot kg^{-1} \cdot min^{-1}$) and the music condition (38.6 ± 8 $mL \cdot kg^{-1} \cdot min^{-1}$, p=.778). **DISCUSSION**: Previous research has shown that high intensity exercises do not see as great of ergogenic benefits from music as submaximal exercises. Despite the synchronous beat of the music, the high intensity required for the maximal test likely negated the ergogenic effects from the music.

Keywords: music, VO2max, maximal test, exercise testing

Board #16

PREDICTORS OF CLINICAL MEASURES OF INSULIN RESISTANCE

Vincent M .Smith (Miami University), Gabrielle A. Volk (Miami University), Elizabeth A. Sohns (Miami University), Callen R. Conroy (Miami University), Rebecca Bartram (Miami University), Casey R. Heindl (Miami University), Kyle L. Timmerman FACSM (Miami University)

Abstract: Approximately 30.3 million adults in the United States have diabetes. Diabetic complications include stroke, myocardial infarction, nerve damage, and renal failure, among others. In addition to being the seventh leading cause of death in the country, the medical costs due to diabetes is over $325 billion annually. Clinical evaluation for type II diabetes can be assessed in a variety of ways: fasting blood glucose (FBG), hemoglobin A1c (HbA1c) percentage, and the homeostatic model assessment of insulin resistance (HOMA-IR). The **PURPOSE** of this study was to evaluate the relationships between these clinical indicators and body composition, physical activity level, and glucose response to mixed nutrient challenge in older adults. **METHODS:** In 38 subjects (7 m /31 f) body composition (bioelectrical impedance); blood glucose (glucometer); insulin (enzyme-linked immunosorbent assay); and HbA1c (HbA1c Analyzer) were assessed. In a subset of 30 subjects, physical activity was assessed via accelerometry (Actical). Further, in a subset of 16 subjects, glucose area under the curve (gAUC) was calculated following mixed nutrient challenge (0.5 g dextrose/kg lean mass + 0.3 g protein/kg lean mass). Partial correlations (controlling for age and sex) were utilized to examine associations. Significance was set as $p<0.05$. **RESULTS:** Subject characteristics included: age= 67.9±6.6y, BMI= 29.3± 7.5 kg/m^2, FBG=104.0 ±19.0 mg/dL, HOMA-IR= 2.61±1.95, and HbA1c=

5.42±0.25%. FBG was significantly correlated with body mass (r= 0.62), body fat percentage (r= 0.33); and gAUC (r= 0.59). HOMA-IR was significantly correlated with body mass (r= 0.64) and body fat percentage (r= 0.51). HbA1c was significantly correlated with gAUC (r= 0.83). There was a trend for a correlation between HbA1c and habitual, daily moderate-to-vigorous intensity physical activity (r= -0.36, p= 0.06). **CONCLUSION:** These preliminary data support previous findings that clinical indices of insulin sensitivity are associated with body composition. Interestingly, our data show blood glucose response to mixed nutrient intake, but not FBG, is predictive of HbA1c.

Funding: NIH grant 1R15AG055923-01

Keywords: Diabetes, Glucose, Uptake, Forecasters

Board #17

BLOOD FLOW RESTRICTION TRAINING LEADS TO ANAEROBIC ADAPTATION BUT NOT IMPROVED SWIMMING PERFORMANCE

Amy E. Boettcher (Northern Michigan University), Elizabeth Wuorinen (Northern Michigan University), Lanae Joubert (Northern Michigan University), Matt Dary (Northern Michigan University), Scott Drum (Northern Michigan University)

Abstract: Blood flow restriction (BFR) training has proven to increase maximum oxygen uptake (VO_{2max}) in athletes; however, there is limited research on sport specific and anaerobic performance. BFR training decreases venous blood return from peripheral limbs forcing occluded limbs into a hypoxic state, which may enable low-intensity exercises to yield noticeable results. **PURPOSE:** The purpose was to determine if three weeks of dryland BFR training improved swimming performance. **METHODS:** Subjects (n=14) participated in walk and body weight resistance training for nine supervised lab visits (3x/wk for 3 weeks). Testing included: VO_{2max}, Wingate, swim time trials (TT) (500 yd and 20 yd), strength (5-10 RM chest and leg press), and DEXA scan completed pre- and post-training. Identical training was done in control (CON) and BFR/experimental (OCC) groups; however, OCC underwent bilateral BFR applied to their uppermost thighs [via x-large blood pressure (BP) cuffs inflated to 70-90% of systolic BP]. Training consisted of: walking on a treadmill for 20 minutes (5 cycles of 3-minutes walking at 3 mph, 5% grade with 1-minute break), a 5-minute rest-break, followed by strength training (3x30 squats, 3x30 reverse lunges, 3x2-minute step-ups with 1-min rest between sets and 2-min rest between exercises). Paired t-tests determined significance ($p \leq 0.05$). **RESULTS:** Fatigue index during the Wingate improved (i.e., decreased) significantly by 2.83% ± 8.79 in OCC and increased by 10.39% ± 8.45 in CON *(p=.019)*. Other, non-significant results for OCC and CON, respectively, were: mean power: +1.65% ± 2.34 and -1.95% ± 6.55; relative peak anaerobic power: +14.61% ± 13.89 and +10.94% ± 12.20; total work: +8.21% ± 16.73 and -1.82% ± 6.46; 20 yd TT: + 0.64 % ± 2.63 and -0.96 % ± 1.78; and 500 yd swim TT: + 0.31 % ±0.85 and -0.32% ± 1.59. **CONCLUSION:** The duration of BFR to the legs and the anaerobic nature of BFR training may explain the improved fatigue index in the OCC group. However, BFR training failed to distinguish OCC from CON during swimming TT performances.

Keywords: Sport, Walk-training, Wingate, Hypoxia

Schedule – Friday Afternoon: Symposia

<u>Symposium #9:</u> Imperial Room – 2:00-2:50pm

Is Resistance Exercise Bad For the Cardiovasculature?

Session Moderator: Kevin Ballard

Presenters: J. Derek Kingsley, PhD, FACSM, Erica Marshall, MS
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.

Erica M. Marshall is currently a Ph.D. candidate in Exercise Physiology at Kent University. She has worked closely under her mentor, Dr. J. Derek Kingsley in the Cardiovascular Dynamics Laboratory. The Cardiovascular Dynamics Laboratory focuses on the cardiovascular and microvascular responses to various anaerobic exercise modalities. Further, Erica is certified as a Certified Strength and Conditioning Specialist through the National Strength and Conditioning Association, as well as an American Red Cross Instructor.

Learning objectives:

- Understand methods to assess the cardiovasculature, specifically vascular and autonomic modulation.
- Explain how an acute bout of resistance affects the vasculature, and autonomic modulation, and how these changes are associated with the risk for CVD.
- Explain how chronic resistance exercise affects the vasculature, and autonomic modulation, and how these changes are associated with the risk for CVD.
- Understand ways to reduce the deleterious cardiovascular effects of resistance exercise by training smart.

Symposium Description:

It has been established that aerobic exercise, acute and chronic, has a positive effect on the cardiovasculature and decreases the risk for CVD. However, data examining the effects of acute and chronic resistance exercise on the cardiovasculature are just emerging. To date, much of the data on acute, and chronic, resistance exercise demonstrates a negative effect on the cardiovasculature, which may transiently result in an increase in the risk for CVD. It is important for those individuals that perform resistance exercise to understand the implications of resistance exercise on cardiovascular function. Therefore, the purpose of this symposium to highlight not only the methods used to assess cardiovascular function, specifically vascular and autonomic modulation, but also the impact of acute and chronic resistance exercise on overall cardiovascular function and the risk for CVD.

<u>Symposium #10:</u> Gerald R Ford Room – 3:00-3:50pm

Exertional Rhabdomyolysis – Do We Need to Rethink "No Pain No Gain"?

Session Moderator: Rebecca Schlaff

Presenters: Adam Coughlin, PhD[1], Tamara Hew-Butler, DPM, PhD, FACSM[2], Brian Rider, PhD[3]
[1]Saginaw Valley State University
[2]Wayne State University
[3]Hope College

Adam M. Coughlin, PhD, is a professor at Saginaw Valley State University. His current research involves athlete and team training volume tracking as well as the effect of footwear on running economy, specifically minimal footwear. His undergraduate degree was a BA in Exercise Science: Pre-PT from Adrian College. His MS and Doctorate were in Exercise Science from Michigan State University. He served as President-Elect for MWACSM and served for three years as Member-At-Large before that.

Tamara Hew-Butler, DPM, PhD, FACSM, is a podiatric physician and associate professor of Exercise and Sports Science at Wayne State University (Detroit). She earned her Doctor of Podiatric Medicine (DPM) at Temple University (Philadelphia) and PhD at the University of Cape Town (South Africa). Dr. Hew-Butler specializes in both sports medicine and exercise physiology. Her expertise is in exercise-associated hyponatremia and the endocrine regulation of water and sodium balance.

Brian Rider, PhD, CSCS, is an assistant professor of Kinesiology at Hope College (Holland, MI). He earned his PhD in Kinesiology from the University of Tennessee (Knoxville, TN). Brian's research interests include the use of activity monitors to measure and promote physical activity, athlete testing and performance, and studying the perceptual responses to exercise.

Learning objectives:

- Understand the spectrum of skeletal muscle breakdown between benign (stimulate muscle growth) to life-threatening (exertional rhabdomyolysis with kidney failure and compartment syndrome).
- Recognize the risk factors and diagnostic tools available to diagnose clinically significant exertional rhabdomyolysis.
- Elucidate strategies to prevent clinically significant rhabdomyolysis from occurring in athletes
- Spread awareness of this growing condition.

Symposium Description:
Asymptomatic exertional rhabdomyolysis (ER) is a common occurrence following unaccustomed exercise

and is largely a biochemical definition, representative of blood creatine kinase (CK) levels above the normal reference range (1-200U/L) and commonly encountered after hard or unaccustomed bouts of physical activity. Asymptomatic rhabdomyolysis is without clinical signs or symptoms and resolves spontaneously, without medical treatment. In contrast, symptomatic ER is a potentially life-threatening medical condition, with acute renal failure the most serious sequelae resulting from significant skeletal muscle breakdown.

In March 2014, a cluster of 13 Oakland University collegiate swimmers presented to the hospital and were subsequently treated and released for symptomatic ER. This case cluster, only the fourth in the history of NCAA Division I sports, was unique in several ways: 1) it involved women, who are generally protected from ER; 2) these swimmers were well trained, coming off the Horizon League Championships and 3) involved arm, not leg, exercise. Data collected on all swimmers participating in another project (the Student Athlete Project) suggested that overtraining may have played a role in the subsequent development of ER. Additionally, those swimmers who were hospitalized and treated for symptomatic ER (with acute kidney injury) tended to be the most highly motivated athletes who strived to push themselves to "muscle failure" and "until their arms locked".

Since competitive athletes need to push themselves hard in training and competition, the acute effects of cumulative, unaccustomed, training on muscle breakdown, renal function, body composition and fatigue are not well established. Furthermore, it has been previously suggested that both under- and over-hydration can augment muscle damage. Therefore, the authors have collectively performed three different research trials exploring both risk factors and diagnostic tools to assist in development of early detection and prevention of clinically significant exertional rhabdomyolysis.

Our Symposium will summarize the evidence to date on both what is known and what is not known about exertional rhabdomyolysis, integrating our own research findings. Dr. Coughlin will provide us with an overview of the definition of rhabdomyolysis and incidence in a variety of sports. Dr. Rider will discuss risk factors and diagnostic markers for rhabdomyolysis. Dr. Hew-Butler will discuss preventative and treatment strategies for rhabdomyolysis. We will then allow ample time for questions/comments from the audience.

<u>Symposium #11:</u> Imperial Room – 3:00-3:50pm

Acute vs Chronic Exercise: The Influence on Blood Lipids and Lipoproteins

Session Moderator: Jeff Lemmer

Presenters: Michael R. Kushnick, PhD, Mark McGlynn, MS
Briar Cliff University

Dr. Michael Kushnick is currently a Professor and Chair for the Department of Applied Health and Exercise Sciences at Briar Cliff University in Sioux City, IA. Having earned his M.S. from University of Louisville in Exercise Physiology and his Ph.D. from Florida State University in Applied Physiology, Michael worked 14 years at Ohio University before transitioning to Briar Cliff University in 2017. Moreover, Dr. Kushnick has served on the Board of MWACSM two times and an additional (3 year) term served as the President of MWACSM – he boasts a perfect attendance record to MWACSM Annual Meetings since 2003, having presented and/or students presenting their own research at nearly every one. Michael's research focus is metabolic aspects of health and human performance.

Mr. Mark McGlynn is currently an Assistant Professor within the Department of Applied Health and Exercise Sciences at Briar Cliff University in Sioux City, IA. Mark earned his B.S. and M.S. degrees in Exercise Physiology from Ohio University and previously has provided coursework at multiple higher education institutions throughout the Midwest region; including Ohio University, Alma College, Saginaw Valley State University. Additionally, Mark completed his thesis research analyzing the influence of initial blood triglyceride concentrations on the change in blood lipids following an acute bout of exercise.

Learning Objectives:

- Review the key components of blood lipid and lipoprotein metabolism
- Define the effects of acute exercise on blood lipids and lipoproteins
- Identify the potential of chronic exercise in modifying blood lipids and lipoproteins
- Synthesize key historic research in this area and identify new findings and active areas of focus in exercise and blood lipids and lipoprotein

Symposium Description:

There is a clear relationship between blood lipids (Total, LDL-Cholesterol, HDL-C and triglycerides) and the risk of coronary heart disease. One frequently cited benefit of exercise is its role in positively influencing blood lipids. This symposium will review the fundamental aspects of blood lipid and lipoprotein metabolism and separate the impact of acute and chronic exercise in modifying these parameters. Key historic research findings will be presented, along with new(er) information, as well as the introduction of active areas of investigation in exercise and lipid and lipoprotein will be explored.

Symposium #12: Gerald R Ford Room – 4:00-4:50pm

Setting the Pace: A New Approach to FES Cycling for Those with Spinal Cord Injuries

Session Moderator: Cardyl Trionfante

Presenters: John McDaniel, PhD[1], Lisa Lombardo, MPT[2]
[1]Kent State University
[2]Louis Stoke Cleveland VA Medical Center

I received my PhD in Exercise Science from the University of Utah. Currently I am an assistant professor at Kent State University and I have a research lab at the Cleveland VA Medical Center. My primary research interest focuses on vascular health and blood flow regulation across a variety of populations. To this end I often utilize cycling and as well as other forms of smaller muscle mass exercise within my research. Over the past 3-4 years I have focused on the efficacy of various exercise modalities for individuals with spinal cord injuries. Specifically, my research has included passive limb movement, blood flow restriction exercise and functional electrical stimulation (FES). The work that includes FES cycling and Team Cleveland's Cybathlon training program is the focal point for this presentation.

Learning Objectives:

- Identify the consequences of SCI on cardiorespiratory and skeletal muscle function and describe the impact of these changes on exercise capacity.
- Identify physiological and physical barriers to exercise for people with chronic SCI.
- Describe an alternative way to cycle using a modified recumbent trike, Nu-Step, and modified rowing machine to allow alternatives to exercise with FES.

Symposium Description:
Physical activity is compromised by the immobility following paralysis, leading to long-term health complications such as cardiovascular disease, pulmonary disorders, diabetes and other secondary conditions. More specifically, individuals with SCI experience significant barriers to exercise, which can lead to weight gain, bone loss, muscle atrophy, poor circulation, impaired cardiovascular function, decreased self-confidence, depression, and overall poor health. Adapted exercise equipment for persons with SCI is often restricted to specialized gyms, requires assistance, and may not provide the intensity needed to promote global health benefits since lower extremity muscles are underutilized. We will review the immediate and long-term consequences of SCI on muscle physiology, cardiorespiratory function, and metabolism, identifying how these changes can diminish exercise capacity and undermine long-term health. We will discuss the existing barriers to exercise and strategies to overcome them. The session will include a description of the development of a new cycling technology for individuals with SCI based on a commercially available recumbent bike interfaced with an implanted neuroprosthesis. We will discuss the challenges we faced in achieving overground biking and the strategies we employed to overcome them. We will also describe plans to expand our existing implant-driven cycling program to include Nu-Step and adapted rowing machines and to broaden the impact of the technology by making it available through surface stimulation thereby allowing almost any individual with lower cervical or thoracic SCI to take full advantage of the novel exercise and recreational activity.

Presentation based on the following two manuscripts:

1. **McDaniel J, Lombardo LM**, Foglyano KM, Marasco PD, Triolo R. Cycle Training Using Implanted Neural Prostheses: Team Cleveland. Eur J Transl Myol. 2017 Dec 6;27(4):7087.
2. **McDaniel J, Lombardo LM**, Foglyano KM, Marasco PD, Triolo RJ. Setting the pace: insights and advancements gained while preparing for an FES bike race. J Neuroeng Rehabil. 2017 Nov 17;14(1):118.

Symposium #13: Imperial Room – 4:00-4:50pm

Physical Activity as Space: A New Lens to Optimize Dissemination and Implementation of Evidence-Based Physical Activity Interventions

Session Moderator: Alex Montoye

Presenters: Eduardo Esteban Bustamante, PhD, FACSM, Jared Donald Ramer, MS, Maria Enid Santiago-Rodriguez, MS, ACSM-RCEP
University of Illinois at Chicago

Dr. Bustamante holds a B.S. in Kinesiology from the University of Massachusetts, Amherst and PhD in Kinesiology, Nutrition, and Rehabilitation from the University of Illinois at Chicago. Dr. Bustamante's research focuses on harnessing lifestyle behaviors as a tool and space for mental health promotion, prevention, and treatment among children and families living in communities of concentrated poverty. He currently serves as Chair of the ACSM Diversity Action Committee where he oversees 3 national mentoring programs.

Jared is an experienced leader, coordinator, and teacher. He received an MS in Kinesiology from UIC in 2015 and is current pursuing a PhD in Kinesiology, Nutrition, and Rehabilitation at UIC. His scope of experience covers techniques in all types of resistance training, Indian Club swinging/turning, restorative arts, martial arts, and physical education. Jared's research interests include optimizing the development of physical literacy through physical education and whole curriculum approaches.

María Enid earned a B.S. in English Education from the University of Puerto Rico – Humacao Campus and a Master's in Exercise Science from the University of Puerto Rico – Rio Piedras. She is currently pursuing her doctoral degree in Kinesiology, Nutrition, and Rehabilitation with an emphasis on Exercise & Health Psychology at UIC. Her research interests include community-based lifestyle interventions for physical activity and sedentary behavior among Latino children at-risk for obesity and obesity-related diseases.

Learning Objectives:

- Conceptualize physical activity as both: (1) a tool that carries myriad physical and mental health benefits and (2) an engaging, emotionally-charged space that can be intentionally manipulated to achieve other ends.
- Understand the role of community-based physical activity intervention research within broader health promotion efforts with a focus on the process of translating evidence-based interventions to real-world practice.
- Envision research projects that align with community partner goals and have an eye towards dissemination from their beginnings.

Symposium Description:

Background: Kinesiology researchers have demonstrated myriad benefits of regular physical activity participation, across types of activity and across the lifespan. Benefits range from improvements in physical health to improvements in mental health. Scientists have excelled at elucidating physiological mechanisms of impact and designing interventions to achieve these ends. Despite these efforts, few science-based physical activity interventions go on to be used in the real-world, part of what is termed the research-practice gap. This symposium will provide an overview of the translational process by which evidence-based interventions become real-world practice through the lens of dissemination and implementation science. Support will be provided for a conceptualization of physical activity as an engaging emotionally-charged space, ripe with opportunities for diverse learning; and for the potential of this conceptualization to align researcher and community setting goals to support real-world dissemination and implementation of evidence-based physical activity interventions.

Format:

1. Title: Introduction
   Time: 5-minutes
   Speaker: Maria Enid Santiago-Rodriguez, MS, RCEP
   Description: Overview of presentations and format.

