2022 Program of Events
49th Annual Meeting Midwest Chapter of the American College of Sports Medicine

October 20-22 2022
Hyatt Regency
Indianapolis IN
#MWACSM2022

Midwest American College of Sports Medicine

Contents

Past-President's Welcome Letter

Dear friends, colleagues, students:

Welcome to Indianapolis IN for the 49th Annual Meeting of the Midwest Chapter of the American College of Sports Medicine and our 50th Anniversary as a Chapter!!! After a rough few years with COVID, and a great online meeting using Gatherly in 2021, I hope that you will find the change in scenery at the Hyatt Regency to be an equally stimulating environment to gather with colleagues and share your latest research and scholarship.

Headlining our event this year are two keynote speakers from our own Midwest Chapter. Dr. Andrew Jagin from Mayo Clinic will present our Friday keynote titled: *Nutrition Knowledge Of Athletes: What They Don't Know May Be Hurting Them* and Dr. Tracy Baynard from University of Boston (she was at University of Illinois-Chicago until recently) as our Saturday keynote entitled: *A Peek into the Physiology of Persons with Down Syndrome—Why is Aerobic Capacity So Low?* In addition to our keynote speakers, we have a full slate of presentations that include 23 faculty & professional led symposiums, 24 oral slide presentations, 140 poster presentations, a student colloquium and our annual Jeopardy Quiz Bowl on Friday evening.

Congratulations to all of our presenters on the acceptance of abstracts, and specifically to our first-time student presenters and our first-time attendees. Welcome! We are glad you are joining us this week. The Midwest ACSM Annual Meeting has always been a tremendous career launching opportunity.

To kick off our meeting this year I encourage each of you to attend our Legacy Social Opening Event that will be held in the Atrium at the conference hotel. Please join us after your travels and enjoy a beverage of your choice, some friendly conversation, and the opportunity to make some new friends. Again, welcome!

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

Welcome to the Hyatt Regency, and Indianapolis, and enjoy the conference! #MWACSM2022!!!

Cheers,

J. Derek Kingsley Ph.D. FACSM

2022 Past-President and Program Committee Chair, Midwest ACSM

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Chapter and Conference Information

The FIRST ACSM regional chapter! It's our 50th Anniversary!!! #MWACSM2022!!

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, October 22nd from 10:00-10:30am in the Cosmopolitan 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/.

MWACSM COVID-19 Policy

MWACSM requires all meeting attendees — including participants, speakers, exhibitors, and guests ("Attendees") — to either **(1) submit evidence they are fully vaccinated as defined by the CDC at the time of the meeting at registration desk at MWACSM, or (2) submit proof of a negative COVID-19 test taken within 72 hours prior to the meeting presented to the registration desk at MWACSM.** Specific requirements, including but not limited to the type of documentation, type of test and the time period in which the test must be administered, may change closer to the meeting based on CDC guidelines at that time, as well as any applicable requirements of the local government and/or health authorities. Attendees will be able to upload their COVID-19 vaccination record card prior to the MWACSM meeting as part of the registration process ***which we highly recommend you get this done prior to attending.*** The online verification process is simple, secure and HIPAA compliant.

COVID-19 Vaccination Protocol

- Proof of full COVID-19 vaccination will be required for entry into the event.
- Attendees who are fully vaccinated for COVID-19 are exempt from providing a negative COVID-19 test.

**The CDC states: Everyone 5 years and older is recommended to receive a primary series of a COVID-19 vaccine to be considered fully vaccinated. For children 5 years through 17 years of age, a primary series consists of 2 doses of the Pfizer-BioNTech COVID-19 vaccine. For persons 18 and older, a primary series consists of:*

- *A 2-dose series of an mRNA COVID-19 vaccine (Pfizer-BioNTech or Moderna), or*
- *A single-dose COVID-19 vaccine (Johnson & Johnson's Janssen vaccine)*

COVID-19 Negative Test Protocol

- Guests who are not fully vaccinated will need to provide proof of a negative COVID-19 test to attend any in-person official event.
- The test must be administered within 72 hours prior to the meeting.
- MWACSM will not provide on-site testing.

Process to be approved:

Clear HealthPass (https://clear.app.link/healthpass)

- **Attendees are instructed to download Clear HealthPass and upload their vaccination status or proof of a negative test.**
- **Once Clear verification is done a green QR code will show on the attendee's phone.**
- **Staff manually verifies the Clear QR code as Green (green means requirements have been fulfilled) and any other documentation the attendee may have, including copies of international vaccine and/or negative test results.**
- **Staff marks the attendee as verified by Clear or verified by other means with a note in an excel sheet with a simple (x) in relating column. If non-Clear documentation is viewed and manually verified notes are made as to the documentation but no actual health information.**

FAQ:

What should you do if you feel unwell before or during the event?
Attendees who feel ill prior to traveling should get tested in accordance with CDC guidelines. If you feel ill while at the event, please do not attend any sessions, get tested and remain in your room as much as possible.
Per the CDC, if you experience COVID-19 symptoms, you should get tested, stay home, and stay away from others, even if you are fully vaccinated.
The CDC's definitions of vaccination may change as the event date approaches. MWACSM will follow current CDC guidelines. Please visit the CDC website for the most current guidelines.

Questions?
Contact Heather Turner with any questions or support requests – hturner@acsm.org or 317-637-9200 x138.

Continuing Education (CEC)

ACSM CEC Certificate

Participant Name

Midwest Regional Chapter of the American College of Sports Medicine

Provider Organization

2022 Midwest ACSM Annual Meeting, Indianapolis IN

Course Title

#650390	**12.0**
Approved Provider Number	CECs

J. Derek Kingsley

Lead Program Administrator Signature

Sponsors

MWACSM would like to thank our 2022 Sponsors for their support our regional chapter and our annual meeting. We encourage all meeting attendees to take a few moments to visit with representatives from the following companies:

Senior Level

Center for Rural
Cancer Survivorship

XSENSOR

Intelligent Dynamic Sensing

BERTEC


HOLOGIC
The Science of Sure


iWu
INDIANA WESLEYAN UNIVERSITY


COSMED
The Metabolic Company
Creative Design in
Cardiopulmonary Diagnostics since 1980


UNIVERSITY OF INDIANAPOLIS
MASTER OF SCIENCE
IN EXERCISE SCIENCE


LOGAN
UNIVERSITY
LEADERS Made

Exhibitors

Midwest ACSM wants to thank our 2022 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 $20 student membership** can help you prepare for your future!

Hologic, Inc. is a medical technology company primarily focused on women's health. Hologic is a global champion of women's health.

Master's of Science in Exercise and Nutrition Science. Gain expertise on how the body moves, functions and is fueled. Explore how to improve quality of life and performance for a variety of populations. Learn from our passionate and experienced faculty, surrounded by our state-of-the-art equipment and facilities.

Center for Rural Cancer Survivorship

We are an academic graduate department within the School of Health Sciences and Education at a private comprehensive university. The CRCS provides education for the next generation of Cancer Care providers, advocacy for rural cancer survivors, and exercise oncology services to the local community.

XSENSOR

Intelligent Dynamic Sensing

For 25 years, XSENSOR Technology has set the standard for accurate sensors and image quality in software — to capture, visualize, and analyze pressure data. Today, XSENSOR innovates and partners with the most demanding customers in the world to explore what is possible with Intelligent Dynamic Sensing, which enables maximum precision measurements, highest quality visualizations, and AI-powered data analysis, resulting in optimized levels of product performance, comfort, and safety. XSENSOR's Intelligent Insole system is a plantar pressure and gait measurement solution for athletic coaches and clinicians to capture lab-quality data in the field. The Intelligent Insoles allow users to evaluate gait, plantar pressure, and foot function with thin, flexible insole sensors that are reliable and durable enough to accurately capture data wherever activity takes place — and without compromising natural motion. XSENSOR's Pro Foot & Gait software provides high-resolution images for fast, confident decision making and has all the necessary features and tools for clinicians interested in more detailed analysis of patient's progress. With the easy-to-use file manager, users can display and compare multiple recordings side-by-side, complete with summary statistics and measurements, and generate reports. Customers universally rely on XSENSOR for accurate, reliable sensors, superior software tools, and outstanding product support.

BERTEC

Based out of Columbus, Ohio, Bertec is an internationally recognized designer, manufacturer, and marketer of research-grade and clinical biomechanical equipment and software.

Indiana Wesleyan University's residential Master of Science in Athletic Training program is committed to developing students as critical thinkers and competent practitioners. Develop your skills in excellent facilities, study with renowned faculty, and gain hands-on experience. Students who complete IWU's residential MSAT program will be well-prepared for certification to practice in the field.

The University of Indianapolis Master of Science in Exercise Science (MEXS) allows students to explore a wide spectrum of exercise science concepts to better understand and prescribe evidence-based exercise programming. The extensive exposure to high-tech equipment in our human performance lab and the accelerated nature of the program allows students to immediately excel in the workforce or professional programs after the completion of the degree. Concentration options include: Human Performance or Clinical Exercise Physiology

Become a confident leader in the dynamic, rewarding field of natural health care. At Logan University, you'll develop the knowledge and skills to make an immediate impact on your community's health. Logan currently offers degrees at the bachelor's, master's, and doctoral levels.

Exercise Science (B.S) and Exercise Physiology (M.S. and P.h.D.) are designed to promote the development of a healthy physically active lifestyle and prepare its graduates for teaching exercise science and fitness professions. Students will acquire knowledge of human movement, requisite skills and competencies in their area of specialization at the Bachelor's, Master's and Doctoral levels.

COSMED
The Metabolic Company
Creative Design in Cardiopulmonary Diagnostics since 1980

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.

DELSYS

Graduate Fair

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

- ## Ball State University

The Clinical Exercise Physiology Program (CEPP) prepares graduate students for careers as advanced exercise professionals in clinical, research, and wellness settings. Additionally, the CEPP serves as a great foundation for pursuing additional educational training as a PhD, MD, or Physician Assistant.
Hallmarks of the CEPP are comprehensive and rigorous coursework, unique practical experiences with apparently healthy and patient populations, and engagement in cutting-edge research.
The CEPP is a 21-month program beginning in August and extending for 5 academic semesters (Fall - Spring - Summer - Fall - Spring) culminating with a May graduation. Graduate assistantships are available for well-qualified students.
Students in the CEP program will learn to:

Develop individualized exercise prescriptions for adults with a variety of health risks and chronic diseases

Perform comprehensive cardiovascular disease risk assessments

Perform and interpret maximal cardiopulmonary exercise testing

Thoroughly understand the acute physiological responses and chronic adaptations to exercise

Use professional scientific statements and clinical guidelines issued by the American College of Sports Medicine, the American Association of Cardiovascular and Pulmonary Rehabilitation, the American Heart Association, and the US Department of Health and Human Services

Develop research questions, prepare a research proposal, collect and analyze research data, and write a research report
Website: www.bsu.edu/cepp

Matthew Harber, mharber@bsu.edu

- ## Bowling Green State University

Attendees will have the opportunity to learn about the following graduate programs at Bowling Green State University: Athletic Training, Kinesiology, and Sport Administration.

Website: https://www.bgsu.edu/education-and-human -development/human-movement-sport-leisure-studies.html

Jessica Kiss, ekiss@bgsu.edu

- # Calvin College

Calvin's Masters in Exercise Science program is taught by industry experts with years of shared experience in exercise science. They are passionate about the field and are committed to helping every student succeed academically and professionally. Complete you fully-online degree part or full-time in as few as 11 months! Starting new cohorts every 8 weeks! Apply today!

Website: https://online.calvin.edu/programs/ms-masters-in-exercise-science/

Secondary website: https://online.calvin.edu/programs/ms-masters-in-exercise-science/courses/

Kerrie Berends, kerrie.berends@calvin.edu

- # Carroll University

Are you on the search for new horizons? You'll learn, explore and excel at Carroll University. The Carroll Pioneer experience includes small class sizes, personal attention, convenient course offerings and an innovative curriculum that make it easy for you to attain your graduate education goals. We offer health science graduate programs in professions including Athletic Training, Exercise Physiology, Occupational Therapy, Physical Therapy and Physician Assistant. All of our programs pride themselves on their inter-professional and medical humanities emphases all while getting you ample hands-on experiences with real patients in and around our community throughout the curriculum.
Website: https://www.carrollu.edu/admissions/graduate

Dave Buehler, Contact Email: dbuehler@carrollu.edu

- # Cincinnati Children's Hospital Medical Center

Clinical Exercise Testing and Therapeutics Symposium — Heart Conference (cincyhearteducationseries.org)
Clinical Exercise Physiology Internship | Cincinnati Children's Hospital Medical Center (cincinnatichildrens.org)

Sandy Knecht, Sandra.Knecht@cchmc.org
Cincinnati Children's Hospital
The Heart Institute -Cardiopulmonary Exercise Lab

- # Eastern Michigan University

Eastern Michigan University's Master of Science in Exercise Physiology is committed to producing students who (a) have an in-depth understanding of how the human body responds and adapts to exercise, and (b) can use this information to help people meet their health, fitness, and performance goals. Students develop their knowledge of up-to-date research findings and statistical skills, which enables them to optimize exercise program design for patients, clients, and athletes. Our program is designed for students with career interests in clinical exercise physiology, strength and conditioning, athletic and health coaching, cardiac rehabilitation, personal training, or other position that helps people pursue a healthier life.

Website: https://www.emich.edu/chhs/hphp/programs/exercise-science/index.php

Catherine Gammon, cgammon1@emich.edu

- # Eastern Illinois University

  Students in our Exercise Physiology major have flexibility in their coursework to prepare for careers in scientifically based exercise programs with an emphasis on cardiac rehabilitation and adult fitness or personal training or strength and conditioning. The program focuses on scholarship through critical evaluation of related research and knowledge of professional standards. The Exercise Physiology program provides meaningful hands-on experience as students have the opportunity to work with staff and participants in two ongoing year-round community adult exercise initiatives: the EIU Adult Fitness Program and the Sarah Bush Health Center Cardiopulmonary Rehabilitation Program, as well as through Graduate internship opportunities.

  Website: https://www.eiu.edu/ksrgrad/

  Anthony Kerins, ajkerins@eiu.edu

- # Kent State University

  The M.S.and the Ph.D. in Exercise Physiology prepares students for a wide variety of career options within the field of exercise physiology including exercise prescription and research, as well as doctoral study. The M.S. in Exercise Physiology is a National Strength and Conditioning Association (NSCA) Education Recognition Program. The mission of the Exercise Physiology doctoral program is to develop the competencies that are needed for someone who intends to teach exercise physiology, pursue research, or apply exercise physiology in practice.
  Website: https://www.kent.edu/ehhs/exph

  J. Derek Kingsley, jkingsle@kent.edu

- # Marquette University

  Data analytics is transforming the world of sports and exercise. The Master of Science in Sports and Exercise Analytics at Marquette University intersects physiology and biomechanics with data science to address specific questions regarding elite athletic, sport, exercise and human performance. Graduates will have the analytic skills to develop new applications and interfaces for large and complex sport and human performance data sets combined with the foundational knowledge in exercise and sport physiology by which to aid in the accurate interpretation and translation of results to consumers, end users and clients.

  Tim Carter, tim.carter@marquette.edu

- # Miami University

  The graduate program in Kinesiology, Nutrition, and Health is designed to prepare students for a wide variety of health-related professional programs and career options, including medicine, nutrition, health promotion, physical/occupational therapy, nursing, chiropractic, clinical exercise physiology, biomedical research, and doctoral programs in Kinesiology and related fields. Multidisciplinary, evidence-based coursework emphasizes exercise physiology, biomechanics, motor control, health promotion, and nutrition for health and performance. Additionally, graduates from this program build the skills, maturity, and competency necessary for the professional world. Students are active in human subjects research and internship experiences. These activities require a significant level of maturity and professionalism. Current laboratory equipment allows students and faculty to assess body composition, physical activity level, cardiorespiratory fitness, dietary intake, biological indices of muscle and cardiometabolic health, motion analysis, ground reaction force, motor control, and muscular strength and endurance.

  Website: https://www.miamioh.edu/ehs/academics/departments/knh/academics/graduate-studies/index.html

  Kyle Timmerman, timmerkl@miamioh.edu

- # Michigan State University

Developing Scholars
The primary objective of the doctoral degree program in Kinesiology at Michigan State University is to develop scholars who are competent in teaching, conducting research, and serving in leadership roles in various educational, governmental, public, or private agencies. In addition to developing expertise in a chosen area of concentration, students must be able to interpret and integrate information from related academic disciplines. As part of the degree, student will create an individualized program of study, which takes into consideration students' academic needs and professional goals.
Our Focus
The kinesiology doctoral degree program involves a disciplinary and interdisciplinary research focus on physical activity and sport across the lifespan with a special emphasis on youth. With a variety of concentrations available within the degree, faculty and doctoral students are currently studying several different aspects of pediatric kinesiology. Such topics include motor development in infants and young children, interventions to increase physical activity, cognitive functioning during preadolescence and the development of life skills through youth sport participation.
Big Ten Quality
As part of the Big Ten Conference, Michigan State University offers a quality education. The Big Ten leads all other conferences with the most Academic All-Americans and many Big Ten institutions are ranked within the top 86 universities in the nation. As a part of the College of Education, Kinesiology is situated in the same college as several top-10 ranked programs in the nation, including four programs ranked #1.

Website: https://education.msu.edu/KIN & https://education.msu.edu/kin/graduate/phd/

Rajiv Ranganathan, KINGRAD@MSU.edu

- # Michigan Tech University

The Department of Kinesiology and Integrative Physiology at Michigan Tech University offers MS (Kinesiology) and PhD (Integrative Physiology) graduate degree programs. Improving human health is a top priority on campus as we gear up to move into a new state of the art Medical Engineering and Health Technologies Building (H-STEM Complex) in 2024. Accordingly, our department strategic goal is double our graduate program over the next two years. The Master of Science degree in Kinesiology at Michigan Tech provides an excellent education paired with advanced research opportunities in health and human movement, which add up to a competitive edge for graduates. Do your interests lie in cardiac rehabilitation, strength and conditioning, fitness training and management, sports administration, or research/teaching in health and kinesiology? If you would like to pursue a career in any of these fields, allow us to prepare you for a high-impact profession. Because kinesiology is a highly interdisciplinary field, our master's students cross departmental borders and collaborate with faculty and students in areas such as biological sciences, human factors, and biomedical engineering. For the PhD in Integrative Physiology at Michigan Tech, we take a system-level approach to understand the role of physiology in human health. Academic training is provided across the entire spectrum - from fundamental basics at the molecular and cellular level to animal- and human-based research to translational work that results in tangible health outcomes. We have many focus areas and laboratories to work with top faculty to do your research (e.g., cardiovascular physiology, integrative physiology, exercise physiology, biomechanics, and aging and cognition). For a more in-depth look at the areas we offer, our research focus page and faculty profile page will show you more.

Website: https://www.mtu.edu/kip/graduate/

Steven Elmer, sjelmer@mtu.edu

- # Northern Illinois University

The M.S. in Kinesiology and Physical Education at Northern Illinois University, with thesis and non-thesis options, prepares students to work as a competent and reflective professional in the exercise science and physical education teacher education communities. Students will choose from three specialities: Exercise Physiology; Physical Educational Pedagogy; and Sport and Exercise Psychology. We offer outstanding

instruction with state-of-the-art equipment to optimize student success and professional growth. Students will also have multiple opportunities to engage with graduate faculty on research projects, grant-writing and community outreach.

Pete J. Chomentowski, Pchomentowski@niu.edu

- # Northern Michigan University

The graduate program in Exercise Science at Northern Michigan University is a two-year program of study for students with undergraduate backgrounds in athletic training, biological sciences, dietetics, health, nursing, physical education, physiology, and physical therapy. The primary objective of the program is to provide students with a working knowledge of the physiological and biomechanical aspects of human movement and exertion. A core of 17 required credits provides a strong foundation in the science of exercise. Students also complete a minimum of 15 elective credits that provide specialized study in a variety of applied areas. NMU Exercise Science graduates have secured careers in corporate/adult fitness, cardiac rehabilitation, clinical graded exercise testing services, clinical exercise physiology, collegiate strength and conditioning coaching, specific sport coaching, physiology equipment sales, and personal training. Graduates have also pursued studies at the doctoral level in exercise physiology, biomechanics, physical therapy and medicine.

Matthew A. Kilgas, Contact Email: mkilgas@nmu.edu

- # Ohio University

The exercise physiology graduate program provides students with the specialized skills needed to work in either a clinical, research, or field-based environment. We offer a one year (4 semesters) MS in Clinical Exercise Physiology, a one year (4 semesters) MS in Human Performance, or a two year MS by Research.

Website: https://www.ohio.edu/chsp/ahsw/exercise-physiology/graduate-0

Sharon Perry, perrys1@ohio.edu

- # Purdue University

Graduate students can choose to pursue a Master of Science (MS), Master of Science in Athletic Training (MSAT), and/or a Doctor of Philosophy (PhD). MS students work with faculty mentors within four research training areas: Biomechanics, Motor Control and Motor Development; Exercise Physiology; Exercise Psychology; and Recreation and Sport Management. PhD students work with faculty mentors within three research training areas: Biomechanics, Motor Control and Motor Development; Exercise Physiology; and Exercise Psychology.
Website: https://hhs.purdue.edu/hk/

Christy Daugherty, hkgrad@purdue.edu

- # Southern Illinois University – Carbondale

The Master of Science in Human Sciences in the College of Health and Human Sciences offers a broad, interdisciplinary program, preparing students for careers in exercise, nutrition, recreation, and sport professions. The program leads to a Master of Science in Human Sciences degree with three concentrations in Exercise Science, Nutrition and Dietetics*, and Sport and Recreation Studies. In addition, the fourth concentration is an Interdisciplinary concentration that allows students to create a program of study specific to their career goals. Students must complete a minimum of 30 credit hours including a research core, a professional development course, and concentration-specific courses. The research core requires 3 credit hours of research methods, 3 credit hours of statistics or analytics, and 3-6 credit hours of a culminating project. For the culminating projects students will choose from one of four options: thesis, research paper, professional development project, or internship. If the thesis or research project option is selected, submission of the completed paper must comply with the rules of the Graduate School. Additional requirements for the degree are specific to the respective concentrations of Exercise Science, Nutrition and

Dietetics, Sport and Recreation Studies, and Interdisciplinary. All students must maintain a minimum 3.0 (4.0 point scale) grade point average and earn a C or better in all graduate-level classes to be eligible to graduate. All students must submit a Program of Study with a Graduate Faculty member in the first semester of graduate school. All Program of Study forms will be approved by the Graduate Program Committee prior to the beginning of the second semester of graduate school.

Website: https://academics.siu.edu/human-behavioral/kinesiology/

Julie Partridge, jpartrid@siu.edu

- Southern Illinois University – Edwardsville

- St. Ambrose University

The MSEP program at St. Ambrose allows you to earn your degree in as few as 12 months, grow your knowledge and experience through research, be guided by faculty with diverse expertise, and apply your new skills in state-of-the-art labs.

Website: http://www.sau.edu/master-of-science-in-exercise-physiology

Promotional Video: https://www.youtube.com/watch?v=w6S5awxLrOY

Nick Voth,vothnicholasr@sau.edu

- University of Cincinnati

The Department of Rehabilitation, Exercise, and Nutrition Sciences offers an exciting learning environment for its students. We have state of the art assessment labs that provide hands-on training in program specialized assessment techniques. We are also located on the same campus as Children's Hospital & Research Facility and the University Hospital which have a strong reputation for providing cutting-edge research and patient care. In addition to our facilities, students have opportunities to participate in ongoing research studies ranging from the DASH diet, food insecurity, optimum therapy strategies for neurological diagnoses, the effects of diet on inflammation, mother-infant feeding practices, occupational ergonomics and biomechanics, and neuroplasticity, to name a few.

Website: https://cahs.uc.edu/about/departments-schools/rehabilitation-exercise-and-nutrition-sciences.html

Linda Threm, Contact Email rensdepartment@uc.edu

- University of Wisconsin – Madison

The Department of Kinesiology's mission is to create, interpret, transmit, and apply knowledge related to movement, exercise, and human occupation with the ultimate goal of enhancing human health, productivity, and quality of life. The Department of Kinesiology at the University of Wisconsin–Madison has a rich history as a pioneer in graduate training and research in exercise, movement, and physical activity. Here we offer students the opportunity to study movement, activity, and occupation at a variety of levels. We offer both MS and PhD degrees with named options that reflect the breadth of the field of kinesiology: Biomechanics, Exercise Physiology, Exercise Psychology, Motor Control and Behavior, Occupational Science, and Physical Activity Epidemiology. We also offer an Applied Exercise Science named option for the MS in Kinesiology, a degree that involves advanced coursework within the field but does not require a thesis.

Website: https://kinesiology.education.wisc.edu/academics/graduate-programs/kinesiology/

Stephanie Trigsted, stephanie.trigsted@wisc.edu

- University of Wisconsin – River Falls

The **Master of Science in Health and Wellness Management** is designed to teach contemporary health and wellness management techniques that have the *power to transform the workplace and beyond.* Courses are taught by expert faculty from the University of Wisconsin and provide the skills you need to manage well-being programs that are good for people and good for business.

Website: https://www.uwrf.edu/Academics/GraduatePrograms/HWM.cfm

Jodee Schaben, Jodee.Schaben@uwrf.edu

Student Grant Winners

MWACSM would like to congratulate the grant award recipients for 2022. Please offer them your congratulations!!

First-time Student Attendee Grant Winners

Claire Tabit, Jaclyn Dziewior, Dakota Tiede, Melissa Spencer, Ian Holder, Ti Hsu, Alexandra Bagg, Joseph Blair, Megan Carulla, Brittney Aldape, Leonardo Barzi, Faith Atkinson, Gretchen Elsey, Isaac Lennox, Grace Louis, Yousuf Abu-Amara, Nazia Saiyed, Zack Weaver, Annemarie Jones, Faith Kurtz

MWACSM Legacy Social Student Award Winners

Balea Schumacher, Vitor Siqueira, Ian Holder, Benjamin Minier, Brittney Aldape, Braydon Lazzara, Grace Louis

Meeting At-A-Glance

Thursday, Oct 20th, 2022

2-4pm **MWACSM Board of Directors (Vision)**

6-7:30pm **First Time Attendee Reception (Studio Lounge)**

7:30-10pm **Legacy Social Opening Reception (Studio Lounge)**

Friday, Oct 21

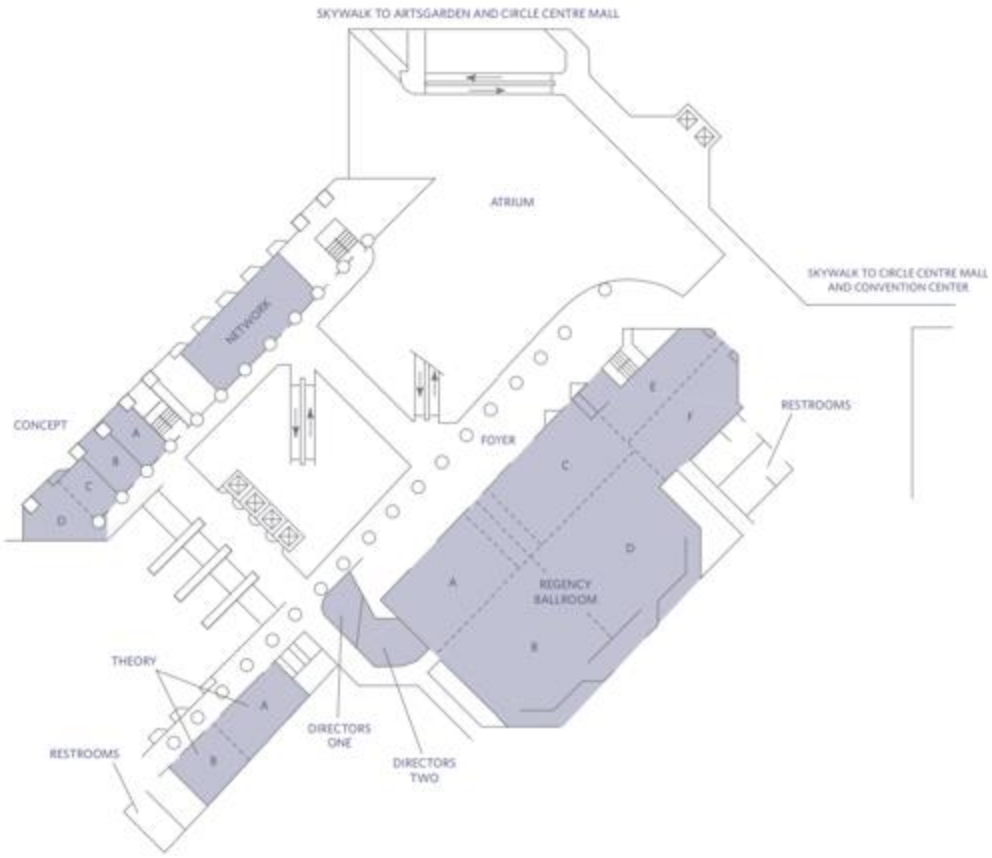
Time	Cosmopolitan Ballroom	Atrium/Foyer	Discovery	Studio 1		Regency Ballroom E & F (2nd Floor)	Vision	Network (2nd Floor)
8:00am	7:00-9:00am Breakfast	7:00am-5:00pm Registration 8am-5:00pm Exhibitors Grad Fair 10:00-noon, 2:00-4:00pm	Elmer, Hawke, Wedig & Lennox #1	Free Comm/Slides #1		Poster Session #1 8:00-9:15am Poster Session #2 9:20-10:35am Poster Session #3 10:40-11:55am Poster Session #4 2:15-3:30pm Poster Session #5 3:35-4:50pm	Oppliger & Hopkins #2	Barkley #3
9:00am			Kingsley #4	Free Comm/Slides #2			Carl & Buckley #5	Ridgel #6
10:00am			Odaffer #7	Free Comm/Slides #3			Nickolson #8	Morelli, Ledman, Donzilla, & Hidde #9
11:00am			ACSM Symposia B/O after lunch Studios 1-3	Free Comm/Slides #4			Chandran, Bolt, & Robison #10	Owoeye #11
12:00pm			Keynote and Luncheon – Cosmopolitan Ballroom Andrew Jagim, Ph.D.					
1:00pm								
2:00pm			Moriarty & Bourbeau #12	Free Comm/Slides #5			Post #13	Young, Edwards, & Onate #14
3:00pm	CEPA Panel 3pm-3:50pm		Laurent #15	Free Comm/Slides #6			Whitaker & Jones #16	Erb, Humm, Kearney, & Kingsley #17
4:00pm			Baumann #18	Hubal #19			Lefferts #20	Mayol #21
5:00pm			Dinner on your own					
6:00pm								
7:00pm			Student Quiz Bowl – Cosmopolitan Ballroom 7:00-8:30pm					
8:00pm								

Saturday, Oct 22

Time	Atrium/Foyer	Discovery		Vision	Regency Ballroom E & F (2nd Floor)	
8:00am					Poster Session #6 8:00-9:15am	
9:00am		Smith-Hale, Rider, &		Knecht #23		

		Hew-Butler #22				
10:00am		Business Meeting 10:00-10:30am – Cosmopolitan Ballroom Keynote and Brunch – Tracy Baynard, Ph.D., FACSM, FTOS, FAHA				

FLOOR PLAN
Second Level



FLOOR PLAN
Third Level

HYATT REGENCY INDIANAPOLIS
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Indianapolis, IN 46204 USA
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Keynote Speakers

Nutrition Knowledge of Athletes: What They Don't Know May Be Hurting Them

Friday, October 21st – 1:00-2:00pm
Cosmopolitan Ballroom

MAYO CLINIC
HEALTH SYSTEM
SPORTS MEDICINE

Andrew R. Jagim, Ph.D., CSCS*D, CISSN

Sports Medicine

Mayo Clinic

LaCrosse, WI

Dr. Andrew Jagim is currently the Director of Sport Medicine Research for the Mayo Clinic Health System in La Crosse, Wisconsin and an Associate Professor of Family Medicine. Dr. Jagim completed his PhD in Kinesiology with an emphasis in Exercise Physiology at Texas A&M University. Andrew is also a certified strength & conditioning specialist with distinction through the National Strength & Conditioning Association and a certified sports nutritionist through the International Society of Sports Nutrition.