2. Title: Embracing Physical Activity as Space
   Time: 20-minutes
   Speaker: Jared D. Ramer, MS
   Description: Mr. Ramer will introduce participants with literature from Educational Psychology conceptualizing physical activity as an engaging emotionally-charged space ripe with opportunities for learning. From this point, examples of evidence-based physical activity interventions operationalizing this conceptualization will be provided from 3 studies in the UIC Healthy Kids Lab (Project Play, Leaders @ Play, and BUILT) with additional examples and results drawn from the broader physical activity intervention literature and sports-based youth development programs in the City of Chicago.

3. Title: Reimagining Physical Activity to Optimize Dissemination and Implementation of Evidence-Based Interventions
   Time: 20-minutes
   Speaker: Eduardo Esteban Bustamante, PhD, FACSM
   Description: Dr. Bustamante will provide an overview of the translational research process by which evidence-based physical activity interventions become real-world practice with a focus on what has been termed the "research-practice gap," "bench-to-bookcase," and "the valleys of death." Participants will then be presented with principles from dissemination and implementation science, and community-based participatory research with promise to improve real-world dissemination of evidence-based interventions. Finally, results of an interdisciplinary community-based study to disseminate a physical activity program (Leaders @ Play) across the Chicago Park District will be presented.

Student Colloquium Session

The Company You Keep: Revisionist History, Windy Blather and Lies

Friday, November 9th – 4pm to 5pm, Pantlind Ballroom

Barry Braun did his Ph.D. in Nutrition from the University of California, Berkeley and post-doctoral work at Stanford University Medical School. He spent 14 years as Professor and Director of the Energy Metabolism Laboratory at UMASS Amherst. Since 2014, he is Professor and Head of the Department of Health and Exercise Science at Colorado State University. Dr. Braun's research is focused on optimizing the use of exercise to prevent type-2 diabetes. He has published more than 100 peer-reviewed research articles with funding from NIH and the American Diabetes Association. He is a Fellow of ACSM and the National Academy of Kinesiology. He is most proud of his awards for undergraduate teaching including the University of Massachusetts Distinguished Teaching Award.

The goal is to take a journey through how one person (me) has navigated through life from undergraduate university to the present. The non-linear path, highlighting the fortuitous opportunities, unexpected detours and instructional missteps will hopefully provide some useful insight regarding the critical importance of mentors, movement and mistakes in creating your own path.

The primary learning objectives are to:

- Hopefully a take-home will be to debunk the perception that there is a "right" path to success.
- Ideally, to imbue attendees with the belief that people matter a lot more than titles, accolades or "stuff."
- To suggest the 60/20/20 rule when making decisions about what to do with your life.

Schedule – Friday Afternoon: Free Communication/Slides

Free Communication/Slides #5:
Pantlind Ballroom – 2:00pm-3:00pm

Session Moderator: Meghan Baruth

2:00-2:15pm

NO GENDER DIFFERENCE IN ENERGY EXPENDITURE DURING WALKING PERFORMED WITH BLOOD FLOW RESTRICTION

Anthony M. Kollasch (Briar Cliff University), Taylor Yockey (Briar Cliff University), Mark L. McGlynn (Briar Cliff University), Norio Hotta (Chubu University), Michael R. Kushnick (Briar Cliff University)

Abstract: Exercise performed with blood flow restriction (BFR) has been explored as a means to increase physiological stress placed on the body. Previous evidence indicates the potential of low-moderate intensity exercise in altering energy expenditure and substrate utilization between genders. **PURPOSE:** to compare energy expenditure and type of fuel utilized in men and women while performing "traditional" (CON) versus BFR treadmill walking at the same mechanical exercise workload. **METHODS:** 17 healthy individuals, ten men (age 21±4yrs; BMI 24.24±6.18 kg/m^2) and seven women (age 23±4yrs; BMI 27.26±7.59 kg/m^2) performed two bouts of treadmill walking (BFR & CON) at 3mph with a 2% grade for 15 minutes. The trials were in random order and at least 24 hours apart. During exercise, ventilatory variables (VO_2 & VCO_2) were monitored to determine energy expenditure and relative (RER) and absolute (g/min) carbohydrate/fat utilization. All data are reported as mean±stdev. A 2×2 RM-ANOVA was performed on steady state data between genders and trials (BFR & CON). Significance was accepted at 0.05. **RESULTS:** Relative VO_2 for the BFR trial was not different between genders (15.51±1.59 vs 14.70±2.48 ml/kg/min, men vs women, respectively). In fact, there were no interactions for any of the data. However, in the collapsed data (men and women combined), the BFR trial energy expenditure (1.42±0.23 vs 1.12±0.13 L/min), RER (0.87±0.08 vs 0.80±0.10), and CHO utilized (1.32±0.11 vs 0.90±0.14g/min) were significantly greater than CON trial, and fat utilization (0.25±0.26 vs 0.38±0.12g/min) was lesser in BFR than CON. **CONCLUSION:** according to this data, while there were no gender differences identified, when the data was analyzed independent of gender, there was a significant increase in VO_2 when completing BFR vs CON treadmill walking and greater carbohydrate/lesser fat utilized.

Keywords: Comparison, Sexes, Exercise, None

2:15-2:30pm

ANALYSIS OF HRV FREQUENCY DOMAIN INDICES IN YOUNG AND MIDDLE-AGED ADULTS DURING AN SPV

Collin T. Garner (Western Michigan University), Rachel M. Maceri (Western Michigan University), Nicholas J. Hanson (Western Michigan University), Panagiotis Koutakis (Florida State University), Cody Diehl (Oklahoma State University)

Abstract: Prior research suggests alterations in frequency domain indices of heart rate variability (HRV) occur with aging, resulting in altered autonomic functioning. Research investigating the age-related differences in frequency domain measures of HRV during incremental exercise is limited. **PURPOSE:** To assess HRV for age- and exercise intensity-related differences during the performance of a self-paced VO_{2MAX} (SPV) test. **METHODS:** The study included young adults (ages 18-35 years, 9 males) and nine middle-aged adults (ages 40-55 years, 1 male) healthy, recreationally active. All subjects performed an SPV on a Wattbike cycle ergometer. The SPV test consisted of five 2-minute stages of increasing exercise intensity, with each stage defined by rating of perceived exertion (RPE) values of 11, 13, 15, 17, and 20, respectively. The measured variables of HRV frequency domain included low and high frequency power (normalized units) and low-high frequency ratio (ms^2). HRV data was recorded via a chest strap and wristwatch heart rate monitor throughout the entire duration of the test and was analyzed using HRV analysis software. Approximate entropy and sample entropy were calculated as measures of complexity and regularity of HRV data. The stress index, derived from frequency and time domain measures, was included in the analysis as well. Repeated-measures ANOVAs were used to compare HRV frequency domain variables, HR, and relative VO_2 for each stage of the SPV, with age-group as a between-subjects factor. Pearson correlation analyses were run on all variables for each stage of the SPV. **RESULTS:** A significant stage effect was present for stress index (p=<.001), VO_2 ($ml \cdot kg \cdot min^{-1}$) (p=<.001), sample entropy (p=<.001), and HR (p=<.001). No age-group differences were detected. HR was positively correlated with approximate entropy for stages 1 (r=.677, p=.001), 3 (r=.831, p=<.001), and 4 (r=.567, p=.009). LF:HF was negatively correlated with HR for stage 1 only (r=.457, p=.030) and approximate entropy for stages 1 (r= -.488, p=.029), 4 (r= -.605, p=.005), and 5 (r= -.660, p=.002). **CONCLUSION:** The absence of age-related differences within the frequency domain indices of HRV suggests that participation in regular aerobic exercise, in addition to its many benefits, may help maintain healthy autonomic functioning with aging.

Keywords: Aging, low and high frequency power, incremental exercise

2:30-2:45pm

CARDIOVASCULAR, METABOLIC, AND PERCEIVED EFFORT WHILE RIDING A REGULAR AND ELECTRIC BICYCLE

Tim Reiman (Miami University), Brett Kemper (Miami University), Courtney Kemper (Miami University), Ryan Mullen (Miami University), McKenna DiRe (Miami University), Winston von Carlowitz (Miami University), Helaine Alessio, FACSM (Miami University)

Abstract: A very small percentage (5%) of Americans bike to school, work, or as a leisure activity (Omnibus, 2003). Use of an electric bike may incentivize active transport for people who may not be fit enough to ride

several miles. This would effectively enhance one's daily exercise levels, possibly create a cardiovascular and metabolic health benefit and would be an environmentally friendly transportation option. **PURPOSE:** The purpose of this study was to determine the metabolic, cardiovascular, and perceived effort of riding an e-bike for 3 miles at two different assist levels, in comparison to a regular bike. **METHODS:** Male and female subjects (n=12), (aged 19-61 yr), completed a YMCA test and 3 outdoor 3-mile bike rides at their own pace. The 3 mile rides were conducted on a standard bike, E-2 assist, and E-3 assist with 10 minute rest periods between each test. Participants wore a heart rate monitor and COSMED that recorded cardiovascular and metabolic responses, respectively, while biking. Subjects were asked to report rating of perceived effort (RPE) at the end of each 3-mile ride. A mixed effects linear model was used to estimate the differences between subjects and bike types on variables of interest. **RESULTS:** Preliminary analysis shows that heart rate, percentage of VO_2 max, breath frequency, respiratory quotient, and caloric expenditure per minute did not differ across the different bike conditions. Riding an e-bike at either assist level reduced the level of perceived effort (regular=12.67, e-bike assist 2=9.92, e-bike assist 3=9.33), as well as the amount of time the 3-mile commute simulation took (regular=14.78 min, e-bike assist 2=13.02 min, e-bike assist 3=11.99min). **CONCLUSION** Besides a quicker commute at a lower perceived effort, there is no significant difference in metabolic, cardiovascular, or caloric expenditure responses between riding an e-bike or a regular bike. Health related fitness benefits are as likely to occur on an e-bike as on a regular bike.

Keywords: Electric Bike, Active Transport, Pedal assist bicycle

2:45-3:00pm

EFFECTS OF HEALTHY AGING ON SKELETAL MUSCLE OXYGENATION DURING A SELF-PACED MAXIMAL EXERCISE TEST

Rachel Maceri (Western Michigan University), Nicholas Hanson (Western Michigan University), Panagiotis Koutakis (Florida State University), Cody Diehl (Oklahoma State University), Collin Garner (Western Michigan University)

Abstract: Previous research has suggested that age-related decline in mitochondrial enzymes consequently results in reduction of skeletal muscle oxidative function. Limited research exists investigating effects of healthy aging on these observed changes, especially with middle-aged individuals. **Purpose:** The purpose of this study was to investigate the effects of healthy aging on changes iN tissue oxygenation in skeletal muscle (SmO_2) during a self-paced VO_2max (SPV) test in younger and middle-aged subjects. **Methods:** This study included seven younger (ages 18-35 years, 4 males, BMI 28.1±3.4 kg/m^2) and nine middle-aged (ages 40-55 years, one male, BMI 25.1±3.8 kg/m^2) healthy, recreationally active individuals. Subjects visited the lab once to complete the SPV test on a Wattbike cycle ergometer. The Moxy sensor, which uses near-infrared spectroscopy, was used to estimate SmO_2. Four Moxy sensors were used and were placed on the right and left quadriceps (vastus lateralis), and right and left gastrocnemius muscles. The SPV test was exactly ten minutes in length, with five 2-minute stages. Each stage was perceptually regulated using the 6-20 rating of perceived exertion (RPE) scale: 11, 13, 15, 17, and 20 (in that order). Repeated-measures ANOVAs were used to compare SmO_2 between anatomical sites and stages of the SPV. Age group was used as a between-subjects factor. **Results:** Measured VO_2max was 48.33±7.56 ml/kg/min for the younger and 38.10±7.45 ml/kg/min for the middle-aged subjects. For SmO_2, there was no main effect of anatomical site ($p=0.170$) and no differences between age groups ($p=0.906$). A main effect was present for SPV stages ($p<0.001$); values remained steady until the last two stages, where they decreased in both groups (younger: 71.0±3.1, 69.5±3.5, 67.9±3.7, 63.6±4.5, 58.3±5.9 percent; middle-aged 69.4±2.8, 70.4±3.1, 70.4±3.3, 65.4±4.0, 56.1±5.3 percent). **Conclusion:** Since no age-related differences were found in SmO_2 during the exercise test, healthy aging (i.e. regular aerobic exercise) can be seen as an effective intervention for maintenance skeletal muscle blood flow and a profound influence for

sustaining quantity and quality of mitochondria function. Future research should determine whether the same findings occur with healthy, active elderly subjects.

Keywords: Moxy, aerobic exercise, VO2max, endurance

Free Communication/Slides #6:
Pantlind Ballroom – 3:00pm-4:00pm

Session Moderator: James Sackett

3:00-3:15pm

ACUTE PHYSIOLOGICAL RESPONSES TO CIRCUIT AND SPRINT HIGH-INTENSITY INTERVAL EXERCISE IN CHILDREN

Jeanette M. Ricci (Michigan State University), Todd A. Astorino (California State University - San Marcos), Karin A. Pfeiffer, FACSM (Michigan State University)

Abstract: Pediatric research investigating high-intensity interval exercise (HIIE) encompasses acute and chronic responses to short, intense bouts of exercise utilizing treadmill or cycle ergometry protocols. However, research on the acute responses to body-weight HIIE in children is lacking. **PURPOSE:** To compare the acute physiological responses between single sessions of body-weight circuit and treadmill-based sprint HIIE in children. **METHODS:** Fourteen active boys (age = 9.9 +/- 0.3 years) completed graded exercise to determine peak heart rate (HR_{peak}), maximal oxygen uptake (VO_{2peak}), and maximal aerobic speed (MAS). Subsequently, time-matched (8-minute) body-weight and sprint regimens were completed in a randomized order on separate occasions within a 1-2-week period. The body-weight circuit consisted of 8 bouts of 30 seconds of maximal repetitions of 4 exercises (mountain climbers, jump squats, jumping jacks, and burpees) which were performed twice; whereas, the sprint regimen consisted of eight 30 s bouts at 100% MAS. For both regimens, a 30 second recovery was allotted between bouts. HR and gas exchange data were continuously assessed during exercise using a portable metabolic analyzer and HR monitor. Blood lactate concentration (BLa) was measured pre- and post-exercise. **RESULTS:** Peak HR and VO_2 were equal to 169 +/- 12 b/min (88% HR_{peak}) and 35.7 +/- 5.1 mL/kg/min (79% VO_{2peak}) for body-weight and 169 +/- 11 b/min (88% HR_{peak}) and 32.9 +/- 4.5 mL/kg/min (73% VO_{2peak}) for sprint, with peak VO_2 higher in body-weight versus sprint HIIE ($p=0.015$). In addition, throughout the regimen, there was a significant difference in RER between body-weight and sprint HIIE ($p=0.002$, $d=0.2$), with no differences ($p > 0.05$) in HR, VO_2, or V_E. Post-exercise BLa values were significantly higher following body-weight versus sprint (mean difference = 3.2 mmol/L, $p=0.006$, $d=0.5$). **CONCLUSION:** The higher RER and BLa values observed for body weight versus treadmill sprinting may be explained by greater muscle recruitment required for multi-joint, dynamic movements. Participants achieved similar peak HR, but there was a higher peak VO_2 in response to the body weight circuit, which contradicts previous work in children performing various types of HIIE. Future research should investigate protocols of longer duration utilizing different body-weight exercises.

Keywords: HIIT, treadmill, functional, VO2

3:15-3:30pm

OBJECTIVELY-MEASURED SEDENTARY TIME AND EXECUTIVE FUNCTION AMONG CHILDREN WITH BEHAVIOR DISORDERS

Maria Enid Santiago-Rodriguez (University of Illinois at Chicago), Jared Donald Ramer (University of Illinois at Chicago), Eduardo Esteban Bustamante, FACSM (University of Illinois at Chicago)

Abstract: Screen time in children with ADHD can exacerbate symptoms and affect self-regulation and attention. However, few studies include sedentary time (ST) when examining executive function (EF) in children with behavior disorders. **PURPOSE**: To test relationships between objectively-measured ST and children's EF with behavior disorders. **METHODS**: Eleven African-American girls and 12 boys (mean age = 9.3 ± 1.9-years) wore a triaxial accelerometer for 5-consecutive-days at the beginning of an intervention trial. Evenson (2008) cut-points were used to determine ST (min/day), sedentary breaks (min/day), and ST% (% per day) during weekdays and a filter to remove intervention time and non-wear time during the night was applied. Data was included if a participant wore the accelerometer ≥ 3 weekdays for ≥ 8 hrs/day. EF was assessed through parental-report of behavioral manifestation of EF (BRIEF-GEC score) and children underwent neuropsychological tests of verbal and visuospatial working memory (AWMA verbal and AWMA visuospatial scores). Assumptions of multicollinearity, outliers, linearity, homoscedasticity, and independence of errors were met. ST (min/day) was reciprocal by 100 transformed to achieve normality. Bivariate correlations and multiple regression analyses tested relationships between EF and ST, controlling for wear-time and moderate-to-vigorous physical activity. **RESULTS**: On average, children spent 295.60±67.17 min/day in ST, 417.60±120.78 min/day in sedentary breaks, and 49.31±7.11% of the day in ST. Children obtained an average score of 59.21±10.42 points in BRIEF-GEC, 32.70±25.68 points in AWMA verbal score, and 38.05±23.31 points in AWMA visuospatial score. BRIEF-GEC, AWMA verbal, and AWMA visuospatial scores were low. In this case, BRIEF-GEC scores indicate a better EF, while AWMA verbal and visuospatial scores represent a less fewer difficulties in working memory and a less problematic behavior in the classroom. In bivariate correlations, a significant relationship was observed between ST% and AWMA visuospatial score ($r(17)=-0.49$, $p=0.04$). None of the regression analyses, controlling for wear-time and moderate-to-vigorous physical activity, showed significant results, though there was a trend for all ST variables to explain ≥ 15% of the variance in AWMA visuospatial scores after controlling for wear-time. **CONCLUSION**: Few significant relationships were evident between objectively-measured ST and assessments of African-American children's EF with behavior disorders.

Keywords: Accelerometry, ADHD, Childhood, African-Americans

3:30-3:45pm

USE OF TWO-REGRESSION MODELS TO PREDICT ENERGY EXPENDITURE USING WRIST-WORN GENEACTIVs IN YOUTH

Andrew S. Kaplan (University of Wisconsin- Milwaukee), Samuel R. LaMunion (University of Tennessee-Knoxville), Paul R. Hibbing (University of Tennessee- Knoxville), David R. Bassett Jr. FACSM (University of Tennessee- Knoxville), Scott E. Crouter FACSM (University of Tennessee- Knoxville)

Abstract: PURPOSE: The purpose was to develop two-regression models (2RM) to estimate energy

expenditure (EE) using wrist-worn GENEActiv (GENEA) activity monitors in youth. **METHODS:** One-hundred youth (mean±SD; age, 12.2±3.5 years; Girls=52) completed 30-min of supine rest and 16 activities (4-5 min each) ranging from sedentary behaviors (SB) to vigorous intensity. Participants wore a Cosmed K4b2 (criterion measure of EE) and a GENEA on either the left wrist (LW; n=50) or right wrist (RW; n=50) wrist. Raw 100-Hz acceleration data were expressed as Euclidean norm minus one (ENMO) and reduced to 1-s epochs. Breath-by-breath oxygen consumption (VO2) from the K4b2 were averaged over 60-s and converted to youth metabolic equivalents (METy; activity VO2/measured resting VO2). For supine rest, minutes from the lowest 5-min VO2 average was used for analysis and for all other activities the last 10-sec were excluded and the previous 60-s was used. Separate 2RMs were developed for each wrist. Leave-one-participant-out cross-validation (LOOCV) was used to assess model performance. Using the entire activity routine, estimates of average EE from the LW and RW 2RMs were calculated and the Hildebrand non-dominant wrist single regression equation was applied to data from both wrists to estimate EE. **RESULTS:** Log-transformed ENMO (log[ENMO]) and the coefficient of variation of log(ENMO) were used for the development of the SB and continuous walk/run (CWR) classifiers, respectively. Log(ENMO) and age were used as predictor variables in the regression equations. The LW and RW, SB (-3.11 and -2.93 log(ENMO), respectively) and CWR (27.0% and 25.6%, respectively) classifiers had sensitivities, specificities, and AUC >85.3%, >93.8%, and >93.2%, respectively. For the LOOCV, the LW and RW 2RMs had root mean square errors (RMSE) of 0.90 and 0.84 METy, respectively, and mean absolute percent errors of 19.6% and 19.4%, respectively. Across the entire activity routine, RMSE for the LW 2RM (0.46 METy) and RW 2RM (0.58 METy) were lower than the Hildebrand equation applied to the LW (1.09 METy) or RW (1.06 METy) data. **CONCLUSION:** Compared to indirect calorimetry, the 2RMs had lower RMSE and MAPE for estimates of EE than the Hildebrand single regression equation regardless of wrist location.