His primary research area focuses on the nutritional requirements, knowledge, and dietary intake of athletes and how these factors influence performance and health. Dr. Jagim also studies the safety and efficacy of dietary supplements and how they influence performance and health. He also has a focused interest on the physiological demands of various sports and how they pertain to injury, recovery status and performance. This work has led to several publications in peer reviewed journals, and presentations at national conference events. In addition to his time spent in academia, Andrew has worked as a personal trainer and sports nutrition consultant for a variety of clients and athletes.

Keynote Speakers

A Peek into the Physiology of Persons with Down Syndrome—Why is Aerobic Capacity So Low?

Saturday, October 22nd – 11:00am-12:00pm
Cosmopolitan Ballroom

Tracy Baynard, Ph.D, FACSM, FTOS, FAHA

Affiliation:
University of Massachusetts Boston
Manning College of Nursing & Health Sciences
Professor, Department of Exercise & Health Sciences

Dr. Tracy Baynard earned her BA from Western Maryland College (now McDaniel College) in PE with minors in athletic training and exercise science, then after working in the "real" world for 6 years in Minnesota, went back to earn her MS from The George Washington University in exercise science with a specialization in clinical exercise physiology. From there, she ventured to upstate New York to earn her PhD from Syracuse University in Science Education/Exercise Physiology, with an emphasis on cardiovascular physiology. She was a post-doctoral associate at the University of Illinois at Urbana-Champaign studying the effects of exercise on adipose tissue biology/inflammation before transitioning to an Assistant Professor faculty position in the Department of Kinesiology & Community Health. In 2011, she moved to the University of Illinois at Chicago to become an Assistant Professor in the Department of Kinesiology & Nutrition, where she was promoted to Associate Professor in 2017. During her time at UIC, she became the Director of the Integrative Physiology Laboratory. As of September 1st, 2022, she is back on the East Coast at the University of Massachusetts Boston, as Professor in the Department of Exercise & Health Sciences. She has over 90 publications in the area of exercise physiology and has been an Associate Editor for MSSE for over 5 years, coupled with currently serving as the Exercise Physiology Councilor/Secretary/Treasurer for the steering committee of the APS Environmental and Exercise Section.

Schedule- Thursday Evening
Thursday, Oct 20th, 2022

2-4pm MWACSM Board of Directors (Vision)

6-7:30pm First Time Attendee Reception (Studio Lounge)

7:30-10pm Legacy Social Opening Reception (Studio Lounge)

Schedule – Friday Morning: Symposia

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

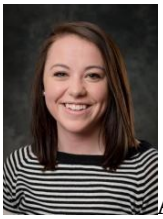
Role Of Physical Activity During The Covid-19 Pandemic: Lessons Learned And Future Considerations

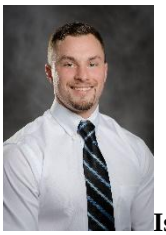
Session Moderator: John McDaniel, Kent State University

Presenters and Institutional Affiliations:

Steven Elmer, Ph.D., Michigan Technological University, Houghton MI

Dr. Steven Elmer, PhD, is an Associate Professor in the Department of Kinesiology and Integrative Physiology at Michigan Technological University. His research goals are to find better ways to restore musculoskeletal function, maintain health, and improve performance in healthy, athletic, and clinical populations. Applications for his research range from basic aspects of muscle contraction to applied human performance in a variety of settings including rehabilitation, ergonomics, and sport.

 **Ashley Hawke, Michigan Technological University, Houghton MI**
Ashley Hawke, MS, is a PhD student at Michigan Technological University, studying kinesiology, with a focus on biomechanics and physiology. Her research goals are to reduce the presence of musculoskeletal disorders (MSDs) in occupational settings – specifically in healthcare and roofing settings – and incorporating various interventions, such as exoskeletons, as a means to reduce MSDs.

 **Isaac Wedig, Michigan Technological University, Houghton MI**
Isaac Wedig, MS, is a certified strength and conditioning specialist (CSCS) and PhD student studying kinesiology and integrative physiology at Michigan Technological University. He has over five years of personal training experience, and his research interests are muscular adaptations to exercise training. He also serves as the graduate student representative for the Exercise is Medicine® On Campus Committee.

 **Isaac Lennox, Michigan Technological University, Houghton MI**
Isaac Lennox, BS, is a master's student studying kinesiology at Michigan Technological University and is striving to become a primary care physician. His research interests are in using exercise as a form of medicine and its implications for rural health.

Abstract:
Over the past 70 years, accumulating evidence has highlighted the important role of physical activity in the prevention and treatment of chronic disease. The beneficial effects of physical activity, however, remain underestimated by the medical community, policy makers, and public at large. Currently, physical inactivity poses a major public health problem as 80% of U.S. adults do not meet the physical activity guidelines. Novel insights from the COVID-19 pandemic have helped to shed further light on the role that physical activity and exercise can play in public health and in the management of infectious disease. Specifically, physical activity can reduce risk for severe COVID-19 outcomes (i.e., hospitalization, admission to the intensive care unit, death) and may assist with recovery in those individuals who were previously infected with the virus and experience persistent symptoms (i.e., post COVID-19 condition). Accordingly, strategies to increase physical activity levels are paramount for keeping individuals and their communities healthy and safe during the COVID-19 pandemic and beyond. In this symposium, we will discuss the: 1) role of physical activity as a protective strategy against COVID-19, 2) effects of COVID-19 on heart and muscle function, cardiorespiratory capacity, and exercise tolerance, and 3) application of exercise to aid in the rehabilitation from COVID-19. Importantly, we offer recommendations that MWACSM members can take to promote, advocate, and facilitate physical activity on campus and in the community to help build a healthier and more resilient nation. Supported by the Michigan Health Endowment Fund and Blue Cross Blue Shield of Michigan Foundation.

Learning Objectives:
1. Explain the role that physical activity has on preventing and treating chronic and infectious diseases

2. Describe the effects of COVID-19 on cardiorespiratory function and exercise tolerance
3. Identify exercise modalities that can aid in the rehabilitation from COVID-19
4. Act by helping to promote, advocate, and facilitate physical activity on campus and in the community

Symposium #2: Vision Room, 8:00-8:50am

Emergence Of Girls Wrestling. Does ACSM Have a Role?

Session Moderator: Bob Oppliger FACSM, Emeritus, Iowa City

Presenters and Institutional Affiliations:

Bob Oppliger, Ph.D. FACSM, Emeritus Iowa City

Dr**.** Bob Oppliger has had an interest in the health and safety of high school wrestlers for four decades. He has published numerous research articles on the topic and co-authored the booklet The Wrestler's Diet which has been published in three languages and distributed around the world. He chaired the writing committee for the 1996 ACSM Position Stand: Weight Loss in Wrestlers and helped develop the weight-management rules now used in high schools and colleges.

B. Eliott Hopkins, Director of Sports, Sanctioning and Student Services National Federation of State High School Associations

Since 1999, Elliot Hopkins has worked for the National Federation of State High School Associations, the governing organization for high school sports. He has administrative responsibilities for girls wrestling. Prior to his current position, he was affiliated with the Pennsylvania State High School Activities Association

Jill Moschelli, MD, MBA, CAQ-SM, Michigan State University, East Lansing, MI

Dr. Jill Moschelli, MD, MBA is a Primary Care Sports Medicine Physician currently working at Michigan State University in East Lansing, MI. She is an Assistant Professor at Michigan State College of Osteopathic Medicine and Michigan State College of Human Medicine. She is the current Program Director for the Sparrow/MSU Sports Medicine fellowship, Clinical Director for MSU Sports Medicine, and Team Physician at Michigan State University. She is a member of the board of directors for MWACSM.

Abstract:
ACSM has had a longtime interest in the health and safety of high school wrestlers. Almost a half century ago in 1976. ACSM issued its first position statement titled “Weight Loss in Wrestlers.” Subsequently, there have been two updates, most recently in 2021. The newest emerging sport in high schools is girls wrestling. Over the past decade, growth has been exponential, and 40 states now sponsor a girls state meet. As it emerges, there is a unique opportunity to influence the development of the sport. The National Federation of State High School Associations, the governing body for high school sports, has responded with rule modifications that benefit female wrestlers and encourage participation. Does ACSM with its interest in health and safety have an opportunity to be part of the sports development? This session will discuss the growth and rule changes for this emerging sport as well as the health and safety issues for participants and ACSM’s role in the process.

Learning Objectives:
Attendees will have a better understanding
1. of the issues facing this emerging sport especially health and safety concerns
2. of the role ACSM can play responding to the concerns

<u>Symposium #3:</u> Network Room (2nd Floor), 8:00-8:50am

Job Searching in Academia

Session Moderator: Mindy Mayol, University of Indianapolis

Presenters and Institutional Affiliations:

Jacob Barkley, Ph.D., Kent State University, Kent OH

Dr. Barkley is a Professor of Exercise Science and Exercise Physiology at Kent State University in Kent, OH where he has worked for the past 16 years. His primary research interests focus upon factors that may influence physical activity and sedentary behavior. In his career he has published over 80 manuscripts in peer-reviewed scientific journals which have been cited more than 5,300 times. Additionally, his research has received extensive national and international media attention (e.g., Chicago Tribune, NPR, TIME). Dr. Barkley has also successfully directed or co-directed 16 doctoral dissertations and served as a doctoral dissertation committee member for a further 30 students. With many of these doctoral candidates Dr. Barkley has helped navigate the often murky waters of academic job hunting. He is hopeful that the present symposium will shed some light on this process to the audience.

BIO:

Abstract:
Many graduate students, especially those pursuing a PhD, aspire to a career in academia. However, there is little formal education about the process of obtaining an academic position. As a result, many students can remain ignorant of the process or be exposed to misinformation circulating among their peers. The purpose of this proposed

symposium is to provide an overview of the academic job search process. This includes discussing the various types of academic positions and institutions, how to find these positions, how to apply and what the interview process is like. Attendees will be encouraged to ask questions throughout the presentation. Lastly, there will be a brief description of the MWACSM Leadership and Mentoring Program as it can provide additional guidance throughout the academic job search process. The proposed symposium will consist of four main topics: 1.) Academic positions available to new graduates A description entry-level academic positions will be provided with an emphasis on the Assistant Professor position and the tenure-track process. 2.) Differences in academic institutions The Carnegie Classification system for organizing universities and colleges will be discussed. Emphasis will be placed on understanding the expectations (e.g., teaching load, scholarly productivity) of the applicant across these categories. 3.) How to perform the job search and apply A discussion and demonstration of how to use websites that advertise academic positions (e.g., chronicle.com) will be provided. 4.) The interview process The various steps of the academic interview process will be discussed as well as what questions the prospective candidate could expect to hear and those they should ask.

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

Symposium #4: Discovery Room, 9-9:50am

Applying For ACSM Fellowship

Session Moderator: Paul Nagelkirk FACSM, Ball State University

Presenters and Institutional Affiliations:

J. Derek Kingsley Ph.D. FACSM, CSCS*D, ACSM-EP, Kent State University, Kent OH

Dr. J. Derek Kingsley, FACSM is an Associate Professor and Program Coordinator in the Exercise Science and Exercise 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

Abstract:
Applying for ACSM Fellowship is an important step for many individuals as they progress in their careers. The application for Fellowship can be hard to navigate for many. Therefore, the goal of this symposium is to provide information to individuals that are interested in applying for Fellowship by discussing the application, and the

review process. Understanding the new application (as of July 2022), and how the Credentials Committee works to review applications, may benefit many individuals that are considering applying.

Learning Objectives:
1. Better understand the meaning of ACSM Fellowship and what purpose it can serve.
2. Understand the revised application for Fellowship.
3. Understand the need for a Fellow mentor.
4. Comprehension of the Fellowship process.

Symposium #5: Vision Room, 9:00-9:50am

FROM HIIT TO FNIRS: A HISTORICAL LOOK AT 10 YEARS OF OUR PROGRESSION IN STROKE REHABILITATION

Session Moderator: Sandra Knecht, Cincinnati Children's Hospital Medical Center

Presenters and Institutional Affiliations:

Dan Carl, Ph.D. FACSM, University of Cincinnati, Cincinnati OH

Dr, Daniel L. Carl, FACSM is an Exercise Physiologist and Professor in the Department of Rehabilitation, Exercise and Nutrition Sciences at the University of Cincinnati. He is a Past-President of the MWACSM including service as Secretary and Member-at-Large on the MWACSM Board of Directors. He is a Fellow of the American College of Sports Medicine (FACSM) and his National ACSM service includes Chair of the Certification-related Content Advisory Committee (CCAC), as a mentor in the Leadership & Diversity Training Program, and as a member of the Professional Education Committee. Dan currently serves as Program Director of Health Sciences and serves as the University of Cincinnati, Chair of Faculty. He conducts research as a member of the UC Neurorecovery lab with a specific interest in High-Intensity exercise and its role in Stroke Rehabilitation (NIH/NICHD R01HD093694 High-Intensity Interval Training to Recover Walking Post-Stoke: HIT Stroke Trial).

Sofia Buckley, University of Cincinnati, Cincinnati OH

Sofia Buckley is a senior studying pre-medicine in the College of Allied Health Science, with a certificate in global health studies in the College of Arts and Sciences at the University of Cincinnati. She is the student director of the UC Neurorecovery lab where she assists in overseeing the ongoing multi-center R01 Hit Stroke Trial which focuses on High-Intensity exercise and its effect on Stroke Rehabilitation. After graduation and a gap year, she intends to enter medical school in fall of 2024 with a focus in women's health or infectious disease.

Abstract:

This symposium will take a historical look at our collective data across 10 years in stroke rehabilitation. We start with our original theory on the potential role of high intensity interval training (HIIT) as an addition to traditional aerobic training. We progress to our seminal publication in MSSE that was the first paper of its kind to identify the physiological responses to HIIT in the stroke population. We expand to address the safety associated with an at-risk population. Next, we share our data associated with the roles that intensity, brain-derived neurotrophic factor, lactate, ventilatory threshold, and different modes of HIIT exercise and how it has driven our research progression. We then move towards the efficacy and potential translation of HITT to rehabilitation in the stroke population. We look specifically at the differences and similarities we have seen in HIIT vs traditional aerobic protocols including some of our most recent data from our 5-year, multi-site study. We conclude with a glimpse into our future direction regarding the use of functional near-infrared spectroscopy (fNIRS) and how we plan to study its role and potential for enhancing the future of stroke rehabilitation.

Learning Objectives:
1. Attendees will come away with awareness, recognition, and support for the potential use of HIIT in the rehabilitation of stroke patients.
2. Attendees will come away with an awareness of functional near-infrared spectroscopy (fNIRS).

<u>Symposium #6:</u> Network Room (2nd Floor), 9:00-9:50am

The Art Of Research Lab Setup And Management

Session Moderator: Emily Van Wasshenova, Oakland University

Presenters and Institutional Affiliations:

Angie Ridgel, Ph.D. FACSM, Kent State University, Kent OH

Dr. Angela Ridgel, FACSM is a Professor in Exercise Science and Exercise Physiology and the Associate Director of the Brain Health Research Institute at Kent State University. She received her Doctoral degree in Biomedical Sciences from Marshall University. Dr. Ridgel completed her post-doctoral training at Case Western Reserve University and Cleveland Clinic. Her early work used animal models to examine the neurobiology of movement and the effects of aging on movement. Over the last 16 years, she has studied how aging and neurological disorders limits movement and cognition in humans. Dr. Ridgel's current research projects examine how exercise promotes neurorehabilitation in individuals with Parkinson's disease. She has served as principal investigator for grants funded by National Institutes of Health, Davis Phinney Foundation, Brain Health Research Institute at Kent State University and Healthy Communities Research Institute at Kent State University. She has ongoing research collaborations with colleagues at University Hospital, Case Western Reserve University, Northwestern University and the Cleveland VA Medical Center.

Abstract:

This symposium is designed for new investigators, senior investigators, postdoctoral fellows and doctoral students. The primary goal will be to provide information and tips for managing a research lab and staff. It will cover how to navigate lab setup and equipment purchases, managing staff and students as well as basics of project management. This symposium is appropriate for anyone who is currently directing a research program of any size or those who plan to do so in the future.

Learning Objectives:
1. Attendees will learn how to prioritize equipment and supply purchases for lab setup
2. Attendees will learn techniques for mentoring and motivating lab staff and students
3. Attendees will learn basic skills for project management

Symposium #7: Discovery Room, 10:00-10:50am

Physical Determinants of Baseball Swing Performance

Session Moderator: Terence Moriarty, Northern Iowa University

Presenters and Institutional Affiliations:

Chad Odaffer, University of Indianapolis, Indianapolis IN

Mr. Chad Odaffer is an Instructor of Exercise Science in the Department of Kinesiology, Health, and Sports Science at the University of Indianapolis. His expertise is in strength, power, and movement assessment as well as performance programming for rotational sports.
Chad has trained rotational athletes from multiple sports and many levels including the PGA Tour, college, and high school. In addition, he has served as a strength and conditioning coach in the WNBA and at the collegiate and high school levels. Chad currently consults with the University of Indianapolis Baseball team on movement assessment and evaluation.
Chad earned his Master's degree in Exercise Physiology from the University of Louisville and is currently pursuing a Ph.D. in Health and Human Performance with a research focus on baseball hitting performance.

Abstract:
Baseball strength and conditioning has progressed dramatically over the past few decades. Historically, coaches, players and staff believed becoming too muscular would harm player performance. Now, a greater focus is placed on fitness and performance programs to enhance sport performance on the field. As our understanding of the physiological factors that relate to baseball performance continues to evolve, there is a greater need for baseball-specific strength and conditioning programs. Traditional programs designed to enhance performance in other sports, such as football and track and field, may not exploit the required physical abilities needed in a rotational sport such as baseball. In order to design the most effective program to enhance performance in baseball players, sport performance professionals should understand the unique needs of the sport. Exit velocity, or batted ball velocity, has previously been established as a core value to success in bat and ball sports. Simply put, the harder a baseball player hits the ball, the more likely they are to have success in hitting. However, it is still unclear what the physical determinants of exit velocity are regarding physical characteristics of the athletes, therefore making performance

training programming unclear. This presentation will present a review of the current literature on the physical characteristics related to hitting performance in baseball. In addition, it will put forth an evidence-based approach to testing and training recommendations for sport performance practitioners.

Learning Objectives:
1. Have a working knowledge of the evidence found in current literature of the physical determinants of exit velocity.
2. Have a working knowledge of what assessments (laboratory and field based) are appropriate for baseball (and other rotational sports).
3. Program testing, evaluation and programming for baseball athletes (and other rotational sports).

Symposium #8: Vision Room, 10:00-10:50am

Factors Affecting Access To Medical Care: How Can We Keep Our High School Athletes Healthy?

Session Moderator: Steve Elmer, Michigan Tech University

Presenters and Institutional Affiliations:

Caitlin Nicholson, M.D., Midwest Orthopaedics at Rush, Chicago IL

Dr. Caitlin Nicholson is a Primary Care Sports Medicine Physician with Midwest Orthopaedics at Rush. She completed her Family Medicine residency at the University of Pennsylvania and her Primary Care Sports Medicine fellowship at Rush University. Dr. Nicholson has special interests in health disparities and endurance athletes. She is on the planning committee for the 2023 AMSSM "Sports Medicine for All" research summit on justice, equity, and inclusion. Dr. Nicholson is the team physician for the Windy City Bulls and stays active through triathlons and masters swimming.

Abstract:
High school athletes are particularly vulnerable to catastrophic injuries and sudden deaths. Medical care for this group includes access to an athletic trainer and team physician as well as proximity to an automated external defibrillator (AED). Athletic trainers diagnose more concussions and help prevent recurrent injuries. Defibrillation within 3 minutes of sudden cardiac arrest greatly improves the odds of surviving cardiac arrest. However, there are socioeconomic and racial disparities in access to medical care. Schools with fewer low income students are more likely to have access to an athletic trainer and schools with fewer non-white students are likely to have more AEDs. This session will consider the factors that affect student-athletes' access to medical care with a focus on high school athletes and their access to athletic trainers, team physicians, and AEDs.

Learning Objectives:
1. Understand that social determinants of health underlie health disparities
2. Identify factors that affect high school athletes' access to athletic trainers, team physicians, and AEDs
3. Consider strategies to improve high school athletes' access to medical care

<u>Symposium # 9:</u> Network Room (2nd Floor), 10:00-10:50am

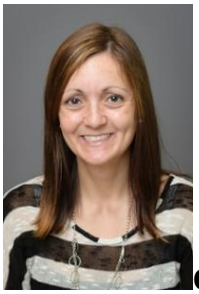
Exercise Is Medicine In Action: From Campus To The Clinic

Session Moderator: Whitney Morelli, Medical College of Wisconsin

Presenters and Institutional Affiliations:

Whitney Morelli, Ph.D., Medical College of Wisconsin, Milwaukee WI

Dr. Whitney Morelli is an assistant professor at the Medical College of Wisconsin in the Department of Physical Medicine and Rehabilitation. Dr. Morelli's overall research goal is to increase physical activity in populations at high risk for being inactive, with an emphasis on preventing or managing chronic disease. She currently serves as the MWACSM chair for the EIM Committee and would like to encourage all members to get involved in Exercise is Medicine.



Cassandra Ledman, M.S, RCEP, CHWC, Purdue University, West Lafayette IN

Mrs. Cassandra Ledman is a Clinical Associate Professor at Purdue University teaches courses primarily within the Clinical Exercise Physiology concentration. She is the chair faculty advisor with Exercise is Medicine on Campus and dedicates a lot of her efforts to bringing a culture of physical activity and health to Purdue's campus. Professor Ledman demonstrates a strong interest in physical activity across the lifespan, the primary and secondary prevention of cardiovascular and metabolic diseases, and the influence of lifestyle medicine and health coaching on patient/client health outcomes.

Cassandra Ledman has >15 years of experience in the clinical setting as an exercise physiologist rehabilitating and educating patients with chronic conditions, specializing in cardiovascular disease.

Professor Ledman is a Registered Clinical Exercise Physiologist (RCEP) and Certified Health and Wellness Coach (CHWC). She is an active member of several professional societies: American College of Sports Medicine (ACSM), Clinical Exercise Physiologist Association (CEPA), American Council of Exercise (ACE), and Wellcoaches.

 **Chris Dondzila, Ph.D., Grand Valley State, Allendale MI**

Dr. Chris Dondzila is an Associate Professor in the Exercise Science program at GVSU (where he completed his undergraduate degree) and earned MS and PhD degrees at the University of Wisconsin-Milwaukee. He primarily teaches courses on exercise testing and prescription for both young/healthy and special populations, which provide ample opportunities to link his pedagogy and research related to fitness trackers, physical activity promotion, and healthy aging. Dr. Dondzila is part of a larger EIM team at GVSU that aims to disseminate the benefits of physical activity and exercise, strategies to incorporate movement into routines, and highlight how the university and community can support all this for a large student population (22,500).

 **Mary Hidde, Ph.D., Medical College of Wisconsin, Milwaukee WI**

Dr. Mary Hidde, is post-doctoral research fellow in the laboratories of Dr.'s Melinda Stolley (Hematology-Oncology) and Andreas Beyer (Cardiovascular Center) at the Medical College of Wisconsin. She received her Bachelor of Science in Exercise Science from Indiana University, her Master of Science in Clinical Exercise Physiology at Ball State University, and her PhD in Human Bioenergetics at Colorado State University. Her research focus is adapting lifestyle behaviors including sedentary time, light physical activity, moderate to vigorous physical activity, and sleep in cancer survivors to prevent or reduce cardiovascular damage from cancer treatment. Her current project at MCW is a randomized controlled trial focusing on endothelial dysfunction in Non-Hispanic White (NHW) and Black/African American (B/AA) breast cancer patients undergoing anthracycline or anti-HER2-based treatments. This study seeks to understand 1) the role of an exercise intervention during treatment to reduce endothelial dysfunction, and 2) explore the disparities between NHW and B/AA breast cancer patients following cancer treatment.

Abstract:

The American College of Sports Medicine manages the global health initiative, Exercise is Medicine (EIM), with the goal to incorporate physical activity promotion into standard clinical care and provide accessible physical activity resources to everyone, everywhere. There are multiple facets of EIM, including EIM on campus working to engage college campuses in physical activity promotions, and EIM for healthcare providers working to integrate physical activity into clinical care with a goal of physical activity assessment and promotion becoming a standard of care. The purpose of this professional talk is to share examples of successful EIM on-campus and clinic-based programs that are currently on going in the Midwest Region. The Midwest Regional Chapter of the American College of Sports Medicine supports EIM on-campus programs through grant funding opportunities. We want to highlight the impressive EIM work being done engaging students in the process to incorporate physical activity on campus by Purdue University (Cassandra Ledman, MS) and Grand Valley State (Chris Dondzila, PhD). In addition, our region boasts significant medical professional advocates for physical activity, providing opportunities for innovative EIM research. We will round out the session with a research talk by Mary Hidde, PhD on an ongoing AHA-funded center project to incorporate physical activity in cancer patients receiving chemotherapy to minimize or prevent the vascular damage associated with these treatments.

Learning Objectives:

1. Attendees will be able to explain how to start an exercise is medicine on-campus program, will be provided with example events and activities that can be completed as part of their on-campus programs.
2. Attendees will be able to describe how healthcare providers and exercise professionals can work together to incorporate physical activity promotion into clinical care.

<u>Symposium #10:</u> Vision Room, 11:00-11:50am

Sports Injury Surveillance: State of the Science and Applications to Sports-Related Concussion Research and Clinical Practice

Session Moderator: Jaclyn Caccese, The Ohio State University

Presenters and Institutional Affiliations:

Avinash Chandran, Ph.D., Datalys Center for Sports Injury Research and Prevention, Indianapolis IN

Dr. Avinash Chandran currently serves as the Director of the NCAA Injury Surveillance Program at the Datalys Center for Sports Injury Research and Prevention. Dr Chandran is a quantitative Epidemiologist by training, and his research interests are, broadly, in athlete health over the lifespan. In addition to sports injury surveillance, his current research program involves emphases on quantitative methods, sport-related concussion, and retired athlete health. Dr. Chandran has coauthored over 80 peer-reviewed publications in sports medicine, and also holds academic appointments at UNC Chapel Hill, the George Washington University, and A.T. Still University.

Adrian Boltz, Datalys Center for Sports Injury Research and Prevention, Indianapolis IN

Adrian is the Research Associate for the National Collegiate Athletic Association Injury Surveillance Program at the Datalys Center for Sports Injury Research and Prevention. In addition to working at the Datalys Center, he is a doctoral student at the University of Michigan in Ann Arbor. His research interests include sports injury epidemiology, and using advanced statistical techniques to predict recovery time using concussion symptomatology, clinical assessments, and physiological (sleep-, neuroimaging-, and protein biomarker-related) changes following concussion.

 **Hannah Robison, Datalys Center for Sports Injury Research and Prevention, Indianapolis IN**

Hannah supports the National High School Sports-Related Injury Surveillance Study (High School RIO) and the National Athletic Treatment, Injury, and Outcomes Network Surveillance Program (NATION-SP) as a Research Assistant at the Datalys Center. Hannah also works as a secondary school athletic trainer in Indianapolis. She holds a Bachelor of Science in Athletic Training from Ithaca College and earned her Master of Science in Kinesiology with an Emphasis in Athletic Training from Indiana University-Bloomington in 2020. Her research interests include sports injury epidemiology, socioeconomic status and health outcomes, and athletic training practice characteristics.

Abstract:
Sport-related injuries remain a public health problem, and injury surveillance serves a critical role in the injury prevention paradigm. Injury surveillance has been especially instrumental in extending the sports medicine community's understanding of sport-related concussion (SRC) epidemiology. By aligning the high-fidelity information captured within injury surveillance with nuanced analytical techniques, it is possible to develop sophisticated hypotheses related to injury etiology, and evidence-based injury prevention programs. With recent advancements in injury surveillance, it is important to consider novel SRC insights that may be obtained from injury surveillance data. Accordingly, this symposium aims to present the current state of sports injury surveillance and to showcase its ability to inform SRC research and clinical management. Attendees will be presented with a general overview of sport injury surveillance operations, and with specific injury surveillance-based studies describing the epidemiology of SRCs in National Collegiate Athletic Association (NCAA) athletes. The symposium will be structured as follows: i. (0-10 mins): Introduction and overview of sport injury surveillance methods, with emphasis on SRCs; ii. (10-25 mins): Description of injury surveillance data and surveillance-based epidemiological estimates used to explore the burden of SRCs among NCAA athletes; iii. (25-35 mins): Presentation of how injury surveillance may be used to identify predictors of SRC clinical presentation and outcomes among NCAA athletes; iv. (35-45 mins): Contextualization of the research and clinical value of surveillance-based epidemiological findings; v. (45-50 mins): Questions and Answers.

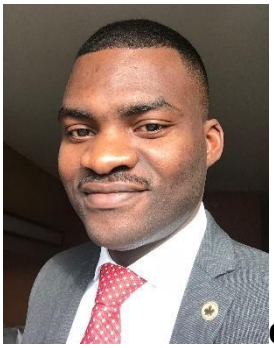
Learning Objectives:
1. Leverage session materials to become refined consumers of sport injury surveillance and epidemiological findings.
2. Apply epidemiological findings in informing their own injury-related research and clinical practice.
3. Note emerging trends in sport-related concussion incidence across NCAA sports, and identify predictors of SRC outcomes among NCAA athletes.

<u>Symposium #11:</u> Network Room (2nd Floor), 11:00-11:50am

Towards Safety in Collegiate Soccer and Basketball: Results from the RICHLoad Project

Session Moderator: Emily Post, Ohio Dominican University

Presenters and Institutional Affiliations:

 **Oluwatoyosi Owoeye. Ph.D., St. Louis University, St. Louis MO**

Dr. Oluwatoyosi (Olu) Owoeye (PhD, MS, BPT) is an assistant professor at the Department of Physical Therapy and Athletic Training at Saint Louis University, St. Louis, Missouri, United States and an adjunct assistant professor at the Sport Injury Prevention Research Centre, University of Calgary, Alberta, Canada. His research is focused on the generation and translation of knowledge that informs the prevention of sport-related injuries and associated consequences in youth and young adults. Much of his research work has focused on injury risk mitigation in soccer and basketball and implementation science towards understanding best practices for translating proven injury prevention interventions into action in real world settings. His research work has been supported by competitive grants from the NBA, General Electric, the Canadian MSK Research Network and Saint Louis University among others. Dr. Owoeye currently has 45 peer-reviewed publications in top sports medicine journals. He is a deputy editor of the British Journal of Sports Medicine, the #1 journal in the field of sports and exercise medicine.

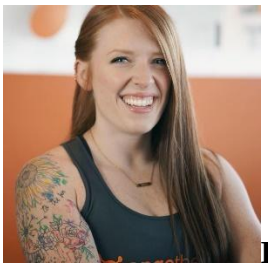
Abstract:
Collegiate soccer and basketball are very popular in the United States, and they are highly competitive. Expectedly, the risk of musculoskeletal injuries is high. Every season, an average 1 in 4 collegiate soccer athletes and 1 in 3 collegiate basketball athletes sustain a significant injury that keeps them out of sports participation for a considerable time. The proposed talk will share current findings from an ongoing 2-year project, the RICHLoad (Reducing Injuries among Collegiate atHletes through Load management). In this session, I will share results from two completed studies within the RICHLoad Project: (1) Normative values for hamstring and quadriceps strength in collegiate soccer and basketball players; (2) Absence of Injury is not Absence of Pain: Prevalence of Preseason Musculoskeletal Pain and Associated Factors in D1 Soccer and Basketball Student-Athletes. The first study provides sport-specific and weight-normalized reference values for isometric hamstring and quadricep muscle strength in collegiate soccer and basketball players; a useful information for collegiate coaches, sports medicine clinicians in preventing lower limb injuries in student-athletes and making informed return to sport decisions after injury. The second study shows that one in four D1 collegiate soccer and basketball players have preseason MSK pain and the most frequent body locations are the back and the knee. The clinical relevance and implications of these findings will be discussed.