Keywords: Equation, Activity Monitor, Accelerometer

3:45-4:00pm

EFFECT OF SAMPLING RATE ON HIP- AND WRIST-WORN ACCELEROMETER RAW ACCELERATION AND PROCESSED COUNTS

Kimberly A. Clevenger (Michigan State University), Karin A. Pfeiffer, FACSM (Michigan State University), Kelly A. Mackintosh (Swansea University), Melitta A. McNarry (Swansea University), Alexander H.K. Montoye, FACSM (Alma College)

Abstract: Sampling rate affects processing of acceleration to activity counts, but research is needed to quantify effects on actual acceleration and for wrist-worn accelerometers. **PURPOSE:** To compare acceleration and counts when using different sampling rates and identify how differences are affected by accelerometer location and activity intensity. **METHODS:** Children (N=29) wore triaxial accelerometers at the right hip and left wrist during rest, two active video games, and a maximal test, while wearing a portable metabolic unit (measured METs). Accelerometers sampled at 100 Hz, which was downsampled to 30 Hz. Paired t-tests were used to compare total counts/15-sec and mean acceleration in each axis by sampling rate. Paired t-tests were used to compare absolute differences by wear location and repeated measures ANOVA was used to compare differences by activity type (rest/transition, active video game 1 or 2, maximal test). Correlations between measured METs and absolute differences were used to identify if differences increased with increasing intensity. Percent agreement between 30 and 100 Hz data was determined for activity intensity (sedentary, light, moderate, vigorous) as determined by hip and wrist count cut-points or METs predicted from four machine learning models. **RESULTS:** 100 Hz data resulted in significantly more total counts/15-sec in each axis for both hip (e.g., 585 versus 565 y-axis counts/15-sec) and wrist monitors (e.g., 1352 versus 1347), with no differences in mean acceleration. METs predicted by machine learning models were significantly different

when using 100 versus 30 Hz data, but mean absolute differences were 0.0-0.1 METs. Differences were greater for hip-worn versus wrist-worn monitors for all variables and tended to be lower during rest/transition and higher during the max test compared to other activities. As measured METs increased, differences increased (e.g., hip counts/15-sec r's=0.55-0.64). When intensity was classified (using cut-points or machine learning), percent agreement between 30 and 100 Hz data was high (97.4-99.7%). **CONCLUSION:** Our findings support research indicating that sampling rate affects the conversion of acceleration to counts and adds that differences increase with intensity and when using hip-worn monitors. Classifying data to activity intensities using cut-points or machine learning approaches resulted in agreement despite differences in sampling rate.

Keywords: monitor, physical activity, measurement

Schedule – Friday Afternoon: Poster Session

Poster Session #4:
Crown Foyer – 2:15-3:30pm

Board #1

METABOLIC ENERGY COSTS DURING CONSTANT SPEED AND INTERVAL WALKING IN HEALTHY SEDENTARY ADULTS

Andary Esho (Oakland University), Christian Maron (Oakland University)

Abstract: Walking represents a popular, convenient and relatively safe form of activity that can easily be incorporated into weight management programs. The energy expenditure associated with walking has been reported to be either linearly or slightly exponentially related to speed. Thus, interval walking training has been developed as a novel free-living training modality that improves physical fitness and cardiovascular risk factors in humans. **PURPOSE:** to determine the effect of interval walking exercise (INT) and constant speed walking exercise (CON) on whole body energy expenditure and fat utilization in healthy sedentary adults. We hypothesized that interval walking exercise (INT) increases whole body fat utilization and energy expenditure to a greater extent, compared with the constant speed walking (CON) exercise. **METHODS:** This study was set as randomized crossover design. Nine healthy sedentary individuals (BMI $\leq$ 25 kg/m^2 and 18-50 yrs) were recruited. Initially nine subjects were randomly assigned into a constant speed walking group (CON) or an interval walking group (INT). Then, CON became INT and INT became CON. The constant speed walking consists of a single bout of 60 min walking exercise at 45% of VO_2max on a treadmill. The interval walking consists of a single bout of 60 min walking exercise with cycles of alternating 3-min slow (30% of VO_2max), 3-min moderate (45% of VO_2max), and 3-min fast (60% of VO_2max) walking. Energy expenditure and fat usage were determined via indirect calorimetry during rest and walking exercise. Two-way ANOVA was used to determine differences in energy expenditure and fat utilization between the groups. **RESULTS:** Total fat utilization (g/min) was higher in INT group, compared with CON (0.276±0.01 g/min vs. 0.238±0.01 g/min, respectively, *P*=0.046). Total calorie expenditure (kcal/min) from body fat was also higher in INT group, compared with CON (2.996±0.13 kcal/min vs. 2.564±0.13 kcal/min, respectively, *P*=0.028). **CONCLUSION:** Our data show that an interval type of walking pattern is better to burn more body fat and total energy

expenditure. Thus, these findings may provide a better exercise strategy to maintain a heathy body weight in healthy individuals and to reduce body weight in obese people.

Keywords: Fat metabolism, Walking exercise

Board #2

AN EVALUATION OF THE IMPACT OF FLEXIBILITY ON BALANCE IN ARCHERY ATHLETES

Branden M. Ziebell (Liberty University), Jared Feister (Liberty University), Andrew Bosak (Liberty University), Russel Lowell (Liberty University), Madeline Phillips (Liberty University), Hannah Nelson (Liberty University), Robert T. Sanders (University of Mississippi)

Abstract: The involvement of static balance in athletic events is usually not debatable, yet the importance of it can sometimes be forgotten. For shooting sports, static balance can have a dramatic impact on successful athletic performance. Furthermore, it is crucial for these special athletes (i.e. archers, biathletes, trap shooters, etc.) to stay steady and still before, during, and after a shot. More specifically, archers need to have a firm foundation and adequate balance during practice and competition. Unfortunately, there appears to be a void in the literature pertaining to flexibility and balance and how they relate to one another in archery. **PURPOSE:** To investigate the potential relationship between flexibility and balance in collegiate archers in order to determine if archers should consider incorporating flexibility training programs in their overall strength training and conditioning programs. **METHODS:** After having descriptive data (Ht., Wt., BF%, age) recorded, 11 (7 males, 4 females) collegiate archers participated in a warm-up consisting of a Queens College step test and a 4-minute dynamic warmup. Next, subjects completed an assessment of a hand grip dynamometer, goniometry for the ankles in the frontal plane, and a series of flexibility tests. The flexibility tests included the sit and reach test (SR), back scratch test (BST), and trunk extension test (TET). Lastly, with a balance system, subjects were assessed on an athletic single leg assessment feature. **RESULTS:** There was no relationship between balance and plantar flexion (.135) or TET (-.071). However, there was low correlation with balance to BST (.246) and SR (.292) and a moderate correlation occurred between balance and dorsiflexion (.398). **CONCLUSION:** Previous studies have shown correlation between ankle range of motion and balance. The moderate correlation of dorsiflexion to balance of the current study supports these findings**.** However, the low correlation of BST and SR suggests that having adequate flexibility in these areas may not necessarily improve static balance. Additional research should investigate the potential relationship between flexibility and static balance in other shooting sport athletes.

Keywords: Performance, Shooting, and Stability

Board #3

THE CIRCULATING INFLAMMATORY RESPONSE TO AEROBIC EXERCISE IN A HOT CONDITION

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Abstract: Purpose: To examine the influences of ambient temperature on the circulating concentration of pro- and anti-inflammatory cytokines. **Method**s: 12 recreationally active men (24.4±3.1yrs; 1.81±0.03m; 81.5±8.0kg; 12.7±3.8 %BF, 3.89±0.41L·min^{-1}) completed three experimental visits: a VO_{2max} test, and cycling in 23°C (MT) and 34°C (HT) in a counterbalanced fashion. Cycling sessions consisted of 60-minute bouts at

60% of previously established VO_{2max}, and time to exhaustion trial at 90% VO_{2max} (TTE). Blood samples were collected prior to exercise (PRE), following 60-minute cycling session (60), TTE (90), and 60-minute recovery session (REC). Blood samples were analyzed for serum concentrations of IL-1β, IL-1ra, IL-6, IL-10 and TNF-α. Data were analyzed using a repeated measures ANOVA, while non-normally distributed data were LN transformed. If LN data violated normality, a Freedman's ANOVA by Ranks was employed. **Results:** A significant interaction was observed for TNF-α ($F= 5.580$, $p = 0.003$, $\eta^2_p = 0.337$). TNF-α increased from PRE to 60 ($p = 0.001$), 90 ($p <0.001$), and REC ($p = 0.025$) in HT, with no changes in MT ($F=0.641$; $p=0.542$; $\eta^2_p = 0.055$). A significant time effect was observed for IL-1Ra ($F= 17.483$, $p < 0.001$, $\eta^2_p = 0.636$), in addition to a condition effect ($F= 9.539$, $p = 0.011$, $\eta^2_p = 0.488$). IL-1Ra increased from PRE to 90 and REC ($p<0.05$) and was significantly higher during HT when compared to MT ($p=0.011$). Similarly, a main effect for time was observed for IL-6 ($F= 81.502$, $p < 0.001$, $\eta^2_p = 0.881$). IL-6 increased from PRE to 60 ($p<0.001$), 90 ($p<0.001$) and REC ($p<0.001$). A significant interaction ($F= 4.368$, $p = 0.037$, $\eta^2_p = 0.304$) for IL-10 was observed. IL-10 increased from PRE to 90 ($p = 0.010$, $p=0.007$) and REC ($p=0.043$, $p=0.025$) during both MT and HT, respectively. A non-significant difference between HT and MT for IL-10 at 90 was also observed ($p =0.063$). No significant interactions were observed for IL-1ß ($p = 0.069$). **Conclusion:** Exercise in the heat appears to increase circulating TNF-α concentrations, but does not appear to influence IL-6 concentrations. Therefore, the exercise induced increase in IL-6 appears to mask the inflammatory effects of heat exposure.

Funding: This study was partially funded by the Kent State University Resource Council

Keywords: Inflammation, Heat Physiology, Cycling

Board #4

PHYSIOLOGICAL COMPARISON BETWEEN CRUTCHES AND KNEE SCOOTER

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Abstract: PURPOSE: Ankle and foot injuries can require individuals to use traditional crutches for movement. However, using crutches can cause a high level of exertion. In recent years, use of knee scooters have increased as a modality for moving around. There is a paucity of research examining the physiological demands of the knee scooter. Therefore, the purpose of this study was to compare moving on a knee scooter with moving using crutches. **METHODS:** Nineteen (13 females, 6 males) apparently healthy young adults were recruited. The participants had one day of practice then another day of testing. Participants completed a figure eight hallway route (196 m) under three conditions: first with walking, then (order randomized) using crutches, and using scooter. The speed was self-paced and had six minutes of sitting rest between conditions. Heart rate and oxygen consumption were monitored with a mobile metabolic system. With alphas = 0.05, One-Way Repeated Measures ANOVA with a paired t-Testing (Bonferroni with Holm's sequential adjustment) for *post hoc* testing were done. **RESULTS:** The average VO_2 (1223 ± 321 mL/min) of crutches was significantly 27% higher than the average VO_2 (992 ± 221 mL/min) for the knee scooter. The average heart rate (164 ±17 bpm) for the crutches was found to be significantly 12% higher than the average heart rate (146 ± 24 bpm) of the knee scooter. Crutch use was non-significantly slower than the scooter. **CONCLUSION:** The knee scooter caused less cardio-metabolic stress than the crutches. This indicates that the knee scooter should be recommended over crutches especially for those with poor fitness levels.

Funding: Funded, in part, by an Oakland University Honors College grant

Keywords: Oxygen Consumption, Heart Rate, Assistive Ambulating Devices, Portable Open Circuit Spirometry

Board #5

ORAL CONTRACEPTIVES EFFECT ON SENSORY NERVE CONTRIBUTION DURING VASODILATION: A PILOT STUDY

Carley A. Shannon (Ball State University)

Abstract: Skin sensory nerves are primarily responsible for the rapid increases in skin blood flow (SkBf) due to local heating. Previously, we observed that menstruating women during mid-luteal (ML) phase exhibit greater sensory nerve contribution to the vasodilatory response than men, likely due to increased concentrations of estrogen and progesterone. **PURPOSE:** To compare the effect of oral contraceptives (OCP) and naturally cycling (NAT) women's responses to increasing local skin temperature. **METHODS:** Fifteen (6OCP and 9NAT) women (23±2 years) were tested once during early follicular (EF) and ML phases of their menstrual cycles. A eutectic mixture of local anesthetic (EMLA) was applied in a 4 cm^2 area on their forearm. Laser-Doppler probes and skin heaters were instrumented at EMLA and control sites. SkBf was continually monitored. T_{loc} was increased from 33°C at 1°C • 20 s^{-1} to 42°C. Following plateau at 42°C, T_{loc} was increased to 44°C for maximal vasodilation. The percent contribution was determined by comparing the EMLA sites to control sites using [(%CVCmax Control-%CVCmax EMLA)/%CVCmax Control] x 100. Independent samples *t*-tests were completed between the groups. Statistical significance was set at $p<0.05$. **RESULTS:** The contribution of sensory nerves to SkBf during the ML phase OCP was 25% compared to NAT who showed of 42% contribution *(*$p=0.049$*)*. Comparing EMLA OCP to NAT during the ML phase %CVCmax was 59% in OCP and 42% in NAT ($p=0.042$). When comparing Control OCP to NAT during the ML phase OCP %CVCmax was 78% and NAT was 72% ($p=0.081$). The EF phase contribution of sensory nerves to the SkBf was 22% in the OCP group and 39% in the NAT group ($P=0.043$). When comparing EMLA OCP to NAT during the EF phase the %CVCmax was 61% in OCP and 47% in NAT ($p=0.065$). When comparing Control OCP to NAT during the EF phase OCP %CVCmax was 78% and NAT was 78% ($p=0.472$). **CONCLUSION:** Sensory nerve contribution to SkBf is blunted by OCP. However, analysis of the unadulterated %CVCmax, indicates other mechanisms are being initiated to maintain overall vasodilatory response. These pilot results warrant further participant recruitment.

Keywords: Local Heating, Skin Blood Flow, Microcirculation, Hormones

Board #6

ASSOCIATION BETWEEN OMEGA-3 FATTY ACID INTAKE AND CARDIOMETABOLIC FACTORS

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Abstract: Research suggests that omega-3 fatty acid intake (EPA and DHA in particular) can improve status of many cardiometabolic risk factors. Proposed rationale includes the ability of omega-3 polyunsaturated fatty acids to promote the reverse cholesterol transport mechanism, promote Triglyceride clearance and reduce LDL-cholesterol synthesis, all of which are mechanisms to raise HDL-cholesterol and lower LDL-cholesterol and

serum Triglyceride levels. **Purpose**: To observe the association between dietary omega-3 fatty acid intake and HDL-cholesterol, LDL-cholesterol, Total Cholesterol, and Triglyceride levels. **Methods:** A sample of 18 overweight (95.5kg ± 18.6), older adults (64 years ± 4.9) completed a series of 3-24 hour recalls listing names and amounts of foods, beverages, and supplements consumed the day prior. Intake was analyzed using NDSR 2017 Software and Average Nutrient Intake Reports were created, including the average daily amount of omega-3 fatty acids consumed. Within 14 days, subjects had fasting bloodwork profiles collected. Participants were instructed to refrain from eating at least 10 hours prior to the time of their bloodwork. At the visit, a 20-mL blood sample was obtained from the antecubital vein and analyzed using the Cholestech LX automated system. Data analysis used SPSS Pearson correlation coefficients partial analysis, controlling for gender and age. **Results:** Results of the Pearson correlation indicated a positive association between intake of Omega-3 Fatty Acids (average intake 1.84 ± 0.8g) and HDL-cholesterol (average 47.1 ± 10.2mg/dL), although it was not statistically significant ($r(14) = .215$, $p = .424$). Additionally, results indicated inverse associations between Omega-3 intake and LDL-Cholesterol ($r(14) = -.194$, $p = .472$) where average LDL = 110.7 ± 25.9mg/dL, Omega-3 intake and Triglyceride levels ($r(14) = -.362$, $p = .168$), average TG = 120.9 ± 45mg/dL, and Omega-3 intake and Total Cholesterol ($r(14) = -.254$, $p= .343$), average TC = 182.1 ± 26.8mg/dL, however none of which were significant. **Conclusion:** Although direction of associations support of the hypothesis that omega-3 FA intake has a positive impact on blood lipid profiles, further research with a larger sample size is necessary to determine the strength of the correlation and statistical significance between blood lipid profiles and Omega-3 Fatty acid intake.
Funding: This project was funded by an NIH Grant- 1R15AG055923-01

Keywords: Lipid profile, Omega-3

Board #7

TOTAL BODY RESISTANCE TRAINING EFFECTS ON AUTONOMIC FUNCTION IN HEALTHY YOUNG ADULTS: A PILOT STUDY

Cody A. Altherr (Ball State University), Andrew T. Del Pozzi (Ball State University), Kayla M. Soave (Ball State University), Paul R. Nagelkirk (Ball State University)

Abstract: Autonomic function (AF) pertains to how well the autonomic nervous system maintains hemodynamic and homeostatic changes in our body. When autonomic function becomes impaired all-cause mortality risk is increased. Aerobic exercise training has been shown to improve autonomic function, however, resistance training has yielded equivocal results. We speculate that this is because of the previous training programing as well as the duration of the training. **PURPOSE:** To analyze the influence of a total body resistance training on autonomic function in healthy adults. **METHODS:** Four women (age 22 ± 2 years) were tested twice, once pre- and post-training during their early follicular phase (EF) of their menstrual cycle for body composition and AF. The total body resistance training protocol (8 exercises; all major muscle groups 3X per week) lasted 8 weeks, starting at 60% of their 1RM and increasing to 85% 1RM, as well as increasing from 2 to 3 sets, at week three. **RESULTS** Adherence to the program was 98.9% (95/96 sessions). 1 repetition maximum (1RM) for chest press increased by 10.99 kg ($p=0.022$; pre-43.36 post-54.36) 1RM for leg press increased by 90.72 kg ($p=0.001$; pre-138.34 post-229.06). Body composition was also favorably changed with increases in lean mass by 0.868 kg ($p=0.138$) and decreases in fat mass by 1.1 kg ($p=0.138$). Respiratory Sinus Arrhythmia increased 0.25 bpm ($p=0.939$) and Valsalva Ratio increased by a factor of 0.103 ($p=0.724$). The difference between peak diastolic blood pressure (DBP) and average DBP at rest increased 17.25 mmHg ($p=0.294$) during static handgrip. Low Frequency (LF) to High Frequency (HF) ratio increased by a factor of 0.26 ($p=0.454$)**. CONCLUSION:** This pilot data suggests that resistance training can influence autonomic function and favor hemodynamic changes during AF testing in young adults. The results of this study warrant

the enrollment of more subjects to evaluate the effects of resistance training on AF in healthy adults.