Learning Objectives:
1. Attendees will gain knowledge on the latest research regarding sex-specific musculoskeletal injury risk mitigation in collegiate soccer and basketball.
2. Attendees will be able to read and interpret normative value data and systematically apply them in routine practice to inform thigh and knee injury prevention and return to play decisions following time-loss injuries.

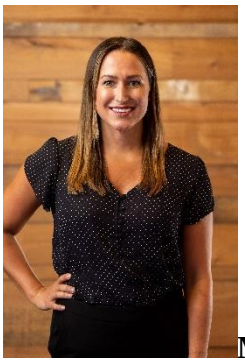
ACSM Symposium: Discovery Room, 11:00-11:50am

Session Moderators: Katherine Schowengerdt and Francis Neric, American College of Sports Medicine

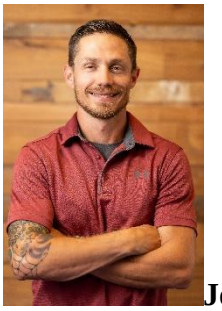
Presenters and Institutional Affiliations:

 **Kaity Wachtel, M.S., Orangetheory Fitness, Indianapolis IN**

Kaity Wachtel is the Regional Fitness Manager and Area Rep Regional Trainer for Orangetheory Fitness in Indiana. She oversees the fitness product and head coaches at eight local Orangetheory studios, tests templates for Orangetheory corporate, runs trainings for individuals hoping to become a part of our Orangetheory coaching staff and provides continuing training, education, and support to the fitness professionals on the team. She has coached over 7,000 classes in her 7 years with the company. Originally coming from a background in Social Work, earning her undergraduate from IU Bloomington & Masters from IUPUI Indianapolis, she became passionate about fitness when it changed her life during her college years. She gained certifications ranging from 200 hour YTT, personal training, group fit, specialties like RRCA, Insanity, TRX & Piloxing, sports nutrition, mindfulness practice through My Steady Mind & is Balanced Body Comprehensively Certified in Pilates. She enjoys public speaking, hiking, endurance running, travel, is an avid reader, loves spending time with people, is an advocate for mental health awareness, and is the rescue mama to 2 incredible pups- Ruthie and A.J.

 **Megan Sparks, Arch Amenities, Chicago IL**

Megan Sparks is a Senior Regional Director for Arch Amenities Group (formerly LifeStart/WTS International) based out of Chicago, IL. After competing in Olympic Trials and finishing her swimming career at University of South Carolina, Megan began working in the Sports industry at events and organizations such as the Masters Golf Tournament, the 2012 London Olympics and the Miami Marlins. Boutique fitness began to call her name, where she taught as an instructor for over 7 years, finishing as a Senior Instructor at a high-profile indoor cycling studio. Hanging up her spinning shoes for a more traditional role, Megan dove into another chapter of her fitness career as a Director of Account Management where she oversaw a portfolio of fitness centers within Class A Commerical Real Estate buildings across the United States. Megan thoroughly enjoys spending time outdoors with her family and is a frequent attendee at many games and concerts. She believes that human connection and movement are two of the most powerful things in life and is happy to be in an industry that combines both.

 **Josh Zaffino, Arch Amenities, Chicago IL**

Josh Zaffino the Director of Training and Development for Arch Amenities Group. He has been in the fitness industry for over 20 years working in college rec, commercial and boutique fitness, currently in corporate

wellness. Josh has always had the passion for health and fitness, but it was the ability to help people achieve something deeper through health and fitness which has been his motivation with clients and now coaching and developing new professionals in addition to speaking on national fitness platforms. Each day he's inspired by the quote "we don't rise to the level of our expectations we fall to the level of our training." Each person is capable of greatness; having belief in oneself and support from our team makes us unstoppable.

Schedule – Friday Morning: Free Communication / Slides

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

Session Moderator: Emerson Sebastião, Northern Illinois University

8:00-8:15am

ENERGY EXPENDITURE AND ACTIVITIES OF DAILY LIVING USING A HANDS-FREE CRUTCH

Dillon Canter, Timothy Finucan, Danny Robertson, Paul Reidy, Kyle Timmerman FACSM, Miami University, Oxford OH

Ambulation using standard axillary crutches (SAC) is associated with increased energy expenditure (EE) and decreased gait speed compared to unassisted walking (UW). Knee scooters (KS) are also commonly prescribed but have mobility limitations. A novel hands-free crutch (HFC) may represent an alternative to decrease EE for those requiring assistive devices. Therefore, the **PURPOSE** of this randomized order, crossover-design study was to determine the differences in EE, HR, and perceived exertion (RPE) between HFC ambulation and common assistive devices. **METHODS**: Twenty healthy (BMI<30 kg/m2) male and female adults (mean ± SD: age: 21.2±0.9 years; height: 172.9±9.7 cm; weight: 69.3±13.2 kg) completed a 6-minute walk at 50m/min and a modified Glittre activities of daily living course (GLITTRE) with SAC, HFC, KS, and UW. A two-flight stair climb was also performed with SAC, HFC, and UW. The order of trial conditions was randomized. EE during each condition was obtained through indirect calorimetry utilizing the COSMED K4b2 portable metabolic system. Unpaired t-tests were performed to compare EE between the assistive devices and UW. **RESULTS:** UW had significantly ($p < 0.05$) lower EE, HR, and RPE compared to all other devices during the 50 m/min paced 6-minute walk, GLITTRE, and stair climb. EE, HR, and RPE during the 50m/min walk with the HFC (5.4±1.2 kcal/min, 123.6 ±16.6 bpm, 12.2 ±2.2) were significantly lower than SAC (6.6 ±1.7 kcal/min, 140.5±22.4 bpm, 15.1±2.4), but significantly higher compared to the KS (3.87.5kcal/min, 109.1±17.2 bpm, 8.5±2.7). There was no significant difference in EE during the GLITTRE between SAC (5.0±1.0kcal/min), HFC (4.7±0.9kcal/min), or KS (4.8±1.0 kcal/min). However, HR and RPE were significantly lower using the HFC (109.7±14.9 bpm, 10.2±2.6) compared to SAC (121.4±16.4 bpm, 13.1±2.6), and RPE using the KS (11.3±2.7) was also significantly lower than SAC. A significantly lower HR and RPE during the stair climb were observed using the HFC (112.3±15.3 bpm, 11.5± 2.4) compared to SAC (126±15.3 bpm, 13.3±1.8). **CONCLUSIONS:** These findings suggest that HFC may offer an energy-efficient alternative to SAC during ambulation on level ground and an effective device to reduce fatigue during ADLs.

8:15-8:30am

THE EFFECTS OF PATIENT-SPECIFIC ADAPTIVE DYNAMIC CYCLING ON FUNCTION MOBILITY IN INDIVIDUALS WITH PARKINSON'S DISEASE

Younguk Kim, Brittany Smith, Jessica Smith-Ricketts, Angela Ridgel FACSM, Kent State University, Kent OH

BACKGROUND: Parkinson's disease (PD) is a progressive neurological disorder that results in bradykinesia, tremor, muscle rigidity, and postural instability. These symptoms disrupt gait and functional mobility as well as increase the risk of falls. **PURPOSE**: To determine if patient-specific settings of dynamic cycling improve functional mobility in individuals with PD. **METHODS:** A total of 10 individuals with PD were randomly assigned

to either a Patient-specific Adaptive Dynamic Cycling (PSADC) or active control (AC) group. Individuals were fitted with the OPAL wearable sensors and performed the Time Up and Go (TUG) test before and after 12-sessions of cycling. The PDQ-39 mobility dimension questionnaire was utilized to measure subjective mobility. TUG time, turn duration, turn velocity, turn degree, sit to stand, stand to sit, and mobility dimension variables were analyzed with SPSS using a repeated measures ANOVA (2 groups by 2-time points). **RESULTS:** There was a significant main effect of time for Time Up and Go (TUG) time ($F=10.928$, $df=1$, $p=0.016$), turn duration ($F=6.793$, $df=1$, $p=0.040$), and turn velocity ($F=10.276$, $df=1$, $p=0.018$) but no interaction or group effect. For the mobility dimension score, there was no main effect of time ($F=3.465$, $df=1$, $p=0.105$) nor group by time interactions ($F=0.636$, $df=1$, $p=0.451$). However, there were 2 points improvements (Pre: 23.33, Post: 21.66) in the PSADC group and a 4-point improvement (Pre: 16.66, Post: 12.50) in the AC group. **CONCLUSION:** TUG time is an important indicator to reflect individuals' functional mobility and turn duration and turn velocity are highly correlated with the risk of falls. These improvements indicate that both adaptive and non-adaptive dynamic cycling improved functional mobility and potentially reduce the risk of falls in individuals with PD.

Grant funding: "This project was supported via the EHHS Graduate Student Grant Program at Kent State University and the Davis Phinney Foundation."

8:30-8:45am

PHYSICAL ACTIVITY RECOMMENDATIONS AND THE MENTAL WELL- BEING OF MIDDLE-AGED SEDENTARY ADULTS

Grace Louis, Shaine Henert, Beth Moxley, FPCNA, Northern Illinois University, DeKalb IL

Depression and anxiety are increasing public health concerns as rates of have increased recently (CDC, 2021). Because 1 out of 4 adults with mental distress will develop CVD within their lifetime (Correll et al., 2017), managing ones' mental health can help prevent CVD, decrease healthcare expenditures, and preserve one's quality of life. Regular PA promotes personal resilience (De la Rosa et al., 2019), modulates stress reactivity (Klaperski et al., 2014; Rimmele et al., 2007; Wunsch et al., 2019), improves cardiorespiratory fitness (CRF), protects against CVD (Franklin et al., 2021), and helps manage mental distress (Wermelinger et al., 2018; Penedo & Dahn, 2005; WHO, 2010). However, depressed and anxious individuals find it difficult to increase their PA due to their symptoms (Firth et al., 2016). Furthermore, additional research is needed to better understand the impact of guideline-based physical activity programming and motivational strategies on PA engagement and the mental well-being of sedentary middle-aged adults (Moxley & Kruk, 2016). **PURPOSE**: To examine the effects of meeting weekly PA recommendations on levels of resilience, depression, anxiety, and CRF in sedentary middle-aged adults. **METHODS:** Thirty sedentary, middle-aged adults will participate in an individualized 4-week guided PA program based on national physical activity guidelines (USDHHS, 2018; ACSM, 2018) appropriate for their age and current fitness level. Pre- and post-test assessments of participants include resilience (CD-RISC; Connor & Davidson, 2003), anxiety (BAI; Beck et al., 1988), depression (BDI-II; Beck et al., 1996), and CRF (Astrand-Rhyming cycle ergometer test; Astrand & Rhyming, 1954). They will use an activity tracker (Mi Smart Band 6; Xiaomi) to monitor and record their heart rates, daily steps, and time in MVPA. Weekly check-ins with the participants will involve motivational messaging and collection of HR and PA data. Separate repeated measures analysis of variance (ANOVA) will be performed comparing the baseline and post-test psychological and fitness variables. Findings from our research will have important clinical implications for personal health and wellness professionals.

8:45-9:00am

REDUCTIONS IN VOLITIONAL SWAY APPEAR RELATED TO TYPE TWO DIABETES AND AGE

Trevor Lopatin, Michael Ko, Kaitlyn Lance. Elise Brown, Daniel Goble, Joshua Haworth, Oakland University, Rochester MI

PURPOSE: Type 2 diabetes has been shown to affect several aspects of balance and postural control. Volitional sway shows how one chooses to move while standing and is one aspect of postural control that is not well understood. The purpose of this preliminary study is to investigate the effects of type 2 diabetes and age on volitional sway. **METHODS:** 31 participants were recruited for this study, 21 healthy college aged participants (mean age 22.3 ± 2.9 years) were recruited from a local university and 10 adults with type 2 diabetes (mean age 53.55 ± 10.6 years) were recruited from a physician's office. Each participant had their height (cm) and shoe size

(cm) recorded. Participants completed the volitional Limits of Stability (vLOS) protocol by standing on a portable balance plate with the medial aspect of each midfoot 31 cm apart, having one minute to move their body maximally in every direction while keeping their feet stationary. Total area of excursion was recorded. Percent of base of support (BoS%) was calculated by dividing total area by base of support (shoe size in cm x 31 cm). A two tailed t-test compared BoS% of the two groups. A Pearson correlation was conducted to examine the relationship between BoS% and age. **RESULTS:** A significant difference in BoS% ($p < 0.01$) was found, such that the healthy group (mean = 57.7 ± 9.9%) had a higher BoS% compared to the diabetes (mean = 42.6 ± 11.1%) group. A moderate negative relationship between age and BoS% ($r = -0.59$, $p < 0.01$) revealed decreased volitional sway with progressed age. **CONCLUSION:** This data suggest that type 2 diabetes and age may insult volitional sway by reducing the total area accessible during movement. Due to the large age difference between the two groups, and only finding a moderate correlation to age, it is difficult to determine the true effect size of each variable. A future iteration of this study will be carried out with extended and age matched grouping to better define the individual impacts of age and type 2 diabetes on volitional sway.

Free Communication/Slides #2: Studio 1, 9-10:00am

Session Moderator: Christopher Hill, Northern Illinois University

9:00-9:15am

CARDIOVASCULAR IMPLICATIONS OF RUNNING A 100-MILE ULTRA-MARATHON - A FIELD STUDY

Stacie M. Humm, Anthony G. Pinzone, Emily K. Erb, Michelle M. Kern, Gretchen E. Elsey, J. Derek Kingsley FACSM

INTRODUCTION: Ultra-marathon running is an increasingly popular sport whose largest participant group is >40 years of age. It has been suggested that heart rate variability (HRV), linear fluctuations of the cardiac cycle indicative of autonomic modulation, is a useful indicator of both cardiovascular disease risk and recovery from fatiguing exercise. Researchers have shown that age, sex, mode, intensity, training status, and hydration affect HRV measurements. A non-linear measure, Sample Entropy (SampEn), may be more appropriate to use in lieu of HRV alone. Therefore, the purpose of this proposal is to determine the effects of an ultra-marathon on hemodynamics, HRV, and SampEn during exercise and recovery. **METHODS**: Participants registered for the Mohican 100mile trail race will be recruited to participate in a 1-day field study evaluating hemodynamics, HRV, and SampEn. All data will be collected via heart rate (HR) monitor. Data will be collected for five days prior to the race, averaged, and used as BASE information. Pre-race data will be recorded approximately 12hrs before race start. Data will also be recorded at halfway (HW), immediately post-race (IP), 1hr- (P1), 2hr- (P2), 24hr- (P24), 48hr- (P48), and 72hrs (P72) post-race. HRV will be quantified by root mean square of successive differences between normal heartbeats (RMSSD). **RESEARCH QUESTIONS:** We hypothesize that HR will be augmented up to 72-hours post-race compared to all other time points, while RMSSD will be elevated at PRE compared to BASE. We also hypothesize that HW, IP, P1, P2, P24 and P48 will be decreased compared to BASE and return to BASE values at P72 and that SampEn will decrease at all time points following PRE compared to Base. Value: This project hopes to demonstrate that HRV recordings can be used to evaluate recovery from ultra-marathon participation and the more sensitive SampEn maybe a better indicator. This project will also add to the limited research evaluating HRV during an ultra-marathon and the time course of autonomic recovery following ultra-endurance events. **PROJECTED LIMITATIONS:** Sample size may be small due to race attrition or exclusion criteria. Fluid intake will not be monitored which may affect blood volume and thus blood pressure and HR.

9:15-9:30am

PHYSIOLOGICAL RESPONSES TO AN ACUTE PROGRESSIVE SESSION OF MOTORIZED WHEELED SLED-PUSH EXERCISE AMONG OLDER ADULTS

Matthew Herring, Elise Craven, Micheal Baumann, Vitor Siqueira, Christopher Hill, Clayton Camic, Peter Chomentowski, Emerson Sebastião, Northern Illinois University, DeKalb, IL

As a functional compound exercise, sled pushing may be an interesting exercise modality for older adults. **PURPOSE**: This study investigated physiological responses to an acute session of progressive motorized wheeled sled-push exercise among older adults and compared to a walking session. **METHODS:** Thirty-six older adults

(age: 69.2±4.7 years; height: 1.70±0.1 cm; body mass: 79.6±19.3 kg; BMI: 27.3±5.9 kg/m2) were enrolled in the study and randomly allocated in the sled-push (SLP, n = 16) or walking control (WKC, n = 16) condition. Physiological assessments included heart rate (HR), blood lactate (LAC), and rate of perceived exertion (RPE). The exercise protocol involved participants pushing a motorized wheeled sled or walking six times on a 30-meter course, with 2-minute rest periods in between. Six different velocities/intensities were selected based on participants' normal speed: 75, 85, 100 (2x), and 125% (2x). Data were collected during all 2-minute rest periods. An online metronome connected via Bluetooth to a speaker was used to pace and monitor participants' speed. For data analysis purposes, the velocities were later combined to create three different exercise intensities/speed zones: subnormal (75 and 85%), normal (100%), and supranormal (125%). Data were analyzed using Mixed-Factor ANOVA with significance level set at $p < .05$, with holm correction. **RESULTS:** Mixed-factor ANOVAs revealed a significant group x velocity interaction for HR $F(2, 66) = 25.924$, $p < .001$ and; LAC $F(2, 68) = 19.613$, $p < .001$, but not for RPE $F(2, 68) = 2.384$, $p = .120$. Follow up analysis revealed that HR values were significantly ($p < .05$) higher for the SLP compared to the WKC group for all three defined velocities (Subnormal: 110.5±15.7 vs 88.3±12.4 bpm; Normal: 122.9±18.2 vs 86.8±12.9 bpm; Supranormal: 132.5±20.9 vs 92.1±14.2 bpm). The SLP group also presented significant ($p < .05$) higher values for LAC compared to the WKC group (Subnormal: 2.6±0.9 vs 1.5±0.4 mmol/L; Normal: 3.3±1.5 vs. 1.4±0.5 mmol/L; Supranormal: 5.0±2.5 vs 1.6±0.6 mmol/L). **CONCLUSION:** Based on the selected physiological parameters assessed, the findings suggest that the acute progressive sled-push session demonstrated an intensity driven modality that may have potential to elucidate positive adaptations in the cardiovascular system of older adults.

9:30-9:45am

NEIGHBORHOOD ENVIRONMENTAL SUPPORT FOR PHYSICAL ACTIVITY IS ASSOCIATED WITH MODERATE-TO-VIGOROUS PHYSICAL ACTIVITY ACROSS PREGNANCY

Ti Hsu, Melissa A. Jones, Bethany Barone Gibbs, Kara M. Whitaker FACSM, University of Iowa, Iowa City IA

PURPOSE: Moderate-to-vigorous intensity physical activity (MVPA) and light-intensity physical activity (LPA) during pregnancy benefit both mother and offspring, while high sedentary behavior (SED) is associated with adverse maternal and offspring outcomes. Despite this, most pregnant women are inactive and spend >50% of the day in SED. Past studies indicate that MVPA, LPA, and SED are associated with environmental support for physical activity, but whether this is true in pregnant populations is unknown. **METHODS:** This study uses preliminary data (N = 150) from Pregnancy 24/7(R01HL153095), a multisite prospective cohort study. MVPA, LPA, and SED were measured objectively for 7 consecutive days in each trimester (3 total assessments) with the activPAL monitor. The extent to which respondents felt their neighborhood (area within 0.5 mile/10-minute walk from home) and community (area within 10 miles/20-minute walk from home) provided structural and social support for physical activity was assessed with the Environmental Supports for Physical Activity Questionnaire at trimester 1, such that greater scores indicated higher levels of support. We examined associations of neighborhood and community support separately with MVPA, LPA, and SED during pregnancy with multi-level models (using residual maximum likelihood) to account for the nesting of physical activity assessments within persons across trimesters (6 total models). Pre-pregnancy BMI, race, education, income, and age were included as covariates. **RESULTS:** Participants ranged from 19 to 41 years of age (M=31.18, SD= 3.92) and were predominantly White (85.8%). Mean percent time of activPAL estimates in the first, second, and third trimester was 1.78%, 1.68%, and 1.20% for MVPA, 25.08%, 27.45% and 26.81% for LPA, and 67.93%, 65.15% and 66.62% for SED, respectively. A one standard deviation increase (6.63 units) in neighborhood access to support for physical activity was associated with .35% higher MVPA across pregnancy trimesters ($\beta = .35$, SE= .09, $p < .001$). This is equivalent to an increase of 3.21 minutes/day across trimesters. Neither community nor neighborhood access were associated with LPA or SED. **CONCLUSION:** Enhancing neighborhood environmental support for physical activity may increase MVPA during pregnancy.

9:45-10:00am

DOES THE FIFA 11+ S REDUCE THE INCIDENCE OF SHOULDER INJURIES IN FEMALE VOLLEYBALL PLAYERS?

Ayse Elma, Juliane P. Wallace FACSM, Southern Illinois University Carbondale, Carbondale IL

INTRODUCTION Volleyball is one of the most popular sports in the world, second to soccer. Volleyball motions are complex involving a quick change of direction, fast reaction time, and coordination of movement. The incidence of musculoskeletal injuries among volleyball players ranges from 1.7 to 10.7 injuries per 1000 playing hours, occurring mostly in the fingers/wrists, shoulders, knees and ankles. Greater dynamic stability of the joint requires appropriate force applied through the muscle tension. Warm ups increase muscle temperature, stimulate the performance of muscle contraction, decrease the time to achieve peak tension and relaxation, and reduce the viscous resistance of the muscles and joints. **LITERATURE REVIEW** The FIFA 11+S program consists of three parts: general warm-up exercises (part I), exercises to develop strength and balance (part II), and advanced exercises for core stability and muscle control (part III). This program reduced upper extremity injuries among soccer goalkeepers. Moreover, the FIFA 11+S program was effective in reducing the incidence of contact injuries, initial injuries, and recurrent injuries. **RESEARCH QUESTIONS/VALUE** While FIFA 11+S is designed for goal keepers, it may be beneficial in preventing shoulder injuries in volleyball players. Limited research is available on the influence of FIFA 11+S on injury prevention in volleyball players. The purpose of this study is to determine the effectiveness of the FIFA 11+ S program in reducing the upper extremity injuries in college level female volleyball athletes. **METHODS** Athletes will be assigned randomly to a control (normal warmup) or FIFA 11+S experimental group. Athletic Trainers will monitor the exercise program and report any injuries during training. The primary outcomes are the incidence of overall upper extremity injuries, the type, mechanism and severity of injury. Incidence is determined by injury rates: the number of injuries per 1000 exposure-hours for both matches and training. **PROJECTED LIMITATIONS** Only female athletes will be recruited. In addition, the participants in the control group will be instructed to continue their usual warm-up programs, and these programs will not be standardized across participants; therefore, within group variation is to be expected.

Free Communication/Slides #3: Studio 1, 10-11am

Session Moderator: Katie Spillios, University of Mount Union

10:00-10:15am

Athletes use heart rate (HR) monitors to assess and monitor exercise intensity. Commercially available devices that employ plethysmography to measure HR via the wrist have become commonplace. However, the accuracy of these devices across a range of resting and exercise intensities is unknown. **PURPOSE**: The purpose of this study was to examine the HR accuracy of two commercially available activity watches among a group of collegiate athletes during periods of rest, activity, and recovery. **METHODS:** Twenty-one collegiate athletes (women n=10, men n=11) wore a Coros® Vertix 2 and Garmin® Fenix 6 watch along with a previously validated Polar® H10 chest sensor (criterion measure). After 2-minute rest periods in a supine, seated, and standing position, each participant began walking on a treadmill at a speed of 1.6 kilometers per hour (kph). Treadmill speed was increased by 1.6 kph every two minutes until participants reached volitional fatigue. Then, participants walked at 4.8 kph for two minutes followed by a seated two-minute recovery stage. HR was recorded from each device in 30-second increments throughout all stages. Total mean difference in HR readings, percent accuracy (calculated as the percentage of occurrences where devices were within and including 5 bpm of the H10), and Pearson correlation coefficients were used to examine the agreement between devices. **RESULTS:** Each device demonstrated a strong correlation with the Polar H10 (Vertix 2 $r2 = 0.92$ and Fenix 6 $r2 = 0.96$) across time points. However, dependent paired t-tests revealed a significant difference between devices in total mean HR (Polar H10: 123.1 vs. Vertix 2:120.4 and Fenix 6:124.4 bpm, $p<0.001$). The Vertix 2 was 77.8% accurate during rest, 73.2% accurate during exercise, and 86.9 % accurate during recovery. The Fenix 6 was 70.2% accurate during rest, 80.9 % accurate during exercise, and 83.3% accurate during recovery. Overall accuracy of the Vertix 2 and Fenix 6 was 75.7% and 77.1% respectively. **CONCLUSION**: Both devices were fairly accurate across exercise intensities in a lab setting. Future research should examine device accuracy across a variety of exercise and climate conditions.

10:15-10:30am

SPECIAL WEAPONS AND TACTICS OFFICERS HAVE EQUAL LOADED AND UNLOADED COUNTERMOVEMENT JUMP PERFORMANCES

Nathan Edwards, Emaly Vatne, Thomas Beach, Jaclyn Caccese, Justin, Merrigan, Josh, Hagen, Jason Stone, James Onate FNATA, The Ohio State University, Columbus OH

PURPOSE: To compare force-time metrics of Special Weapons and Tactics (SWAT) officers performing loaded and unloaded countermovement jumps (CMJ). **METHODS:** Six SWAT officers attending a department training session volunteered for this study. Following a dynamic warm-up, officers performed three maximal effort loaded and unloaded CMJs with hands on hips while standing on dual force plates (ForceDecks Max, Vald Performance). The loaded CMJs were performed while officers wore their full duty vest with body armor and attached equipment (9.95±2.5kg). Jump height, body weight normalized concentric and eccentric mean power, and modified reactive strength index (RSI-mod) from the three CMJs were averaged. Paired samples t-test comparing loading conditions were performed in JMP Pro 16, and Cohen's d values were calculated in Microsoft Excel. The alpha level with Bonferroni corrections was set at p = 0.0125. **RESULTS:** Officers (n=6) were all male, 44.8±5.6 years old, and had worked as a SWAT officer for 10.3±7.7 years. Self-reported weights of their typical on-duty equipment were between 5-9.1 kg (n = 1), 14.1-18.2 kg (n=1), or 18.6-22.7 kg (n=4). Duty vests worn during loaded CMJs constituted 10.5±2.8% (range: 7.9% to 15.6%) of their body weight. Loaded and unloaded CMJs did not differ for jump height (p = 0.059, d = 0.68), concentric mean power (p = 0.256, d = 0.26), eccentric mean power (p = 0.430, d = 0.26), or RSI-mod (p = 0.357, d = 0.35). **CONCLUSION:** This research is an initial investigation using force plate performance testing in SWAT officers. The additional external loading from duty vests did not significantly reduce officers' CMJ performances, likely because of the relatively light load and their experience wearing their duty vests. However, there was a medium effect size for decreasing jump height in the loaded condition thus indicating potential movement limitations. Since the small pilot sample size may have inadequate power to demonstrate statistical significance, continued research is encouraged to confirm these findings. By providing the contributing components of lower body force and power production, force plates can contextualize CMJ performance, guiding tactical strength and conditioning programs aiming to improve officers' ability to move with the external loads of their duty vests and equipment.

10:30-10:45am

EXAMINING THE ACCURACY OF TWO COMMERCIALLY AVAILABLE GLOBAL POSITIONING SYSTEM ENABLED WATCHES IN TRAIL RUNNING

Allison Tripure, Anastasia Tucker, Sara E. Mahoney, PhD, FACSM, Kirk Brumels, PhD, Brian C. Rider, Bellarmine University, Hope College

Wearable activity monitors with GNSS (global navigation satellite system) capabilities, are commonly used by trail runners who rely on these devices to accurately track mileage. However, trail conditions, specifically the amount of tree coverage/foliage, can interfere with satellite signals thus reducing the overall GNSS accuracy. **PURPOSE**: The purpose of this investigation was to determine the accuracy of two popular and high-end commercially available watches, the Coros® Vertix 2 and Garmin® Fenix 6, in two trail running conditions among a group of recreational trail runners. One trail had significant tree coverage (heavy) and the other had minimal coverage (light). **METHODS:** Six participants (women n=4, men n=2) completed four self-paced, one-mile trail runs. Accuracy of the watches was compared across the two trail conditions. Participants were outfitted with both watches on opposite wrists, wearing each device on each wrist across all trials (2x2 design). Distance measured by the watches was recorded every quarter mile. Conditions were compared using paired t-tests (alpha<0.05) and mean and standard deviation were calculated for each condition. **RESULTS:** The Garmin reported 0.93±0.03 miles and the Coros reported 0.94±0.02 miles for the 1.0 mile trail. But overall, no difference was detected between the two watches (p=0.43). The distance measured by the watches was significantly greater during the light coverage condition (0.96±0.02 miles) than in the heavy condition (0.91±0.02 miles) (p<0.01). Additionally, the distance was significantly greater while the watches were worn on the left wrist (0.94±0.03 miles) compared to when worn on the right (0.93±0.02 miles) (p=0.04). **CONCLUSION:** While watch brand did not affect accuracy, both watches under-reported the distance by 6-7%, which could cause much greater ramifications over longer distances. Future research should examine the device accuracy across a variety of trail locations and distances greater than 1 mile.

10:45-11:00am

THE G-SUIT HAS NO EFFECT ON PERFORMANCE AND MUSCULAR ACTIVATION DURING A 40-METER SPRINT

Benjamin S. Minier, Faith C. Kurtz, Curtis A. Cornell, Madison E. Radcliffe, James R. Sackett, Cornerstone University, Grand Rapids MI

The G-Suit is a wearable device designed to increase axial loading through full-body compression. Previous investigations have demonstrated that increasing axial load on the human body improves core muscular activation. An increased core muscular activation may improve performance during sport and exercise. **PURPOSE:** The purpose of this study was to test the hypothesis that wearing the G-Suit improves performance and muscular activation in male collegiate athletes during a 40-meter sprint. **METHODS:** Eleven male collegiate athletes (age: 20 ± 2 y, BMI: 25.5 ± 3.0 kg/m2) participated in three randomized trials in which they completed a 40-meter sprint: a control session not wearing the G-Suit (CT), a session in which they wore the G-Suit for only the warm-up (WU), and a session in which they wore the G-Suit the entire time (GS). The subjects participated in a standardized warm-up before the sprint. Thereafter, maximum voluntary isometric contractions were completed for the rectus abdominis (RA) and the serratus anterior (SA) and these data were used to normalize muscular activation during the sprint. Sprint time (s) and sprint speed (m/s) were measured using a laser timing system. Feeling scale (a.u.) was self-reported (-5 = very bad, 0 = neutral, 5 = very good). Muscular activation (%) for the RA and SA were measured using electromyography. Data were analyzed using a one-way repeated measures ANOVA. **RESULTS**: There were no significant differences between sprint times (CT: 5.70 ± 0.21 s, WU: 5.78 ± 0.37 s, GS: 5.73 ± 0.28; p = 0.39). There were no significant differences between sprint speeds (CT: 15.88 ± 0.61 m/s, WU: 15.70 ± 0.99 m/s, GS: 15.71 ± 0.77 m/s; p = 0.57). There were no significant differences between feeling scale (CT: -0.77 ± 1.03 a.u., WU: -0.77 ± 1.15 a.u., GS: -1.00 ± 1.43 a.u.; p = 0.69). Lastly, there were no significant differences between RA activity (CT: 112.7 ± 45.6 %, WU: 143.0 ± 67.3 %, GS: 100.1 ± 28.6 %; p = 0.06) and SA activity (CT: 86.2 ± 36.7 %, WU: 80.2 ± 34.6 %, GS: 64.3 ± 19.6 %; p = 0.27). **CONCLUSION**: The increased axial loading from the G-Suit did not improve performance or muscular activation of the SA or RA during a 40-meter sprint. It appears that the axial loading provided by the G-suit does not benefit collegiate athletes during an acute bout of exercise.

Free Communication/Slides #4: Studio 1, 11-12pm, 10-11:00am

Session Moderator: Devin Laurent, Ohio Dominican University

11:00-11:15am

TEND-AND-BEFRIEND TENDENCIES IN RESPONSE TO PHYSICAL STRESS

Megan Carulla, Oakland University, Rochester MI

This study may provide evidence that physical stress has similar effects on tend-and-befriend tendencies compared to psychosocial stress. **LITERATURE REVIEW:** Previous research has shown that females show an increase in tend-and-befriend tendencies in response to psychosocial stress while males show the opposite response. This has been offered as an alternative response to the fight-or-flight theory specific to gender, but has not yet been tested during physical stress. VALUE: This study may provide support for the tend-and-befriend theory as an alternative, gender-specific stress response to the fight-or-flight reaction. **METHODS**: Heart rate (HR), Rating of Perceived Exertion (RPE), and affect [Calmness, Tension, Energy, Tiredness, State Anxiety (SA)] will be recorded in 30 participants (15 female; age 18-35 yrs) before, during and after each (passive cycling, PC; active cycling, AC) 35-min cycling bout. Each session will consist of identically paced warm-ups (2.5-min@35 r·min-1), exercise bout (30-min@65 r·min-1), and cool-down (2.5-min@35 r·min-1) at a self-selected intensity of hard (15 RPE). Preliminary data has shown that both HR and RPE were higher in participants during AC compared to PC. These measures, taken into conjunction with salivary cortisol and alpha-amylase, will confirm that AC will stimulate physical stress in the participants compared to PC. At the end of each session, a questionnaire assessing tend-and-befriend tendencies will be administered. **ANTICIPATED RESULTS**: Physical stress has similar effects on tend-and-befriend tendencies compared to psychosocial stress. Females will show an increase in tend-and-befriend tendencies following AC due to the increased physical stress compared to passive cycling, while males will show opposite

results. **PROJECTED LIMITATIONS**: Limitations may include a small sample size and lack of participant demographic data.

11:15-11:30am

BIOLOGICAL AND PSYCHOPHYSIOLOGICAL EFFECTS IN ACTIVE VS PASSIVE CYCLING

Alissa Kizy, Oakland University, Rochester MI

This novel study may provide evidence that active (volitional) cycling (AC) has a stronger effect on salivary cortisol and amylase levels as compared to passive (motor-driven) cycling (PC). **LITERATURE REVIEW**: Congruent with reviewed literature and preliminary data, AC demonstrates an increase in enjoyment, heart rate (HR) and rating of perceived exertion (RPE) compared to PC. This novel study is re-examining AC and PC with the addition of saliva (cortisol & alpha amylase) analysis to determine if AC and PC similarly impact the stress response. **RESEARCH QUESTION**: Will AC have a stronger effect on salivary cortisol and alpha-amylase levels because AC increases the body's stress response, as well as biological and psychophysiological effects? VALUE: Preliminary data shows increased HR, RPE and higher State Anxiety for individuals partaking in AC as well as affective improvements in both conditions. This study may provide support for a dose response relationship with AC vs PC. **METHODS:** HR, RPE, and affect [Calmness, Tension, Energy, Tiredness, State Anxiety (SA)] will be recorded in 30 participants (15 female; age 18-35 yrs.) before, during and after each (PC, AC) 35-min cycling bout. Each session will consist of identically paced warm-ups (2.5-min@35 r·min-1), exercise bout (30-min@65 r·min-1), and cool-down (2.5-min@35 r·min-1) at a self-selected intensity of hard (15 RPE). **PROJECTED LIMITATIONS:** The sample size for this proposal will be limited by the available funding for saliva analysis.

11:30-11:45am

INVESTIGATING ENJOYMENT DURING AND IMMEDIATELY AFTER AN ACUTE PROGRESSIVE SESSION OF MOTORIZED WHEELED SLED-PUSH EXERCISE AMONG OLDER ADULTS

Elise Craven, Matthew Herring, Micheal Baumann, Vitor Siqueira, Christopher Hill, Clayton Camic, Peter Chomentowski, Emerson Sebastião, Northern Illinois University, DeKalb IL

Enjoyment is a relevant predictor of the intention to continue exercising, and adherence. **PURPOSE**: This study investigated enjoyment levels during and immediately after an acute progressive session of motorized wheeled sled-push exercise among older adults and compared that to a walking session. **METHODS**: Thirty-six older adults (age: 69.2±4.7 years; height: 170 cm±0.1 m; body mass: 79.6±19.3 kg; BMI: 27.3±5.9 kg/m2) were enrolled in the study and randomly allocated into the sled-push (SLP, n = 16) or walking control (WKC, n = 16) conditions. Enjoyment was assessed during the exercise session using a 10-point scale and immediately after using the 8-item Physical Activity Enjoyment Scale. The exercise protocol involved participants pushing a motorized wheeled sled or walking six times on a 30-meter course, with 2-minute rest periods in between. Six different velocities/intensities were selected based on participants' normal speed: 75, 85, 100 (2x), and 125% (2x). Data were collected during all 2-minute rest periods. An online metronome connected via Bluetooth to a speaker was used to pace and monitor participants' speed. For data analysis purposes, the velocities were later combined to create three different exercise intensities/speed zones: subnormal (75 and 85%), normal (100%), and supranormal (125%). Data were analyzed using Mixed-Factor ANOVA with significance level set at $p < .05$, with holm correction. **RESULTS:** Mixed-factor ANOVA did not reveal a significant group x velocity interaction for enjoyment during the exercise session $F(2, 68) = 1.808$, $p=.184$ or a main effect for velocity $F(2,68) = .114$, $p=.815$. However, it revealed a main effect for group $F(1, 34) = 9.122$, $p=.005$. The SLP group reported lower mean enjoyment values than the WKC for all three velocities (Subnormal: 7±1.8 vs 8.3±1.8; Normal: 6.7±1.6 vs 8.6±1.7; Supranormal: 6.6±2.2 vs 8.5±1.6). Independent t test showed no significant difference ($p=0.712$) on levels of enjoyment measured immediately after the exercise session between the SLP (5.1±0.8) and WKC (5.2±1.1) groups. **CONCLUSION:** The findings suggest that perceived level of enjoyment is somehow similar between the SLP and WKC conditions, although the WKC group reported overall higher absolute values compared to the SLP group throughout the exercise session.

11:45-12:00pm

RACIAL BATTLE FATIGUE AND DIABETES OUTCOMES - WHAT WE KNOW, WHAT'S MISSING, AND PROPOSED RESEARCH

Christopher Carey, NiCole Keith FACSM, Indiana University Purdue University Indianapolis, Indianapolis IN

INTRODUCTION. In the United States, Type 2 diabetes (T2D) harms more than 34 million individuals, and this incidence is projected to increase. The occurrence is 7.5% in non-Hispanic Whites, 11.7% in Blacks, 12.5% in Puerto Ricans 12.6% in Asians, 14.4% in Mexicans, and 14.7% in American Indian/Alaska Natives. Research has not yet determined the causes of these disparities. Furthermore, evidence demonstrates that lifestyle interventions may not produce equitable benefit in these groups. **RESEARCH QUESTIONS**. Is racial, psychosocial stress related to T2D risk factors? Does this stress diminish the effects of lifestyle interventions? **PROPOSED METHODS.** Individuals with > two T2D risk factors will be consented and enrolled. Measures will include blood pressure, body mass index, percent body fat, waist circumference, fasting blood glucose and lipoprotein, perceived stress, adolescent discrimination distress, race-related stress, racial/ethnic microaggressions, exercise self-efficacy, and general self-efficacy at baseline, 90, and 180 days. The lifestyle intervention will consist of total body exercise 3d/wk for 45-60 minutes with monthly nutrition education. Nutrition knowledge will be assessed every 3 months. **VALUE.** We will attempt to discover whether racial psychosocial stress is associated with T2D risk factors in order to determine the need to further tailor lifestyle interventions for minoritized peoples. Projected limitations. Attrition and adequate racial/ethnic representation continue to be concerns noted in longitudinal exercise studies. **FUTURE DIRECTIONS.** Studies that consistently and systematically parse race/ethnicity demographic data will need to be devised. The disaggregation of these data should create more clarity regarding the present disparities, while not only elucidating the challenges related to the disparities' origins but also revealing more tailored strategies to treat them.

Schedule – Friday Morning: Poster Session

Poster Session #1: Regency Ballroom E & F (2nd Floor), 8:00-9:15am

Board 1

EFFECT OF AEROBIC EXERCISE TRAINING ON LARGE ARTERY STIFFNESS AND BLOOD PRESSURE IN MIDDLE-AGED ADULTS

Taryn AD Anderson, Blair E Bell, Abby M Frescoln, Quinn Keleher, Angelique G Brellenthin, Wesley K Lefferts, Iowa State University, Ames IA

Behavioral prevention of cardiovascular disease (CVD) remains a key avenue to reduce disease burden. Large artery stiffening is a mechanism of CVD that may decrease with aerobic exercise training, although this depends on substantial changes in blood pressure. The **PURPOSE** of this study was to investigate the effect of 12 weeks aerobic exercise training on large artery stiffness and blood pressure (BP) in adults with elevated blood pressure and stage-1 hypertension (HTN). **METHODS:** 23 Inactive middle-aged adults with elevated blood pressure or stage 1 HTN (52±7 yrs; BMI 30.3±4.4 kg/m2; n=19 females) were randomly assigned in a 2:1 fashion to 12 wks moderate/vigorous aerobic exercise training (AET; 3 d/wk, 70-85% heart rate reserve, 30-40 min) or a no-exercise control group (CON). Vascular measures were assessed in the supine position at 0, 6, and 12-week visits. Brachial BP was assessed using tonometry and an automated oscillometric cuff, with carotid BP assessed via tonometry. Large artery stiffness was assessed as aortic and carotid stiffness, measured via tonometry and carotid-femoral pulse wave velocity (PWV) and carotid PWV-β via ultrasound, respectively. **RESULTS:** Brachial mean pressure tended to increase following CON but not AET (interaction effect p=0.06), however carotid systolic BP increased in both groups (time effect p=0.04). Carotid PWV-β was unaltered in both groups from baseline while cfPWV tended to increase in CON only (interaction effect p=0.06) compared to AET. Differences in cfPWV were attenuated after accounting for changes in mean pressure (p=0.32). **CONCLUSION:** Our findings suggest short-term AET may prevent increases in aortic stiffness through modest reductions in blood pressure among adults with stage 1 HTN/elevated blood pressure and thus help reduce future CVD burden.

Table 1: Changes in blood pressure and large artery stiffness after 12 wksAET vs CON (mean±SD)

	CON (n=9)		AET (n=14)	
	Baseline.	12-wk.	Baseline.	12-wk
Brachial mean BP (mmHg)^	96±9.	100±8	100±8	98±9
Carotid systolic BP (mmHg)*	122±12	127±11	124±13	126±14
Carotid PWV-β(cm/s)	590±97	572±70	597±55	582±70
cfPWV (cm/s)^	747±83	821±164	816±183	800±141

BP, blood pressure; PWV, pulse wave velocity; cf, carotid-femoral. ^Interaction effect, p=0.06; *time effect, p<0.05.

Board 2

POST EXERCISE MICROVASCULAR RESPONSIVENESS AFTER REPEATED PASSIVE STRETCHING

Lukas Bekkedal, Sarah A. Fenn., Macy Luff, Andrew Holliday, Connor Lisowski, Grace Johnson, Andrew R. Jagim, Jacob T. Caldwell, University of Wisconsin-La Crosse La-Crosse WI

INTRODUCTION: Passive stretching has been shown to create improvements in shear stress that may act to protect exercise induced vasodilation. Unfortunately, studies have yet to show an understanding of how the muscle microvasculature is impacted after stretch. The current study investigated the effects of repeated passive muscle calf stretching and its effect on microvascular responsiveness after treadmill exercise. We hypothesized that passive stretching would improve microvascular responsiveness after treadmill exercise and be impaired in the control group. **METHODS:** 18 males and females underwent a single lab visit to assess repeated passive stretching on the microvascular responsiveness. To perform passive stretching, each participant had a splint device placed on each foot followed by a 5-minute constant stretch, 5-minutes of relaxation, and repeated 4 times through. Microvascular responsiveness was measured during three vascular occlusion tests (VOT). Time points measured consisted of a VOT pre-stretch, VOT post-stretch, and a VOT post-treadmill exercise. Participants were placed in either the sham-control group, no discomfort, or performed passive stretching to moderate discomfort. Following the stretching protocol, participants completed a treadmill test as a means to calculate 60% peak oxygen uptake. The participants then completed 30-minutes of treadmill exercise at 60% VO2 peak. Near Infrared Spectroscopy (NIRS) was placed on the lateral head of the gastrocnemius throughout testing. A 2-way ANOVA group (sham vs. stretch) by condition (pre vs. post) was performed to compare differences at ($p<0.05$). **RESULTS:** The NIRS slope 1 was not significantly different at rest or after passive stretching ($p>0.05$); however, this was elevated after exercise in both groups ($p<0.01$). We found no significant difference in the NIRS slope 2 response after treadmill exercise ($p>0.05$). **CONCLUSION:** This investigation suggests that in a healthy, college aged population, passive stretching does not appear to improve microvascular responsiveness. However, this technique should be considered more in clinical populations where microvascular responses are not normal. This may be due to the study being done in a healthy population but further research will need to be performed to fully understand this concept.

Board 3

DAY-TO-DAY RELIABILITY OF ARTERIAL STIFFNESS FOLLOWING A BOUT OF RESISTANCE EXERCISE IN HEALTHY YOUNG FEMALES

Wesley T. Blumenburg, Amy E. Boettcher, Kayla M. Soave, Katharine D. Currie, Michigan State University, East Lansing MI

BACKGROUND: Various public health guidelines advocate incorporating aerobic and resistance exercise (RE) to improve health and decrease arterial stiffness. While it is understood that regular aerobic exercise can reduce arterial stiffness, the effects of RE on the vasculature are equivocal. Both increases and decreases in arterial stiffness have been observed following acute RE, and paucity in the literature exists on the day-to-day reliability of these acute arterial stiffness changes. PURPOSE: To determine if arterial stiffness responses following a single bout of RE demonstrate substantial day-to-day reliability in healthy young females. **METHODS:** Eight non-resistance trained females (23±3 years) participated in two 60-min full body RE sessions with a 7-min aerobic warm-up and cooldown on separate days. During each session, arterial stiffness (i.e., carotid-femoral pulse wave velocity; cf-PWV) was measured at baseline (pre-RE) and for 60-min post-exercise (post-RE) in 15-min intervals. To examine the change in cf-PWV during the post-RE period, we calculated AUC by plotting the post-RE cf-PWV values, setting pre-RE cf-PWV as the baseline and determining the total AUC above and below baseline. Test-retest reliability of pre- and post-RE cf-PWV and AUC from the two sessions were assessed using coefficients of variation (CV) and intraclass correlation coefficients (ICC); an ICC >0.60 was considered substantial reliability. **RESULTS:** cf-PWV

demonstrated substantial reliability at pre-RE [ICC: 0.72, 95% confidence intervals (CI): -0.43-0.95; CV: 4.9%] and post-RE at 45 (ICC: 0.63, 95% CI: -0.87-0.93; CV: 8.1%) and 60-min (ICC: 0.72, 95% CI: -0.41-0.94; CV: 7.4%), but moderate reliability (ICC 0.41-0.60) at 15 (ICC: 0.60, 95% CI: -0.99-0.92; CV: 7.4%) and 30-min (ICC: 0.59, 95% CI: -1.02-0.92; CV: 6.8%). Total AUC for cf-PWV showed poor reliability (ICC: 0.01, 95% CI: -3.96-0.80). **DISCUSSION:** These preliminary findings suggest absolute cf-PWV measurements taken before and after a single bout of RE are considered reliable at most points. Our novel analysis of cf-PWV AUC, however, showed poor reliability, and therefore further investigation is needed to determine if AUC analysis is a suitable tool for vascular measurements.

Board 4

FUNCTIONAL CARDIOVASCULAR CHANGES IN RESPONSE TO ALTERED PRESSURE AND VOLUME STIMULI IN ELITE SWIMMERS

Amy Boettcher, Alexandra Coates, Christian Cheung, Trevor King, Margo Mountjoy, Jamie Burr, Katharine Currie, Michigan State University, East Lansing MI

BACKGROUND: Cardiac adaptations in response to chronic exercise training are attributed to repetitive pressure and/or volume overload. Sprint/strength athletes are more exposed to pressure overloads while endurance athletes are more exposed to volume overloads. Consequently, the athlete's heart phenotype can vary based on competition distance and/or sport modality. Recent research has examined whether there are differences in how the heart responds to pressure and volume stimuli in land-based strength and endurance-trained adults. This study sought to extend these observations to elite swimmers that vary in competition distance. **PURPOSE:** To determine if left ventricular systolic and diastolic function responded differently to pressure and volume stimuli in short-distance (ShD) and long-distance (LD) elite swimmers. **METHODS**: Swimmers were grouped as ShD (n=32, 74% male, 23±4 years, events <1500m) and LD (n=11, 64% male, 22±3 years, events ³1500m). Echocardiography images were captured in the left lateral decubitus position at rest and during a pressure [submaximal isometric handgrip (IHG)], and volume (seated position) stimulus. Images were analyzed to determine systolic (heart rate, stroke volume, cardiac output) and diastolic [peak early transmitral (E) and mitral annular (E') velocities, and E/E'] function. The change in each variable during the two stimuli relative to rest was calculated (ΔIHG=IHG-rest; ΔSEAT=seated-rest), and compared between groups using Mann- Whitney U tests with significance set at P<0.05. **RESULTS:** The ΔIIHG and ΔSEAT for all systolic and diastolic variables were similar between groups. There was a trend for ΔIHG E and E/E' (both P=0.07). During IHG, LD increased E [median and interquartile range (MED and IQR): 8.3, -3.3-20.0 cm/s] while ShD decreased E (MED and IQR: -6.7, -17.0-6.3 cm/s), and both increased E/E' but to a greater extent in LD (MED and IQR: 0.95, -0.31-1.58) compared to ShD (MED and IQR: -0.03, -0.51-0.73). **DISCUSSION:** These preliminary results indicate that regardless of competition distance, left ventricular function in ShD and LD swimmers responds similarly to changes in pressure and volume. Additional investigation is warranted, however, to further elucidate the changes in diastolic function in response to a pressure stimulus in these athletes.

Board 5

BILATERAL AND UNILATERAL UPPER-BODY RESISTANCE EXERCISE ON MEASURES OF PULSE WAVE REFLECTION AND LEFT VENTRICULAR FUNCTION

Gretchen Elsey, Stacie M. Humm, Michelle M. Kern, Anthony G. Pinzone Emily K. Erb, Erica M. Marshall, J. Derek Kingsley FACSM, Kent State University, Kent OH

PURPOSE: To evaluate measures of pulse wave reflection and left ventricular function following bilateral (BL) and unilateral (UL) upper-body resistance exercise. **METHODS:** Seventeen resistance-trained individuals (Mean±SD: 23±3yrs) were assessed for measures of pulse wave reflection (brachial and aortic blood pressures (BP), augmentation pressure (AP), the augmentation index (AIx), and the AIx normalized at 75bpm (AIx@75)) as well as measures of left ventricular function (left ventricular wasted energy (ΔEw) and the subendocardial viability ratio (SEVR)). Data were collected at Rest, 10-, and 30-min following BL and UL conditions. The BL condition consisted of 4 sets of 5 reps on the dumbbell (DB) bench press and 4 sets of 10 reps on the DB biceps curl. During the UL condition, participants completed all reps in both limbs. Two-way repeated measures ANOVAs were used to analyze the effects of the BL and UL condition across time on all measures with a Bonferroni correction. **RESULTS:** There were significant main effects of time for heart rate (HR, $p \leq 0.001$),

brachial diastolic BP (bDBP, $p \leq 0.001$), aortic diastolic BP (aDBP, $p \leq 0.001$), AP ($p \leq 0.001$), AIx ($p \leq 0.001$), AIx@75 ($p \leq 0.001$), ΔEw ($p \leq 0.001$), and SEVR ($p \leq 0.001$) but no significant effects for brachial or aortic systolic BP. HR significantly decreased from 10 to 30 min, but still remained above Rest. Additionally, there was a significant decrease in bDBP at 10 and 30 min compared to Rest, in addition to a significant increase in bDBP from 10 to 30 min, which remained below Rest. There was a significant decrease in aDBP and SEVR such that they were decreased at both 10 and 30 min compared to Rest. Additionally, there a significant increase in aDBP, and SEVR from 10 to 30 min such that they remained below Rest. Additionally, there was a significant increase in AP, AIx, AIx@75bpm, and ΔEw such that they were significantly increased at 10 and 30 min compared to Rest. There was a significant decrease in AP, AIx, AIx@75bpm, and ΔEw from 10 to 30 min. Though, these measures significantly decreased from 10 to 30 minutes such that they were similar to Rest. **CONCLUSIONS**: This study suggests that unilateral upper-body resistance exercise does not seem to be an appropriate modality to reduce pulse wave augmentation and increased work of the left ventricle compared to bilateral upper-body resistance exercise.

Board 6

RESISTANCE EXERCISE ALONE OR WITH CAFFEINE ON MEASURES OF ARTERIAL STIFFNESS

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PURPOSE: Resistance exercise (RE) has been shown to alter brachial blood pressure and measures of arterial stiffness, however, the impact of RE in conjunction with caffeine on arterial stiffness is unknown. The purpose of this study is to examine differences in alterations in blood pressure and arterial stiffness at rest, following the consumption of a caffeine supplement (CAFF) or placebo (PLA), and during recovery from a fatiguing bout of RE in resistance-trained women. **METHODS:** Eleven young, resistance-trained women (Mean±SD: Age: 24±4yrs) volunteered to participate in a counterbalanced, double blind, placebo-controlled, crossover-design study. Participants consumed 4mg/kg of caffeine, or PLA. Applanation tonometry was utilized to assess arterial stiffness via carotid-femoral pulse wave velocity (cf-PWV). Blood pressure and cf-PWV were measured at baseline (Rest 1), 30 minutes after consuming caffeine/placebo (Rest 2), immediately post-RE (Rec 1), and 10 minutes post-RE (Rec 2). The RE consisted of two sets of 10 repetitions at 75% 1-repetition maximum (1RM), and one set of repetitions until failure at 70% 1RM for squat and bench press, with two minutes of rest between sets and exercises. A 2x4 two-way analysis of variance (ANOVA) was utilized to assess the effects of condition across the repeated measure of time. **RESULTS:** There was no significant difference in the total performance volume within conditions (CAFF: 3930±488kg, PLA: 3907±503kg). There were no significant interactions or main effects of time ($p>0.05$) for brachial systolic (CAFF: Rest1: 112±6mmHg, Rest2: 117± 8mmHg, Rec1: 119± 9mmHg, Rec2: 112±6mmHg; PLA: Rest1: 112±6mmHg, Rest2: 114±9mmHg, Rec1: 116±9mmHg, Rec2: 114±7mmHg) or brachial diastolic blood pressure (CAFF: Rest1: 66± 6mmHg, Rest2:71± 6mmHg, Rec1: 67± 6mmHg, Rec2: 65± 6mmHg; PLA: Rest1: 66± 5mmHg, Rest2: 67± 6mmHg, Rec1: 67± 5mmHg, Rec2: 65± 5mmHg) as well as for cf-PWV (CAFF: Rest1: 5.2±0.5m/s, Rest2: 5.3±0.4m/s, Rec1: 5.5±0.9m/s, Rec2: 5.5±0.8m/s; PLA: Rest1: 5.2±0.8m/s, Rest2: 5.0±0.4m/s, Rec1: 5.5±0.8m/s, Rec2: 5.6±0.9m/s). **CONCLUSIONS:** Changes in brachial blood pressure and arterial stiffness following a fatiguing bout of RE do not differ when in conjunction with 4mg/kg caffeine compared to placebo in resistance-trained women.

Board 7

CARDIORESPIRATORY FITNESS AND INCIDENT HYPERTENSION IN HEALTHY MEN AND WOMEN FROM THE BALL ST COHORT

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Cardiorespiratory fitness (CRF) has been associated with future risk of hypertension (HTN); however, this relationship has not been examined in apparently healthy cohorts that include both men and women. **PURPOSE:** Examine the relationship between directly measured CRF and incident HTN in apparently healthy men and women. **METHODS:** The sample included 749 individuals (476 males, 273 females) with mean age 42 +/- 11 yr from the Ball State Adult Fitness Longitudinal Lifestyle Study (BALL ST) who completed a maximal cardiopulmonary exercise test for the assessment of CRF (i.e., VO2max) and cardiometabolic risk factor assessment. Cox proportional hazard models were performed to assess the relationship between CRF and incident HTN. Models were performed using CRF as a continuous variable and as a categorical variable based on age and sex-adjusted percentiles from the Fitness Registry and the Importance of Exercise National Database (low CRF: <34th %tile; average CRF: 34th-66th %tile; high CRF: >66th %tile). **RESULTS:** A total of 212 participants (28% of sample) developed HTN during a follow-up period of 10.0 +/- 9.3 yr. CRF was associated ($P<0.05$) with incident HTN (hazard ratio [HR], 95% confidence interval [CI]: 0.977, 0.954-0.982) even after controlling for age, sex, and test year but not after further controlling for traditional risk factors (obesity, dyslipidemia, diabetes, physical activity, and smoking) (HR, 95% CI, 0.983, 0.961-1.006). Further, individuals with average CRF (HR, 95% CI, 0.594, 0.408-0.865, $P<0.05$) and high CRF (HR, 95% CI, 0.566, 0.392-0.819, $P<0.05$) were less likely to develop HTN compared to those with low CRF. **CONCLUSION:** These data support the important role of CRF in preventing the development of HTN. Additional large cohort studies are needed to comprehensively assess potential sex differences in these relationships.

Board 8

ANTIHYPERTENSIVE MEDICATIONS AND PEAK EXERCISE BLOOD PRESSURE RESPONSE

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An excessive rise in systolic blood pressure (SBP) during exercise is linked to increased risk of cardiovascular disease (CVD). Hypertensive individuals are more likely to have an exaggerated SBP response to exercise. However, research is limited on the impact of antihypertensive medication use on the exercise blood pressure response. **PURPOSE:** To determine if individuals on antihypertensive medications (excluding beta-blockers) have a normal blood pressure response to maximal exercise compared to unmedicated individuals. **METHODS:** Participants included 2,555 apparently healthy adults from the Ball State Adult Fitness Longitudinal Lifestyle STudy (BALL ST) cohort. Participants were divided into groups by sex and antihypertensive medications status (Male medicated, Male unmedicated, Female medicated, Female unmedicated). A 2-way analysis of covariance (Sex x Medication Status) was used to assess peak SBP between groups. A chi-squared test was used to determine the prevalence of exaggerated and blunted responses within each group using the Fitness Registry and the Importance of Exercise: A National Database (FRIEND) and absolute criteria (FRIEND Exaggerated ≥90th percentile, Blunted ≤10th percentile; Absolute exaggerated >210mmHg for men and >190mmHg for women, Blunted <140mmHg). **RESULTs**: Peak SBP was higher in medicated compared to unmedicated subjects ($p<0.01$) in the overall cohort when controlling for age and resting SBP. When men and women were assessed independently, peak SBP remained higher in the medicated women compared to unmedicated women ($p<0.05$), however the difference in peak SBP between medicated and unmedicated men was not significant after controlling for age and resting SBP ($p=0.31$). Further, the unmedicated group had a greater prevalence of blunted SBP responses, whereas the medicated group had a higher prevalence of exaggerated SBP responses using both the FRIEND and absolute criteria. **CONCLUSION:** Individuals on antihypertensive medications had a higher prevalence of an exaggerated peak SBP response than unmedicated. Given the prognostic value of exaggerated peak SBP, individuals on antihypertensive medications should be monitored closely during peak exercise to lower risk of an adverse cardiovascular event.

Board 9

IMPACTS OF PARKINSON'S DISEASE AND EXERCISE ON SKELETAL MUSCLE MITOCHONDRIAL FUNCTION

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INTRODUCTION: Habitual exercise programs have been shown to have positive effects on mitochondrial function. Mitochondrial function can be non-invasively assessed using a near-infrared spectroscopy (NIRS) assessment that measures the NIRS recovery rate constant. **LITERATURE REVIEW:** Patients diagnosed with Parkinson's Disease (PD) have been reported to have lower levels of parkin, a protein that aids in mitochondrial biogenesis and mitophagy of dysfunction mitochondria. **RESEARCH QUESTION:** Does skeletal muscle (forearm) mitochondrial function differ between PD exercisers, PD non-exercisers, and healthy non-exercisers? **VALUE:** Clinicians could prescribe the exercise (boxing) program to PD patients if the program positively effects skeletal muscle mitochondrial function. **METHODS:** In this initial cross-sectional study, mitochondrial function will be measured in 30 individuals (10 PD exercisers, 10 PD non-exercisers, and 10 healthy non-exercisers) using the NIRS assessment. Subjects will perform 15-sec of maximal handgrip exercise and then passively rest as intermittent occlusions (250 mmHg) are applied to their upper arm and NIRS responses are measured from the flexor digitorium superficialis. Raw NIRS data will be corrected for blood volume changes and the linear slopes during each intermittent occlusion will be identified. NIRS recovery rate constants will then be determined by fitting an exponential decay function to the linear slope versus time graph. Subjects will then perform a submaximal cycling test to assess aerobic capacity and be asked to wear an activity monitor for seven days to record their daily stepping activity. One-way analysis of variance will be used to examine if differences in the NIRS recovery rate constant or aerobic capacity exists between groups. The aerobic capacity and activity monitor data will be used to help confirm the activity level (exerciser versus non-exerciser) of the subjects. **PROJECTED LIMITATIONS**: Due to the cross-sectional research design, we will not be able to demonstrate the within subject changes that the exercise (boxing) program might have on mitochondrial function.

Board 10

CARDIORESPIRATORY FITNESS AND CHANGE IN PULSE PRESSURE IN HEALTHY ADULTS FROM THE BALL ST COHORT

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Widening of pulse pressure with age is associated with arterial stiffening and increased risk of cardiovascular disease. High cardiorespiratory fitness (CRF) is associated with lower age-related arterial stiffening, but the relationship between CRF and change in pulse pressure over time has not been examined in cohorts that include both men and women. **PURPOSE:** Examine the relationship between directly measured CRF and change in pulse pressure over time in apparently healthy men and women. **METHODS:** The sample included 749 normotensive (resting blood pressure <140/80 mmHg and unmedicated for blood pressure) individuals (476 males, 273 females) with mean age 42+/-11 yr. from the Ball State Adult Fitness Longitudinal Lifestyle Study (BALL ST) who completed a maximal cardiopulmonary exercise test for the assessment of CRF (i.e., VO2max) and cardiometabolic risk factor assessment. Linear regression analysis was performed to assess the relationship between baseline CRF and the change in pulse pressure over time. Models were performed using CRF as VO2max (ml/kg/min) and as percentile based on age and sex-adjusted normative values from the Fitness Registry and the Importance of Exercise National Database (FRIEND). **RESULTS:** The change in pulse pressure was calculated over a follow-up period of 10.0+/-9.3 yr. CRF expressed as VO2max was related to the change in pulse pressure in the univariate model ($r = -0.123$, $P<0.05$) and after adjusting for age, sex, follow-up years, and test year ($r = -0.117$, $P<0.05$) but not after further controlling for traditional risk factors (obesity, dyslipidemia, diabetes, physical activity, and smoking) ($r = -0.147$, $P>0.05$). CRF expressed as FRIEND percentile was associated with the change in pulse pressure ($r = -0.066$, $P<0.05$), even after adjusting for age, sex, follow-up years, test years, and traditional risk factors. **CONCLUSION:** These data suggest the cardioprotective effects of CRF are mediated, at least partially, through reducing arterial stiffening and widening of pulse pressure with aging.