Keywords: Heart Rate Variability, Pre-syncopal, Body Composition, Valsalva Maneuver

Board #8

ACCURACY OF A HANDHELD BLOOD GLUCOSE MONITOR DURING EXERCISE AND AN ORAL GLUCOSE TOLERANCE TEST

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Abstract: **PURPOSE**: The purpose of the present study was to examine the validity and reliability of a handheld blood glucose monitor during an oral glucose tolerance test (OGTT) and 60-minute bout of exercise. **METHODS**: A total of 30 subjects (mean age ± SD = 22.3 ± 1.9 yrs; body mass = 77.6 ± 14.2 kg) volunteered to participate in a single visit to the laboratory for an OGTT (n=15) or 60-minute treadmill exercise test (n=15). For the OGTT, the subjects were required to visit the laboratory in the morning following an 8-hour overnight fast and ingest a 75-gram load of glucose. For the treadmill test, the subjects were required to walk at 5.6 $km \cdot hr^{-1}$ for 60 minutes. Blood glucose concentrations were measured from the fingertip at six different time points during the OGTT (0, 10, 20, 30, 60, and 90 min) and treadmill test (0, 5, 10, 15, 30, and 60 min). Each blood sample was analyzed four times at each time point, two by the reference method and two by the handheld monitor. **RESULTS**: Our findings indicated that the blood glucose values provided by the handheld monitor were significantly ($P < 0.05$) greater than the reference method at all time points of the OGTT and treadmill test. In addition, the handheld device exhibited an overall mean absolute relative deviation (±SD) of 9.0 (±7.0) and did not meet the 95% accuracy requirements of ISO 15197:2013 (only 87.2% of all values met the criteria). The Bland-Altman plot for constant error (reference method – handheld monitor) versus the reference method indicated an average negative bias (-8.2 $mg \cdot dL^{-1}$) that increased (r = -0.23) at higher blood glucose values. Intra-device reliability analyses for the handheld monitor on two consecutive measurements taken at the same time points demonstrated the intra-class correlation (ICC) was $R = 0.99$ and coefficient of variation (CV) =3.0%, with no mean differences between measurements. **CONCLUSION**: The present findings indicated that the handheld monitor provided highly reliable, yet inaccurately high blood glucose values compared to the reference method during the dynamic conditions associated with an OGTT and exercise.

Keywords: validity; reliability; treadmill

Board #9

IMPACT OF ACUTE EXERCISE ON POSTPRANDIAL VASCULAR FUNCTION IN OVERWEIGHT/OBESE ADULTS

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Abstract: Postprandial hyperglycemia (PPH) impairs vascular endothelial function (VEF) and increases cardiovascular disease risk. A single bout of aerobic exercise (AE) attenuates PPH-induced decreases in brachial artery flow-mediated dilation (FMD), a non-invasive measure of VEF, in healthy adults for up to 17 h post-exercise. Studies examining the effects of acute resistance exercise (RE) on postprandial FMD responses

are lacking. **PURPOSE**: The purpose of this investigation was to determine the effects of different exercise modalities on brachial artery FMD and plasma glucose and insulin responses to an oral glucose tolerance test (OGTT) in overweight/obese adults. We hypothesized that a single bout of exercise performed the prior evening would attenuate PPH-mediated decreases in FMD, independent of exercise modality. **METHODS:** In a randomized, crossover design, overweight/obese adults [n = 11 (8 women); age = 22 ± 4 y; body mass index = 32.3 ± 5.8 kg/m^2] completed three separate trials. Seated rest (control), 30 min of AE at ~60% VO_2max, or 30 min of whole-body RE (3 x 10-repetition maximum) preceded an OGTT (1 g/kg body mass) by 14-17 h (15.3 ± 1.0 h). Brachial artery FMD and plasma glucose and insulin were measured prior to and at 30 min intervals for 2 hours following the OGTT. Repeated-measures ANOVA and Bonferroni post-hoc tests were used to evaluate differences within and between trials. **RESULTS**: Relative to baseline, FMD transiently decreased ($P<0.01$) by 26-31%, 26-32%, and 29-31% at 30-60 min post-ingestion in the control, AE, and RE trial, respectively. No between differences were observed. Plasma glucose increased ($P<0.01$) at 30-90 min post-ingestion and insulin increased ($P<0.05$) at 30-120 min post-ingestion. Plasma glucose and insulin area under the curve did not differ between trials ($P\geq0.13$). **CONCLUSION:** Acute aerobic or resistance exercise performed 15 h prior to an OGTT does not attenuate postprandial decreases in VEF in overweight/obese adults. Future research should examine if the effect of acute exercise on postprandial cardiometabolic responses is influenced by age and/or health status.

Funding: Miami University Seed Grant and Committee on Faculty Research Grant

Keywords: obesity, vascular function, flow mediated dilation, hyperglycemia

Board #10

RELATIONSHIP BETWEEN CARDIORESPIRATORY FITNESS AND ARTERIAL STIFFNESS IN HEALTHY ADULTS

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Abstract: Aortic stiffness and cardiorespiratory fitness (CRF) are independent predictors of cardiovascular disease (CVD), cardiovascular (CV) events, and early mortality. However, the relationship between arterial stiffness and CRF is largely unknown. **PURPOSE**: To examine the relationship between arterial stiffness and CRF in apparently healthy adults. **METHODS**: Two hundred three subjects—97 men (aged 50±21 years) and 106 women (aged 47±20 years) performed a maximal cardiopulmonary exercise test to determine CRF (i.e., VO_{2max}). VO_{2max} for the entire cohort was 32.8±12.0 ml/kg/min (range 11.4-66.4). Aortic stiffness was measured via carotid-femoral pulse wave velocity (cfPWV). The entire cohort had a cfPWV (m/s) of 7.3±1.6 (range 4.8-12.2). Data were checked for normality, and pearson-product moment correlations were performed to determine the association between CRF and arterial stiffness. **RESULTS**: cfPWV was moderately associated with CRF (r= -0.585, p=0.000). This relationship persisted for physically active (r= -0.593, p=0.000) and inactive groups (r= -0.484, p= 0.000). **CONCLUSION**: Arterial stiffness is inversely related to CRF, independent of activity level. These data suggest that the beneficial effects of CRF on cardiovascular-related outcomes may be mediated, at least partially, through arterial stiffening.

Keywords: cardiovascular health

Board #11

THE ACCURACY OF MAXIMAL OXYGEN CONSUMPTION (VO2 MAX) PREDICTION FROM GPS WATCH TECHNOLOGY

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Abstract: PURPOSE: The aim of the present study was to determine the accuracy of $VO_{2\ max}$ prediction using GPS watch technology. **METHODS:** Nine healthy, trained runners (5 male, 4 female) completed outdoor running using a GPS watch (Garmin Fenix 3 or Forerunner 630) heart rate monitor for at least two weeks to obtain a predicted VO_2 max value. Participants then completed a graded exercise test to volitional fatigue to determine the directly measured $VO_{2\ max}$ using open circuit spirometry (Parvomedics True One, Provo UT). Measured VO_2 max was then compared to the predicted VO_2 max. Data were analyzed for significant correlation using Pearson product-moment correlation and for significant differences using a paired t-test with the statistical software SPSS version 22. **RESULTS:** Average predicted VO_2 max was 47.89 ± 7.75 ml/kg/min while measured VO_2 max was 48.18 ± 7.47 ml/kg/min. Predicted VO_2 max was significantly correlated with measured VO_2 max ($r=.908$, $p<0.001$). No significant difference ($p>0.05$) was found between the predicted versus directly measured values. **CONCLUSION**: The $VO_{2\ max}$ prediction function for GPS watches accurately predict measured VO_2 max when worn for outdoor running for a period of at least two weeks.

Keywords: running, wearable technology

Board #12

DISSIMILAR EFFECTS OF RESISTANCE TRAINING ON MASS, STRENGTH, & HEMOSTASIS IN WOMEN: PILOT STUDY

Kayla M. Soave (Ball State University), Cody A. Altherr (Ball State University), Andrew T. Del Pozzi (Ball State University), Paul R. Nagelkirk (Ball State University)

Abstract: Blood coagulation potential, or "hemostasis," is directly correlated to CVD and risk of a cardiovascular event. Strength training is known to produce various muscular, metabolic, and vascular adaptations, and is theorized to influence hemostatic potential. Limited research on this subject is available, particularly with regard to women. **PURPOSE**: The purpose of this study was to identify possible changes in coagulation potential after participation in an 8-week resistance training program. **METHODS**: Four healthy women (age 21 ± 2 years) completed an 8-week, 3 days/week resistance training program. Training targeted all major muscle groups. Each exercise included 2-3 sets of 8-12 repetitions performed at 60-80% 1RM. Body composition was determined using air displacement plethysmography. Maximal strength was assessed by 1-RM chest and leg press. Blood samples were obtained by clean venipuncture during the early follicular phase of the menstrual cycle, before (PRE) and after (PO) the 8-week regimen, and analyzed for plasma concentrations of coagulation Factor VII and VIII, activated partial thromboplastin time (APTT) and prothrombin time (PT). **RESULTS**: Training induced significant improvements in maximal strength during leg press (PRE = 146.3±29.0, PO = 221.1±24.4 kg) and chest press (PRE =38.8±6.0, PO = 53.8±4.9 kg)($p<0.05$). Fat mass

decreased (PRE = 18.2±5.2, PO = 16.8±4.9 kg, p<0.05), and trends for increased lean body mass (PRE = 47.8±3.4, PO = 49.0±4.2 kg, p=0.17, eta^2=0.52) and decreased body composition (PRE = 27.1±5.2, PO = 25.6±5.4%, p=0.11, eta^2=0.66) were observed. Resistance training did not affect Factor VII (PRE = 119.9±29.6, PO= 115.6±58.8% of normal), Factor VIII (PRE = 80.4±27.7, PO = 102.3±88.4% of normal), APTT (PRE = 34.6±5.7, PO = 35.0±3.6 sec), or PT (PRE = 12.7±0.8, PO = 12.3±1.2 sec) (all p >0.05). **CONCLUSION**: Eight weeks of resistance training caused predictable improvements in strength and body composition, but did not influence coagulation potential. Further investigation is needed to enhance statistical power to confirm these findings, and evaluate other markers of hemostatic activity before and after strength training in healthy women.

Keywords: coagulation, body composition, healthy women

Board #13

PRECOOLING'S EFFECT ON AMERICAN FOOTBALL SKILLS

Libby J. Bradley (Central Michigan University), Brian Weise (Central Michigan University), Jason Novak (Central Michigan University)

Abstract: Precooling (i.e., cooling before exercise) with cold-water immersion (CWI) elicits several physiological changes that may help reduce the risk of exertional heatstroke (EHS) in American football athletes. However, implementation of precooling as an EHS prevention strategy would likely be low if it impairs American football performance. **PURPOSE:** We investigated whether precooling impacts American football skill performance. **METHODS:** Twelve physically-active, unacclimatized men (24±2y, mass=85.5±6.3kg, height=181.8±8.1cm) completed this randomized, crossover, counterbalanced study. Participants completed a familiarization day to practice each skill and then two testing days outdoors (wet bulb globe temperature=19.3±4.1°C). On testing days, participants were either precooled using CWI (10.1±0.3°C) for 15 minutes or not. Then, they donned an American football uniform and completed eight football skills: 40-yard dash, vertical jump, broad jump, an agility test, dynamic (i.e., catching while running) and stationary catching, throwing distance, and throwing accuracy. To minimize order effects, skill-testing order was randomized and counterbalanced. Rectal temperature (T_{rec}) was measured before, during, and after precooling and every 5 minutes during skill testing. MANOVA and dependent t-tests were used to determine differences between conditions for football skill data. Repeated measures ANOVA and Tukey-Kramer post-hoc tests were used to identify differences in T_{rec} between conditions over time. **RESULTS**: Data are means±standard deviations; effect sizes (ES) were calculated when significant differences occurred. Precooling did not affect vertical jump, broad jump, agility, dynamic or stationary catching, or throwing distance (P≥0.13). Precooling impaired 40-yard dash time (Precooling=5.72±0.53 s, Control=5.31±0.34 s; P=0.03, ES=1.2) and throwing accuracy (Precooling=0.9±0.2 points, Control=1.3±0.3 points; P=0.001, ES=1.4). On average, T_{rec} was 0.58±0.35°C lower during skills testing following precooling and statistically differed from control from minute 10 to the end of testing (~35 minutes; P<0.05, ES≥1.2). **CONCLUSION:** Precooling may help prevent EHS in American football players since it lowered T_{rec} without impacting most American football skills. By lowering T_{rec}, precooling would prolong the time it would take for an athlete's T_{rec} to become dangerous (i.e., >40.5°C). If precooling is implemented, coaches should alter practice so throwing accuracy drills and maximum speed drills occur after an athlete's body core temperature returns to normal (i.e., >35 minutes).

Funding: The Herbert H. and Grace A. Dow College of Health Professions Student Research and Creative Work Grant (CHP)

Keywords: exercise performance, water immersion

Board #14

INFLUENCE OF ACUTE AEROBIC EXERCISE ON 24-HOUR AMBULATORY CENTRAL BLOOD PRESSURE

Malvina Shoukri (Ball State University), Thomas Burke (Ball State University), Brandon Kistler (Ball State University), Bradley Fleenor (Ball State University)

Abstract: Ambulatory central blood pressure (cABP) assessed for 24-hours is a predictor of cardiovascular disease (CVD) and CVD-related mortality. Acute bouts of exercise lower peripheral blood pressure; however, it is currently unknown if an acute bout of vigorous exercise reduces 24-hour cABP. **PURPOSE:** To examine the response of cABP over 24 hours after an acute bout of aerobic exercise. **METHODS:** Apparently healthy adults (N=10; 6 males; age 25.9±1.8 years; body mass index 25.4±0.6 kg/m^2; VO_{2max} 46.1±2.7 ml/kg/min) completed two trials in a randomized order. Trials consisted of a maximal exercise test or a non-exercise control. During each trial, participants wore an ambulatory BP (ABP) monitor to record brachial and central BP variables over 24 hours. Hemodynamic variables between trials were analyzed as mean for 24 hours and by time of day; Daytime (0800-2200 hours), and Nighttime (2200– 0800 hours). **RESULTS:** Over the course of 24 hours, average brachial systolic BP (bSBP) (119.6 ±2.2 vs. 122.0 ±2.5 mmHg) central systolic BP (cSBP) (108.1 ± 2.2 vs. 111.2 ± 2.4 mmHg), and mean arterial pressure (MAP) (86.9 ± 1.5 vs. 89.4 ± 1.9 mmHg) were lower ($p<0.05$) after exercise compared to control. A main effect for time ($p<0.05$) indicated that bSBP, bDBP, brachial pulse pressure, MAP, cSBP, and cDBP, were lower during nighttime compared to day time, independent of exercise. **CONCLUSION:** A single, vigorous bout of aerobic exercise lowers ambulatory central hemodynamics for at least 24 hours. These novel findings provide insight into the regulatory effects of exercise on blood pressure.

Keywords: vascular hemodynamics, vigorous intensity

Board #15

EXERCISE IS MEDICINE ON CAMPUS: EVALUATION OF A PHYSICAL ACTIVITY MENTORING PROGRAM

Kerri L. Vasold (Michigan State University), Kristin Traskie (Michigan State University), James M. Pivarnik, FACSM (Michigan State University)

Abstract: Exercise is Medicine on Campus (EIM-OC) is a growing initiative across the country. Yet, few universities have established referral systems between healthcare providers and physical activity resources. **PURPOSE:** To evaluate an EIM-OC pilot initiative involving healthcare provider referrals to a physical activity mentoring program. **METHODS:** Healthcare providers were recruited from student health clinics, counseling and psychological services, and employee assistance programs. All were provided a brief educational session on EIM-OC and the mentoring program and delivered patient referral cards. This program was open to students, faculty and staff, and referrals were assigned a physical activity mentor (PAM). PAMs were senior-level Kinesiology students trained in fitness assessments and exercise programming. Referrals were asked to complete an online pre-registration form, physical activity readiness questionnaire, and informed consent. Referrals worked with PAMs over the course of the semester, and were asked to complete an online post-evaluation that included program impacts on health and wellness outcomes. Percentages were calculated

for program outcomes. **RESULTS:** During this program pilot, participants (N=23) were primarily undergraduate students (74%), female (74%), and few met US guidelines for aerobic exercise (30%) or resistance training (4%). Participants' most frequently listed goals were: weight loss (52%), improved mental health (39%), and increased physically activity (39%). Post-evaluation completion was low (48%). Of those who completed the post-evaluation, 73% reported meeting aerobic exercise guidelines, and 64% met resistance training guidelines. Participants reported positive impacts on self-confidence (91%), overall health (100%), physical health (100%), mental health (91%), stress level (91%), academic and/or work performance (64%), and ability to live an active lifestyle (91%). All participants reported making progress on or meeting their goals at the end of the program. **CONCLUSION:** An on-campus healthcare provider referral-based physical activity mentoring program can be effective in helping participants make progress towards health and wellness goals, and can lead to positive impacts on various health outcomes. However, barriers include referral rates and post-evaluation completion. Future programs should explore methods for increasing referral rates and promoting more participant engagement.

Keywords: Health; Wellness; University; Students

Board #16

AMBULATORY CENTRAL BLOOD PRESSURE OVER 24 HOURS FOLLOWING INTERMITTENT VS. CONTINUOUS EXERCISE

McKenzie A. Williams (Ball State University), Erika. M. Silva (Ball State University), Nicholas. A. Carlini (Ball State University), Brandon M. Kistler (Ball State University), Bradley. S. Fleenor (Ball State University), Matthew. P. Harber FACSM (Ball State University)

Abstract: Ambulatory blood pressure (BP) derived from the large central arteries has been shown to be a better predictor of cardiovascular events and mortality compared with peripheral ambulatory brachial blood pressure. Currently, however, it is unknown if exercise, either intermittent or continuous bouts, influence ambulatory central BP. **PURPOSE:** To examine the ambulatory central blood pressure response over 24 hours following a moderate intensity intermittent (MII) bout of aerobic exercise compared to a moderate intensity continuous (MIC) bout. **METHODS:** Eight, normotensive males (61.5±2.4yrs) performed one of three trials in a randomized order: non-exercise control (CON), MII, and MIC. Participants wore an ambulatory BP (ABP) monitor to record brachial and central BP variables over 24 hours. Hemodynamic variables between trails were analyzed as mean for 24 hours and by time of day; Morning (0800-1200 hours), Afternoon (1230-1630 hours), Evening (1700–2130 hours) and Nighttime (2200– 0700 hours). **RESULTS** No differences ($P>0.05$) between CON, MII, and MIC were observed for any variable. Brachial and central hemodynamic variables were lower ($P<0.05$) during Nighttime (Nt) compared to other times of day, independent of trial. Brachial SBP was lower ($P<0.05$) during Nt (120.5±4.5 mmHg) compared to morning (Mn, 131.6±5.6 mmHg); afternoon (An, 132.3±5.2 mmHg) and evening (Evn, 134.4±5.3 mmHg). Central SBP was lower during Nt (112.7±4.4 mmHg) compared to morning (Mn, 120.8±4.9 mmHg); afternoon (An, 119.3±4.5 mmHg) and evening (Evn, 123.0±4.5 mmHg). **CONCLUSION:** An acute bout of moderate intensity exercise in accordance with the physical activity guidelines, independent of delivery mode (continuous or intermittent), did not influence 24 hour ambulatory brachial or central hemodynamics in middle-aged and older men. Moreover, we show that reductions in central hemodynamics during night time hours (i.e., dipping) is not compromised after exercise. Future work should explore different exercise parameters to better understand the influence of acute exercise on ambulatory central hemodynamics.