Board 11

SINGLE LIMB PASSIVE MOVEMENT RESPONSES AFTER ELECTRICAL STIMULATED CONTRACTIONS OF THE KNEE EXTENSORS

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PURPOSE: The investigation involved quantifying changes in blood flow of femoral artery after electrical stimulated (ES) contractions of the knee extensors. **METHODS:** Six recreationally active men and women (26.2 ± 2.1 yrs.; 178.2 ± 6.5 cm; 75.4 ± 8.3 kg) participated in this study that required 3 visits. Participants completed 40 isometric contractions, with ES parameters set at 75 Hz, 400μs, and contractions lasting 6 sec. followed by 20 sec. of rest. Participants were seated in a custom built chair equipped with a linear force transducer. Two sets of two sticky electrodes were placed over the anterior aspect of the thigh with two positive electrodes being positioned over the muscle bellies of the vastus lateralis and rectus femoris, and two negative electrode placed 5 cm below the inguinal ligament. Maximal muscle strength (MVC), perceived soreness (VAS), peak blood flow (pBF), change in flow (BFdiff), and hyperemia (AUC) were assessed after resting blood measures. All assessments occurred prior to exercise (baseline) and then 1-,24-, and 48-h post contractions. For blood flow measures, subjects were seated in an upright position with knees fully extended (180°). Superficial femoral blood velocity was measured for 30 s utilizing a GE Logiq 7 ultrasound. Paired samples t-tests were performed to determine significant differences in MVC, VAS, pBF, BFdiff, and AUC before and after the muscle contractions at an alpha level equal to 0.05. Specific force was also calculated for each participant. **RESULTS:** MVC was significantly lower from baseline to 24h; 15.26 ± 2.4 N vs. 12.41 ± 2.2 N, $p > 0.01$, and from baseline to 48h; 15.26 ± 2.4 N vs. 12.8 ± 2.4 N, $p = 0.18$. Perceived soreness was significantly higher from baseline to 24h; 1.5 ± 3.7 mm. vs. 20.3 ± 12.3 mm., $p = 0.01$, from baseline to 48h; 1.5 + 3.7 mm. vs. 25.6 ± 13.2 mm., $p = 0.05$, and between 24h and 48h; 20.3 ± 12.3 mm. vs. 25.6 ± 13.2 mm., $p = 0.04$. There were no significant differences in, pBF, BFdiff , or AUC from baseline up through 48h, $p > 0.05$. **CONCLUSION:** ES isometric contractions reduced knee extensor strength and increased perceived soreness up to 48 h, but did not statistically result in changes in blood flow. Thus, vascular function assessed via single leg passive movement, was not influenced by ES contractions that reduced muscle strength and increased soreness over two days.

Board 12

BALANCE TESTING FOR PATIENTS WITH TYPE 2 DIABETES

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PURPOSE: Type 2 Diabetes (T2D) has shown to cause deficits in postural control due to such complications as peripheral neuropathy and retinopathy. The Modified Clinical Test of Sensory Integration in Balance (mCTSIB) may disambiguate the proprioception, visual, and vestibular aspects of postural control. The implementation of postural control assessments in a clinical setting that are easily accessible and provide quantifiable data has been limited. The purpose of this study is to investigate the viability of using a portable balance plate to assess postural control of patients with T2D in a clinical setting, using the mCTSIB protocol. **METHODS:** 10 participants with T2D (mean age 53.55±10.58) were recruited from a general physician's office. Patients outside of the age 18-64 years old, outside the blood glucose range of 80-250 mg/dL, who could not stand without assistance, or had any non-diabetes related neurological diseases were excluded from the study. Participants completed the mCTSIB protocol within four 20 s static trials each with different sensory conditions: Standard, Proprioception, Vision, and Vestibular. Center of Pressure path length (PL) was calculated for each condition to quantify postural control. The resulting PL values were compared to existing normative data within healthy individuals in the same sex and age range. **RESULTS:** It was found that participants with T2D on average had larger amounts of sway (i.e. increase PL) and consistently scored below the 50th percentile. Female participants showed a better performance than males in each condition except for the proprioception condition (10th-20th percentile). Male participants scored between the 20th-30th percentile in all categories and females scored between the 40th-50th in the vision condition and the 30th-40th for the vestibular condition. **CONCLUSION:** This data was able to be collected with minimal problems and aligns with the current understanding that people with T2D have reduced postural control. This suggests that the use of the mCTSIB on a portable balance plate is a viable and convenient way to assess postural control of T2D patients in a clinical setting. The exclusion of participants with a blood glucose above 250 mg/dL (based on the American Diabetes Association's guidelines) disallowed several viable participants; it is recommended that this limit be reconsidered for future studies. Advancements in quantified posture analysis could lead to physicians and patients being better informed and allow for more precise patient-centered therapy.

Board 13

THE EFFECTS OF HEAT AND HYDRATION ON OTHROSTATIC TOLERANCE

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PURPOSE: There is a vast pool of data surrounding orthostatic tolerance; however, there is not much data including heat and hydration simultaneously with orthostatic tolerance. Therefore, the purpose of this study is to observe the effects of fluid loading on autonomic function and orthostatic tolerance during acute heat stress. **METHODS:** Five men and one woman (23.17 ± 3.19yrs) participated in this study. Following assessment of hydration status via urine specific gravity, participants were assigned to a condition (EU - euhydrated; HH - hyperhydrated). On the HH collection day, the participants consumed one liter of oral rehydration solution (ORS) containing 20 g glucose, 90 mEq/L Sodium, and 20 mEq/L Potassium mixed in 1L of water. The participants were passively heated until core temperature increased 1°C. Autonomic function was assessed by completing deep breathing, Valsalva maneuver, and tilt-table testing. Differences between HH and EU trials were analyzed using a paired T-test. **RESULTS:** Significant findings were observed in the difference between EU and HH respiratory sinus arrhythmia (9.21 ± 1.49bpm & 16.78 ± 3.96 bpm), Valsalva ratio (1.35 ± 0.22 & 1.60 ± 0.41), tilt time (3.84 ± 5.57 min.& 7.98 ± 7.31 min.), baseline plasma volume (59.77 ± 3.15 mL & 66.67 ± 2.35 mL), and heated baseline plasma volume (57.60 ± 4.45 mL & 65.20 ± 6.42 mL) with the HH variables all being at a higher value than that of the EU variables ($p < 0.05$). **CONCLUSION:** The use of an ORS can alleviate some of the declinations to autonomic functioning during combined orthostatic and heat
stress.

Board 14

DIRECT AND INDIRECT EFFECTS OF THE COVID-19 PANDEMIC ON HEALTH AND SOCIETY: A LITERATURE REVIEW

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INTRODUCTION: To date, there have been over 560 million cases and 6 million deaths of COVID-19 reported worldwide. Accordingly, it is imperative to understand the effects COVID-19 on physiological function and human health. It is also important to consider ways in which the pandemic has altered health independent of COVID-19. Literature Review: For example, many health behaviors have worsened during the pandemic including negative changes in diet, physical activity levels, body weight, smoking habits, sleep, and mental health. Even with certainty about no prior infection, it cannot be assumed that individuals are unaffected by the pandemic. Additionally, society is dealing with several co-existing pandemics. Indeed, several authors have described the synergistic effects between the COVID-19, physical inactivity, and non-communicable disease pandemics as a syndemic. Consequently, the outlook ahead is not good as society will be dealing with direct and indirect effects of these pandemics for the foreseeable future. **RESEARCH QUESTIONS:** We will perform a mini literature review to answer the question "What are the direct and indirect effects of COVID-19 on human health and society?" **VALUE:** Based on this review summarizing the direct and indirect effects of COVID-19 on health and society, a theoretical framework will be developed leveraging the Healthy Living for Pandemic Event Protection (HL-PIVOT) model to reinforce the critical role of promoting and facilitating healthy living behaviors to build resilience in the population during COVID-19 and beyond. **METHODS:** Specifically, a literature search will be carried out from November 2019 to present day using two electronic databases: PubMed and Google Scholar. The search will be conducting using several keywords such as "SARS-CoV-2 infection", "COVID-19", "physiology and pathophysiology", "health behaviors", "pandemic", "syndemic", and "healthy living". Only studies published in English will be selected. Project Limitations: A limitation is that this mini review, compared to a systematic review, will not provide high level evidence to draw specific conclusions. **SUMMARY:** Our broad-based findings and general recommendations will facilitate discussion of how to move forward during a critical time as society manages numerous worldwide public health risks.

Board 15

THE EFFECT OF PRE-SEASON TRAINING ON AEROBIC POWER IN CLUB ROWERS

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PURPOSE: This study aims to identify what rowing performance variables are most impacted by an individualized training protocol and quantify them through a self-designed maximal aerobic capacity testing modality and measurement of anthropometric measures before and after training in the pre-season. Data concluded from this study aims to expand the limited realm of scientific rowing literature by providing evidence of how a tailored training protocol can boost performance of collegiate rowers by aiming to increase their absolute aerobic capacity, increasing their ability to achieve a higher total distance (TD), test length (TL), total watts (TW), higher peak stroke rate (SR), and higher skeletal muscle mass (SMM) and lower body fat post training. **METHODS:** Nine collegiate rowing volunteers [6 males, 3 females; 20.9yrs ± 1.3] participated in body-comp assessment (BIA) [Wt = 78.8kg ± 14.9] [SMM = 36.5kg ± 8.5], as well as performed a maximal intensity testing protocol on a rowing ergometer to measure total aerobic capacity before and after a 12-week training program. The athletes were tasked with training 4 days per week, and the types of training they performed was documented. The exercises these athletes completed during the program were based on individual maximal heart rate which was determined from participants' VO2Max test. Time spent training was converted to MET-Minutes in order to quantify training volume. **RESULTS:** Compared to pre-training, participants saw mean increase in absolute VO2Max (0.15L, p = 0.01), relative VO2Max (1.025ml/kg/min, p = 0.08), SR (.729 s/m, p = 0.026), TW (.86W, = 0.076), TL (54s, p = 0.03), TD (139.13m, p = 0.002), and SMM (1.013kg, p = 0.004). Total weight decrease of participants was also observed. (Wt = -.481kg, p = 0.109) There was a slight correlation determined between total MET-min training and increase in an individual's VO2Max (p = .322). **CONCLUSION**: This data suggests that individualized pre-season training positively improves the aerobic and rowing specific performance variables necessary to excel within the sport.

Board 16

THE CARDIORESPIRATORY & PERCEPTUAL RESPONSES TO KNEE EXTENSION RESISTANCE EXERCISE

Madeline Stookey, Randal Claytor, Will Byorh, Anthony Nasca, Miami University, Oxford OH

It is of clinical interest to gain a more complete understanding of cardiorespiratory and metabolic responses to resistance exercise completed unilaterally & bilaterally. **PURPOSE:** To determine the cardiorespiratory response to an acute bout of knee extension resistance exercise (RE) completed with one-leg (1L) & two-legs (2L). RE was completed to failure with 1L & then the same volume/workrate of the RE was completed with 2L. **METHODS:** 10 male volunteers (age= 19.6+0.5; BMI=23.3+2.9; %fat=12.6+5.0; SMM=37.7+4.5) underwent anthropometric & body composition (Inbody 770) & 1L-1RM knee extension testing. At least 72 hrs later, Ss completed the 1L & 2L RE trials in a single (75% 1RM 1L) session. First, 1L RE was completed to failure, followed by 10 min of seated Rest (1L PER). Next, 2L RE was completed using the same resistance, number of reps & RE time. Following 2L RE seated Rest (2L PER) was completed for 10 min. Prior to starting the RE trials, Ss completed 6 min of seated rest. VO2, VCO2, Ve, & HR were measured continuously (Cosmed K5) throughout the Rest & RE trials. **RESULTS:** 2-way (1L RE & 2L RE; 1L PER & 2L PER) ANOVA's with repeated measures suggested there were no differences in RE T(1L=38.2+6.2 s; 2L=35.6+6.0 s), RE VO2(1L=11.6+2.1; 2L=10.9+1.2 ml/kg/min), RE HR(1L=124.8+16.9; 2L=121.8+7.8 b/min). However, 1L RE RQ(1L=1.01+0.2; 2L=0.87+0.1), Ve(1L=2.7.1+5.1; 2L=22.2+2.6l/min), VCO2(1L=865.7+148.3; 2L=686.2+81.8ml/min) & RPE(1L=7.8+0.8; 2L=4.8+0.4) were significantly greater. Also, over 10 min PER, 1L VO2(1L=7.2+0.7; 2L=6.6+0.7), RQ(1L=1.06+0.06; 2L=0.93+0.09), VCO2(1L=584.3+68.2; 2L=469.4+70 ml/min) & Ve(1L=18.9+2.4; 2L=16.2+2.5 l/min) were significantly greater, but not PER HR(1L=83+10; 2L=83.3+11 b/min). **CONCLUSIONS:** These data suggest an acute bout of knee extension RE completed at the same intensity, volume & rate results in a greater respiratory & perceptual load when completed with 1L during the RE bout. Additionally, following the RE bout with 1L there is a greater metabolic & respiratory response.

Board 17

HISTORICAL PERFORMANCE TRENDS IN WINTER ULTRA-ENDURANCE EVENTS

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PURPOSE: Winter ultra-endurance events provide some of the most difficult challenges in human-powered performance. For these events, competitors travel on snow-covered terrain via foot, ski, or bike. To date, there are no reports that document which mode of locomotion consistently yields the fastest finish times. Our purpose was to

compare race performance (number of finishers, finish times) across these three locomotive modes (foot, ski, and bike) for two ultra-endurance events. **METHODS:** Number of finishers and finish times from the Arrowhead 135 (Minnesota) and Iditarod Trail Invitational (ITI) 350 (Alaska) mile events were extracted between the dates of 2002-2022 using publicly available data. Times of the top three participants in each category (when available) were averaged and used for analysis. Differences in finish times between locomotive modes were analyzed using a one-way ANOVA. Changes in finish times over event history were analyzed using multiple linear regression. **RESULTS:** For the Arrowhead 135, the average number of finishers was 40±23 bike, 20±15 foot, and 3±3 ski. Finish times for bike (18±6 hrs) were faster than those for foot (43±7 hrs) and ski (41±11 hrs) (both $p<0.001$), however, finish times for foot and ski did not differ ($p=0.54$). Event year was a significant predictor of finish time ($p<0.001$), but there was no significant interaction of event year by locomotive mode ($p=0.37$). For the ITI 350, the average number of finishers was 20±9 bike, 9±4 foot, and 2±2 ski. Finish times for bike (97±47 hrs) were faster than those for foot (163±31 hrs) and ski (174±31 hrs) (both $p<0.001$), however, finish times for foot and ski did not differ ($p=0.34$). Event year was a significant predictor of finish time ($p<0.05$), but there was no significant interaction of event year by locomotive mode ($p=0.15$). **CONCLUSION**: In the last two decades, finish times for the Arrowhead 135 and ITI 350 have decreased when completed via foot, ski, and bike suggesting a general improvement in training and/or technology. Bicycling has consistently yielded the most finishers and the fastest times in both events and represents the superior mode of transport when time is the objective. This also suggests that bicycling is the more efficient mode of locomotion which has implications for areas as diverse as sport and extraterrestrial locomotion.

Board 18

BUILDING MASS AND BULKING-UP - BODY COMPOSITION CHANGES IN COLLEGIATE FOOTBALL PLAYERS ACROSS FOUR SEASONS

Tyler Werth, Sarah Rogers, Gloria Martinez-Perez, Landin Mitchell, Emily Dodge, Valerie Smith-Hale, Cody Vargo, Ruben Mendoza, Tamara Hew-Butler FACSM, Wayne State University, Detroit MI

PURPOSE: To evaluate longitudinal changes in body composition in National Collegiate Athletic Association Division 2 (NCAA D2) American football players tested annually over four seasons. Our primary question was how much lean mass could college football players gain, over time and training. **METHODS**: Members of a NCAA D2 American football team underwent annual body composition testing using a dual energy x-ray absorptiometry (DXA) scanner (Hologic, Horizon A TBAR 1209). Serial scans were obtained during August football camp. Twenty-seven players were scanned 3 times over 4 years (2019; 2021; 2022, excluding 2020 because of the pandemic) and included in longitudinal analyses. Players were subdivided into three position groups: BIGS (linemen); SKILLS (wider receivers, running backs, safety and corners) and COMBO (all others) to assess positional group differences using 1-way ANOVA. Data expressed as means±SD with statistical significance set at $p<0.05$. **RESULTS**: 27 players (age=22±0.9years; BMI=30.2±5.5kg/m2 in 2022) included 13 BIG, 9 SKILL, and 5 COMBO players. On average, increases in bone mineral density (0.04±0.04g/cm2; 3%), lean mass (3.3±2.4kg; 4%), fat mass (0.3±2.9kg; 1%) and total mass (3.6±4.7kg; 3%) were seen with an overall decrease in body fat percent (-0.4±1.8%; 0.3%) over time (Change = 2022 minus 2019 values). No significant body compartmental Change (longitudinal) differences were seen between the three position groups, although cross-sectional (2022) differences were seen in bone mineral content ($F=3.78;p=0.03$), lean mass ($F=34.14;p<0.0001$), fat mass ($F=16.69;p<0.0001$), total mass ($F=28.83;p<0.001$) and body fat% ($F=12.75;p=0.0001$), with BIGS significantly larger than SKILL players. Changes in lean mass were positively correlated with Changes in both total mass ($r=0.83;p<0.001$) and fat mass ($r=0.53;p=0.004$) but not with Changes in bone mineral density ($r=0.16;p=0.44$). **CONCLUSION:** A structured collegiate football training program is anabolic over time, with an average increase of ~7lbs of lean mass seen with negligible (<1lb) increases in body fat over a typical 4-year career. Football training is also osteogenic, with ~3% increases in BMD noted over time and training. Any potential confounding effects of pandemic-induced training disruptions remain unclear.

Board 19

BODY COMPOSITION, STRENGTH METRICS AND DEPRESSION SCORES IN COLLEGIATE FOOTBALL PLAYERS ACROSS A PANDEMIC

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PURPOSE: To 1) assess if a summer training attendance threshold exists which maintains favorable body composition in collegiate football players and 2) explore relationships between body composition variables with strength metrics and depression scores following 2-years of pandemic training and lab testing disruptions. **METHODS:** 50 Collegiate football players underwent whole-body body composition analyses, using a dual energy x-ray absorptiometry (DXA) scanner, in August 2019 (pre-pandemic) and in August 2021 (post-pandemic). Summer training resumed in 2021, where attendance was recorded and strength metrics (power clean, bench press, squat) assessed. Post-pandemic depression scores were assessed using the CESD-R scale, prior to the DXA scan. Non-paired t-tests were used to assess body composition changes in players who attended <50% versus ≥50% of summer training sessions. Relationships between body composition (fat percent/%, lean mass, and bone mineral density/BMD) versus strength metrics and depression scores were assessed using Pearson's r. Data expressed as mean±SD with significance set at $p<0.05$. **RESULTS:** Thirty-one of fifty players attended ≥50% of summer training sessions and gained less body fat% compared with players who attended <50% of summer training sessions (0.1±1.4 vs. 1.4±2.0%;$p<0.05$), across the 2-year pandemic disruption. In 2021, negative relationships were noted between depression score vs. both power clean ($r=-0.35$;$p=0.04$) and bench press ($r=-0.39$;$p=0.04$) while positive relationships were noted between power clean vs. lean mass ($r=0.68$;$p<0.001$) and BMD ($r=0.45$;$p<0.01$); squat vs. lean mass ($r=0.86$;$p<0.001$), body fat% ($r=0.68$;$p<0.001$), and BMD ($r=0.42$;$p<0.05$); and bench vs. lean mass ($r=0.80$;$p<0.001$), body fat% ($r=0.51$;$p<0.01$) and BMD ($r=0.48$;$p<0.01$). **CONCLUSION:** Players who attended ≥50% of summer training sessions in 2021 maintained body fat% compared with players who attended <50% of sessions, across a two-year pandemic hiatus. Strength metrics (i.e., higher power clean and bench press scores) were associated with lower depression scores while stronger players had more fat, lean, and bone mass at one point in time (cross-sectional analyses) rather than across time (longitudinal analyses, across the pandemic), per correlation analyses.

Board 20

DO ATHLETES WITH PRIOR CONCUSSIONS PRESENT WORKING MEMORY AND BALANCE DEFICITS USING VIRTUAL REALITY TECHNOLOGY?

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PURPOSE: To evaluate if athletes with prior concussions present working memory and balance deficits using virtual reality technology. **METHODS:** Twelve individuals (18 - 24yrs) were assigned to three groups; no concussions (Control; n = 7), 1 concussion (OC; n = 2), and 2 or more concussions (TC; n = 3), and completed both a virtual reality (VR) memory capacity and balance assessment. To assess memory via VR, participants completed four different boulder climbing routes (BCR), which were timed, and also scored out of a total of 40 points. The VR balance assessment was completed via a stationary tightrope walk with varying levels and was scored out of a total of 30 points. For all testing, one point was deducted for each error, therefore higher scores represent greater memory and balance. **RESULTS:** One-way ANOVA indicated there was a significant difference in course 2 BCR times between groups ($p = 0.009$), as group OC (412.0 + 11.0) had a greater time compared to the control group ($p = 0.007$, 134.29 + 94.48). A significant difference was also observed in course 3 BCR times between groups ($p = 0.022$), as group TC (246 + 0) had a greater time compared to the control ($p = 0.018$, 134.29 + 94.48). There was a significant difference in course 2 BCR errors ($p < 0.001$), as group OC (10 + 0.0) had a greater number of errors compared to the control (1.29 + 1.70; $p < 0.001$) and group TC (0.50 + 0.71; $p < 0.001$). A significant difference was observed between the BCR total score ($p = 0.001$), as group OC (22.0 + 1.4) had a significantly lower total score

than the control (p = 0.001, 35.57 + 2.51). A significant difference was also observed between groups for the total amount of BCR errors (p = 0.004), as group OC (16 + 1.4) had a greater number of total errors on all boulder courses compared to the control (p = 0.003, 4.43 + 2.51). Lastly, a significant difference was observed between the tightrope total score (p = 0.009). Group TC (6.33 + 1.53) had a significantly lower total score on the tightrope walk than the control (p = 0.001, 19.86 + 5.46). **CONCLUSION**: Individuals who have had a previous concussion had greater times and errors in the VR boulder courses as well as greater errors in the stationary VR tightrope walk. Data may suggest that individuals with a concussion suffer from memory and balance deficits. VR may be an effective tool for investigating long-term effects of concussions.

Poster Session #2: Regency Ballroom E & F, Second Floor, 9:20-10:35am

Board 1

EFFECT OF BLOOD FLOW RESTRICTION INTERVENTION ON QUADRICEP HYPERTROPHY AND FUNCTION FOLLOWING ACL RECONSTRUCTIVE SURGERY

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INTRODUCTION: Although the rehabilitation for ACL tears is roughly standardized, questions remain whether new technology, including blood flow restriction (BFR), can positively affect the outcomes. BFR is a relatively new method that has been shown to increase hypertrophy of a targeted muscle through controlled restriction of venous and arterial blood flow. No studies to date have evaluated the effect of BFR on quadricep muscular hypertrophy in conjunction with reduced time to return to play in ACL reconstructed athletes. **LITERATURE REVIEW:** BFR has been shown to create an anaerobic environment by reducing the oxygen delivery to muscle cells mimicking high-intensity training to promote muscular hypertrophy while avoiding intense mechanical stress on the joints. An anaerobic environment increases metabolic accumulations that stimulate anabolic growth factors, increases muscle protein synthesis, and fiber type recruitment. Low cuff pressure (50-150mmHg) combined with low resistance training load (20-50% of 1RM) have been shown to promote hypertrophy and increase muscular strength in healthy and post-operative individuals. **RESEARCH QUESTIONS:** 1) In a healthy adult population, does BFR increase quadricep muscular hypertrophy and reduce time to return to play as measured by MRI cross-sectional images following ACL reconstructive surgery? Value: Evaluation of these data may assist to minimize quadricep muscular asymmetry, standardize BFR protocol, and reduce time to return to play for ACL reconstructive patients. **METHODS:** Fifty healthy individuals, aged 18-25yrs, will be included in the study. Participants will be assigned to a BFR group or control group in a counterbalanced format, with the BFR group receiving restriction through a cuff during exercise and the control group receiving no restriction. Participants will be assessed first for an isolated ACL tear and surgery scheduled, then participants will undergo 16 weeks of controlled post-surgical rehabilitation, 7 days a week with 7 different exercises. Each participant will receive a baseline MRI cross-sectional quadricep measurement and a 16-week follow-up measurement. Exercises will include, isometric quadricep contraction, straight leg raise, short-arc quad, quadricep extensions, hip abduction, half-squats, and unilateral leg press. Each group will complete 4 sets of each exercise (30, 15, 15, 15 repetitions with 30 seconds interset rest) followed by 1 minute rest between each exercise with the BFR group having cuffs to limit blood flow to the quadriceps while the control group will not. **PROJECTED LIMITATIONS:** The lack of standardization of exercise protocol with BFR and the timeframe may result in a lower reliability.

Board 2

CARDIOVASCULAR RESPONSES TO A DUAL-STRESSOR TASK FOLLOWING AN ACUTE BOUT OF RESISTANCE EXERCISE IN RESISTANCE-TRAINED INDIVIDUALS

Anthony G. Pinzone, Stacie M. Humm, Gretchen E. Elsey, Emily K. Erb, Michelle M. Kern, J. Derek Kingsley FACSM, Kent State University, Kent OH

INTRODUCTION: During recovery from an acute bout of resistance exercise (ARE) there is a significant loss of vagal tone and baroreflex sensitivity (BRS). In addition, every individual has been shown to have a limited capacity to increase maximal vascular resistance mediated by adrenergic activation. **LITERATURE REVIEW:** Isometric handgrip (IHG) increases heart rate (HR) and reduces BRS. Postexercise muscle ischemia (PEMI) maintains vascular sympathetic stimulation observed during IHG while concomitantly allowing for HR recovery. The cold pressor test (CPT) also elevates sympathetic stimulation. When two autonomic stimuli are combined, the alterations in HR and BRS are greater compared to when each stimulus is provided alone. Resistance-trained individuals have been suggested to have an exaggerated hemodynamic response to PEMI, suggesting improved autonomic control. However, no studies have evaluated the effect of a dual-stressor task in conjunction with an ARE on hemodynamics, autonomic modulation, and BRS in resistance-trained individuals. **RESEARCH QUESTION:** How will a dual-stressor task in conjunction with an ARE affect hemodynamics, autonomic modulation, and BRS compared to a single-stressor task in resistance-trained individuals? Value: Evaluation of these responses may elucidate potential adverse cardiovascular effects from engaging in these autonomic stressors following ARE in resistance-trained individuals. **METHODS:** Fifty healthy individuals, aged 18-30yrs, will be recruited. After providing informed consent, and following assessment of maximal strength (1RM), participants will undergo two experimental trials in a counterbalanced format. Hemodynamic, autonomic modulation, and BRS data will be collected at rest, during, and after the stressor tasks, performed before and after the ARE. Participants will perform IHG at 30% maximal voluntary contraction for two minutes. IHG will be followed by PEMI with or without the CPT at 4º C for two minutes. The ARE will consist of 4 sets of 5 repetitions at 80% 1RM on the bench press and 4 sets of 10 repetitions at 70% 1RM on the bicep curl with two minutes of rest between sets and exercises. **PROJECTED LIMITATIONS**: The ARE protocol for the proposed investigation has low levels of external validity, however it has been shown to augment autonomic modulation.

Board 3

INFLUENCE OF SEX ON RELATIONS BETWEEN CARDIORESPIRATORY FITNESS AND CEREBROVASCULAR HEMODYNAMICS IN HEALTHY ADULTS

Krista Reed, Cynthia Weiner, Sara Mascone, Jacqueline Augustine, Kevin Heffernan, Elizabeth Lefferts, Wesley Lefferts, Iowa State University, Ames IA

Regular aerobic exercise increases cardiorespiratory fitness and exerts protective effects on the brain, however the exact mechanisms underlying this association are unclear. Cerebral hemodynamics, as assessed by blood velocity and pulsatility, are important mechanisms brain health that may contribute to the protective effects of fitness and appear subject to sex differences. **PURPOSE:** Investigate sex-specific relations of cardiorespiratory fitness (VO2peak) and cerebral blood velocity and pulsatility and their respective blood pressure components (mean arterial pressure and pulse pressure) in healthy adults across the lifespan. **METHODS:** We assessed VO2peak and cerebrovascular hemodynamics in 157 healthy adults (42±13yrs, BMI 24.5±2.7kg/m2). Middle cerebral artery (MCA) pulsatility index (PI), MCA mean velocity, mean arterial pressure, and carotid pulse pressure were assessed via transcranial Doppler and tonometry. Cardiorespiratory fitness was assessed via VO2peak during an incremental exercise test. Multiple regression was used to assess contributions of VO2peak to cerebrovascular outcomes after adjustment for relevant covariates. RESULTS: In the fully-adjusted sex-specific analyses, VO2peak was inversely associated with MCA PI among females (β=-0.39, p=0.01) but not males, and was not related to MCA mean velocity in either group. VO2peak was inversely associated with carotid pulse pressure in females (p=0.02) but not males, and was not associated with mean arterial pressure in either group. **DISCUSSION.** These data suggest that carotid pulse pressure may be a key hemodynamic mechanism underlying the beneficial inverse association between VO2peak and cerebral pulsatility in healthy females. Associations between VO2peak and cerebral blood velocity or pulsatility were absent in males and suggests regular aerobic exercise protects the brain in males through different cerebrovascular mechanisms.

Table 1: Association between cardiorespiratory fitness (VO2peak) cerebrovascular hemodynamics after adjustment for covariates within healthy males and females.

		N	B (95%CI)	β
MCA.	Females	75	-0.005 (-0.008, -0.001)*	-0.39*
PI	Males	77	-0.002 (-0.006, 0.002)	-0.16

MCA mean

velocity	Females	75	0.484 (-0.137, 1.105)	0.23
	Males	77	0.222 (-0.222, 0.667)	0.13
Carotid pulse pressure	Females	77	-0.481 (-0.894, -0.068)*	-0.33*
	Males	80	-0.193 (-0.439, 0.053)	-0.22
Mean arterial pressure	Females	77	-0.189 (-0.458, 0.081)	-0.19
	Males	80	-0.181 (-0.394, 0.033)	-0.22

* denotes VO2peak is a significant contributor to vascular outcome at p<0.05. Models include covariate adjustment for age, BMI, and exercise test modality.

Board 4

EFFECTS OF VARYING BLOOD FLOW RESTRICTION PRESSURES DURING WALKING EXERCISE

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PURPOSE: Application of blood flow restriction (BFR) techniques have demonstrated beneficial cardiorespiratory adaptations when used during walking programs. An important variable practitioners must consider is what BFR occlusion pressure to use during exercise. The purpose of the study was to investigate the effects that BFR occlusion pressures had on heart rate (HR), microvascular tissue oxygenation (StO2), and pain responses during walking exercise. **METHODS:** 10 healthy adults (24 ± 3 years) reported for 3 testing sessions separated by at least 48 hours. During session 1, subjects walked on a treadmill for 15 minutes at a speed that elicited a rating of perceived exertion of 3/10 (RPE3). During the remaining sessions, subjects walked on a treadmill for 15 minutes at the RPE3 speed with a randomized application of 40% (40BFR) or 80% (80BFR) limb occlusion pressure applied bilaterally to the proximal thighs. HR and near-infrared spectroscopy sensors were used to continuously record the HR and StO2 (vastus lateralis) responses during the exercise sessions, respectively. Perceived pain (Visual Analog Scale, 0-100) was recorded every minute throughout the walking bouts. Two-way repeated measures analysis of variance was used to examine if exercise condition (RPE3, 40BFR, 80BFR) and/or time (1-15 min) had an effect on HR, StO2, or perceived pain. Significant main effects were further analyzed using Tukey's post hoc analysis. Significance was set at $p < 0.05$. **RESULTS:** 80BFR (42−72 %HRR; −28.6 to −32.8 ΔBSL) resulted in a higher HR and local metabolic demand compared to RPE3 (16−22 %HRR; 0.5 to −6.7 ΔBSL) and 40BFR (23−28 %HRR; −3.2 to −9.4 ΔBSL) throughout the entire exercise session, respectively. 80BFR (27−83) elicited higher perceived pain compared to most of 40BFR (18−32) and all of RPE3 (0). 40BFR (18−32) elicited higher pain compared to most of RPE3 (0). **CONCLUSION**: It is recommended to prescribe an occlusion pressure higher than 40BFR during BFR walking, as 40BFR did not significantly alter the cardiovascular (HR) or local metabolic demand (StO2) during the walking exercise despite increasing the perceived pain. Although 80BFR did elevate HR and local metabolic demand, it resulted in the highest perceived pain which may challenge exercise tolerance.

Board 5

RESISTANCE EXERCISE ALONE OR IN CONJUNCTION WITH CAFFEINE ON MEASURES OF LEFT VENTRICULAR WORKLOAD IN WOMEN

Elena C. Spaethe, Stacie M. Humm, Sarah G. Kearney, Emily K. Erb, Gretchen E. Elsey, Michelle M. Kern, Anthony G. Pinzone, J. Derek Kingsley FACSM, Kent State University, Kent OH

Resistance exercise (RE) alone or in conjunction with caffeine increases cardiovascular work. While acute RE has been shown to increase left ventricular workload, the addition of caffeine on these responses is unknown. **PURPOSE:** To evaluate alterations in left ventricular workload at rest, following acute caffeine supplementation (4mg/kg), as well as during recovery from a fatiguing bout of RE in resistance-trained women. **METHODS:** Eleven resistance-trained women (Mean±SD: Age: 24±4yrs) participated in a counterbalanced, double blind, placebo-controlled, crossover-design study. Measurements were taken at rest (Rest 1), forty-five minutes after caffeine ingestion (Rest 2), immediately post-RE (Post 1), and 10 minutes post-RE (Post 2). The acute bout of RE consisted of two sets at 75% 1-repetition maximum (1RM) for 10 repetitions, and one set at 70% 1RM with repetitions to failure on the squat and bench press. Two minutes of rest were given between sets and exercises. A 2x4 two-way

analysis of variance (ANOVA) was used to assess the effects of condition (caffeine, placebo) with a repeated measure of time (Rest 1, Rest 2, Post 1, Post 2). **RESULTS:** There were significant (p=0.003) main effects of time for wasted left ventricular energy (Rest 1: 608±687dynes; Rest 2: 529±667dynes; Post 1: 2154±1164dynes; Post 2: 1956±1873dynes), systolic pressure time index (Rest 1: 1849±267mmHg*ms; Rest 2: 1995±367mmHg*ms; Post 1: 2767±580mmHg*ms; Post 2: 2669±537mmHg*ms), and diastolic pressure time index (Rest 1: 2868±281mmHg*ms; Rest 2: 3011±339mmHg*ms; Post 1: 2392±302mmHg*ms; Post 2: 2310±382mmHg*ms). These variables were augmented at Post 1 and Post 2 compared to Rest 1 and Rest 2, with no significant differences from Rest 1 to Rest 2. There was no change in subendocardial viability ratio across time. **CONCLUSIONS:** These data suggest RE in conjunction with 4mg/kg of caffeine does not further augment left ventricular workload compared to a placebo in resistance-trained women.

Board 6

MUSCULAR ENDURANCE TESTING MAY NOT RELATE TO SELF-REPORTED FATIGUE IN AYA CANCER SURVIVORS

Nicholas B. Kelly, Danielle M. Halsey, Melissa Sherman, Tammy Sajdyk, Jamie Renbarger, Tarah J. Ballinger, Keith G. Avin, Mark Urtel, NiCole R. Keith FACSM, Indiana University Purdue University Indianapolis, Indianapolis IN

BACKGROUND: Cancer related fatigue (CRF), or its treatment can lead to physical inactivity, reduced quality of life (QoL), and reduced functional capacity. Adolescent and young adult (AYA) cancer survivors are currently understudied and have increased cardiovascular and metabolic disease risk as they age. understanding how to reduce (CRF) and increase physical activity (PA) is paramount in this population. Understanding how PA can mitigate CRF effects may lead to a better QoL for AYA cancer survivors. **PURPOSE**: To examine the relationship between self-reported CRF and muscular endurance/strength in AYA survivors. **METHODS**: 29 AYA cancer survivors aged 15-39 (mean=27; M=7, F=22) were randomized into either an exercise (EX) or an attention control (AC) health coaching arm. Participants were assessed at baseline, 12-weeks, and 24 weeks. Measures included the Functional Assessment of Chronic Illness Therapy - Fatigue (FACIT-F), a 40-item questionnaire to assess CRF therapy and a 60-second chair sit-to-stand test that evaluated muscular endurance and strength. **RESULTS:** EX participants sit-to-stand scores increased by 3.23 repetitions on average, and FACIT-F scores improved by 1.3 points on average, however, the improvements were not statistically significant. AC participants' sit-to-stand scores and Facit-F scores worsening at the 12-week assessment (-1.25 repetitions and an increase in fatigue score of 1.89 points on average). These changes were also not statistically significant. There was generally no correlation observed between FACIT-F scores and the sit-to-stand scores when statistical analyses were performed. The correlation values for EX and AC groups respectively were $r=.213$, $r^2=.045$; $r=.165$, $r^2=.027$; and $r=.27$, $r^2=.073$. **CONCLUSION:** These data suggest that the severity of CRF-related therapy may not correlate with muscular endurance tests such as the sit-to-stand test. Further research should explore higher-intensity exercise or longer interventions to that may reveal significant clinical outcomes in therapy-related fatigue and functional capacity in AYA cancer survivors.

Board 7

THE MULTIDISCIPLINARY ONCOLOGY VITALITY AND EXERCISE PROGRAM (MOVE): PATIENT NEEDS ASSESSMENT AND PROGRAM DESIGN

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INTRODUCTION: Physical activity (PA) is beneficial to all biological and physiological systems. PA also improves cognitive function, QoL, fatigue, depression, anxiety, and emotional well-being. Despite the positive effects of PA, cancer survivors do not meet the ACSM recommended PA guidelines of 150 min/wk of aerobic exercise and 2d/wk of strength training to illicit positive health outcomes. Cancer, its treatment, and side effects are complex. A comprehensive, multi-disciplinary care approach allows patients to be monitored for safety, progression, modifications, behavior change, and tailored resources for their multi-faceted needs.
PURPOSE: To describe patient needs and program design of the Multidisciplinary Oncology Vitality and Exercise (MOVE) program delivered to cancer patients in one cancer care center (CCC). **METHODS:** Cancer patients (n=374; F=216, 57.8%), completed a survey about their experiences at the CCC. Items included PA participation in the last seven days, barriers, and preferences**. RESULTS:** Most (77%) did not meet PA guidelines citing fatigue

(22.9%), lack of motivation (18.4%), and time constraints (16.1%) as the primary barriers to PA. Most (82.8%) received no PA information about resources from the oncology team or cancer center and 61.8% reported their oncologist did not mention PA for survivor treatment. **DISCUSSION:** A patient-centered care team designed the MOVE program to integrate functional assessment, rehabilitation, PA, and comprehensive supportive care for cancer patients. It establishes a clinical infrastructure that will improve patient PA, physical function, and QoL. **CURRENT PROGRESS AND FUTURE DIRECTION:** After a cancer diagnosis, an initial assessment is completed by a Physical Therapist (PT) Cancer Specialist and the patient completes several questionnaires assessing symptom burden including a PROMIS-29. Next the patient receives a personalized support prescription including one of the following: 1) continued PT 2) referral to a PA program: supervised, unsupervised, home-based, community-based or 3) referral to other resources to optimize care. To date, 55 patients have completed a PT MOVE program assessment. Future work will describe the MOVE program's progress toward transformative research, impactful public health policy, education, and personalized care.

Board 8

INVESTIGATING DIFFERENCES IN PERCEIVED STRESS BETWEEN INJURED AND NON-INJURED DIVISION II STUDENT-ATHLETES DURING COVID-19

Faith Atkinson, Trent E. Cayot, Nathanial R. Eckert, Gary M. Long, Riggs Klika, Brian Reagan, Richard Robinson, Mindy Hartman Mayol, University of Indianapolis, Indianapolis IN

Very little research has examined the perceived stress levels of injured student-athletes (SAs) during the COVID-19 pandemic. **PURPOSE:** To determine if there are differences in perceived stress levels during the pandemic between SAs who experienced an injury versus those that did not. **METHODS:** 158 NCAA Division II SAs from 12 teams composed of injured (n = 66) and non-injured SA groups (n = 92) were recruited to complete an online demographics questionnaire and the 10-item Perceived Stress Scale (Cohen, 1994) which measures the degree to which situations in one's life are appraised as stressful. An independent samples t-test was performed with an alpha level of $p \leq 0.05$ to examine if differences between SA groups existed. **RESULTS:** The analysis revealed a statistically significant difference in perceived stress scores, t(156)=3.18, p=.002, d = .51, between injured and non-injured SAs with injured SAs showing higher scores (M=21.62, SD=7.19) versus non-injured SAs (M=18.17, SD=6.35). **CONCLUSION:** Findings support our hypothesis that a statistically significant difference would be seen between injured and non-injured SAs, specifically, with injured SAs demonstrating higher perceived stress scores. It is known that experiencing an injury has been associated with increased depression and anxiety in SAs as well as feelings of anger, low self-esteem, a lack of motivation, and feeling secluded from teammates and coaches due to the injury rehabilitation process. In addition, the trying times during the COVID-19 pandemic may have negatively impacted perceived stress levels for SAs regarding their physical, mental, and emotional health as SAs experienced interruptions in their training and competition and, particularly, the return to sport process for injured SAs.

Board 9

SLEEP PATTERNS AND DEPRESSIVE SYMPTOMS ACROSS PREGNANCY

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BACKGROUND: Depression in pregnancy is linked to poor health outcomes. While poor sleep is related to depression in general populations, associations between sleep and depression during gestation are unclear, especially in the 1st trimester and with consideration of pre-pregnancy sleep. **PURPOSE:** Investigate associations between sleep quality and depressive symptoms throughout pregnancy. **METHODS:** Pregnant persons in IA and PA were recruited at <13 wks gestation for the Pregnancy 24/7 Cohort Study. Sleep quality was recalled 3 months prior to pregnancy and in each trimester with the Pittsburgh Sleep Quality Index (PSQI). Depressive symptoms were assessed each trimester with the Centre for Epidemiological Studies Depression Scale (CES-D-10). Greater PSQI (scale 0-21) and CES-D (scale 0-30) scores imply worse sleep quality and more depressive symptoms, respectively. Friedman and Wilcoxon tests assessed differences in PSQI and CES-D scores across and between trimesters. Cross-sectional linear regression tested for associations between sleep quality (exposure) and depressive symptoms (outcome), adjusting for pre-pregnancy sleep quality, age, and income. P<0.05 defined significance. **RESULTS:**

Participants (N=109) had a median age of 30±4 yrs and were most often white (94%), married (92%), and of high income (87%). Sleep quality decreased across pregnancy, with significant differences across pregnancy and between trimesters 1&2 (+0.25) and 1&3 (+0.48) PSQI scores. Depressive symptoms were higher in trimesters 1&3, with significant differences between trimesters 1&2 (-1.22) and 2&3 (+1.07) CES-D scores. Worse sleep quality was associated with more depressive symptoms across pregnancy, reaching significance in trimester 3 (β = 0.25; CI: 0.15 - 1.10). **CONCLUSIONS:** Changes in sleep quality and depressive symptoms were observed. Poor sleep quality was associated with higher depressive symptoms. Future work should use objective measures of sleep quality in addition to sleep quality.

Board 10

THE EFFECT OF MINDFULNESS MEDITATION ON PRESSURE PAIN THRESHOLD AMONG COLLEGE STUDENTS

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A survey from the National Institutes of Health (NIH) revealed that the number of Americans who suffer from any type of daily pain (acute or chronic) is around 25.3 million. To help combat this immense problem of pain, non-medicinal methods like mindfulness meditation have become a popular practice. Previous research shows a connection between mindfulness meditation and pain reduction. **PURPOSE:** The purpose of this research study was to confirm the correlation between mindfulness meditation and increased pressure pain thresholds in college students. **METHODS:** 20 subjects (14 females; 6 males) volunteered for this study. The subjects were randomly assigned to a 20-minute mindfulness meditation (MM) or resting group. Pressure pain threshold (PPT) was assessed for each subject using a 30-kilogram (kg) capacity dolorimeter before and after their assigned session. The average of three trials was used as the final PPT score and recorded in kg of pressure. Paired samples t-tests were used to assess the difference in PPT within groups while an independent t-test determined the difference in PPT between the MM and resting group. **RESULTS:** Neither the resting session ($t(9) = -0.154$, $p = 0.881$) nor the meditation session ($t(9) = 0.361$, $p = 0.726$) elicited a statistically significant increase of pressure pain threshold. The mindfulness meditation ($M = 0.102$, $SD = \pm 0.875$) did not produce a statistically significant difference in PPT from the control group ($M = -0.052$, $SD = \pm 1.070$), $t(18) = -0.348$, $p = 0.732$. **CONCLUSION:** Subjects in the MM group did not exhibit a significant increase in PPT compared to the resting group, despite showing an increase in mean PPT from the pretest scores. Because mean scores increased for the meditation group, but decreased for the control group, it appears that there is a relationship between a state of mindfulness and PPT. Further, Cohen's d effect size within the MM group ($d = 0.762$) suggested a greater effect than the resting group ($d = 0.573$).

Board 11

EXAMINING INJURY-RELATED DIFFERENCES IN MOTIVATION SOURCES IN NCAA DIVISION II STUDENT-ATHLETES DURING COVID-19

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Few studies have explored motivation sources using the Self-Determination Theory in student-athletes (SAs) who were injured before or during the pandemic versus those not injured. **PURPOSE:** To assess differences in motivation sources during the COVID-19 pandemic between SAs who experienced an injury versus those that did not. **METHODS:** 158 NCAA Division II SAs from 12 teams composed of injured (n = 66) and non-injured SAs (n = 92) were recruited to complete an online demographics questionnaire and the 18-item Sport Motivation Scale II (Pelletier et al., 2013) measuring six motivation sources during one time point: intrinsic (IR), integrated (INTR), identified (IDR), introjected (ITR), external (EXT), and amotivation (AMR) regulation/motivation. Independent samples t-tests were performed with an alpha level of $p \leq 0.05$ to examine if differences between SA groups existed for each motivation source. **RESULTS**: The analyses demonstrated no statistically significant differences among the six motivation sources between injured and non-injured SAs, respectively ($p > .05$): IR (M=15.89, SD=3.88; M=16.22, SD=3.68); INTR (M=16.71, SD=3.64; M=16.78, SD=3.38); IDR (M=17.41, SD=3.33; M=16.90,

SD=3.55); ITR (M=14.77, SD=3.98; M=14.47, SD=4.33); EXT (M=8.71, SD=4.58; M=8.12, SD=4.27); AMR (M=7.85, SD=4.51; M=6.65, SD=4.19). **CONCLUSION:** It was hypothesized that differences would be seen in intrinsic-based motivation sources between injured and non-injured SAs with non-injured SAs demonstrating higher intrinsic motivation. Yet, study findings suggested no difference between the SA groups indicating that the athletics professionals worked diligently and equally with injured and non-injured athletes' motivation and care during the pandemic.

Board 12

TEMPORAL VARIANCE IN EXERCISE-RELATED READINESS, AFFECT, AND PERFORMANCE SATISFACTION IN INDIVIDUALS WITH PARKINSON'S DISEASE

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Parkinson's Disease (PD) is a progressive neurodegenerative disorder characterized by symptoms such as tremor and bradykinesia, and these symptoms may be improved with regular exercise. In general, behavioral regularity is improved when exercise experiences enhance well-being (pleasant affective states, feelings of performance satisfaction). Both aspects of well-being are determined, in part, by one's pre-exercise readiness (physical and mental states). To date, however, the degree of temporal variance in perceptions of exercise-related readiness, affect, and satisfaction has not been studied in PD. **PURPOSE:** Examine temporal variance in pre-exercise mental and physical states, recalled in-task affect, and performance satisfaction in individuals with PD who completed dynamic cycling. **METHODS**: Participants (N=9, age=74 ± 3.4 years, 22% women) completed 12 sessions of dynamic cycling (a motorized, stationary cycle that fluctuates speed around the set cadence). Target variables were assessed using the Multidimensional Mood Survey (calmness, valence, energetic arousal), Perceived Physical State (physical fitness/flexibility), Feeling Scale (post), Felt Arousal Scale (post), and Performance Satisfaction via visual analog scale (post). Two-way mixed intra-class correlation coefficients (ICC) were calculated with 95% confidence intervals (CI) for each target variable across all 12 cycling sessions. ICC ≤ 0.5, between 0.5-0.75, between 0.75-0.9, and ≥0.9 indicate poor, moderate, good, or excellent consistency. **RESULTS**: ICC values demonstrated poor to moderate consistency across all measures: calmness= 0.529 (95% CI 0.297 - 0.811), valence= 0.467 (0.248 - 0.778), energetic arousal= 0.429 (0.217 - 0.752), physical health= 0.501 (0.280 - 0.799), flexibility= 0.143 (0.023 - 0.461), feeling scale= 0.478 (0.259 - 0.785), and performance satisfaction= 0.460 (0.243 - 0.772). **DISCUSSION:** Perceptions underlying exercise-related readiness and well-being vary over time in PD, which aligns with prior work conducted in apparently healthy adults. Future research will determine if readiness predicts experiential outcomes in PD, as matching exercise dose to readiness offers a potential strategy for person-adaptive programming.

Board 13

THE EFFECT OF PERCUSSION MASSAGE GUN USE ON REPEATED SPRINT PERFORMANCE IN COLLEGIATE ATHLETES

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The use and popularity of percussion massage guns are; increasing, particularly among athletes. However, the effectiveness of percussive massage (PM) on athletic performance remains unclear. **PURPOSE:** To investigate the effect of PM on repeated sprint performance of collegiate athletes. **METHODS**: Athletes were recruited from the institution's men's and women's track and field, basketball, and soccer teams, as well as the softball, baseball, volleyball, and football teams. Each participant completed three 30-second Wingate anaerobic tests (WAnTs) on a cycle ergometer separated by three minutes of rest. Participants in the PM experimental group lay supine and prone and received PM during the rest, with 30 seconds each on the right quadriceps, left quadriceps, right hamstrings, and left hamstrings. Participants in the control group (CON) lay supine and prone for 60 seconds each without PM. Changes in peak power (PP), mean power (MP), and fatigue index (FI) during the WAnTs were assessed using a two-way, group by time ANOVA. Significance was established at $p<0.05$. **RESULTS:** Twenty-nine

individuals (PM: n=16, CON: n=13) participated in this study. For PP relative to body mass, there was a significant main effect for time, with lower values for each successive trial (14.6, 12.7, and 11.2 W·kg−1 in trials 1, 2, and 3, respectively). For MP, there was a significant main effect for time, with lower values for each successive trial (677, 541, and 453 W in trials 1, 2, and 3, respectively). For FI, there was a significant main effect for time, with trial 1 lower than trials 2 and 3 (71.8, 77.1, and 77.2%, respectively). There were no significant group or interaction effects for any metric. **CONCLUSION:** With respect to repeated sprint performance, the use of a percussion massage gun does not appear to have a benefit.

Board 14

RELIABILITY OF ACCELERATION MEASURES USING A LINEAR POSITION TRANSDUCER DURING SEGMENTS OF THE BENCH PRESS

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PURPOSE: To determine the inter-set reliability of acceleration measurements in concentric segments of the barbell bench press (BP). **METHODS:** 17 participants (24 ± 4 years; 1.71 ± 0.07 m; 80.8 ± 11.2 kg) with six months of prior resistance training experience completed three trials at least 48 hours apart. During visit one participants completed an informed consent and one-repetition maximum assessment (1RM) for the BP. During visits two and three, participants performed two sets of three BP repetitions at 30, 50, 60, and 70% 1RM. The linear position transducer (LPT) was attached to the medial aspect of the barbell sleeve with the retractable belt perpendicular to the floor. Barbell position, collected by LPT, was sampled at a rate of 100Hz with velocity calculated as the change in displacement over time and filtered on a rolling 0.10s average with a custom spreadsheet. Repetition onset was defined as filtered velocity of 0.05m•s-1 with a prerequisite displacement of 10cm. Repetition segments were determined by dividing total displacement into three equal portions based on displacement: bottom (BOT), middle (MID), and top (TOP). Acceleration was defined as the change in velocity over time and represented as both the mean acceleration averaged over three repetitions (AR) and as the repetition with the highest mean velocity (BR). AR and BR were compared from set one to set two and from session two to session three. Intraclass Correlation Coefficients (ICC) and paired samples t-tests were used to assess reliability in filtered data for the LPT. AR reflected greater reliability than BR and are displayed below. **RESULTS:** Inter-set comparisons demonstrated excellent ICCs (ICC2,k >0.90) in 6 of 12 segments and good ICCs (ICC2,k = 0.75 - 0.90) in 5 of 12 segments. Inter-session comparisons demonstrated good ICCs at 30% and 50% with the exception of MID 50% (ICC2,k = 0.297). Higher intensities (60 and 70% 1RM) had poor ICCs in BOT (ICC2,k = -0.141 - 0.095), and moderate ICCs at MID and TOP (ICC2,k = 0.541 - 0.729). No significant differences were observed between sets or sessions at any intensity or segment. **CONCLUSION**: Acceleration can be reliably assessed using LPT technology in repetitions segments on an inter-set and inter-session basis; however, the inter-session relationships are less reliable as training loads exceeding 60% 1RM.

Board 15

SACCADES AND REACTION TIME IN SPECIAL WEAPONS AND TACTICS OFFICERS

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PURPOSE: Special Weapons and Tactics (SWAT) officers must be aware of their surroundings and able to rapidly respond in high-risk situations. Constant training may allow officers to perform better than typical adults in oculomotor and reaction time (ORT) tests; however, repeated exposures to blunt head impacts and low-level blasts could result in ORT deficits. The purpose of this study was to examine baseline ORT testing in SWAT officers to report findings relative to normative, previously published data in healthy adults. We hypothesized that SWAT officers would perform better in ORT tests relative to normative data. **METHODS**: Fourteen male SWAT officers (44.0±5.94 years) performed ORT testing in a virtual reality head-mounted display (Neurolign, Dx-100, Pittsburgh, PA) at one time point. ORT tests included horizontal saccades (HS), visual reaction time (VRT), and a combined

horizontal saccades and visual reaction time tests (HS+VRT). Participants indicated responses in VRT tests using a handheld remote. Outcome measures included latency and accuracy for HS and latency for VRT. Findings are reported relative to normative data in healthy adults. **RESULTS:** For HS testing, latency was 229±21ms and accuracy was 93±5%; normative data for latency is up to 220ms and accuracy is 81-103% based on 95% confidence intervals. For VRT testing, latency was 199±21ms; normative data for latency is up to 343ms. For HS+VRT, saccadic latency was 255±81ms and accuracy was 79±21% and VRT latency was 368±72ms; normative data for saccadic latency is up to 290ms and accuracy is 74-104% and for VRT latency is up to 650ms. Of the 14 participants, 10 (71%) had slower HS latency than normative data, 2 (14%) had slower HS latency than normative data for HS+VRT tests, and 7 (50%) were outside normative ranges for HS+VRT accuracy; remaining outcomes were all within normative ranges. **CONCLUSION:** Although preliminary in nature, the findings suggest that SWAT officers performed as well as or worse (particularly for HS testing) when compared to the normative data of healthy adults. Oculomotor training could be implicated to improve performance. Assessing SWAT officers immediately after blunt head impacts and low-level blasts could be an area for future studies to examine the association between head trauma and oculomotor performance.

Board 16

ANKLE TAPING CONDITIONS AFFECT ON THE VERTICAL JUMP

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INTRODUCTION: Chronic ankle instability (CAI) is often caused by repeated lateral ankle sprains. Many clinicians and athletic trainers implement the use of ankle taping to prevent further or future ankle sprains. It is unclear how these ankle taping techniques impact vertical jump height as well as limiting ankle range of motion. **METHODS**: Ten active subjects (females = 4) suffering from CAI participated in a vertical jump test monitored by IMU sensors for ankle motion. The subjects participated in the vertical jump tests in three different conditions: no tape, ridgid athletic tape (RT), or KT tape. Three trials were performed under each condition in random order on a force plate to calculate jump height.. Ankle plantarflexion, dorsiflexion, and inversion as well as jump height were each compared between the three taping conditions using repeated measures ANOVA ($\alpha = .05$) with a Bonferroni post-hoc test where significance was found. **RESULTS:** Increased ankle dorsiflexion was observed in the KT tape condition (27.7 ± 11.7°) compared to both the RT (22.0 ± 10.3°, $p = .04$) and no tape condition (23.6 ± 12.1°, $p = .03$). There were no differences between any tape condition in plantarflexion ($p = .19$) nor inversion ($p = .50$). There was no significant difference in jump height between the conditions ($p = .16$). **CONCLUSION:** The data collected in this study showed that the varying ankle taping methods did not restrict ankle range motion in individuals with CAI. Furthermore, no evidence was observed that either taping method affected vertical jump height. Ankle taping may still be used for stability purposes without the drawbacks of decreased performance.

Board 17

OXYGEN UPTAKE EFFICIENCY SLOPE IN PREADOLESCENT BOYS AND GIRLS

Donald Deiwert, Brandon Dykstra, Justin Guilkey, C. Eric Heidorn, Jennifer Erichsen, Dillon Kuszmaul Anthony Mahon, Ball State University, Muncie IN

PURPOSE: This study investigated sex differences in absolute, ratio-scaled, and allometrically-scaled oxygen uptake efficiency slope (OUES) in 8.0- to 12.0-year-old children. **METHODS:** Retrospective and prospective data from 40 preadolescent participants (18 boys) were utilized. All participants had undergone familiarization prior to performing a maximal cycle ergometer test. The VO2 and ventilation (VE) data were used to calculate absolute OUES values using the following equation: $VO2 = OUES \cdot \log10(VE) + b$. The absolute OUES values were also ratio-scaled and allometrically scaled to body mass and body surface area (BSA) prior to comparison between boys and girls. These sex differences were tested using independent sample t tests or Mann-Whitney U tests. **RESULTS:** The average age (yrs) for the groups was not significantly different (boys: 10.4 ± 1.2 vs girls: 10.3 ± 0.9). Maximal VO2 (L/min) and maximal VE (L/min) were significantly higher in the boys (VO2: 1.74 ± 0.33; VE: 63.1 ± 9.6) compared to the girls (VO2: 1.39 ± 0.20; VE: 52.2 ± 8.9), but when VO2max relative to body mass

(mL/kg/min) was no different (41.7 ± 8.0 in boys and 38.1 ± 5.4 in girls). Absolute OUES values (VO2 [mL/min] / log10VE [L/min]) were also significantly higher in the boys compared to the girls (1860.8 ± 359.3 vs 1514.3 ± 212.6). When scaled to mass (VO2 [mL/kg/min] / log10VE [L/kg/min]), OUES was no longer significantly different between groups (boys: 44.6 ± 9.5 vs girls: 41.5 ± 6.5), but when scaled to BSA (VO2 [mL/m^2/min] / log10VE [L/m^2/min]), OUES was significantly higher in the boys than the girls (1414.4 ± 204.2 vs 1268.9 ± 134.6). When allometry was applied for mass, OUES/mass^0.444, the boys had significantly higher values compared to the girls (350.8 ± 46.7 vs 305.0 ± 31.5). OUES was not allometrically scaled to BSA due to failing to meet the allometry criteria. **CONCLUSION:** These findings suggest that there may be significant differences between preadolescent boys and girls when comparing ratio-scaled OUES to BSA or allometrically scaled OUES to mass, but further investigation is needed to verify this assertion.

Board 18

EFFECTS OF LEVEL OF EARLY LIFE PHYSICAL INACTIVITY ON GROWTH AND HEALTH IN ADULTHOOD

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BACKGROUND: Physical inactivity (PIA) can negatively impact health and wellness and maybe even development. Less is understood regarding the impact of degree of physical inactivity during key stages of skeletal muscle development on adult health later in life. Purpose: We propose that exposure to different levels of PIA for a short time early in life will impair growth rate, muscular function and tissue composition in adulthood. **METHODS**: We exposed postnatal mice (~3 weeks old) to 2 weeks of PIA in the form of hindlimb unloading (HU, N=10), small mouse cage (SMC, N=17) or standard mouse cage activity (CON, N=18) after weaning and then followed their recovery for 4 months until adulthood at 5 months of age. Growth, grip strength and body composition were assessed once per month during the 4 mo recovery. They were then tested for physical function (grip strength, aerobic capacity on a treadmill), metabolic function (GTT) and muscle size at 5 mo of age. **RESULTS**: Growth rate, assessed as the change in body weight from pre-PIA, was similar at 17.24±0.67 g, 17.83±4.31 g, and 17.28±3.62 g for CON, SMC and HU, respectively. Final lean mass was identical at 20.77±0.52 g, 20.88±1.07 g, and 20.75±0.99 g for CON, SMC and HU, respectively. Max grip strength was similar with 283±14, 321±26, and 356±30 g of force for CON, SMC and HU, respectively. Area under the curve and 2hr glucose during the GTT and muscle and liver weights were similar. Time to exhaustion on the treadmill was similar with 18.2±1.4 min, 16.8±1.3 min, and 17.5±2.6 min for CON, SMC and HU, respectively. **CONCLUSION:** Early postnatal mice subjected to the modest form of PIA as SMC and severe form of PIA (HU) displayed similar growth rates, max grip strength, treadmill time, glucose responses to a GTT and lean mass compared to control mice as adults. Mice exposed to a short period of early life inactivity are able to recover muscle and metabolic function four months later in adulthood. Data are Mean± SEM.

Board 19

PROTEIN SUPPLEMENTATION AND RESISTANCE EXERCISE TRAINING

Grace Passolano, Lauren Massaro, David Howey, Paul Reidy, Miami University, Oxford OH

BACKGROUND: Dietary protein ingestion after resistance exercise training (RET) is a common combination employed amongst individuals, young and old, to aim for the enhancement of gains in muscle mass and strength, which is important to maintain with aging, It is often shown that dietary protein and resistance exercise, combined, will maximize skeletal muscle protein synthesis beyond that of exercise alone but specific increased on direct measures of muscle size are unclear. **PURPOSE:** Measuring skeletal muscle mass using the methods included in this study will assess muscle mass change more precisely than the RET studies in which a majority use an indirect measure of muscle mass. Including studies that utilized accurate modes of skeletal muscle mass measurements will better describe the relationship between protein supplementation, resistance training, and skeletal muscle mass. **METHODS**: Population: Studies involving participants of >18y, of both sexes, in any degree of health or physical activity. Intervention: Resistance exercise and protein and/or amino acid nutrition with and without other nutrients. Comparison: Resistance exercise type, training and duration, protein and/or amino acid nutritional types, study size, methods, nutritional timing, and period of measurement. Specifically, an age comparison is required. **OUTCOMES:** myofiber size, muscle mass and not lean mass or fat-free mass only. **TYPE OF STUDY DESIGN:** Randomized

clinical trials with any of the following designs: Studies must be resistance exercise training studies >4 weeks that include a direct measure of muscle mass. The studies required an arm with protein supplement and also a placebo arm and/or other comparison to nutritional supplementation, but all comparisons must include resistance exercise training with or without placebo. **FUTURE PLANS**: First, the studies will be screened by title and abstract. Second, the full text of selected studies were examined to decide inclusion and exclusion. Next, quality assessment was conducted and lastly, data extraction via a specially designed form. When conflict emerged between the two independent researchers, consensus was obtained through the opinion of a third researcher (PR or AS) will be considered. Once the data is able to be compared, we will obtain our results.