Keywords: moderate intensity, hemodynamics

Board #17

OXYGENATED TISSUE RESPONSE TO SINGLE AND DOUBLE-LEG CYCLING IN NORMOXIA AND HYPOXIA

Cody S. Dulaney (Kent State University), Shane E. Draper (Utah Valley State), Tyler J. Singer (Kent State University)

Abstract: PURPOSE: To assess muscle oxygen saturation during short maximal bouts of small and large muscle mass exercise in normoxia and hypoxia. **METHODS**: Recreationally active participants (n=10, 25.2±2.9yrs; 175.6±10.0cm; 74.9±15.4kg; 3.3±0.65L·min^{-1}) completed 30 second double leg (DL) and single leg (SL) Wingates in normoxia (*N)* and hypoxia (*H)*. Tissue Saturation Index (*TSI*), Oxygenated-Hemoglobin (*O2Hb*), and Total-Hemoglobin(*tHb*) were evaluated at Baseline (BL) and at time points T1(0 sec), T2 (15 sec), and T3(30 sec). *DL* and *SL* mean power (*P*) and fatigue index (*FI*) were also assessed. Changes in all dependent variables were analyzed using within-subject repeated measures ANOVA. **RESULTS:** No interaction was observed for *TSI* during *DL N* or *H* nor *SL N* or *H.* A time effect was observed for *TSI* during *DL N* and *H* (p<0.001). *TSI* decreased from BL (74.5±1.5) to T1(54.4±3.4), T2(55.1±3.5), and increased at T3(56.9± 3.2). No interaction was observed for *O2Hb* during *DL N* or *H* nor *SL N* or *H.* A time effect was observed for *O2Hb* during DL *N* and *H* (p < 0.001). *O2Hb* decreased from BL (7.1±1.2), TI(-6.4±1.5), T2(-5.2±1.4), and increased at T3(-3.2±1.4). No interaction was observed for *DL tHb* in *N* or *H* (p=0.110). A time effect was observed for *TSI* during *SL N* and *H* (p<0.001). *SC TSI* decreased from BL (76±1.2), T1(54.4±3.5), T2(55.7±3.2), and increased at T3(57.9±2.7). A time effect was observed for *O2Hb* during *SL N* and *H* (p<0.001). *SC O2Hb* decreased from BL (9.2±2.0), T1(-5.4±1.5), T2(-3.0±1.6), and increased at T3(-0.85±1.9). No interaction was observed for *SL tHb* in *N* or *H* (p=0.068). There was a significant effect of condition for *P* during *DL* and *SL H* (p < 0.001, 1015.7 ± 78.3, 533.3 ± 44.3 respectively). There was a significant effect of condition for *P* during *DL* and *SL H* (p < 0.001, 1045.4 ± 71.5, 353.3 ± 25.1 respectively). No interaction was observed for *FI*. **CONCLUSION:** *TSI* and *O2Hb* declined during the Wingate until T3 where the relationship inverted. *P* was greater in *DL N* and *H* compared to *SL N* and *H.* No changes in *FI* were seen in any condition.

Keywords: Hemodynamics, Tissue Saturation, Power

Poster Session #5:
Crown Foyer – 3:35-4:50pm

Board #1

RELATIONSHIPS AMONG MUSCLE FUNCTION, SKELETAL MUSCLE MASS AND ARTERIAL STIFFNESS

Olivia E. Jones (Ball State University), Daniel R. Elston (Ball State University), Bradley S. Fleenor (Ball State University), Matthew P. Harber, FACSM (Ball State University)

Abstract: Skeletal muscle function (MF), skeletal muscle mass (SMM) and arterial stiffness are independent risk factors for all-cause mortality and cardiovascular events. Decreases in SMM are negatively associated with

arterial stiffness, however, the relationship between MF and arterial stiffness remains unclear. **PURPOSE**: To examine the relationship between MF and SMM with arterial stiffness and to determine if the relationships are modulated by physical activity (PA). **METHODS**: Participants (N=203, 97 males/106 females) were apparently healthy adults (Age 48.3 ± 20.2 years, BMI 26.8 ± 4.9 kg/m^2, VO_{2max} 32.8 ± 12.0 ml/kg/min). Arterial stiffness was assessed through carotid-femoral pulse wave velocity (cfPWV). SMM was assessed through dual-energy X-ray absorptiometry (DXA), while handgrip strength was measured with a hand dynamometer. PA level was self-reported and activity status was determined in accordance ACSM guidelines. Relationships for the entire cohort in addition to activity specific relationships were analyzed using Pearson correlations between cfPWV, SMM, and MF. **RESULTS:** Inverse associations for the entire cohort were observed with MF and cfPWV (r= -0.338, p=0.001) while SMM was not associated with cfPWV (r= -0.045, p=0.527). All associations remained significant for active and inactive individuals when divided into groups based on sex and activity level ($p<0.05$). **CONCLUSIONS:** These data suggest that muscle function, specifically handgrip strength, but not SMM are associated with arterial stiffness irrespective of sex and activity-levels. Interventions to improve arterial health should target measures of muscle function instead of skeletal muscle mass.

Keywords: pulse wave velocity, handgrip strength, DXA, physical activity

Board #2

GREATER RELIANCE ON CARBOHYDRATES DURING SINGLE LEG VERSUS DOUBLE LEG CYCLING

Sarah G. Kearney (Kent State University), Shane Draper (Kent State University), John McDaniel (Kent State University)

Abstract: Small muscle mass exercise allows for greater muscle specific blood flow and tissue perfusion. This increase in oxygen delivery should allow individuals to tolerate a greater muscle specific workload which potentially would result in greater reliance on carbohydrate oxidation. However, the metabolic consequences of manipulating active muscle mass is not fully understood. **PURPOSE:** To determine if there is a difference in carbohydrate and fat oxidation between single-leg and double-leg cycling at the same rate of whole body oxygen consumption. **METHODS:** Eight healthy college aged men (n=5) and women (n=3) completed the study**.** Participants arrived fasted and completed two conditions across two days (matching for oxygen consumption): 30-minute single leg cycling and 30-minutes double leg cycling. Oxygen consumption (VO^2), respiratory exchange ratio (RER), kilocalories (kcal), carbohydrate oxidation (CHO), fat oxidation (FTO), and power (PWR) were recorded throughout the entire bout of exercise. Paired samples t-tests were performed to find differences in all dependent variables across both conditions. **RESULTS:** Matching for oxygen consumption (1.6 ± 0.39 versus 1.58 ± 0.38 L/min) required slightly lower PWR (t=3.08, *p*=0.015) in SL (86.58 ± 25.26 W) than DL (94.23 ± 30.67 W) while still maintaining the same energy expenditure (239.38 ± 75.64 versus 232.19 ± 74.65 kcal) . However, participants had a greater rate of carbohydrate oxidation (t=7.61, *p*=<0.001) during SL (1.46 ± 0.45 g/min) compared to DL (1.01 ± 0.49 g/min). This is further demonstrated with significantly greater RER values (t=5.28, *p*=0.001) in SL (0.92 ± 0.03) than DL (0.86 ± 0.05) and reduced FTO in SL (t=5.47, *p*=<0.001; 0.22 ± 0.06 g/min) than DL (0.36 ± 0.09 g/min). **CONCLUSION:** Despite the same global intensity based on oxygen consumption and energy expenditure within both conditions, there was an increase in CHO and decrease in FTO during SL cycling. This suggests that there is a potential for smaller muscle mass activities (i.e. single leg exercise training) to have greater impact on post-prandial blood glucose control compared to larger muscle mass activities. Future research should consider participants with metabolic disease.

Keywords: oxygen consumption, exercise intensity, metabolic disease

Board #3

INFLUENCE OF AN EXERCISE PROGRAM ON CARDIOPULMONARY EXERCISE TESTING DERIVED VARIABLES

Spencer M. Romanowski (Ball State University), Dylan S. Whetstone (Ball State University), Bradley S. Fleenor (Ball State University), Matthew P. Harber (Ball State University)

Abstract: Cardiopulmonary exercise testing (CPX) has emerged as a useful tool in assessing disease severity and prognosis in clinical populations. Yet, little is known about the trainability of specific variables, aside from cardiorespiratory fitness (CRF), particularly in apparently healthy individuals. **PURPOSE:** The purpose of this study was to evaluate the changes in oxygen consumption at ventilatory threshold (VO_2 at VT), oxygen uptake efficiency slope (OUES), ventilatory power (VP), and circulatory power (CP) in apparently healthy adults following an exercise program. **METHODS:** Participants (n=79, 34 males/45 females, age 51.3±1.5 years, body mass index 29.0±0.7 kg/m^2) performed a maximal CPX before and after ~6 months of exercise training to determine VO_2 at VT, OUES, CP, and VP. **RESULTS:** VO_2 at VT (ml/kg/min) increased in the total sample (Pre: 19.8± 0.4 vs. Post: 20.7± 0.4, p=0.0000), males (Pre: 20.7± 0.7 vs. Post: 22.3±0.8, p=0.0024), and females (Pre: 16.9±0.6 vs. Post: 18.5±0.8, p=0.0003). CP (ml/kg/min·mmHg) increased in the total sample (Pre: 5428.9±136.0 vs. Post: 5655.6±123.4, p=0.0000), males (Pre: 5790.1±294.7 vs. Post: 6254.0±243.3, p=0.0142), and females (Pre: 4130.0±175.5 vs. Post: 4808.6±197.5, p=0.0000). OUES increased in males only (Pre: 2.3±0.1 vs. Post: 2.5± 0.1, p=0.0013). VP (mmHg) did not increase in any group. **CONCLUSION:** VO_2 at VT and CP can be altered with exercise training, independent of sex, while the adaptability of OUES appears to be sex-specific. Additionally, VP is not influenced by exercise training. Future research should explore the sex-specific response of CPX-variables to exercise training.

Keywords: ventilatory power, circulatory power

Board #4

EFFECTS OF BINGOCIZE® ON QUALITY OF LIFE AND FALL RISK IN COMMUNITY-DWELLING OLDER ADULTS

A. Kathryn Dispennette (Ohio State University), Jason Crandall (Western Kentucky University), Mark Schafer (Western Kentucky University), Matthew Shake (Western Kentucky University), Gretchen Macy (Western Kentucky University), Brian Clark (Western Kentucky University)

Abstract: Quality of life (QOL) is an important aspect of overall well-being in older adults. QOL is associated with functional, physical, and psychological health; all of which can be improved with increased physical activity. A high fall risk is associated with low physical function and QOL. One in four older adults experiences a fall each year, making it necessary to focus public health interventions towards decreasing fall risk and improving QOL in older adults. Bingocize® is a health promotion program designed to promote health, health knowledge, physical activity, and social engagement among older adults. The purpose of this study was to determine the effects of the new version of Bingocize® on QOL and fall risk in community-dwelling older adults (N=36; mean age 73.63 ± 6.97). Participants were clustered and randomly assigned to (a) experimental (n=19; participating in Bingocize® program, which included the bingo game, exercise, and health education) or

(b) control (n=17; only played bingo). Each group completed a 12-week intervention that consisted of two 45-60 minute sessions per week. Pre and post data assessments included the TUG, 30-second chair stand, 4-staged balance, handgrip strength, WHOQOL-BREF, PANAS, and a health knowledge quiz. A mixed design analysis of variance (ANOVA) was used to compare intervention effects. There were no significant interactions for any of the variables, with the exception of positive affect (PA) (F (1,34) = 5.66, p = 0.02, η_p^2 = 0.15, power = 0.64) and handgrip strength (F (1,34) = 8.31, p = 0.007, η_p^2 = 0.196, power = 0.80).. There was also a significant main effect for time for health knowledge. Post hoc analysis using independent samples t-tests were conducted on PA (t (33) = 2.39, p = 0.023, two-tailed) and handgrip strength (t (34) = 2.85, p = 0.007, two-tailed). Participating in the Bingocize® health promotion program can produce a meaningful and detectable change in handgrip strength and PA in community-dwelling older adults.

Funding: Western Kentucky University

Keywords: Falls, Aging, Health Promotion, Quality-of-life

Board #5

BLOOD FLOW RESTRICTION EXERCISE AFTER TOTAL KNEE ARTHROPLASTY: A CASE REPORT

Alicia E DenHerder (Central Michigan University/ Michigan Technological University), Matthew A. Kilgas (Michigan Technological University), Lydia L.M. Lytle (Michigan Technological University/ Aspirus Keweenaw Outpatient Therapies), Cameron T. Williams (Central Michigan University/ Michigan Technological University), Steven J. Elmer (Michigan Technological University, Central Michigan University)

Abstract: After total knee arthroplasty (TKA) persistent quadriceps muscle atrophy and weakness impair physical function. Blood flow restriction (BFR) exercise is emerging as an effective method to improve muscle size and strength in clinical populations with orthopedic limitations. Exercise with BFR is advantageous because increases in muscle size and strength are elicited using low-loads, strength gains can be achieved faster than traditional exercise, and it is used with resistance and aerobic exercise. **PURPOSE:** To investigate the efficacy of home-based BFR exercise to increase quadriceps size, strength, and physical function of an individual post-TKA. **METHODS:** A 59yr old male, 6 months post-TKA performed body weight and walking exercises with BFR 5x/wk for 8wks. Blood flow in the TKA leg was restricted using a thigh cuff inflated to 50% of limb occlusion pressure. Lean leg mass, vastus lateralis and rectus femoris thickness, knee extensor strength, and physical function were measured at baseline (6 months post-TKA), post-training (8 months post-TKA), and long-term follow-up (14 months post-TKA). **RESULTS:** After training, the TKA leg exhibited increased lean mass (4%), vastus lateralis (14%) and rectus femoris (20%) thickness, and knee extensor strength (49%). Compared to baseline, post-training symmetry indices (TKA/uninvolved leg) increased for vastus lateralis (79 to 89%) and rectus femoris (85 to 103%) thickness and knee extensor strength (66 to 99%). The patient improved his gait speed (40m fast walk), functional use of lower body strength (30 s chair stand), and aerobic exercise capacity (6min walk test). Increased quadriceps and physical function were maintained at the long-term follow-up. **CONCLUSION:** With enhanced quadriceps and physical function the patient resumed independent physical activity. Muscle and strength gains surpassed those typically reported after TKA and were consistent with BFR findings. Outcomes suggest that home-based BFR exercise was feasible, safe, and effective. BFR exercise after TKA is promising and warrants further research.

Keywords: function, quadriceps, atrophy, home-based

Board #6

AEROBIC FITNESS AND BODY COMPOSITION OF INDIVIDUALS WITH ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

Ashley N. Triplett (Michigan State University), Christopher M. Kuenze (Michigan State University)

Abstract: Anterior cruciate ligament reconstruction (ACLR) requires six to nine months of rehabilitation, often resulting in long periods of sedentary behavior. Following rehabilitation, only 45% of patients make a full return to pre-injury level of sport participation, placing them at high risk of developing a physically inactive lifestyle. However, it is unknown whether individuals with ACLR also experience negative shifts in aerobic fitness and body composition during this time. **PURPOSE**: To compare body composition and aerobic fitness between women with ACLR and healthy controls. **METHODS**: Women with ACLR (<5 years post-ACLR, age 18-30) and healthy women with no history of lower extremity injury completed the Tegner Activity Scale. Body fat percentage (%BF) was estimated using air displacement plethysmography. A continuous graded exercise test using a cycle ergometer was performed by all participants to evaluate differences in aerobic fitness (VO_{2peak}), which was defined as the highest 20 second VO_2 attained during the test. Maximal heart rate (HR_{max}), time to exhaustion (mins), and rating of perceived exertion (RPE) were also measured. Variables were compared between groups using Mann-Whitney U tests due to limited sample size. **RESULTS**: Participants included seven females with history of ACLR (age=22.0±4.2 years) and four healthy controls (age=24.5±3.7 years). Individuals with a history of ACLR had significantly higher %BF than controls (ACLR=33.6±7.4%, control=23.5±4.7%) (p=0.02). No differences were observed between groups in relative VO_{2peak} (ACLR=31.8±5.5 ml/kg/min, control=41.6±5.1 ml/kg/min) (p=0.07), absolute VO_{2peak} (ACLR=2.4±0.4 L/min, control=2.7±0.3 L/min) (p=0.16) or time to exhaustion (ACLR=12.9±2.0 mins, control=15.6±1.6 mins) (p=0.07) on the cycle. **CONCLUSION**: Results indicate that women with a history of ACLR may have greater body fat than women who have not experienced a lower extremity injury. Although individuals with ACLR displayed lower VO_{2peak} and time to exhaustion, no significant difference was found in aerobic fitness between the groups. Excessive body fat is a risk factor for chronic disease and premature mortality; therefore, it is concerning that these young individuals returning to activity post-ACLR have poorer body composition than healthy women. Future research should assess physical activity engagement of individuals with ACLR to evaluate its relationship with the variables in this pilot study.

Funding: This research was funded by the Michigan State University College of Education Summer Research Fellowship.

Keywords: ACLR, VO2peak, Body Fat, Knee Injury

Board #7

DOES HIGH-CADENCE CYCLING IMPROVE EMOTIONAL RECOGNITION IN INDIVIDUALS WITH PARKINSON'S DISEASE?

Bryan T. Dowdell (Kent State University), Sara A. Harper (Kent State University), Jin Hyun Kim (Kent State University), Alena J. Varner (Kent State University), Brandon S. Pollock (Kent State University)

Abstract: Parkinson's disease (PD) is a progressive neurodegenerative disease that can lead to cognitive dysfunction including deficits in emotional recognition, which is the ability to identify facial expression of happiness, sadness, fear, anger and disgust. This deficit has been shown to lead to difficulties in social interaction and communication. High cadence cycling is a unique rehabilitation modality that has been shown to improve motor function in PD, but it is not known how this modality alters cognition. **PURPOSE:** To examine if three bouts of high-cadence cycling improved emotional recognition in individuals with PD. **METHODS:** Individuals with PD (N=21) completed three sessions of high cadence cycling, on a custom motorized stationary cycle, consisting of a 5-minute warm-up at 50 revolutions per minute (rpm), 30 minutes of high cadence cycling between 75-85 rpm, and a 5-minute cool down. Emotional recognition was assessed using a computerized cognitive assessment battery at baseline and after (post-test) the three cycling sessions. Individuals with PD in the control group (N=12) did not cycle and just underwent baseline and post testing. The percentage of accurately identified emotions and the average reaction time to correctly select an emotion (emotion bias) was used for the analysis. Z-scores were used for the analysis and negative numbers represented scores below expected normal values. **RESULTS:** Three bouts of high-cadence cycling resulted in a significant improvement in overall emotion bias from baseline to post-test (-1.26±0.94 vs. -0.79±0.93, p=0.003) compared to the control group (-1.03±0.93 vs. -0.82±0.78, p=0.339). Specifically, cycling improved reaction time from baseline to post-test for sad (-1.37±1.29 vs. -0.66±1.00, p=0.003), anger (-1.18±1.08 vs. -0.41± 1.21, p=0.006) and fear emotions (-1.60±1.33 vs. -1.10±1.25, p=0.030). The control group showed no improvement for any specific emotion (p>0.05). **CONCLUSIONS:** Three bouts of high-cadence cycling improved several measures of emotional recognition, specifically negative-bias emotions. These findings suggest that high-cadence cycling could be a valuable rehabilitation modality for improving emotional recognition and potentially social interactions in individuals with PD.

Funding: Kent State University's School of Health Sciences, Midwest American College of Sports Medicine, Ohio Parkinson Foundation Northeast Region Grant.