Board 20

SEX DIFFERENCES IN MOTOR UNIT RECRUITMENT, HAMSTRING:QUADRICEP RATIO, AND FUNCTIONAL ABILITY IN OLDER INDIVIDUALS.

Emily Rigden, Hale, Reierson, Brittany Followay, Ripon College, Ripon WI

PURPOSE: To examine sex differences in motor unit recruitment, hamstring:quadricep (H:Q) ratio, and functional ability in older individuals. **METHODS**: Thirty older adults (72.5 + 6.2 yrs) completed closed-kinetic chain exercises (CKCs) including a front-lunge (FL), side-lunge (SL) and bilateral squat (BLSQ). Electromyography (EMG) of the vastus lateralis (VL) and biceps femoris (BF) was recorded on the dominant limb. Raw EMG recordings were normalized to the maximal voluntary isometric contraction and analyzed for root mean square (RMS). The H:Q ratio was calculated using RMS as BF/VL. Participants also completed a functional movement screening (FMS) and activities of daily living (ADLs), including sit-to-stand (STS), ascending and descending stairs, and stepping over a hurdle the height of their tibial tuberosity. A total ADL score was also calculated. **RESULTS**: H:Q ratios were significantly greater in males compared to females during the front lunge ($p = 0.002$; 0.523 + 0.07, 0.269 + 0.03), side lunge ($p = 0.012$; 0.38 + 0.056, 0.216 + 0.018) and bilateral squat ($p = 0.023$; 0.481 + 0.083, 0.257 + 0.04). Greater RMS of the BF was observed in males compared to females during the FL ($p = 0.031$), SL ($p = 0.042$) and bilateral squat ($p = 0.02$). No significant differences were observed in RMS of the VL between males and females during any of the CKCs. Significantly greater scores were observed in females compared to males during the STS ($p = 0.028$; 4.0 + 0.02, 2.3 + 0.256) step-over ($p = 0.013$; 17.08 + 0.4, 13.12 + 1.0), and for the total ADL score ($p < 0.001$; 47.69 + 0.76, 38.88 + 2.03). Additionally, significantly greater FMS scores were observed in females compared to males for total FMS ($p = 0.015$; 14.8 + 0.7, 11.6 + 1.04), shoulder mobility ($p = 0.017$; 1.7 + 0.23, 0.94 + 0.17), active straight-leg raise ($p = 0.04$; 3.6 + 0.14, 2.1 + 0.19) and rotary stability ($p = 0.013$; 2.3 + 0.17, 1.4 + 0.27). No significant difference was observed between males and females for FMS squat, hurdle step, in-line lunge or push-up ($p > 0.05$). **CONCLUSION**: Greater H:Q ratios and motor unit recruitment may suggest that males activate their hamstrings more effectively, and that females tend to remain quadricep dominant. Additionally, greater hamstring activation relative to quadricep, may be a limiting factor in the performance of functional related activities in males.

Poster Session #3: Regency Ballroom E & F (2nd Floor), 10:40-11:55am

Board 1

EFFECTS OF QUADRICEP DOMINANT VERSUS FUNCTIONAL TRAINING PROGRAMS ON BALANCE AND ACTIVITIES OF DAILY LIVING

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PURPOSE: To examine the effects of a quadricep dominant versus functional training program on balance and activities of daily living. **METHODS:** Eight participants (56-86 yrs) participated in either a quadricep dominant (QD) or functional (FX) training program for nine weeks (27 sessions). A balance error scoring system (BESS) test including single leg stance (SLS) and tandem stance (TS) was performed on both a firm and foam surface. The BESS was calculated by adding one point for each error during a 20-second time period. Participants also performed ascending and descending stairs, scored out of 20. Total number of sit-to-stand (STS) was also recorded, as well as

peak power during a single STS. Activities of daily living (ADLs), which were scored on a scale of 0-3 (0 = pain, 1 = unable to perform, 2 = compensation needed, 3 = performed) were performed to calculate a total ADL score. All testing was performed before (PRE) and after (POST) the nine week training program. **RESULTS:** A time x group interaction was observed for SLSFoam ($p = 0.003$), with a main effect of time for the FX group ($p = 0.034$) and a lower score at POST (0.033 + 0.002) compared to PRE (1.667 + 0.065). A time x group interaction ($p = 0.038$) was observed for TSfoam ($p = 0.007$), with main effect of time for the FX group ($p = 0.003$), and a lower score at POST (0.5 + 0.012) compared to PRE (3.0 + 0.057) . A time x group interaction was observed for timed SLSfoam ($p = 0.003$), with a main effect of time for the FX group ($p = 0.001$), and a greater time at POST (19.56 + 1.37) compared to PRE (12.23 + 2.4). A time x group interaction was observed for STS ($p = 0.043$), with a main effect of time for the FX group ($p = 0.005$), and a greater total at POST (16.46 + 0.63) compared to PRE (12.2 + 0.91). A time x group interaction was observed for STSpeakpower ($p = 0.024$), with a main effect of time for the QD group ($p = 0.017$), and a greater score at POST (81.0 + 4.07) compared to PRE (61.6 + 2.27). Additionally, a main effect of time was observed for the STAIRS ($p = 0.014$), with a greater score at POST (18.37 + 0.69) compared to PRE (13.67 + 0.88). A main effect of time was observed for total ADL score ($p = 0.010$), with a greater score at POST (18.05+ 1.69) compared to PRE (12.55 + 1.66). **CONCLUSION:** While both programs resulted in improvements, a functional training program may be more beneficial for improving balance and activities of daily living.

Board 2

COMPARING KINEMATICS OF THE FREE THROW SHOT USING MARKER AND MARKERLESS MOTION CAPTURE ANALYSIS

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Traditional methods of motion capture include the use of the full body inverse kinematic marker sets. Recent technology has introduced methods of markerless tracking that do not rely on the use of markers, but implement a human silhouette model to track motion. **PURPOSE** The purpose of this study is to compare kinematic measures quantified from three different motion capture processes (i.e. traditional reflective markers; TRAD, a silhouette model; SIL, and a hybrid approach that combines both the marker and silhouette models;HYB) during the free throw basketball shot. **METHODS** One DIII basketball player performed 10 shots for purposes of data analyses. Eight digital cameras recording at 120 fps were utilized for capturing video. Cameras were placed two to four meters from the participant in a circular pattern on the court. The space was calibrated for each shot performed. Kinematic variables of the knee angle, elbow height, elbow angle, forearm angle related to the vertical, shoulder angle, and shoulder angle related to the vertical were tracked for each shot using all three separate approaches (TRAD, SIL, and HYB). An inverse kinematic marker set was used for the TRAD tracking. The HYB approach utilized markers located on the wrist, elbow, trochanter, and ankle to guide the SIL model. A one-way repeated measures ANOVA was used to compare the data across each motion capture process for all kinematic measures. **RESULTS**: The ANOVA was significant ($p<0.05$). Pairwise comparisons revealed differences between the three tracking techniques. Specifically, the SIL model differed from both the TRAD and HYB models when examining the knee angle (67.84° ± 6.06° vs 88.78°± 5.18° and 88.04°± 9.37°respectively; $p<0.05$) and the HYB model differed from both the TRAD and SIL models when examining the forearm angle (26.62° ± 13.73° vs 16.86°± 8.02° and 17.37°± 7.58° respectively; $p<0.05$). No other comparisons revealed significance. **CONCLUSION** The findings of this study suggest that the SIL and HYB methods can be effectively utilized to analyze markerless motion capture data.

Board 3

KNEE JOINT LOADING DURING A 180-DEGREE CUT VERSUS A 45-DEGREE CUT AND A JUMP-LANDING TASK

Alejandro Ovispo-Martinez, Henry Wang, Dorice Hankemeier, D. Clark Dickin, Ball State University, Muncie IN

PURPOSE: The purpose of this study is to assess the mechanical risk for injury during the 180-degree cutting maneuver compared to 45-degree cut, and a jump-landing task. **METHODS:** 12 participants performed 45-degree cuts, 180-degree cuts, and a drop-jump landing maneuver. Kinematic, kinetic, and electromyography data was collected during the pre-initial contact, initial contact, loading, and propulsive phases of the movements. Sagittal and frontal peak angles and moments were analyzed alongside the peak vertical ground reaction forces. Hamstrings to quadriceps muscle activation ratios were computed and compared for each task. **RESULTS:** During initial contact

of the movements, the participants demonstrated significantly decreased knee flexion and hip flexion angles during the 180-degree cut when compared to the other two tasks ($p > .00$). During the propulsive phase, the 180-degree cut resulted in decreased peak knee flexion angles ($p > .00$) and increased knee adduction moments when compared to only the jump-landing ($p > .00$). During the 180-degree cut; the participants displayed decreased H:Q ratio versus the jump landing ($p > .01$) and the 45-degree cut ($p > .00$) during pre-initial contact phase. **CONCLUSION:** During the initial contact, the 180-degree cutting maneuver placed an individual at the greatest biomechanical risk for ACL injury when compared to both other tasks. During the propulsive and loading phases, a similar finding was observed, however only between the 180-degree cut and the jump-landing task.

Board 4

THE EFFECTS OF TARGET DISTANCE ON KINEMATIC SEQUENCE OF THE SHORT GAME IN MALE COLLEGIATE GOLFERS

Caitlyn T. Picard, Tess G. McGuire, Young-Hoo Kwon, Mark Walsh, Miami University, Oxford OH

PURPOSE: Golf is an international sport that has become increasingly more popular in recent times. Previous literature has shown that golf approach shots are crucial to the success of elite golfers. However, there is no known publication investigating distances less than 100 yards, known as the short game. The primary purpose of this study was to collect comprehensive data on 3D biomechanical variables of the short game at four target distances in college-aged, male golfers. **METHODS:** Fifteen male collegiate golfers volunteered to participate in this study. The average (± SD) age, height, weight, and handicap of the participants were 20.5 ± 1.2 years, 183.9 ± 5.7 cm, 76.9 ± 12.4 kg, and 2.3 ± 1.0, respectively. Participants were instructed to hit five successful shots at each target distance: 30 yards, 50 yards, 70 yards, and full swing (maximal distance) yardage. A motion capture system recorded kinematic and temporal parameters of golfer movement, in addition to a golf simulator that collected the ball carry distance of each shot **RESULTS:** Distance did have a significant effect on swing phase timing (Wilks' $\lambda = 0.051$, $F(3,9) = 25.972$, $p < 0.001$), angular velocities (Wilks' $\lambda = 0.065$, $F(3,9) = 15.581$, $p < 0.001$), and motion sequencing (Wilks' $\lambda = 0.259$, Greenhouse-Geisser $F(4,12) = 23.827$, $p < 0.001$). Short distances of less than 50 yards show swing styles that separate the hips and the shoulders. All distances displayed a pattern of hip line to shoulder line/upper arm line/club, which signifies that the hips lead the golfer and should be the focus of training. Movement sequencing within the short game displayed irregular patterns across all distances and phases, with partial proximal-to-distal pattern (pelvis, shoulder girdle, arms, club) at best. **CONCLUSIONS:** Distance did have an effect on swing phase timing, angular velocities, and motion sequencing. The similarities and differences between distances in the short game presented in this study suggest the emphasis on the practice of each distance goal as its own unique skill.

Board 5

EFFECTS OF QUADRICEP DOMINANT VERSUS FUNCTIONAL TRAINING PROGRAMS ON FUNCTIONAL MOVEMENT

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PURPOSE: To examine the effects of quadricep dominant versus functional training programs on functional movement. **METHODS:** Eight participants (56-86 yrs) participated in either a quadricep dominant (QD) or functional training (FX) program for 9 weeks (27 sessions). A functional movement screen (FMS) was completed before (PRE) and after (POST) the 9-week training program, including the deep squat, hurdle step, in-line lunge, shoulder mobility, active straight leg raise, trunk stability pushup, and rotary stability. FMS was scored on a scale of 0-3 (0 = pain, 1 = unable to perform, 2 = compensation needed, 3 = perfect). **RESULTS:** A time x group interaction was observed for the deep squat ($p = 0.034$). A main effect of time was observed for the QD group ($p = 0.003$), with a greater score at POST (2.1 + 0.245) compared to PRE (0.60 + 0.013). A time x group interaction was observed for the in-line lunge ($p = 0.036$). A main effect of time was observed for the QD group ($p = 0.003$), with a greater score at POST (2.1 + 0.245) compared to PRE (0.60 + 0.013). A time x group interaction was observed for shoulder mobility ($p < 0.001$). A main effect of time was observed for the FX group ($p = 0.02$), with a greater score observed at POST (2.93 + 0.023) compared to PRE (0.833 + 0.067). A time x group interaction was observed for rotary stability ($p = 0.012$). A main effect of time was observed for the FX group ($p = 0.047$), with a greater score observed at POST (0.667 + 0.033) compared to PRE (2.5 + 0.05). A main effect of time was observed for the hurdle

step (p = 0.034), with a greater score at POST (1.83 + 0.012) compared to PRE (1.2 + 0.022). A main effect of time was observed for the trunk stability pushup (p = 0.036), with a greater score at POST (1.25 + 0.018) compared to PRE (0.63 + 0.024). **CONCLUSION:** While both training programs resulted in improvements, a quadricep dominant program may be more beneficial for functional movements involving the lower limbs, whereas the functional training program may be more beneficial for functional movements involving the core and upper limbs.

Board 6

REINFORCEMENT AND SENSORY FEEDBACK SIMILARLY MAINTAIN A NEW WALKING PATTERN DURING RETENTION TESTING: A PRELIMINARY ANALYSIS

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PURPOSE: Reinforcement feedback (Reward and Punishment) during upper extremity motor learning enhances or decreases task retention, depending on feedback valence. Locomotor learning in humans has received considerable interest as a method of neurorehabilitation. However, we lack an understanding of the types of feedback that enhance retention of newly learned locomotor patterns. Thus, the purpose of this study is to determine the effects of reinforcement feedback during locomotor learning compared to sensory feedback. **METHODS:** We recruited 22 healthy participants and divided them into three groups [Reward (n=9), Punishment (n=8), Sensory (n=6)]. During treadmill walking, at a rate of 90 steps/minute, right knee angular kinematics were acquired using two IMUs affixed to the thigh and shank. Feedback of the right knee's movement during the swing phase was displayed on a screen corresponding to group. Reward and Punishment groups were provided a graded number scale corresponding to a monetary gain or loss respectively. The Sensory group was provided a bar graph with the current knee angle and a line representing the desired knee angle. Baseline walking was collected for 250 steps. Participants were then visually cued to learn a new walking pattern by matching their knee flexion to a desired angle (+30˚ of baseline walking) for 500 steps. Afterward, participants were asked to continue their walking pattern and feedback was removed from their visual field for an additional 500 steps. A linear mixed model was used to detect differences in knee angle magnitude between groups and conditions. Specifically, we compared average knee angle during the last 50 steps of the learning period and the last 50 steps of the retention period. **RESULTS:** All groups decreased their knee angle during retention testing ($p<0.01$) [Mean difference ± standard error, Reward=7.097±2.77˚, Punishment=12.918±3.610˚, Sensory=3.831±3.899˚], however, no group differences were noted (p=0.193). **CONCLUSIONS:** Neither reinforcement or sensory feedback effectively promotes retention of a new locomotor skill. As a result, other methods of feedback may be employed opposed to providing reinforcement or sensory feedback alone. This finding provides insight into locomotor rehabilitation over a longer term for persons with neurological disease.

Board 7

REINFORCEMENT AND SENSORY FEEDBACK SIMILARLY ENHANCE LOCOMOTOR LEARNING: A PRELIMINARY ANALYSIS

Leo Barzi, Christopher M. Hill, Sara Atkins, Tyler Wood, Emerson Sebastião, Matt Wilson, Northern Illinois University, DeKalb IL

PURPOSE: Reinforcement feedback (Reward and Punishment) and locomotor learning in humans has received considerable interest as a method of neurorehabilitation. Most understanding of locomotor learning is derived from upper limb reaching paradigms and cannot be directly applied to functional lower limb tasks. Currently, we lack models addressing reinforcement-based learning in lower extremities. Thus, the purpose of this study is to determine the effects of reinforcement feedback during locomotor learning compared to sensory feedback. **METHODS:** We recruited 22 healthy participants and divided them into three groups [Reward (n=9), Punishment (n=8), Sensory (n=6)]. During treadmill walking, at a rate of 90 steps/minute, right knee angular kinematics were acquired using two IMUs affixed to the thigh and shank. Feedback of the right knee's angular movement during the swing phase was displayed on a screen corresponding to group. Baseline walking was collected for 250 steps. Participants were then visually cued to learn a new walking pattern by matching their knee flexion to a desired angle (+30˚ of baseline walking) for 500 steps. Reward and Punishment groups were provided a graded number scale corresponding to a monetary gain or loss respectively. The Sensory group was provided a bar graph with the current knee angle and a

line representing the desired angle. A linear mixed model was used to detect differences in knee angle magnitude between groups and conditions. Specifically, we compared average knee angle during the first 50 steps and the last 50 steps of the learning period. **RESULTS:** All groups increased their knee angle as they performed the task ($p<0.01$) [Mean difference ± standard error, Reward=11.355±2.77˚, Punishment= 10.01±3.139˚, Sensory=2.30±3.391˚], however, no group differences were noted ($p=0.181$). **CONCLUSIONS:** This finding demonstrates that reinforcement feedback can effectively promote locomotor learning and produces similar outcomes to sensory feedback. This method could be applied to settings where sensory feedback may be low, such as stroke or neuropathy, as means of enhancing rehabilitation.

Board 8

ACUTE EFFECTS OF A MULTI-INGREDIENT PRE-WORKOUT SUPPLEMENT ON PEAK TORQUE DURING AN ISOKINETIC FATIGUE PROTOCOL

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PURPOSE: To examine the acute effects of a multi-ingredient pre-workout supplement (MIPS) on peak torque (PT) production of the leg extensors during a fatiguing isokinetic protocol. **METHODS:** Thirteen male subjects (mean age ± SD = 22.9 ± 2.2 years; body mass = 84.6 ± 8.6 kg; resistance training = 5.0 ± 3.4 hr·wk−1) volunteered to visit the laboratory on three occasions. The first visit served as an orientation session to familiarize the subjects with testing procedures. For the second and third visits, each subject was randomly assigned to ingest one serving of the MIPS or placebo 30 minutes before completing an isokinetic fatigue protocol that consisted of 60 maximal, alternating concentric and eccentric muscle actions of the leg extensors at 60º·s−1. Immediately before (PRE) and after (POST) the fatigue protocol, each subject was assessed for isometric PT at a 120° angle between the thigh and leg. From the fatigue protocol, the first three PT values (1st − 3rd, PRE) and the last three PT values (28th − 30th, POST) were averaged separately for both concentric and eccentric muscle actions. Separate two−way (time: PRE and POST; condition: MIPS, placebo) repeated−measures analysis of variance (ANOVAs) with follow−up paired−samples t−tests were used to analyze the isometric, concentric, and eccentric PT values. **RESULTS:** The statistical findings indicated the MIPS condition resulted in significantly greater isometric (205 ± 48 vs. 185 ± 44 N·m, $p = 0.04$, respectively) and concentric (121 ± 34 vs. 103 ± 27 N·m, $p = 0.015$, respectively) PT values compared to placebo collapsed across time (i.e. main effect for condition). For eccentric PT, there was no significant interaction ($F(1,12) = 0.110$; $p = 0.746$; partial $\eta2 = 0.009$) or main effect for condition ($F(1,12) = 1.198$; $p = 0.295$; partial $\eta2 = 0.091$). In addition, there were significant main effects for time (PRE vs. POST) for all muscle actions ($p < 0.001$). **CONCLUSIONS:** These findings indicated that the MIPS significantly attenuated the fatigue-induced decline in both isometric and concentric PT, but not eccentric PT during the isokinetic protocol of the leg extensors in college-aged males. Thus, the ergogenic effects associated with the current MIPS product uniquely influence the ability to maintain PT among static, shortening, and lengthening muscle actions.

Board 9

DOES LOWER-BODY STRENGTH OR POWER BETTER PREDICT GAIT SPEED IN A HETEROGENEOUS SAMPLE OF ADULTS?

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PURPOSE: Gait speed is a potent predictor of functional mobility, all-cause mortality, and health-related quality of life in the adult population. The individual contributions of musculoskeletal properties underlying gait speed are less understood, however. Therefore, the purpose of this study is to compare the independent associations between

lower-body strength and power with respect to habitual gait speed, in a clinically heterogenous sample of adults. **METHODS:** A sample of 107 adults (mean age = 57.3 ± 17.2 years, 58% female) were tested for isometric maximal knee extension strength (STR), using a linear force transducer, and lower-body muscular power (POW), estimated from the five-times sit-to-stand test. To account for variations in body size across participants, both STR and POW were normalized to body mass. Habitual gait speed was measured using the 10-meter walk test. The associations between STR and POW to gait speed, after controlling for age, sex, and BMI, were assessed using multiple linear regression models. Standardized beta coefficients (β) and their 95% confidence intervals (95%CI) are reported, to illustrate the individual contributions of STR and POW to habitual gait speed. **RESULTS**: Controlling for potential confounders, both STR and POW were significant, independent predictors of gait speed, with POW explaining more variation than STR (β = 0.45 [95%CI: 0.25, 0.64] and 0.32 [95%CI: 0.08, 0.56], respectively). With age, sex, and BMI entered, adding POW and STR to the models explained 32% ($F(4,102) = 13.38$, $P<0.001$) and 24% ($F(4,102) = 9.16$, $P<0.001$) of the total variation in gait speed, respectively. **CONCLUSION:** Estimated muscle power appears to be a more robust predictor of gait speed, compared to isometric knee extension strength in a clinically diverse sample of adults. It is unclear, however, whether global muscle strength and isolated measures of muscle strength differ in their relationships to gait speed, compared to muscle power. Future work investigating the objective measures of muscle power and its intervention effectiveness on physical mobility and function is warranted in both ostensibly healthy and clinical populations.

Board 10

PHYSICAL ACTIVITY DISPARITIES CONTRIBUTE TO INEQUITABLE HEALTH-RELATED QUALITY OF LIFE AMONG BLACK INDIVIDUALS WITH KNEE-OSTEOARTHRITIS

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PURPOSE. Knee osteoarthritis (KOA) is the most common form of arthritis, which is a leading cause of disability. While there is no cure for KOA, physical activity has been shown to slow down progress and reduce symptoms, which can improve an individual's health-related quality of life (HR-QOL). However, racial disparities exist for participating in physical activity (PA), which can result in Black individuals with knee osteoarthritis experiencing lower HR-QOL compared with their white counterparts. The purpose of this study was to understand disparities of PA, and related determinants, specifically pain and depression, and how these constructs explain why Black individuals with knee osteoarthritis experience lower HR-QOL. **METHODS.** Data was analyzed from the Osteoarthritis Initiative, which is an NIH funded longitudinal multi-center observational study that collected data from individuals with KOA. The present study analyzed change scores (across 24 months) in pain (WOMAC scale), depression (CES scale), physical activity (PASE), and HR-QOL (SF-12), which was found to be complete among 1658 participants. **RESULTS**. A MANCOVA model at baseline found Black race to be a predictor of high pain, depression, and lower physical activity and HR-QOL, $F(4, 2299) = 59.21$, $p < .001$. The findings supported the prospective multi-mediation model which found race to predict pain ($\beta = .39$, $p < .001$), pain to predict depression ($\beta = .13$, $p < .001$), depression to predict physical activity ($\beta = -.10$, $p < .001$), and physical activity to predict quality of life ($\beta = .00$, $p < .001$). The entire indirect pathway was found to be significant ($\beta = -0.18$, 95% CI [−0.268, −0.1001]), while direct pathway was no longer significant ($\beta = 0.11$, 95% CI [−0.005, 0.222]), denoting total mediation effect. **CONCLUSION.** The study highlights disparities experienced among Black patients with KOA (higher pain, depression, and lower PA) and explains why they experience lower HR-QOL compared with their white counterparts. Future effective and equitable interventions should address higher levels of pain concerns and depression among Black patients, which would alleviate burden for PA. The program would also need to include additional inequitable barriers of PA experienced among Black individuals such as safety, access, and cost, as identified in the literature.

Board 11

COMMON MUSCLE DAMAGE MARKERS ARE ASSOCIATED WITH DIVERGENT GENE EXPRESSION CHANGES AFTER ECCENTRIC EXERCISE

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PURPOSE: Unaccustomed eccentric (ECC) exercise results in exercise-induced muscle damage (EIMD). Soreness, strength loss and serum creatine kinase (CK) levels are often used to evaluate the extent of EIMD, however, changes in these markers are not fully understood at the mechanistic level. In this study, we leveraged variation in each indirect marker following standardized exercise using correlated gene expression to gain insight into the different processes involved in each and their relationship to each other, with the hypothesis that unique molecular pathways drive each response. **METHODS:** Vastus lateralis biopsies were collected (N=35) from young men 3hr post-ECC exercise (non-exercised contralateral leg (CON) as a control). Maximal isometric strength measured on a Biodex isokinetic dynamometer, soreness measure via visual analog scale, and serum creatine kinase were assessed 24h pre-exercise, 0h post-exercise, and every 24 hours for 5 days following exercise. RNA from muscle biopsies was used to generate global gene expression profiles (Agilent Whole Genome Microarrays). Partek Genomics Suite correlated peak values of soreness, strength loss and CK post-ECC (0-5d) with gene expression in ECC relative to intra-subject paired CON using Pearson linear correlation. One-way RMANOVA was used to examine the effect of time on each marker. **RESULTS:** We detected the following correlations (all $p<0.05$) after ECC: 2677 genes with peak soreness, 3333 genes with peak strength loss, and 3077 genes with peak CK. Of the 9087 genes correlated with ECC, only 16 (0.17%) are shared between all three markers. Unique genes for each marker were: 2346 genes (88%) for peak soreness, 3032 genes (91%) for peak strength loss, 2937 genes (95%) for peak CK. **CONCLUSION:** In a model of moderate exercise-induced muscle damage, we related early changes in gene expression to variation in common indirect markers of muscle damage. Our results suggest that changes in these markers are the result of distinct biological processes with little shared variance between markers. Top pathways correlated with each marker include GABA receptor signaling and serotonin receptor signaling with peak strength loss, NF-κβ signaling and actin cytoskeleton remodeling with peak soreness, and axonal guidance signaling and phagosome formation.

Board 12

THE RELATIONSHIP BETWEEN CARDIORESPIRATORY FITNESS, BODY MASS INDEX AND CHANGES IN SALIVARY IMMUNOGLOBULIN A (SIGA) FOLLOWING MAXIMAL EXERCISE

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Secretory immunoglobulin A (SIgA) levels are recognized as a physiological marker of the health of the human mucosal immune system. Previous research has shown SIgA concentrations decrease immediately following high intensity and long duration exercise while moderate intensity exercise may result in an increase in SIgA levels. More recently, researchers have suggested that a person's cardiorespiratory fitness (CRF) and body mass index (BMI) may impact SIgA response following acute exercise. **PURPOSE:** To investigate the relationships between CRF, BMI, and SIgA changes following maximal exercise. **METHODS:** Unstimulated saliva was collected from 28 (10 males, 18 females) healthy college students (Age=20.1±1.2) before and five minutes after a VO2Max test. Samples were measured for volume to determine salivary flow rate (SFR). Biochemical analysis was performed using an enzyme-linked immunosorbent assay (ELISA) to determine absolute SIgA concentrations. Additionally, SIgA secretion rate was computed from SFR and absolute SIgA concentrations. Pearson correlations were used to examine relationships between variables. Significance was set a $p < 0.05$. **RESULTS**: A significant relationship was observed between BMI and changes in SIgA concentration ($r = -.462$) following maximal exercise. No significant relationships were observed between changes in secretion rate ($r = -.340$) or SFR ($r = .124$). Additionally, CRF was not significantly related to changes in SIgA concentration ($r = -.220$), secretion rate ($r = -.067$), or SFR ($r = -.158$) following maximal exercise. **CONCLUSION:** BMI appears to have a strong, inverse relationship with concentration response following maximal exercise, while CRF was not related to SIgA concentration, secretion rate, or SFR following maximal exercise. Future research should investigate a wider range of BMIs and how it affects SIgA following exercise.

Board 13

VALIDATION OF A POPULAR FITNESS WATCH FOR STEP COUNT AND PHYSIOLOGICAL VARIABLES DURING INCREMENTAL EXERCISE

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PURPOSE: To determine the validity of a popular fitness watch for step count, heart rate, and energy expenditure during an incremental treadmill exercise test. **METHODS:** Thirty-six subjects (males: n = 22, females: n = 14; mean age ± SD = 22.7 ± 3.5 years; body mass = 76.5 ± 16.1 kg; height = 173.3 ± 10.9 cm) volunteered to complete an incremental treadmill test that consisted of four, 4-minute stages at 4.8, 7.2, 9.7, and 12.1 km·hr-1. The fitness watch was placed around the left wrist of each subject after being programmed for gender, age, body mass, and height. Heart rate from the watch was recorded every minute, whereas step count and energy expenditure were recorded as single values across the entire 16-minute test. An electrocardiogram, indirect calorimetry using a calibrated metabolic cart, and video recordings with handheld counters were used as the criterion measures to provide the actual values for heart rate, energy expenditure, and step count, respectively. Pearson product-moment correlations were used to determine the relationships between the fitness watch and criterion measures of heart rate, energy expenditure, and step count. Paired-samples t-tests were used to examine mean differences between the fitness watch and criterion measures for step count, heart rate, and energy expenditure. **RESULTS:** Regression analyses indicated significant relationships for the fitness watch versus the criterion device for step count ($r = 0.64$, $p < 0.001$) and heart rate ($r = 0.74$, $p < 0.001$), but not energy expenditure ($r = 0.09$, $p = 0.627$). In addition, there were significant mean differences between the fitness watch and criterion device for heart rate (126 ± 28 bpm vs. 144 ± 34 bpm, $p < 0.001$, respectively), but not step count (2319 ± 591 steps vs. 2293 ± 483 steps, $p = 0.794$, respectively) or energy expenditure (150.8 ± 64.5 kcal vs. 130.0 ± 38.0 kcal, $p = 0.100$, respectively). **CONCLUSION:** These findings indicated that the popular fitness watch provided accurate values for step count, but underestimated heart rate and exhibited no relationship with energy expenditure in young adults during incremental exercise. Thus, the current fitness watch may serve as a valid step count tracker, whereas the physiological variables provided (i.e. heart rate and energy expenditure) should be interpreted with caution.

Board 14

EARLY POSTNATAL VOLUNTARY WHEEL RUNNING IMPACTS ON GROWTH RATE, GRIP STRENGTH, MUSCLE MASS, AND BODY COMPOSITION

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BACKGROUND: Physical activity (PA) is a vital behavior to maximize health. Less is understood regarding the impact of physical activity opportunities in key stages of skeletal muscle development, such as the time frame between weaning and sexual maturation. **PURPOSE:** We propose that, in opposition to the negative effects of disuse, exposure to voluntary wheel running early in life will enhance growth rate, muscular function, and tissue composition. **METHODS:** We exposed postnatal mice (3-4 weeks old) to 2 weeks of voluntary wheel running (VWR) compared to control (CON) mice in a standard cage. We then removed the wheels to give one week of detraining. Grip strength and body composition were assessed before (3 weeks) and after the 2 week period with or without access to VWR (5 weeks) and after the week of detraining (6 week). **RESULTS:** Growth rate, assessed as the change in body weight from week 3 to week 5, was 8.43±0.49 g, and 8.82±0.37 g for CON and VWR, respectively ($P>0.05$). Average lean mass change from week 3 to week 5 was similar in VWR (6.68±0.435 g) vs CON (6.11±0.44 g) ($P>0.05$). Average fat mass change from week 3 to week 5 was less in VWR (0.07±0.07 g) vs CON (1.12±0.12 g) ($P<0.05$). Absolute max grip strength change between weeks 3 and 5 was greater in VWR (104.4±7.45 vs 70.85±4.0 g force) CON ($P<0.05$). The liver, soleus, and plantaris were larger ($p<0.05$) in VWR vs CON, but not the gastrocnemius, tricep surae, TA/EDL and triceps. **CONCLUSION:** Early postnatal mice subjected to VWR displayed an increase in their max grip strength change, liver weight, soleus weight, and plantaris weight, as well as a decrease in fat mass change. The growth rate, and lean mass change were similar in both groups of mice. Changes in lean mass and body weight suggest there is no difference in physical health that may have bearing on healthy development and aging. Nonetheless, the VWR mice may be less predisposed to obesity with less change in fat mass.