Keywords: cognition, disease, rehabilitation, emotion

Board #8

CARBOHYDRATE EFFECT ON POST-EXERCISE PERFORMANCE IN PREPUBESCENT GIRLS

C. Eric Heidorn (Ball State University), Brandon J. Dykstra (Ball State University), Cori A. Conner (Ball State University), Anthony D. Mahon (Ball State University)

Abstract: Carbohydrate (CHO) consumption is a common practice during variable-intensity exercise (VIE) such as team sports. The effects of CHO on performance during VIE have been studied in adults; however, the effects are less defined in children and apparently not at all in prepubescent girls. **PURPOSE**: To investigate the effects of a 6% CHO drink on a one-minute performance test following 30-minutes of VIE in prepubescent girls. **METHODS**: Ten girls (10.4±0.7 yrs.) participated in this study. During the initial visit, maximal aerobic power was determined followed by a familiarization of the protocol used during the next two visits in which the child consumed either a CHO drink or an electrolyte-matched placebo (PL). The experimental protocol involved two 15-minute bouts of VIE (20, 55, 95% maximal aerobic power and 6-second maximal sprint); beverages were consumed prior to exercise and after each 15-minute segment. A one-minute performance trial was then completed at maximal effort. Measurements during VIE included heart rate (HR), rating of perceived exertion (RPE), sprint mean power (MP) and sprint peak power (PP). During the one-minute performance bout, HR, RPE, PP, total work (TW), and fatigue index (FI) were assessed. **RESULTS**: VO_2max was 39.7±5.5 $mL \cdot kg^{-1} \cdot min^{-1}$ and HRmax was 196±11 bpm. During VIE, there were no interaction effects, no trial effects (p>0.05) for HR, %HRmax, RPE, sprint MP, sprint PP and no time effects (p>0.05) for HR, %HRmax, or MP. However, there

were time effects ($p<0.05$) for RPE (VIE1<VIE2) and PP (VIE1>VIE2). No differences were found between trials (CHO vs. PL) for one-minute performance for HR (190±9 vs. 189±9 bpm), %HRmax (97.0±3.2 vs. 96.6±3.0 %), RPE (7.8±2.3 vs. 8.1±1.9), PP (238±70 vs. 235±60 W), FI (54.7±10.0 vs. 55.9±12.8 %), and TW (9.37±2.6 vs. 9.37±2.1 kJ). **CONCLUSION**: A 6% CHO drink is ineffective at improving one-minute performance following 30-minutes of VIE in pre-pubertal girls. Based upon the current findings, CHO supplementation does not appear to be beneficial with respect to improving performance for prepubescent children completing VIE activity lasting 30-minutes.

Funding: Ball State University Aspire Graduate Student Research Grant awarded to C. Eric Heidorn

Keywords: pediatric variable-intensity cycle

Board #9

CAN THE TALK TEST BE USED TO PREDICT TRAINING INDUCED CHANGES IN VENTILATORY THRESHOLD?

Kristen M Deal (University of Wisconsin-Milwaukee), Carl Foster, FACSM (University of Wisconsin-La Crosse), John P. Porcari, FACSM (University of Wisconsin-La Crosse), Richard P. Mikat, FACSM (University of Wisconsin-La Crosse)

Abstract: PURPOSE: To test the reliability of the talk test (TT) in tracking changes in ventilatory threshold (VT) over time. **METHODS:** Thirteen healthy college-age students (mean±SD; age, 20.5±1.91 years; BMI, 25±2.8 kg/m^2; Females=6) completed a TT and graded exercise test (GXT) before and after six weeks of training or detraining. The TT was used to predict VT by assessing the ability to talk comfortably after three minutes of exercise by reading a pre-selected passage out-loud. The criterion measure of VT was indirect calorimetry during the GXT and was determined used the v-slope method. Training and detraining were self-directed and documented using exercise logs. Subjects recorded their exercise minutes and average rating of perceived exertion during the training session (sRPE) using the 1982 Borg CR10 scale which was used to calculate training impulse (TRIMP; sRPE* training minutes). A two-way repeated measures analysis of variance (ANOVA) with Tukey's post-hoc analysis was used to detect differences between the change in power output found during the TT and VO2 max test ($p<.05$). **RESULTS:** No significant differences were found between the power output (PO) at equivocal stage (EQ) during the TT (135±29.8 watts) and VO_2 at VT (134±32.4 watts)($p>.05$). There was no significant change between exercise baseline minutes (160±7.6 minutes) and experimental minutes (213±46.6 minutes) ($p>.05$). However, there was a significant change between sRPE and TRIMP at baseline (4.5±0.17 and 715±204.7, respectively) and experimental (5.9±0.23 and 1302±228.5, respectively; $p<0.05$). Baseline training loads were considerably more than the 150 min/week at moderate intensity (RPE=3) recommended by ACSM (2017) for basic fitness with 68% of subjects exceeding the recommendations. **CONCLUSION:** The TT was shown to be reliable in tracking changes in VT over time, which was first reported by Foster et al. (2008). The results suggest that determining exercise capacity can be done using the simpler method of the TT. Therefore, exercise training can be adjusted based on the TT results rather than using a GXT to adjust training.

Keywords: Exercise, Testing, Rainbow Passage, Equivocal Stage

Board #10

EVIDENCE FOR COMPENSATION OR SYNERGY OF PHYSICAL ACTIVITY DURING OUTDOOR AND INDOOR PRESCHOOL TIME

Michael J. Wierenga (Michigan State University), Kimberly A. Clevenger (Michigan State University), Karin A. Pfeiffer, FACSM (Michigan State University)

Abstract: INTRODUCTION: Evidence for compensation (e.g., increased physical activity (PA) leads to decreasing PA in another part of the day) and synergy (e.g., build on times of high PA with additional high PA) of PA in school-aged youth has been reported, but this has not been studied in preschoolers. **PURPOSE:** To determine if preschoolers exhibit evidence of compensation or synergy in their indoor and outdoor PA during child care. **METHODS**: Children (N=44; 3-4 y) in three preschools wore an accelerometer on their right hip for two school days. PA intensity was determined using Pate cut-points (counts/15-sec). A proximity tagging beacon was placed in each classroom and children's accelerometers acted as receivers. Lack of communication between beacons and receivers indicated that children were outdoors. Outdoor and indoor time (min/hr) in light, moderate, vigorous, or total PA was determined. Paired t-tests were used to identify if time in each intensity (for both indoor and outdoor time) was significantly different between days (p<0.05). Difference in time in each intensity between days was calculated and Pearson correlations were performed to compare between-day changes in outdoor and indoor light, moderate, vigorous, and total PA (e.g., correlation between change in outdoor total PA and change in indoor total PA). Positive associations support synergy, while inverse associations support compensation. **RESULTS:** There were no differences in time in each intensity between days. Change in outdoor light (r=0.02, p=0.883), moderate (r=-0.17, p=0.279), and total (r=-0.14, p=0.369) PA were not significantly related to change in indoor light, moderate, and total PA, respectively. Change in outdoor vigorous PA was positively related to change in indoor vigorous PA (r=0.40, p=0.007). For total PA, 59% of children exhibited evidence of compensation and 41% exhibited evidence of synergy. For vigorous PA, 45% of children exhibited evidence of compensation, and 55% exhibited evidence of synergy. **CONCLUSION:** Results from this sample suggest that vigorous intensity exercise may be more synergistic in nature. The weak to moderate, negative correlations between light, moderate and total PA warrant some evidence for PA compensation at these intensities; however, results should be further examined in future studies using a larger sample size.

Keywords: YOUTH, ACCELEROMETRY, ACTIVITYSTAT, TEMPORAL PATTERNS

Board #11

THE EFFECTS OF ACUTE AEROBIC EXERCISE ON BDNF LEVELS AND COGNITION IN POSTMENOPAUSAL WOMEN

Ryan T. Wiet (Kent State University), Kenneth Sparks (Cleveland State University), Douglas Wajda (Cleveland State University), Jeremy Genovese (Cleveland State University), Emily Kullman (Cleveland State University)

Abstract: PURPOSE: The purpose of this study was to examine how menopausal status affects choice reaction time and peripheral BDNF levels after aerobic exercise. It was hypothesized that exercise would affect peripheral BDNF levels and choice reaction time similarly among pre and postmenopausal women. **METHODS:** The subjects consisted of 14 active females (7 premenopausal and 7 postmenopausal). Subjects went through two different trials: an exercise trial and a controlled reading trials. The exercise trial consisted of running on a treadmill at 75% of VO_2max for 30 minutes. The control trial consisted of a reading session. A computerized Stroop test was given to assess choice reaction time, and blood samples were obtained before, immediately after, and 30 minutes after the exercise and control trials. **RESULTS:** Exercise did not lead to a significant change in BDNF in either group. However, there was a statistical interaction (P=0.041) between pre

and postmenopausal women following exercise, with premenopausal women trending towards an increase in BDNF(Δ +5474.6 pg/mL), and postmenopausal women trending towards a decrease in BDNF (Δ -5623.9 pg/mL). Both age and FSH had indirect relationships with BDNF ($p<0.05$); the greater the age or FSH, the lower the peripheral BDNF levels (post menopause FSH = 1533.35 pg/mL; post menopause BDNF post-exercise = 14273.69 pg/mL; pre menopause FSH = 161.30 pg/mL; pre menopause BNDF post-exercise = 21482.29 pg/mL). There was a positive correlation between age and Stroop Test time over all time points (P = .039, .089, and .027; pre, post, and post30 exercise respectively). This indicated an age-related decline in choice reaction time capabilities. **CONCLUSION:** Within the study, there was not statistical evidence that acute exercise affects BDNF levels nor choice reaction time for the Stroop incongruent test, regardless of menopausal status. However, a clear decline in choice reaction time was noted with increase age. Additionally, there appears to be a blunting of exercise-induced increases in BDNF in postmenopausal women. Further investigation is required to clarify this relationship.

Keywords: BDNF, menopause, exercise, physiology

Board #12

EFFECTS OF TAI CHI EXERCISE VERSUS BINGO ON FINE MOTOR FUNCTIONS IN OLDER ADULTS

Saira Talwar (University of Wisconsin – Milwaukee/Mississippi State University), Chih-Chia Chen (Mississippi State University), John Lamberth (Mississippi State University), Yonjoong Ryuh (Mississippi State University), Poram Choi (Mississippi State University), Morgan Hommel (Mississippi State University), Zhujun Pan (Mississippi State University)

Abstract: Tai Chi exercise improves gross motor skills, such as balance, flexibility, and lower extremity strength in older adults. However, fine motor skills, including eye-hand coordination, manual dexterity, force production/steadiness, range of motion, and grip strength, all of which enhance performance of daily living activities (ADLs) in older adults, have not been thoroughly examined. **PURPOSE:** The purpose of this study was to investigate the effects of Tai Chi versus BINGO on fine motor skills in older adults. **METHODS:** Twenty-eight self-ambulatory older adults (age: 77 $\pm$ 8.92; male: N = 1, female: N = 27) with no restrictive health conditions, MMSE score ≥ 21, or recent surgery, completed this study. Participants engaged in one-hour, twice-per-week Tai Chi or BINGO sessions for eight weeks. Fine motor skills were assessed at four time-points throughout the study, using the unilateral Jebsen Taylor Hand Function Test (JTHFT), comprised of seven tasks resembling ADLs. Repeated measures 2x4 [2(Tai Chi exercise x BINGO) x 4(Baseline x Intraintervention x Post x Retention)] ANOVA was used with alpha of 0.05. **RESULTS:** Data was analyzed separately for the dominant and nondominant hand. Significant main effect of time was noted for the simulated page turning task using the dominant hand ($p < 0.0001$). For the nondominant hand, significant main effect of time was found for the following JTHFT tasks: simulated page turning ($p < 0.0001$), picking up small objects ($p = 0.024$), simulated feeding ($p = 0.027$), stacking checkers ($p = 0.027$), lifting light, large objects ($p < 0.0001$) and heavy objects ($p < 0.0001$). Significant group difference was noted for lifting heavy objects with the nondominant hand ($p = 0.027$). There were no significant time by group interactions. **CONCLUSION:** This study was one of the first to explore the effects of Tai Chi on fine motor skills. Tai Chi does not demand precise finger movements such as those required for BINGO; however, similar improvements were seen in both groups. Our study shows that Tai Chi may improve fine motor skills in addition to gross motor skills in older adults.
Note: Conclusions made from this study are based on mostly female participants.

Funding: Mississippi State University, College of Education - Travel Grant

Keywords: elderly, dexterity, coordination, intervention

Board #13

HIGH-INTENSITY HEAVY ROPE EXERCISE ON PULSE WAVE REFLECTION IN RESISTANCE-TRAINED INDIVIDUALS

Stacie M. Humm (Kent State University), Erica M. Marshall (Kent State University), Jason C. Parks (Kent State University), James D. Kingsley, FACSM (Kent State University)

Abstract: High-intensity heavy rope exercise (HI-HRE) is suggested to improve muscular strength and increase power. However, the effects of HI-HRE on pulse wave reflection are unknown. **PURPOSE:** To examine alterations in pulse wave reflection after acute HI-HRE in resistance-trained individuals. **METHODS:** Fifteen resistance-trained individuals (mean±SD: age: 23±2 yrs; height: 1.7±0.1 m; weight: 71.8±12.2 kg; body fat: 15.6±5.8%; years of training: 5±2 yrs) volunteered to participate in this study. Heart rate (HR), brachial and aortic blood pressure (BP), and pulse wave reflection, were collected at rest and 15 (Rec1), 30 (Rec2), and 60 (Rec3) minutes following HI-HRE. During the acute HI-HRE, participants performed six, 15-second exercise bouts, using a double wave pattern, separated by 30-second seated, passive recovery intervals at a pace of 180bpm. A one-way repeated ANOVA was used to analyze the effects HI-HRE across time (rest, Rec1, Rec2, Rec3). Post hoc analysis utilized paired t-tests with a Bonferonni correction. **RESULTS:** There were significant ($p<0.001$) main effects of time for HR (rest: 64±3bpm; Rec1: 86±2bpm; Rec2: 78±3bpm; Rec3: 72±2bpm) and the subendocardial viability ratio (rest: 148.8±29.5%; Rec1: 85.8±14.6%; Rec2: 102.7±26.8%; Rec3: 122±20.4%) such that they were augmented and attenuated, respectively, from rest to Rec1, Rec2 and Rec3. There were no significant ($p>0.05$) main effects of time for brachial or aortic BP. There was a significant main effect of time for central augmentation pressure (rest: 3.7±4.2mmHg; Rec1: 10.6±7.11mmHg; Rec2: 6.8±5.2mmHg; Rec3: 5.5±4.9mmHg, $p<0.001$) such that it was augmented from rest to Rec1. There was a significant main effect of time for the Augmentation Index (AIx) (rest: 10.1±12.6%; Rec1: 25.3±14%; Rec2: 16.5±12.3%; Rec3: 13±10.7%, $p<.001$) such that it was augmented from rest to Rec1. There was a significant main effect of time for the AIx normalized at 75bpm such that it was augmented from rest to Rec1 and Rec2, but was similar to Rec3 (rest: 4.7±11%; Rec1: 28.9±12.1%; Rec2: 16.9±11.9%; Rec3: 13.2±9.7%, $p<0.001$). **CONCLUSION:** These data demonstrate that recovery from acute high-intensity heavy rope exercise has a significant effect on pulse wave reflection lasting up to 60 minutes post-exercise.

Keyword: interval exercise, augmentation index, blood pressure, heart rate

Board #14

CHANGE IN CARDIORESPIRATORY FITNESS AND PREVALENCE OF METABOLIC SYNDROME AFTER AN EXERCISE PROGRAM

Matthew P. Riccardi (Ball State University), Brittany Smith (Ball State University), Mary Imboden (Ball State University), Lenny Kaminsky (Ball State University), Bradley S. Fleenor (Ball State University), Mitch Whaley (Ball State University)

Abstract: Metabolic syndrome (MetSyn) is defined as the clustering of multiple risk factors associated with an increased risk for cardiovascular disease (CVD) and type II diabetes. We, and others, have shown that cardiorespiratory fitness (CRF) is associated with the prevalence of MetSyn, however, it is unknown if a change in CRF with exercise training is related to reduced prevalence of MetSyn. **PURPOSE**: To examine the relationship between the change in CRF and the change in number of MetSyn risk factors following a self-referred exercise program. **METHODS**: Maximal cardiopulmonary exercise (CPX) tests and MetSyn risk factors were analyzed prospectively from 364 adults aged 46.1 years (45% women). MetSyn was defined according to the National Cholesterol Education Program- Adult Treatment Panel III criteria as updated by the American Heart Association/National Heart, Lung, and Blood Institute. Correlations and logistic ordinal regression were used to assess the relationship between the change in CRF and the change in number of MetSyn risk factors following ~6 months of participation in a self-referred, community-based exercise program. **RESULTS**: Overall prevalence of MetSyn decreased from 25% to 15%, while CRF improved 15% (30.9 ±8.1 vs. 35.5 ±8.9 mL/kg/min, P<0.001) following the exercise program. Measured change in CRF had a significant, inverse relationship with the change in number of MetSyn risk factors (r= -0.211; P<0.001). Subjects who improved CRF had a 52% reduction in likelihood of gaining MetSyn risk factors when compared to subjects who did not improve CRF (Odds ratio=0.474; P=0.030). **CONCLUSION**: This prospective analysis indicates that there is an inverse relationship between the change in CRF and the change in MetSyn risk factors in a self-referred cohort participating in an exercise program for approximately 6 months. Participating in a community-based, self-referred exercise program yields significant improvements on CRF, the MetSyn risk factors, and the overall prevalence of the MetSyn and therefore should be emphasized as a primary prevention strategy for MetSyn.

Keywords: HEALTH, DISEASE, RISK, DIABETES

Board #15

PHYSIOLOGICAL RESPONSES TO SINGLE AND DOUBLE LEG CYCLING IN NORMOXIC AND HYPOXIC CONDITIONS

Tyler J. Singer (Kent State University), Shane Draper (Utah Valley State University), Cody Dulaney (Kent State University), Sarah Kearney (Kent State University)

Abstract: It has been well established that exercise intensity as well as exercise performance declines at altitude. However, it has yet to be determined how femoral blood flow and muscle oxygenation kinetics are influenced by altitude during submaximal performances. Furthermore, it has yet to be determined if the utilization of small muscle mass exercise which allows for greater blood flow to the active muscle, will allow for similar muscle oxygenation kinetics in hypoxic conditions that is achieved during larger muscle mass activities in normoxia. **PURPOSE:** The purpose of this study is to determine if tissue oxygenation is compromised at altitude during submaximal bouts of exercise and whether reducing the active muscle mass exercise can be used to offset any observed decrement due to increases in blood flow. **METHODS:** Ten individuals performed double leg cycling for four minutes at 50%, 60%, 70% and 80% of their maximal oxygen consumption, rested for 15 minutes and then performed single leg cycling utilizing the same protocol but at half the double leg work rate. This protocol was performed in both normoxic and hypoxic conditions. Dependent variables assessed were arterial oxygen concentration, lactate, femoral blood flow, and changes in oxyhemoglobin, total hemoglobin, and tissue saturation index. **RESULTS:** The amount of blood flow during single leg trial in hypoxia was significantly higher compared to blood flow during double leg cycling in hypoxia (p = 0.02). TSI was significantly higher when comparing 80% of VO_2 max to 50%, 60%, 70% of VO_2 max ($p \leq$ 0.05). Oxygenated hemoglobin was significantly less in the double leg hypoxia trial compared to the double leg normoxia trial (p = 0.04). Additionally, double leg cycling in hypoxia produced a significantly higher amount of lactate compared to single leg cycling in hypoxia ($p \leq$ 0.02). **CONCLUSION:** The results suggest that

elevated hemoglobin saturation and femoral blood flow during the single leg condition in hypoxia are similar to that observed during double leg cycling in normoxia and may prove to be a viable training modality enabling an individual to exercise at the same level of intensity achieved at normoxia.

Keywords: Vascular, Blood Flow, Training

Board # 16

CARDIORESPIRATORY FITNESS & HEALTHY VASCULAR AGING

Nicholas A. Carlini (Ball State University), Matthew P. Harber (Ball State University)

Abstract: Healthy Vascular Aging (HVA), defined as pulse wave velocity (PWV; arterial stiffness) <7.6 m/s and absence of hypertension in adults ≥50 years of age, is associated with lower incident cardiovascular disease (CVD) events. Higher cardiorespiratory fitness (CRF) is associated with lower CVD mortality; however, the relation between HVA and CRF is currently unknown. **PURPOSE:** To determine the relation between HVA and CRF in an apparently healthy adult population. **METHODS:** One hundred and six individuals (54M/52F) underwent measures of vascular hemodynamics (PWV; resting blood pressure, BP), CRF (VO_{2max}), and traditional CVD risk factors. Participants were divided into either the HVA or no-HVA groups based on the resting PWV and blood pressure values and medication status. **RESULTS:** HVA was present in 21% (n=22) of the subjects, while 79% (n=84) had no-HVA. Compared to no-HVA, HVA were younger (59.2 ± 9.6 vs. 64.6 ± 8.2 years, $p<0.05$), and had lower PWV (6.7 ± 0.6 vs. 8.5 ± 1.3 m/s, $p<0.05$) and systolic BP (109.7 ± 10.5 vs. 117.6 ± 13.0 mmHg, $p<0.05$). CRF was not different between groups (25.1 ± 7.3 vs. 27.9 ± 7.3 ml/kg/min, $p>0.05$), but age and sex adjusted CRF percentiles according to the Fitness Registry and Importance of Exercise national database (FRIEND) demonstrated greater CRF in HVA vs. no-HVA (66% ± 0.3 vs. 46% ± 0.3, $p<0.05$). HVA compared with no-HVA had lower ($p<0.05$) body mass index (BMI) (25.9 ± 5.3 vs. 28.9 ± 5.2 kg/m^2, $p<0.05$), waist circumference (87.1 ± 12.1 vs. 98.5 + 14.0 cm, $p<0.05$), and glucose (90.5 + 13.1 vs. 103.1 ± 22.0 g/dL, $p<0.05$). PWV ($r=-0.3536$) and bSBP ($r=-0.3132$) were both inversely correlated with the FRIEND percentiles ($p<0.05$, both). **CONCLUSIONS:** Our findings indicate HVA is associated with greater CRF. Thus, these data support the notion for lower CVD-related mortality with higher levels of CRF may be attributable, in part, to HVA.

Keywords: Vascular Stiffness, Aging, VO2max, CRF

Board #17

EXAMINING THE VALIDITY OF A COMMERCIALLY AVAILABLE WRIST-WORN HEART RATE MONITOR

Summer S. Besteman (Grand Valley State University), Grace L. Ditzenberger (Hope College), Claire M. Bouret (Hope College), Adam M. Coughlin (Saginaw Valley State University), Scott A. Conger (Boise State University), Brian C. Rider (Hope College)

Abstract: Athletes and coaches use heart rate (HR) monitors to assess and monitor exercise intensity. Recently, wrist-worn watches that use infrared technology to measure HR via the wrist have become an option replacing traditional chest strap monitors (which detect HR via cardiac electrical impulses). These new devices are convenient and increasing in popularity, however the validity across a range of resting and exercise intensities is unknown. **PURPOSE**: The purpose of this study was to determine the validity of the Polar® A360

HR monitor during periods of rest, walking/running, and during active and passive recovery from exercise. **METHODS:** Thirty Division III collegiate athletes (females n=15) participated in this study. Subjects wore an A360 monitor and a previously validated chest HR monitor (Polar RS400) that served as the criterion measurement during two-minute stages across a range of resting and exercise intensities. Subjects rested in a supine, seated, and standing position. Then, each subject began walking on a motorized treadmill at a speed of 1.6 kilometers per hour (kph). Treadmill speed was increased by 1.6 kph every two minutes until subjects reached volitional fatigue. After volitional fatigue, subjects walked at 4.8 kph and then were seated for a final resting recovery stage. HR was recorded from each device in 30-second increments. Total mean difference in HR readings, percent accuracy, and Intraclass Correlation Coefficients (ICC) analysis was run on all HR data to examine the level of agreement between devices. Bland-Altman plots and a regression were utilized to examine the agreement between devices. **RESULTS:** The A360 demonstrated a strong correlation with the RS400 (r^2 = 0.98) across time points. Dependent paired t-tests revealed a significant difference between devices in total mean HR (chest: 122.5 vs. wrist: 122.0 bpm, $p<0.001$). The greatest percent accuracy was found during rest (91%) and recovery (90%). An ICC of 0.78 was achieved when examining all of the 30-second data, which demonstrated a strong level of agreement between devices. **CONCLUSION:** The A360 is a valid option for assessing HR at rest and during various walking and running speeds.

Keywords: watch, tracker, photoplthysmography

Schedule – Saturday Morning: Symposia

Symposium #14: Gerald R Ford Room – 8:00-8:50am

Using a Gameful Teaching Strategy to Maximize Autonomy and Student Motivation in a Campus-Wide Elective Kinesiology Course

Session Moderator: Katie Clark

Presenters: Peter F. Bodary, PhD
University of Michigan

Dr. Pete Bodary serves as a clinical faculty member in the University of Michigan School of Kinesiology for both the Movement Science and Applied Exercise Science programs. He is involved in teaching at all academic levels and performing research with colleagues across campus including Michigan Athletics and Michigan Medicine. He is passionate about the use of technology and data to improve patient health, education and human performance.

Learning Objectives:

- Describe the characteristics of, and pedagogical advantages of, a "gameful" teaching strategy
- Outline the pros and cons of using gameful elements in a required course versus an elective course
- Summarize the value of providing gameful elements in a course from the perspective of both instructor and student

Symposium Description:
With the rapidly changing educational landscape, it is important that we move away from concepts like "teaching to the test" and focusing only on short-term performance of in-class assessments (ie. exams). This presentation will outline the idea of introducing "gameful" elements into kinesiology courses and the specific example of using it in a campus-wide elective course titled: "Exercise, Nutrition and Weight Control". The course is currently taught to more than 200 students per semester and does not have a pre-requisite course. This makes the course difficult to deliver in an engaging and personalized way to students of varied academic backgrounds. However, the introduction of gameful elements, although challenging in some ways (to be outlined), has made this more feasible. Students have many opportunities for earning points and have room to try new things without the fear of "losing" points on assignments. There are definite pros and cons of this strategy and the presentation will summarize lessons learned using "gameful" elements in different class settings.

Symposium #15: Pantlind Ballroom – 8:00-8:50am

How to Rock Your Internship!

Session Moderator: Greg Farnell

Presenters: Sandra K. Knecht, MS, RCEP[1], Carol Weideman, PhD[2]
[1]Cincinnati Children's Hospital Medical Center
[2]Western Michigan University

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 19 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 is a 19yr 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.

Learning objectives:

- Describe how to approach the internship process and finding the best fit
- Discuss how to nail "The interview"
- Describe and identify how to present the 'professional you'
- Distinguish the keys to success for noticeable job performance

Symposium Description:
Even if you're working for free, your internship can be worth a fortune –in job experience and valuable career connections. An internship is an excellent opportunity to try out a career field, build clinical skills, grow your professional network and potentially become employed at the company after graduation. The internship is thought of as the culminating experience of many undergraduate and graduate academic programs in exercise physiology, corporate wellness, strength and conditioning, and other fitness careers. Consider the steps of planning, selecting, and managing the experience to make your internship the best it can be. This interactive presentation will involve the audience through Q&A, discussion, and feedback. Good internships don't happen by chance, they are made!

Discussion will include:

1. Searching for an internship site
2. Establishing priorities: Where to apply?
3. Interviews: How to prepare, what to wear, questions to ask when you are there
4. Job performance: Your internship expectations, your performance during the internship
5. Documenting your efforts
6. Application to your career
7. The Endgame

Symposium #16: Gerald R Ford Room – 9:00-9:50am

Beyond Health: Use of Activity Trackers for Sport-Specific Metrics

Session Moderator: Brian Rider

Presenters: Alexander H.K. Montoye, PhD, FACSM[1], Karin A. Pfeiffer, PhD, FACSM[2]
[1]Alma College
[2]Michigan State University

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 current member of the Midwest ACSM Board of Directors and is an ACSM Fellow.

Dr. Karin A. Pfeiffer is an Associate Professor of Kinesiology at Michigan State University. Her areas of research include measurement of physical activity and interventions to increase physical activity in children and adolescents. Dr. Pfeiffer is a past President of the Midwest ACSM and is an ACSM Fellow.

Learning Objectives:

- Explain the link between physical activity and health in populations of all ages.
- Describe what a wearable activity tracker is, what kinds of variables it can assess, and how accurate it is for assessing these variables.
- Identify future technologies and devices that are currently or will likely be created which will improve the ability to measure PA for health and athletic performance.

Symposium Description:

Physical activity (PA) has many well-known health benefits, and current government-sponsored PA recommendations include accumulating 150 minutes/week of moderate- or vigorous-intensity, aerobic PA and 2-3 days of muscle-strengthening exercises (1). Focus has historically been on achieving aerobic guidelines, but estimates suggest that few adults achieve either guideline, with lower achievement of muscle-strengthening guidelines (2). **~5 minutes**

Activity trackers represent a popular way to track progress toward meeting PA guidelines. Most commercially-available activity tracking devices are designed to assess PA metrics such as steps taken, Calories burned, active minutes accrued, and recently heart rate. Past studies show that steps are generally assessed more accurately and reliably than Calories or active minutes but that all metrics have a high degree of error (3). Studies examining wrist-based heart rate assessment have mixed findings (4, 5). Additionally, studies suggest that, despite popularity of wrist-worn devices, placement on the ankle or hip is more accurate for assessing these aerobic-focused metrics other than heart rate (6-8). **~15 minutes**

Metrics such as steps, Calories, and active minutes can be useful for tracking aerobic PA but not muscle-strengthening guidelines or participation in sports, which represents a major portion of PA in youth (9). Therefore, efforts are needed to objectively assess sport-specific and muscle-strengthening exercises. Recent years have brought a wide variety of activity trackers which claim to assess sport-specific metrics. Examples include Blast Motion, Babolat Pop, Head Zepp, and Atlas Wristband as well as research-grade accelerometers including ActiGraph. Our research team has evaluated several of these devices, and we present accuracy, reliability, and usability data for each device assessed. **~20 minutes**

The wearable activity tracker industry is rapidly changing, and several new technologies and approaches are being tested for improving the tools available to measure PA. More sensors which incorporate movement and physiologic data (e.g., skin temperature, heart rate) and more complex modeling techniques increase the amount and types of meaningful information that can be derived from such devices. These data have the potential to shape how we approach health and athletic performance. **~5 minutes**

The symposium will close with 15-20 minutes for a question and answer session.

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Symposium #17: Pantlind Ballroom – 9:00-9:50am

Training and Testing Professional Firefighters: Research, Internship, and Career Opportunities with these Unique Occupational Athletes

Session Moderator: Angela Hillman

Presenters: Andy Bosak, PhD, EP-C, CSCS, *D
Liberty University

Andy Bosak, Ph.D., EP-C, CSCS, *D is the director and professor of the Graduate Exercise Science Program in the Department of Health Professions at Liberty University. Dr. Bosak earned BS and MS degrees in Physical Education (Emphasis: Exercise Science) from Western Kentucky University and completed a Ph.D. in Human Performance/Kinesiology (Emphasis: Exercise Physiology) at the University of Alabama. Dr. Bosak has presented his research and related works at various conferences with over 110 primary presentations. Dr. Bosak is an occupational performance specialist with the City of Lynchburg Fire Department Cadets/Recruits and was previously a sports scientist for the Professional Referee Organization.

Learning Objectives:

- Understand that physiological demands of firefighting and how to design training programs for these unique individuals.
- Learn about the challenges and barriers to successfully conducting firefighter research studies and designing fitness programs for various types of firefighter positions.

- Discover the various internship and career opportunities that exist with being an occupational performance specialist, exercise physiologist, and/or strength training and conditioning professional with the firefighter population.

Symposium Description:
The relationship between fitness and firefighters has been assessed in prior research studies. Many studies evaluated the association between fitness, stress, cardiovascular disease risks, and/or job performance. Furthermore, some studies have assessed the unique "on the job" workload requirements and the corresponding fitness parameters needed to meet these specific demands, but more studies are required using these special type of occupational athletes. Firefighters are faced with exceptional physiological challenges during the course of duty where they may sit for long periods of time in the fire station, but when called upon "to save the day", they must instantly respond at or near maximal physical capacity and perform at a high intensity for various amounts of time. This stressful reaction takes the body through a dramatic "fight or flight" response and it is wise to believe that firefighters should be physically trained in the same manner such as professional or Olympic athletes. However, there are many challenges and barriers (ie. job demands, work schedule, irregular fire patterns, family, etc.) to assessing, conducting research on, and training firefighters. Hence, the purpose of this presentation, with an intended target audience of students and faculty who are interested in sports and occupational performance and physiology, will be to assess the particular physiological demands of several firefighter positions (ie. Pump, Line Stretcher, Irons/Entry and Rescue, etc.) and suggest ways to develop appropriate training programs. Also, an overview of key prior firefighter research studies as well as suggested future research opportunities will be provided. Finally, possible unique and exciting internship and career opportunities with firefighters will be discussed.

Schedule – Saturday Morning: Poster Session

Poster Session #6:
Crown Foyer – 8:00-9:15am

Board #1

THE EFFECTS OF CAFFEINE INGESTION ON REPEATED-SPRINT PERFORMANCE IN COLLEGE-AGED NON-ATHLETES

Michael D. Belbis (Northern Illinois University), Peter J. Chomentowski III (Northern Illinois University), Clayton L. Camic (Northern Illinois University), Steven M. Howell (Northern Illinois University), Shuqi Zhang (Northern Illinois University)

Abstract: Caffeine is one of the most widely used drugs in the world due to its benefits of increasing mental and physical capabilities. Caffeine also is commonly used as an ergogenic aid when performing repeated-sprint activity (RSA). **PURPOSE:** The purpose of this study is to examine the effects of 200 mg of caffeine during RSA on heart rate (HR), rating of perceived exertion (RPE), blood lactate concentration (BLa), and sprint time (ST). **METHODS:** Thirty-two students (Age: 22.19 ± 2.29 years) participated in the study. The study followed a randomized crossover design, in which each participant ingested either 200 mg of caffeine or placebo 45 minutes prior to sprinting. The sprinting protocol consisted of three sets of six maximal-effort 30-meter sprints. Each sprint covered a 15-meter distance between the starting and the secondary marker, such that each subject sprinted down to the secondary and back to the starting. Each of the sprints in a set were separated by a total of

20 seconds of active recovery. Following each set, HR, BLa, ST, and RPE were recorded. **RESULTS:** The caffeine trials were not significantly different than the placebo for HR and RPE. However, for RPE, there was a main effect for time [$F(3,93) = 292.810$, $p < 0.001$]. The caffeine trials (Resting: 1.30 ± 0.52 mmol/L; Set 1: 11:33 ± 2.38 mmol/L; Set 2: 13.26 ± 3.02 mmol/L; Set 3: 13.67 ± 2.49 mmol/L) elicited increased BLa compared to the placebo (Resting: 1.37 ± 0.53 mmol/L; Set 1: 9.24 ± 2.43 mmol/L; Set 2: 11.46 ± 2.87 mmol/L; Set 3: 11.83 ± 2.55 mmol/L). The caffeine trials (Set 1: 6.78 ± 0.58 secs; Set 2: 6.81 ± 0.55 secs; Set 3: 6.85 ± 0.57 secs) also produced a decreased average ST compared to the placebo (Set 1: 7.00 ± 0.64 secs; Set 2: 7.02 ± 0.62 secs; Set 3: 7.12 ± 0.63 secs). For the average ST, there were significant main effects for condition [$F(1,31) = 36.839$, $p < 0.001$] and time [$F(2,62) = 5.806$, $p = 0.006$]. **CONCLUSION:** Caffeine supplementation of 200 mg elicits an increase in RSA in college-aged non-athletes.

Keywords: ergogenic aids, supplementation

Board #2

NORMATIVE VALUE OF FUNCTIONAL MOVEMENT SCREEN (FMS) COMPOSITE SCORE IN HIGH SCHOOL ATHLETES

Thomas Grabski (Capital University), Bart Welte (University of Findlay), Kenneth Galletta (Tiffin University), Ethan James (University of Findlay)

Abstract: The Functional Movement Screen (FMS) is a musculoskeletal screening test that professionals can use to identify potential injury risk factors in athletes. Many professionals have implemented the FMS as a pre-participation screen in order to identify flaws in the kinetic chain. **PURPOSE:** To describe the normative values of FMS composite scores in OHSAA athletes and within grade levels (9th, 10th, 11th, 12th). **METHODS:** Descriptive study using subjects from four local high schools. Fifty-one (51) OHSAA athletes (30 male, 21 female; Age = 16.61±1.25) with no previous injury within eight weeks of testing were eligible to participate. Subjects were scored by two experienced FMS graders on all seven of the movements of the FMS both live and after video analysis. There was excellent reliability between the two graders with an ICC of .953. Cross-tabs and frequencies were used to display descriptive statistics. **RESULTS:** 5 subjects were 9^{th} graders with a mean score of 13.00±2.264, 17 were 10^{th} graders with a mean score of 14.06±1.793, 11 were 11^{th} graders with a mean score of 14.55±1.573, and 18 were 12^{th} graders with a mean score of 14.83±2.015. The normative value for an FMS composite score in the high school population was 14.333 ±1.90. Underclassmen (9^{th} and 10^{th} grades) had a mean score of 13.529±2.02 (Age = 15.41±0.67) and upperclassmen (11^{th} and 12^{th} grades) had a mean score of 14.689±1.79 (Age = 17.52±0.69). **CONCLUSION:** Practitioners using the FMS as a screening test should be aware that normative values differ in high school athletes. Using a cut-off score of 14 may not be the best measure for younger high school athletes to best detect potential injury risk factors. In this study, 47% of subjects did not meet the cut-off score of 14 on the FMS. Most high school athletes (13-18 years old) undergo significant physical and neurologic development between 9^{th} and 12^{th} grades. Lower FMS scores in high school aged subjects could be due to the lack of neurologic and physical maturity.

Key Words: FMS, Functional Movement Screen, High School, Normative Score, Athletes

Board #3

EMPLOYER EXPECTATIONS OF ATHLETIC TRAINING ABILITIES BASED ON THE TYPE OF

PROFESSIONAL DEGREE

Bart D. Welte (University of Findlay)

Abstract: There are two different professional degrees for athletic trainers (bachelor's degree and master's degree). The same educational competencies and proficiencies are mandated by the Commission on Accreditation of Athletic Training Education (CAATE) for students graduating from either type of athletic training program. Graduates from master's degree programs have a higher first-time pass rate on the Board of Certification Exam and are more likely to practice as athletic trainers than graduates from bachelor's degree programs but it is unknown if graduates face different expectations in the field. **PURPOSE:** To identify if employers of athletic trainers have different expectations of employees with a professional master's degree than a professional with a bachelor's degree. **METHODS:** This was a cross-sectional quantitative study using an anonymous online survey. The National Athletic Trainers' Association (NATA) randomly recruited participants from Districts 4 and 9, minus Ohio. Only employers of athletic trainers were asked to participate and provide their level of expectation in the areas of athletic training knowledge, athletic training skills, critical thinking, leadership, and professional maturity for both professional master's and bachelor's degree athletic trainers. The instrument was reviewed by experts for content and face validity, piloted to employers in Ohio, and was found to be valid and reliable. Expectations were gathered using 0-10 visual analog scales. Each construct area was analyzed using t-tests and ANOVAs were performed to identify relationships among demographics. Seventy-eight (39 male, 39 female) participants completed the survey. **RESULTS:** The employer expectation for bachelor's degree athletic trainers was lower than master's degree athletic trainers $t(76)=-11.45$, $p\leq.000$. There was a significant difference in employers' expectations between professional Master's degree prepared and undergraduate prepared athletic trainers in knowledge $t(76)=-9.17$, $p\leq.000$, skills $t(76)=-9.21$, $p\leq.000$, critical thinking $t(76)=-10.41$, $p\leq.000$, leadership $t(76)=-9.76$, $p\leq.000$, and professional maturity $t(76)=-8.76$, $p\leq.000$. **CONCLUSION:** The results demonstrate that employers expect better-prepared practitioners if employing someone with a professional master's degree over a bachelor's degree. Athletic training educators must be aware that advancing a degree level (bachelor's to master's) carries higher expectations in the field. Education increasing in degree level should have a corresponding increase in student abilities to meet employer expectations.

Key Words: Master's degree, Bachelor's degree, employer expectations, athletic training education

Board #4

EFFECTS OF A PRE-SEASON INTERVENTION ON HYDRATION IN FEMALE COLLEGIATE VOLLEYBALL ATHLETES

Alyssa M. Pollard-McGrandy (Saginaw Valley State University), Brian C. Rider (Hope College), Madison P. Zimmerman (Saginaw Valley State University), Matthew A. Nicolai (Saginaw Valley State University), Adam M. Coughlin (Saginaw Valley State University)

Abstract: BACKGROUND: Urine specific gravity (USG) is commonly utilized to assess hydration status. Athletic performance has been shown to be affected by hydration status. In addition to nutritional and hydration practices, environmental conditions can also influence hydration status. Therefore, healthcare professionals should also consider environment, both indoor and outdoor, when assessing hydration. **PURPOSE:** To compare base-line urine USG to season-long collections of urine following a one-time, pre-season hydration intervention. **METHODS:** Fourteen NCAA Division II female collegiate volleyball athletes participated in this study. Urine was collected in sterile cups in the hours preceding either a game or practice. Collections were roughly two weeks apart, starting August 25th and ending November 4th, 2017, resulting in eight total urine

collections. The hydration intervention consisted of information and guidelines presented to the team and coaching staff. The hydration intervention was administered verbally after the base-line urine collection, after which written guidelines were left with athletes and coaching staff. Urinalysis was conducted via reagent strips. Data was analyzed via SPSS v.22 with an a priori level of 0.05. Subsequent urinalyses were compared to the baseline urinalysis only. **RESULTS:** Specific gravity statistically decreased from base-line to the second urine collection and did not statistically differ again until the final three measurements (base-line = 1.021±0.008, 1.007±0.003*, 1.015±0.008, 1.013±0.006, 1.020±0.016, 1.014±0.005*, 1.011±0.008*, and 1.013±0.003*, *statistically significant compared to the initial value, $p < 0.05$). **DISCUSSION:** The hydration intervention illustrated a short-term effect on USG. A correlation between USG and environmental temperatures was evaluated post hoc for the final six urine collections, arguably when the effects of the intervention had "worn off". The coefficient of determination (r^2) revealed that 35.7% of the difference in USG was due to the environmental temperature, which was statistically significant ($r = 0.597$, $p<0.05$). **CONCLUSION:** The intervention appeared to have a short-lived impact on USG. Differences in USG were evident again later in the season (late October to early November). Further analysis demonstrated a statistical influence of cooler temperatures as a significant contributor to lowering USG at the end of season.

Keywords: Environment, Temperature, Urine Specific Gravity

Board #5

EFFECTS OF CARBOHYDRATE MOUTH RINSING ON UPPER-BODY RESISTANCE EXERCISE PERFORMANCE

Ben M. Krings (University of Wisconsin-Platteville), Brandon D. Shepherd (Mississippi State University), Hunter S. Waldman (Mississippi State University), Matthew J. McAllister (Texas State University, San Marcos), JohnEric W. Smith (Mississippi State University)

Abstract: PURPOSE: There is evidence demonstrating the efficacy of carbohydrate mouth rinsing (CMR) during various exercise modes. The purpose of this investigation was to examine the effects of CMR during an upper-body resistance exercise (RE) protocol on performance, heart rate (HR) response, rating of perceived exertion (RPE), and felt arousal (FA). **METHODS**: Resistance trained males (n=17, age: 20.6 ± 1.3 years, height: 177.3 ± 5.2 cm, mass: 83.5 ± 9.3) completed three experimental sessions with the first serving as familiarization to the RE protocol. The final two trials were randomized, counter-balanced, double-blinded, and participants mouth rinsed a 25 mL solution containing either a 6% carbohydrate solution or artificially flavored placebo (PLA) at nine time points during the exercise session. Participants rinsed before beginning the RE protocol and 20 s before repetitions to failure with the exercises of bench press, bent-over row, incline bench press, close-grip row, hammer curls, skull crushers (all completed at 70% one-repetition maximum), pushups, and pull-ups. HR, RPE, and FA were measured at baseline and immediately after each set of repetitions to failure. Total repetitions and session volume completed for each exercise and overall repetitions completed during each trial were compared using paired samples *t*-tests. HR, RPE, and FA were analyzed using a two-way (treatment x time point) repeated measures analysis of variance. **RESULTS**: There were no differences for total repetitions completed or session volume for any exercise ($p > 0.05$). The total amount of repetitions completed across all eight exercise was not different (CMR: 203.2 ± 24.5 repetitions, PLA: 200.8 ± 23.4 repetitions, $p = 0.456$). No treatment differences were observed for HR, RPE, or FA. **CONCLUSIONS**: Although CMR has been shown to be effective in increasing aerobic performance, the results from this investigation show no benefit in RE performance in resistance trained males.

Keywords: Weight training, nutrition, ergogenic aid

Board #6

A QUALITATIVE ANALYSIS OF THE ETIOLOGIES OF BURNOUT SYMPTOMS IN MEDICAL TRAINEES

Cynthia Allen (Carthage College), Jennifer Anderson (University of Illinois- Chicago), Sidney Burke (Carthage College)

Abstract: Burnout is a psychological syndrome resulting from a prolonged response to chronic stress in the workplace. More than 50% of physicians experience burnout or burnout symptoms. Studies show that having uncertain work hours, work-overload, insufficient job resources, and unresolved conflicts with co-workers or supervisors can increase feelings of ineffectiveness and lead to exhaustion. **PURPOSE:** Identifying causes of stress and anxiety and potential intervention strategies to mitigate burnout among medical trainees. **METHODS**: Twenty-nine medical residents completed a 9-question online survey intended to investigate the causes of stress and anxiety in their personal and professional lives. Participants were also asked for their recommendations to reduce stress and anxiety related to their residency. A qualitative analysis was conducted to identify principal themes that emerged from each question. A secondary analysis categorized themes that appeared in the primary analysis as organizational or individual stressors that contribute to burnout. **RESULTS**: Organizational stressors included: overwork, inability to control schedule, conflict, lack of confidentiality, and a work culture perceived by the residents as unequal and demeaning. Organizational solutions suggested by participants included: establishing a reporting system for misbehavior, a confidential mentoring program, and promoting two-way communication between residents and supervisors. Identified individual stressors were interpersonal work conflicts, inexperience, finances, maintaining intimate relationships, and personal medical issues. Individual interventions recommended were maintaining social networks and exercise. **CONCLUSIONS**: The healthcare industry would benefit by re-examining workload distribution. Medical residents and their faculty supervisors would benefit from instruction in positive communication skills. Mentorships with physicians the residents don't report to may help trainees deal with the toxic inequality and hierarchy issues reported by participants in this study. A confidential reporting system to document and resolve disputes should be implemented. Residents may benefit from a support group run by a trained leader who can maintain confidentiality. A successfully run group may help lessen the stigma, noted by respondents, associated with seeking help. Encouraging residents to spend time with family, friends and peers outside of work is helpful in reducing their stress and anxiety.

Keywords: stress, work culture

Board #7

EFFECTS OF A NOVEL WELLNESS CURRICULUM ON WELLNESS OF FIRST-YEAR COLLEGE STUDENTS

Erica G. Thomas (St. Ambrose University), Darla K Baumgarten (St. Ambrose University), Julia A. Moffitt (Arkansas College of Osteopathic Medicine)

Abstract: Development of the whole person has long been a goal of wellness programs used by college campuses, and student wellness has been correlated with performance and retention on college campuses. Traditionally, student wellness curriculum has been a required wellness course delivering information primarily in a lecture format. Research has shown that increases in autonomous functioning and self-direction are of great

benefit for college students in improving health behaviors. **PURPOSE:** To examine the effects on self-assessed wellness scores when students complete a novel method of wellness curriculum (Wellness Passport; WP) over the course of an academic year rather than completing the standard eight-week Wellness Concepts course. **METHODS:** Data were collected from two groups of first-year students. Both groups completed the college student version of the TestWell survey at the beginning and end of the academic year. The WP group (n=20) viewed their results and were instructed to choose and complete activities to improve on their weakest areas of wellness, which were reported to instructors. The control group (n=10) completed the traditional eight-week wellness concepts (WC) course. The TestWell survey results were compared between groups using t-tests. **RESULTS:** At the beginning of their freshman year, composite TestWell survey results were similar between the groups (WP=752.1, WC=755.2, $p>0.05$), indicating a similar baseline for both groups. At the end of the academic year, students who had undergone the Wellness Passport intervention reported wellness scores similar to those at the start of the program (752.1 and 713.4, respectively, $p>.05$). Testwell survey results at the end of the year were also not found to be statistically different between WP and WC groups. However, individuals who had undergone the traditional Wellness Concepts course were observed to have significantly decreased TestWell scores versus their earlier scores (755.2 and 679.6, respectively. $p = 0.03$). **CONCLUSIONS:** In a cohort of first-year students in which two groups began with similar self-assessed wellness scores, the Wellness Passport method was shown to be effective at attenuating a reduction in wellness score that is observed in students who have instead completed a traditional 8-week Wellness Concepts course.

Keywords: wellness, health promotion

Board #8

THE EFFECTS OF ANAEROBIC EXERCISE ON BALANCE PERFORMANCE IN ATHLETES

Mallory S. Kobak (The University of Akron), Michael J. Rebold (Hiram College), Alina Mille (Hiram College)

Abstract: Balance is considered an important skill-related fitness component that allows for the successful engagement in sports, and for decreasing the risk of sustaining lower body musculoskeletal injuries during sport participation. While athletes are more likely to have better balance scores as compared to non-athletes, the concern here is that engagement in frequent bouts of anaerobic exercise during sports may disrupt an athlete's balance, therefore, possibly affecting their performance and increasing their risk for sustaining lower body musculoskeletal injuries. **PURPOSE:** To assess the effects of anaerobic exercise on balance performance in athletes. **METHODS:** Fourteen college students (n = 14 females) that were members of the women's soccer team participated in one condition (*anaerobic sprint exercise*). During the *anaerobic sprint exercise* condition participants sprinted on a treadmill at eight miles·hour^{-1} with a 20% grade until failure. Balance was assessed pre- and post-anaerobic exercise. **RESULTS:** Overall postural stability was significantly (p = 0.04) worse from pre- (1.65 ± 0.49° of displacement) to post-anaerobic exercise (2.56 ± 1.53° of displacement). Anterior and posterior postural stability was significantly (p = 0.05) worse from pre- (1.34 ± 0.62° of displacement) to post-anaerobic exercise (2.23 ± 1.47° of displacement). No significant (p = 0.14) differences were observed between medial and lateral postural stability from pre- (0.64 ± 0.51° of displacement) to post-anaerobic exercise (0.96 ± 0.81° of displacement). **CONCLUSION:** Completing a bout of anaerobic exercise can disrupt an athlete's balance by causing a worsening of overall postural stability by 55.15%. These findings suggest that possible negative effects on sport performance and increased risk of sustaining lower body musculoskeletal injuries during sport participation may occur.

Keywords: Postural stability; soccer; treadmill exercise; musculoskeletal injuries

Board #9

THE IMPACT OF CELL PHONE TEXTING ON COGNITION DURING A BOUT OF AEROBIC EXERCISE

Michael J. Rebold (Hiram College), Mallory S. Kobak (The University of Akron), Cody Croall (Bloomsburg University of Pennsylvania), Emily Cumberledge (Bloomsburg University of Pennsylvania), Matthew Dirlam (Bloomsburg University of Pennsylvania), Timothy Sheehan (Bloomsburg University of Pennsylvania)

Abstract: Cell phones have become a near-ubiquitous tool for communicating. While the increased ability to communicate with others that cell phones provide likely has benefits, the concern here is that frequent cell phone use during aerobic exercise may blunt aerobic exercise-induced cognitive benefits. **PURPOSE:** To assess the effects of cell phone texting on cognition during a bout of 30-minutes of cycle ergometer exercise. **METHODS:** Twenty-eight college students (n = 15 males, 13 females) participated in two conditions (*cell phone*, *no cell phone*). During the *cell phone* condition participants used their cell phone only for texting purposes while engaging in 30-minutes of cycle ergometer exercise. During the *no cell phone* condition participants did not have access to their cell phone nor any interaction with other individuals or electronics while participating in the 30-minutes of cycle ergometer exercise. Cognition was assessed pre- and post-exercise to determine how reaction time and accuracy were affected. **RESULTS:** Reaction time significantly ($p < 0.001$) worsened in the *cell phone* condition from pre- (1,003.75 ± 178.04 ms) to post-exercise (1,124.46 ± 238.55 ms). Reaction time significantly ($p < 0.001$) improved in the *no cell phone* condition from pre- (1,107.71 ± 229.54 ms) to post-exercise (953.86 ± 177.42 ms). Accuracy significantly ($p = 0.01$) worsened in the *cell phone* condition from pre- (97.61 ± 2.32) to post-exercise (94.04 ± 7.88). Accuracy significantly ($p < 0.001$) improved in the *no cell phone* condition from pre- (94.82 ± 4.42) to post-exercise (97.39 ± 2.42). **CONCLUSION:** Reaction time worsened by 12.03% when using a cell phone during aerobic exercise as compared to a 13.89% improvement in reaction time when no cell phone was present. Accuracy also worsened when using a cell phone during aerobic exercise by 3.66% and improved by 2.71% when no cell phone was present. It appears that using a cell phone for texting can interfere with aerobic exercise-induced cognitive benefits.

Keywords: Mobile device; reaction time; accuracy; cycle ergometer

Board #10

ACCEPTANCE AND FEASIBILITY OF USING A SEATED ELLIPTICAL DURING SEDENTARY BEHAVIORS IN OLDER ADULTS

Nicholas L. Lerma (Grand Valley State University), Chi C. Cho (University of Wisconsin-Milwaukee), Ann M. Swartz, FACSM (University of Wisconsin-Milwaukee), Young Cho (University of Wisconsin-Milwaukee), Scott J. Strath, FACSM, (University of Wisconsin-Milwaukee)

Abstract: Older adults aged 60+ years are particularly vulnerable to the exposure and negative health consequences related to sedentary behavior (SB). There is limited evidence for the feasibility and effectiveness of SB interventions in older adults. **PURPOSE:** Therefore, the purpose of this study is to explore the feasibility and acceptability of using a seated elliptical device (SED) to replace SB with a light-intensity physical activity (LPA) in the homes of older adults. **METHODS:** Each participant was outfitted with hip-mounted activity monitor and SED in the home for seven days. Participants were randomly assigned to one of four pedaling duration groups (15, 30, 45, and 60 minutes/day) and instructed to accumulate SED pedaling at a self-selected light-intensity during typical SB activities in their homes for a minimum of three of the next seven days.

Pedaling adherence and SB displacement by pedaling were analyzed with a Fisher's exact test and univariate analysis of variance, respectively. **RESULTS:** All four groups achieved 100% adherence and no significant differences were found in the number of days pedaled between the groups (p=.241). Overall, participants in groups assigned to longer durations tended to accumulate more minutes pedaled per day (p<0.001). The 45 and 60 min group accumulated greater minutes per day of pedaling than the 15 and 30 min groups (p<.005) with no significant differences between the 45 and 60 min groups or the 15 and 30 min groups. Participants' perceptions of using the SED were positive. **CONCLUSION:** Older adults were successfully able to exceed 60 minutes of daily pedaling without altering or interrupting their typical daily behaviors. The long term impact of these daily changes in LPA on health and function in aging populations are to be determined.

Funding: TL1TR001437 - Clinical and Translational Science Institute Training Fellowship

Keywords: sitting, pedaling, gerontology

Board #11

THE VALIDATION OF WHOLE AND REGIONAL BODY COMPOSITION TESTING DEVICES

Rachel N. Tauber (Northern Illinois University), James R. Peterson (Northern Illinois University), Shuqi Zhang (Northern Illinois University), Peter J. Chomentowski III (Northern Illinois University), Clayton L. Camic (Northern Illinois University)

Abstract: Obesity has increased exponentially within the last three decades and is now widely recognized as one of the leading health threats due to its association with such as type 2 diabetes, cardiovascular disease, and hypertension. In recent years, there have been advances in technology such as bioelectrical impedance analysis (BIA), dual-energy X-ray absorptiometry (DEXA), and air-displacement plethysmography that has been used to categorize individuals into percent fat categories. However, there are still concerns with the validity of these devices. **PURPOSE**: The purpose of this study was to analyze the validity of an 8-point electrode BIA, DEXA, and air-displacement plethysmography methods compared to hydrostatic weighing. **METHODS**: thirty-two male (mean age ± SD= 22.4 ± 2.5 years) and thirty female subjects (mean age ± SD= 21.9 ± 2.3 years) performed body composition testing using BIA, DEXA, air-displacement plethysmography, and hydrostatic weighing. **RESULTS**: The one-way ANOVA with repeated measures and follow-up paired samples t-tests indicated that percent body fat estimated from DEXA (mean ± SD = 31.0 ± 8.9%) resulted in significantly greater values than hydrostatic weighing (23.3 ± 9.2%), air-displacement plethysmography (23.3 ± 10.8%), and BIA (23.6 ± 10.5%). In addition, the constant error (CE) and total error (TE) values of predicting hydrostatic weighing percent body fat from DEXA (CE = -7.7%, TE = 8.2%) was significantly greater than those associated with air-displacement plethysmography (CE = 0.1%, TE = 3.2%) and BIA (CE = -0.3%, TE = 8.2%). **CONCLUSION**: These findings indicated that the air-displacement plethysmography and BIA methods provided acceptable estimates of body composition when compared to hydrostatic weighing. The DEXA method, however, failed to produce adequate body fat percentages due to the large CE and TE values.

Keywords: DEXA, BIA, hydrostatic weighing, air-displacement plethysmography

Board #12

THE EFFECTS OF COLD WATER AND COLD SPORTS DRINK CONSUMPTION ON RESTING

LUNG FUNCTION

Sandra Tecklenburg-Lund (St. Ambrose University), Seth C. Brauman (St. Ambrose University), Rhiannon M. Seneli (St. Ambrose University)

Abstract: Resting pulmonary function (PFT) is known to have important effects on ventilation, gas exchange and breathing mechanics during and after exercise. ATS/ERS guidelines contain no specific recommendations on beverage consumption. Previous research has shown that consumption of 1L of cold water affects resting lung function, but no other beverages have been examined. Because athletes frequently consume cold water or sports drink, it is important to understand the effects of these beverages on pulmonary function. **PURPOSE:** Therefore, the purpose of this study was to determine whether cold water or cold Gatorade would decrease resting PFTs in healthy individuals. **METHODS:** Nine healthy (6 men, 3 women), individuals (age 22 ± 1 yrs) visited the laboratory on two separate occasions to complete an experimental trial consisting of either 1L of cold water (~4°C) or 1L cold sports drink (~4°C). PFTs were performed before and at 5, 10, and 15 min after beverage ingestion. **RESULTS:** The cold water significantly reduced forced vital capacity (FVC) from pre- to post-ingestion by 3.7% (4.96 ± 1.17 L to 4.78 ± 1.12 L) ($p = 0.002$). Similarly, the cold sports drink significantly reduced FVC from pre- to post-ingestion by 3.7% (5.09 ± 1.17 L to 4.93 ± 1.24 L) ($p = 0.02$). Maximum drop in FVC was not significantly different between water and sports drink ($p=0.99$). Forced expiratory volume in 1 second (FEV_1) significantly decreased by 3.5% from pre- to post- water ingestion (4.35 ± 1.05 L/min to 4.22 ± 0.96 L/min) ($p = 0.04$). Sports drink also significantly decreased FEV_1 by 5.0% from pre- to post ingestion (4.34 ± 1.09 L/min to 4.16 ± 1.08 L/min) ($p = 0.015$). There was no significant difference in maximum drop FEV_1 from pre- to post-ingestion between water and sports drink ($p=0.29$). **CONCLUSIONS:** The ingestion of cold water and cold sports drink decreased pulmonary function in healthy individuals, but changes in PFTs were not different between the two beverages. This suggests that cold fluid intake can influence PFT measurement and could be an important consideration for individuals planning fluid intake strategies pre-, during, and post-exercise.

Keywords: respiratory, pulmonary