Board 15

ACCURACY OF BIA FOR MEASURING BODY COMPOSITION AND RESTING METABOLISM IN YOUTH.

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PURPOSE. This study assessed the accuracy of bioimpedance analysis (BIA) for measuring body composition and resting metabolic rate (RMR) against criterion measures in youth. **METHODS.** Youth of varying sex, age (child, 7–12 y; teen, 13–17 y), weight status (healthy weight, BMI<85th %ile; overweight, BMI≥85th %ile; obese, BMI≥95th %ile), and pubertal status (years from peak height velocity) were recruited from Athens and surrounding counties. Using paired t-tests, fat mass (FM; kg), fat free mass (FFM; kg), visceral adipose tissue (VAT; cm2) and RMR (kcal/day) measures from a multi-frequency, tetrapolar, eight-point BIA device were compared to dual-energy X-ray absorptiometry (DXA) and a portable metabolic analyzer, respectively. Relationships among all measures were assessed using correlation analyses. Accuracy was calculated as the root mean squared error (RMSE) and bias between methods. **RESULTS**. In total, 132 youth (12.5±3.0 y; 70 female, 87 healthy weight, 77 children, 61 pre-pubertal) participated in the study. BIA measures of FM was greater in girls (13.55±1.27 kg), and obese (26.35±2.78 kg) compared to boys (9.86±0.91 kg) and healthy weight youth (7.66±0.39 kg). FFM was higher in boys (41.76±1.83 kg), teens (48.73±1.34 kg), and post-pubertal youth (51.19±1.55 kg) compared to their counterparts (35.33±1.12, 30.93±0.88, and 28.46±0.69 kg, respectively). BIA-estimated RMR was higher in boys (1272±40 kcal/day), teens (1423±29 kcal/day), and post-pubertal youth (1476±33 kcals/day) compared to their counterparts (1133±24, 1038±19, 985±15 kcals/day, respectively). Assessing the entire sample, BIA reported lower FM (11.8±0.8 kg) and higher FFM (38.4±1.1 kg) and VAT (50.4±4.0 cm2) compared to DXA (14.7±0.8 kg, 32.6±1.0 kg, 45.5±2.6 cm2), whereas estimated and measured RMR values were similar (1199±24 vs. 1145±254 kcal/day; $p>0.05$). Correlations between methods ranged from $r=0.71$ to 1.00 ($p<0.05$). BIA overestimated FFM by 5.7 kg and underestimated FM by 2.8 kg. **CONCLUSIONS.** While measures between methods were statistically different, the magnitude of these differences were physiologically insignificant and strong relationships between BIA and criterion measures were observed. Future research should assess the sensitivity of BIA to body composition and RMR changes across growth trajectories.

Board 16

USING A CABLE SYSTEM TO MEASURE THE PHYSIOLOGICAL AND PERCEPTUAL EFFECTS OF A UNIQUE COMBINATION OF AEROBIC AND RESISTANCE EXERCISE

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Using a cable resistance system, we tested a unique combination of aerobic (AE) and resistance exercise (RE) to determine the benefits of this exercise modality and observe the practicality of this routine in a realistic setting. **PURPOSE**: To determine if alternating between short bouts of RE & AE into one exercise routine or microcycles (MC) of RE & AE results in similar cardiovascular, metabolic & perceptual responses compared to a traditional method of RE followed by AE (TR) while using a cable system. **METHODS:** 5 males (age=19.6±1.3 yr; % fat=12.2±6.3; VO2max=54.6±4.3 ml/kg/min) with varying training experiences volunteered. Day 1 included VO2max & body composition assessment. Day 2 consisted of 4 RE (front squat, bench press, bent-over rows, abdominal curls) to determine 1RM. On days 3 & 4 Ss were randomly selected (counter-balanced) to complete the MC or TR trial. The volume (RE-70% 1RM (12 reps); AE-50% VO2-R (3 min bouts)) & work rate was held similar between MC & TR. Blood lactate (La) & RPE was sampled at similar times for each trial. Metabolic & HR measurements (Cosmed K5) were collected continuously during each trial. **RESULTS**: 2-way ANOVA with repeated measures showed total time (TT) across trials was significantly different (MC=2916±78; TR=3137±126). VO2 (ml/kg/min) for MC & TR was similar (MC=26.4±3.6; TR=26.6±2.6). HR (b/min) for MC & TR was also similar (MC=149.7±2.8; TR=144.7±9.1). RPE for MC was significantly lower than TR (MC=6.6±0.5); TR=7.6±0.5). La (mmol) was significantly lower for MC=6.0±0.9 compared to TR=7.0±1.4. Energy expenditure per minute (EEM) for MC & TR was similar (MC=10.8±0.8; TR=10.8±0.8). **CONCLUSION:** While using a cable system, RPE & La responses during MC were significantly lower when compared to TR; however, VO2, HR &

EEM were similar between both trials. These data suggest short, alternating bouts of AE & RE affect the clearance of La and result in acutely lower perceptions of effort during the MC routine.

Board 17

THE FUSION OF AEROBIC AND RESISTANCE EXERCISE: PHYSIOLOGICAL AND PERCEPTUAL RESPONSES

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To optimize the benefits of exercise training, we tested a novel combined aerobic (AE) & resistance exercise (RE) routine. **PURPOSE:** To determine if alternating short bouts of RE & AE into one exercise routine or microcycles (MC) of RE & AE result in similar cardiovascular, metabolic & perceptual responses compared to a traditional method of RE followed by AE (TR). **METHODS**: 10 males (age=20.4±1.0 yr; % fat=17.8±3.6; VO2max=51.5±4.2 mL/kg/min) with varying training experiences volunteered. Day 1 included VO2max & body composition assessment. Day 2 consisted of 8 RE to determine 1RM. On days 3 & 4 Ss were randomly selected (counter-balanced) to complete the MC or TR trial. The intensity (RE-75% 1RM (12 reps); AE-50% VO2-R (3 min bouts)) & Total Time (TT) of each trial was similar. On days 5 & 6 Ss were randomly selected (counter-balanced) to complete AE-only (AEo) or RE-only (REo) trials. Blood lactate (La) & RPE was sampled at similar times for each trial. Metabolic & HR measurements (Cosmed K5) were collected continuously during each trial. **RESULTS**: 4-way (MC, TR, AEo & REo) ANOVA with repeated measures & pair-wise contrasts suggested minimal statistical significance for TT. TT (s) during MC, AEo, & REo was similar and less than TR (MC=2977±152; TR=3131±113; AEo=2943±56; REo=2949±74). Also, avVO2 (mL/kg/min) during MC, TR & AEo was similar and greater than REo (MC=24.4±4.0; TR=21.8±2.4; AEo=19.7±3.0; REo=10.1±1.9). avHR (b/min) across MC & TR was similar and greater than AEo & REo (MC=145.7±15.0; TR=144.6±13.6); AEo=124.5±14.7; REo=108.5±15.4). However, RPE for MC was significantly lower than TR (MC=5.7±0.7; TR=7.5±0.9; AEo=3.4±0.5; REo=4.4±1.0). La-AUC (mmol/L) across trials was significantly lower for MC=4.6±1.6 & AEo=1.4±0.3 compared to TR=6.3±2.3 & REo=7.0±1.5. Total energy expenditure (TEE) for MC & TR was similar & greater than AEo & REo (MC=501±66.5; TR=478±54.1; AE=393±44.2; RE=203±34.4). **CONCLUSION:** A combined bout of AE & RE of similar intensity & volume using MC resulted in similar VO2, HR & TEE responses when compared to TR; however, RPE & La responses were significantly lower during MC. These data suggest short, alternating bouts of AE & RE (MC) affect the clearance of La and may result in an acutely lower perception of effort during and immediately following the MC exercise routine.

Board 18

REDUCING PHYSICAL ACTIVITY DISPARITIES AMONG VULNERABLE MINORITIES - METHODS AND PRELIMINARY OUTCOME

Rafael A. Alamilla, Yanoula M. Georgiadis, Navin Kaushal, NiCole R. Keith, FACSM, Indiana University Purdue University Indianapolis, Indianapolis IN

INTRODUCTION: Vulnerable minorities experience high rates of chronic disease. Physical Activity (PA) is an effective preventive behavior to mitigate multiple diseases. Vulnerable minorities have low PA participation. Finding ways to engage PA in vulnerable minorities is imperative. **PURPOSE**: To describe the baseline data from a community-based wait-list pilot PA trial for vulnerable minorities. **METHOD:** Forty-five participants from a Midwest urban community were randomized to an experimental (EXP: N = 23; 15 F) or control (CON: N = 22; 15 F) group. Baseline measures are height = 168.5 ± 9.1cm (EXP), and 167.9 ± 7.0cm (CON); weight = 95.8 ± 26.4kg (EXP) and 85.0 ± 19.3kg (CON), age = 39.9 ± 9.7y (EXP) and 48.8 ± 13.2y (CON). EXP participants were counseled to engage in regular PA (>4d/wk for >30 mins). EXP participants received a fitness center membership, trainer, and on-site monthly education to help them develop exercise identity and habit formation. The CON group could engage in PA if desired but did not have the same research resources. Both groups completed monthly surveys assessing exercise identity, social support, and habit formation. Baseline data included one week of moderate-to-vigorous PA (MVPA) and health-related fitness (measured by accelerometry and fitness tests, respectively). **RESULTS**: Paired-samples T-test were used to make baseline comparisons. Study participants were 73.2% White, 67.4% employed full-time, 56.1% obtained a bachelor's degree or higher, and 32.0% earned >300% of the federal poverty level. MVPA was 127.9 ± 69.8 min/wk (EXP) and 174.7 ± 103.1 min/wk (CON). Other outcomes included

body fat % (EXP: 37.1 ± 10.9%; CON: 32.9 ± 12.0%), 8ft-up-and-go time (EXP: 5.01 ± 0.8s; CON: 5.05 ± 1.10s), 30s chair stand (EXP: 15.3 ± 6.5; CON: 17.5 ± 5.2), 30s seated arm curl (EXP: R =18.9 ± 5.1, L = 19.2 ± 5.1; CON: R = 21.2 ± 5.7, L = 20.1 ± 5.4) and were not different. Chair sit-and-reach scores for right (EXP: -0.1 ± 8.3cm; CON: 1.0 ± 12.2cm, p = 0.003) and left (EXP: -0.3 ± 8.2cm; CON: 0.1 ± 11.4cm, p = 0.01) legs were different. **CONCLUSION**: Data show baseline measures did not vary between groups and difficulty recruiting vulnerable minorities. Next steps include reporting final outcomes and developing refined recruitment methods.

Board 19

THE EFFECTS OF PROFANE LYRICS FROM A RAP/HIP-HOP MUSIC PLAYLIST ON CARDIORESPIRATORY FUNCTION AND MOOD IN COLLEGE ATHLETES

Sabia Akhoon, Raymond Kraus, PhD, Elmhurst University, Elmhurt IL

PURPOSE: Profanity has been shown to increase muscular strength and power when stated aloud; however, the performance effects of listening to profanity are unknown. The purpose of the study was to determine the effects of profanity in music on maximal graded exercise test (GXT) variables like cardiovascular function as well as mood. **METHODS:** Ten healthy college athletes (mean ± SD: age 20.5±0.97 yr; BMI: 23.0±1.8 kg/m2) participated with valid data obtained for 9 subjects (men, n=6; women, n=3). Subjects completed a simulated GXT, for familiarization, and 2 maximal GXTs at least 2 d but no more 14 d apart. Subjects were asked to refrain from strenuous exercise 48-hours prior to all tests. GXTs were performed on a treadmill beginning at an individually prescribed submaximal speed with standard increases until volitional fatigue. VE, VO2, and VCO2 were monitored with open-circuit spirometry via an indirect calorimeter, and HR, RPE and time to exhaustion (TTE) were measured. The Profile of Mood States (POMS) questionnaire was administered before and after each GXT. Two Rap/Hip-Hop music playlists with identical tracks and track sequence were created with the only difference between the playlists being profanity (i.e., ~10 profane words/min). A counterbalanced design was used, and the order of the GXTs were randomly assigned. Student's dependent t-tests were used to detect differences between trials except for the POMS data which were analyzed with 2x2 ANOVAs. **RESULTS:** No significant differences in cardiorespiratory function or GXT related dependent variables were observed except that maximum respiratory exchange ratio (RER) was found to be higher ($p=0.016$) for the profane music condition. The TTE for the profane music condition (556.8±105.8 s) was nearly identical ($p=0.99$) to that of the clean music condition (556.9±120.6 s). There were no significant interactions from the POMS data, but there were timing main effects (i.e., pre vs. post) for the tension ($p<0.001$) and fatigue ($p=0.019$) subscales whereby tension was lower and fatigue was higher in the posttest state. **CONCLUSIONS:** Although past studies have demonstrated that profanity stated aloud may improve anaerobic physical performance, listening to profanity during a GXT does not appear to have an effect on cardiorespiratory function or mood.

Schedule – Friday Afternoon: Symposia

Symposium #12: Discovery Room, 2:00-2:50pm

EXERCISE TO ENHANCE BRAIN HEALTH

Session Moderator: Angela Ridgel FACSM, Kent State University

Presenters and Institutional Affiliations:

 **Terence Moriarty, Ph.D., University of Northern Iowa, Cedar Falls IA**

Dr. Terence Moriarty is currently an Assistant Professor of Exercise Physiology in the Department of Kinesiology at the University of Northern Iowa. Dr. Moriarty's educational background includes a BS in Sport and Exercise Sciences from the University of Limerick, Ireland, a MA in Exercise Physiology from Central Michigan University, and a PhD in Exercise Physiology from the University of New Mexico. Terence is passionate about studying high-intensity interval training as well as brain and muscle oxygenation along with cognitive function in clinical and healthy populations. He enjoys playing all team sports, especially soccer.

 **Kelsey Bourbeau, University of Northern Iowa, Cedar Fall IA**

Kelsey Bourbeau is currently an Instructor in the Kinesiology Department at the University of Northern Iowa. Kelsey earned her bachelor of science and masters degree in Exercise Physiology at Central Michigan University. She is currently a Ph.D. candidate at the University of New Mexico where she is investigating the role of home-based aerobic exercise on cognition in adults with obesity. Kelsey is passionate about the use of aerobic exercise as adjunct treatment to mental health disorders. She is especially interested in the molecular changes that accompany cognitive and psychological improvements related to exercise. Aside from her research interests, Kelsey loves teaching her students the benefits of exercise and helping them find their passion within exercise science.

Abstract:

Exercise has shown to have a wide range of positive effects on the brain's anatomy, physiology, cognitive and affective functions. Poor brain health is associated with a wide variety of consequences, for example, poor academic performance in students. Impairments in brain health and cognitive function may also predict the future onset of psychiatric disorders (e.g. dementia, depression, anxiety, addiction disorders). The severe consequences of poor brain health compounded with the increasing prevalence of psychiatric disorders warrants the exploration of treatments aimed to mitigate or prevent poor brain health and onset of disease. There is growing evidence in the literature that regular exercise (both acute and chronic) may be a potential method to enhance brain health and reduce the risk of developing psychiatric disorders in both healthy and diseased populations. However, the optimal exercise characteristics (e.g., type of physical exercise, exercise intensity, and exercise duration) to effectively improve brain health across varying clinical and non-clinical populations are largely unknown. In addition, the possible cellular and molecular mechanisms that may be responsible for such improvements are speculative. Specifically, we are interested in understanding the optimal effective exercise dose on brain health as well as the possible mechanisms of action for such brain health improvements.

Learning Objectives:

Attendees should be able to:

1. explain historical perspective on aerobic exercise and brain health.
2. understand the physiology of possible mechanisms related to cognitive improvements.
3. describe optimal exercise characteristics and benefits of these training techniques.

4. describe current research on topic and future direction.

<u>Symposium #13:</u> Vision Room, 2:00-2:50pm

Impact of Exercise on Adults with Down Syndrome

Session Moderator: Dan Carl FACSM, University of Cincinnati

Presenters and Institutional Affiliations:

Emily Post, Ph.D., CSCS, Ohio Dominican University, Columbus OH

Dr. Emily Post, CSCS is an Assistant Professor of Exercise Science. She earned her B.S. at Ohio Dominican University in Exercise Science with a minor in Biology. She earned her M.S. from The University of Tennessee-Knoxville (UTK) in Kinesiology, Recreation, and Sport Studies with a specialization in exercise physiology. She worked primarily in the pediatric and special populations exercise physiology laboratory while at UTK. She also lead the general public body composition, aerobic, and anaerobic testing and many public health initiatives at UTK. Emily earned her PhD at The Ohio State University in Exercise Physiology with a minor in Neuroscience. Much of her time spent at OSU was working with special populations and the military, working through neuromuscular and cognitive impacts of exercise.

Emily currently is the Head of the Exercise Science Department at Ohio Dominican University. Throughout her career she has co-authored research articles in exercise physiology, Down syndrome, biochemistry, sports performance, supplementation, military, and recovery. Emily is active in professional organizations and continues to pursue and present her research with the Down syndrome community. She is also highly active in the Down Syndrome Association of Central Ohio (DSACO) and their wellness initiatives.

Abstract:
Adult with Down syndrome (DS) are an underserved population at high risk for a host of different pathologies, including increased risk of Alzheimer's Disease, metabolic syndrome, cardiovascular disease, and general increase mortality rates. Aerobic and resistance training (RT) exercise are specific modalities that have been shown to positively impact several aspects to health. Research on individuals with DS in the current exercise literature base focuses primarily on benefits from aerobic exercise. Evidence has shown that aerobic exercise is highly beneficial to individuals with DS. There is a much smaller body of literature that focuses on RT and DS. However, the research shown is very provocative and supports the need for more study of this modality as a key intervention, as evidence as shown improvements in strength, balance, coordination, self-efficacy towards exercise, and greater independence in individuals with DS have been observed. Recent research has begun to show immense benefits for the DS population based on evidence that there is a positive association between intellectually stimulating activities (e.g. RT) and an improvement in cognitive performance, motor control, and physical strength (Post et. al., 2022). These sorts of improvements lead to improvements in activities of daily living, independence, and general functionality, which tend to be hinderances to daily life functionalities in adults with Down syndrome. RT for individuals with Down syndrome has been proven both safe and effective if done properly. With continued research and education, will lead to eventual safe guidelines and more specifics for exercise prescription in this population of individuals challenged with this genetic disorder.

Learning Objectives:
1. Understand the benefits of exercise for people with Down syndrome (i.e., resistance and aerobic training benefits to motor skill, cognitive performance, strength, body composition, mood, and independence). This talk will focus most on resistance training, due to lack of knowledge for this population in that field of study.
2. Understand the enhanced risk of exercise for people with Down syndrome compared to general typically developed population.
3. Specific tips on running intervention studies and training individuals with Down syndrome safely and effectively

<u>Symposium #14:</u> Network Room (2nd Floor), 2:00-2:50pm

A Systems Science Approach to Well-Being in Helping Professions

Session Moderator: Clayton Camic, Northern Illinois University

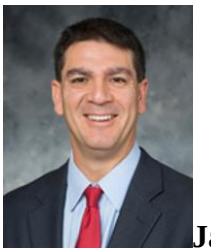
Presenters and Institutional Affiliations:

Julie Young, Ph.D., Nationwide Children's Hospital Research Institute, Columbus OH

Dr. Julie Young graduated from Mount Union College and then obtained her master's degree from UNC Chapel Hill. She has her PhD from The Ohio State University in Health and Rehabilitation Sciences. She worked for Nationwide Children's Hospital Sports medicine for over 15 years in a variety of settings including high school outreach, physician extender and treating patients in outpatient rehabilitation. Julie worked with the division to advance their research in areas of concussion, female athlete, overuse injuries, and musculoskeletal ultrasound. More recently, she has focused her research efforts around physical activity and mental health in adolescents. Julie currently works as a project manager on a HRSA funded grant at NCH under Dr. Mahan on a program aiming to improve mental health and resilience in pediatric physicians and trainees.

Nathan Edwards, The Ohio State University, Columbus OH

Mr. Nathan Edwards completed a B.A. in Exercise Science from Taylor University (2017) and continued to complete his M.S. in Biomechanics at Ball State University (2019). He is in his 4th year at The Ohio State University in the Health and Rehabilitation Science's PhD program. While in this program, his research has explored multiple components of holistic health for first responders. Nathan has worked with local law enforcement agencies to improve their fitness assessments methods and to guide overall performance improvement efforts. He is currently focused on determining the influence of equipment carriage on law enforcement officers' movement and health.

 **James Onate, Ph.D., The Ohio State University, Columbus OH**

Dr. James Onate is an Associate Professor at The Ohio State University in the College of Medicine's School of Health and Rehabilitation Sciences. He is the and Director of the Division of Athletic Training education program and Director of the Multidisciplinary Opportunities for moVement Education and Science (MOvES) research laboratory, as well as being a member of the Human Performance Collaborative and Jameson Crane Sports Medicine Institute at OSU. His main research focus is developing human movement and performance science that bridges the gap across research to clinical systems to allow for evidence-based outcomes for aiding individuals to sustain optimal health and performance throughout their careers and lives. The specific aims of his research are focused on exploring issues related to lower extremity injury, in particular anterior cruciate ligament (ACL) injury, human performance optimization paradigms including but not limited to biomechanical, neurological, psychological, and physiological system processes. His research also extends to combining motor learning, biomechanics, sport performance, coaching and rehabilitation paradigms to create systems of clinical discovery to optimize human health and performance in cohorts ranging from athletics to military and first responders. His research has been sponsored by organizations including the National Institutes of Health, Office of Naval Research, Department of Defense, United Special Operations Command and the National Athletic Trainers' Association Research and Education Foundation. Dr. Onate is an Associate Editor for the Journal of Athletic Training and is a reviewer for several sports medicine, biomechanics, athletic training, and rehabilitation journals. He is currently the Chair of the National Athletic Trainers' Association Research and Education Foundation committee for Athletic Training Research Agenda (ATRA). Dr. Onate is the Vice President of the Organization of Latinx/Hispanic Employees at OSU and is a Fellow of the National Athletic Trainers' Association. He also participates in extensive community service as a baseball coach and member of the Youth Development Committee for the American Baseball Coaches Association (ABCA) focused on High School aged baseball player development along with being a Youth Mental Health First Aid Instructor and a Certified Athletic Trainer since 1995.

Abstract:

In our world, there are many parts and levels that can interact in non-linear and seemingly unpredictable ways. Systems science (SS) thinking is a framework that can help us understand complex systems by examining the whole system, often elucidating obscure relationships and leverage points with high system influence. This framework can be especially helpful with examining complex issues such as wellness. Those in helping professions are vital to a functioning society. Law enforcement, EMS, and physicians all can experience high stress environments and life or death situations. Burnout, stress, and overwhelm can negatively impact their performance and lead to poorer outcomes to those who they are trying to help. Even before the pandemic, helping professions struggled with high workload, inefficient work systems (such as EMR) and disengagement. Poor mental health can impact physical health as well. Improving individual resilience and mental health can alleviate some stress, but organizational and societal changes offer a unique opportunity for larger improvements.

Learning Objectives:

1. Explain individual and organizational level factors that deteriorate or protect against stress in first responders from a systems science perspective (including resilience and performance).
2. Identify prevalence of stress, burnout and mental health concerns for helping professions (including first responders and physicians)
3. Discuss how systems science may offer insights into improving helping profession well-being

Symposium #15: Discovery Room, 3:00-3:50pm

Prevalence Of Obesity And Physical Activity Among Obese Adolescents In Rural Appalachia.

Session Moderator: Katharine Currie, Michigan State University

Presenters and Institutional Affiliations:

Devin Laurent, Ph.D., Ohio Dominican University, Columbus OH

Dr. Laurent is an Assistant Professor in the Department of Exercise Science at Ohio Dominican University. He earned his B.S. and M.A. in Exercise Science from Central Michigan University. His graduate research examined the influence of fitness monitors and self-reported journals on physical activity behavior among middle school children. He earned his PhD at The Ohio State University in Kinesiology with a specialization in health behavior and health promotion. His dissertation work examine different self-regulation skills used for exercise as mediators between BMI and MVPA among high school teens living in rural Appalachia. He primarily works with children and adolescents to promote healthy lifestyle behaviors and to educate youth populations about ways to improve cardiovascular health. Dr. Laurent's research focuses on the impact of both cognitive and environmental factors associated with exercise among morbidly obese youth.

Abstract:
Obesity prevalence among youth populations continues to steadily increase with nearly 22% of adolescents in the US classified as obese. Compared with the national prevalence average, previous reports indicate that adolescents living in rural areas have higher rates of obesity. Specifically, in rural Appalachia, nearly 30% of adolescents were classified as obese and extremely obese. Adolescence is considered a favorable time to influence healthy lifestyle behaviors. Physical activity is among the most influential and controllable behaviors to establish during adolescence as these patterns have been shown to carry into adulthood. Despite the substantial benefits of physical activity established, most adolescents are not meeting physical activity guidelines to accumulate 60 minutes or more of moderate-to-vigorous physical activity (MVPA) per day to maintain beneficial outcomes. Previous research found Appalachian adolescents average nearly half of the daily recommendation with only 31 minutes of MVPA per day. Our goal is to design effective behavioral interventions to address the youth population at risk of obesity and target modifiable health factors such as physical activity to reduce the risk of such comorbidities. Self-regulation skills could potentially be a promising approach for behavioral interventions designed to target adolescents living in rural regions with limited resources for recreational activities, organized sports, and environmental accessibility for physical activity.

Learning Objectives:
1. Compare the differences in PA behavior based on US daily guidelines for adolescents.
2. Understand the use of self-regulatory skills implemented currently in behavioral interventions
3. Recognize the current approaches used to measure PA among youth populations.

Symposium #16: Vision Room, 3:00-3:50pm

Sedentary Behavior In Pregnancy: Implications For Maternal And Child Health

Session Moderator: Abby Peairs, University of Cincinnati

Presenters and Institutional Affiliations:

Kara Whitaker, Ph.D., University of Iowa, Iowa City IA

Dr. Kara Whitaker is an Assistant Professor at the University of Iowa. She received her BS in kinesiology from the University of Michigan and her MPH and PhD in exercise science from the University of South Carolina. Dr. Whitaker completed her postdoctoral fellowship in cardiovascular disease epidemiology and prevention at the University of Minnesota. Dr. Whitaker's research examines the role of physical activity, sedentary behavior, and sleep on cardiometabolic health. She is especially passionate about working with women during pregnancy as this is a critical time period where interventions have the potential to positively impact the health of both the mother and child. Dr. Whitaker has been a Fellow of ACSM since 2021.

Melissa Jones, Ph.D., Oakland University, Rochester MI

Dr. Melissa Jones is an Assistant Professor at Oakland University. She received her BS in exercise science from Saginaw Valley State University, her MS and PhD in Exercise Physiology from the University of Pittsburgh and recently completed Postdoctoral training in the Physical Activity and Women's Health lab at the University of Iowa. Dr. Jones' research examines the role of exercise and sedentary behaviors during pregnancy on future cardiovascular health risk of both the mom and baby. Further, she is interested in examining the interplay of health disparities and health behaviors in order to reduce cardiovascular health risk across the lifespan in an equitable and accessible way.

Abstract:
Pregnancy is a critical period during which unhealthy lifestyle habits, obesity, hypertensive disorders, and diabetes can develop or worsen. Prevention of these adverse behavioral and cardiometabolic changes in pregnancy is critical due to the intergenerational health implications affecting both the mother and child. Sedentary time is one potentially important modifiable behavior for prevention. In non-pregnant populations, too much sedentary behavior

has recently gained attention as an independent risk factor for outcomes such as obesity, cardiovascular disease, diabetes, and mood disorders, especially in the absence of sufficient moderate-vigorous intensity physical activity. Pregnant women may be especially prone to excessive sedentary behavior due to the physical, hormonal, social and psychological aspects of pregnancy. Despite abundant research in the general population, research demonstrating potentially deleterious health effects of excessive sedentary time during pregnancy is just emerging. Careful review of the available data are necessary to inform clinical practice as there are currently no specific recommendations for limiting or interrupting sedentary time during pregnancy. The purpose of this professional talk is to comprehensively review emerging research that has investigated patterns and consequences of sedentary behavior during pregnancy on maternal and child cardiometabolic health.

Learning Objectives:
1. Describe potential adverse effects to mother and child of excessive sedentary behavior during pregnancy.
2. Evaluate what additional research is needed to recommend reduced sedentary behavior during pregnancy.

<u>Symposium #17:</u> Network Room (2nd Floor), 3:00-3:50pm

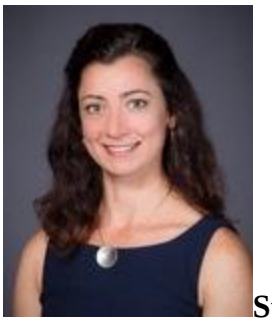
Cannabis: Exercise Performance and Recovery

Session Moderator: J. Derek Kingsley FACSM, Kent State University

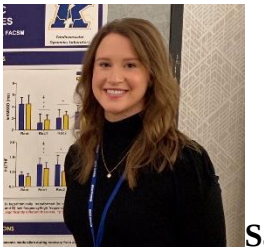
Presenters and Institutional Affiliations:

Emily Erb, Kent State University, Kent OH

Ms. Erb is a Ph.D. candidate at Kent State University. She holds an M.S. in Exercise Physiology from Kent State University. Currently, she works as part of the Cardiovascular Dynamics Laboratory under the guidance of Dr. J. Derek Kingsley, where she investigates the impact of resistance exercises on autonomic and vascular health, as well as cognitive function. She is also a graduate assistant in the Exercise Science and Exercise Physiology program at Kent State University. In her spare time, she enjoys reading, gardening, and long-distance running and biking.

 **Stacie Humm, Kent State University, Kent OH**

Mrs. Humm, Ph.D. candidate, is a native of the Upper Peninsula of Michigan and received her undergraduate and master's degrees from Northern Michigan University. She is a life-long campus recreation professional. She enjoys gardening, her dogs and is an accomplished ultra-endurance trail competitor.

 **Sarah Kearney, Ph.D., Seton Hill University, Greensburg PA**

Dr. Sarah Kearney is an instructor of Exercise Science at Seton Hill University. Sarah is completing her doctorate in Exercise Physiology at Kent State University, working under Dr. J. Derek Kingsley, Ph.D, FACSM in the Cardiovascular Dynamics Laboratory. Her research experience includes cardiovascular effects, specifically hemodynamics and measures of pulse wave reflection, on caffeine and resistance exercise in women.

 **J. Derek Kingsley, Ph.D. FACSM, CSCS*D, Kent State University, Kent OH**

Dr. J. Derek Kingsley, FACSM is an Associate Professor and Program Coordinator in the Exercise Science and Exercise 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.

Abstract:

Currently, the United States has legal cannabis in 39 states (20 medicinal, 19 recreational). In addition, the NCAA just increased the amount of THC it will allow athletes to have in their system during drug screening. Taken together it is clear that cannabis is here to stay. However, despite these changes in the United States and within the NCAA, the literature on cannabis is sparse. This symposium aims to increase awareness on the use of cannabis for exercise performance and recovery.

Learning Objectives:
1. Understand the difference between, and physiological effects of CBD and THC
2. Gain awareness of dosing methods
3. Discuss how CBD and THC alter aerobic and anaerobic performance
4. Understand the use of CBD and THC for recovery

<u>CEPA Symposium:</u> Cosmopolitan Ballroom, 3:00-3:50pm

Who is the Clinical Exercise Physiologist?

Session Moderator: Laura Richardson, University of Michigan

Presenters and Institutional Affiliations:

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

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

Sandra K. Knecht, MS, RCEP, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio

Ms. Sandy Knecht is a Master's prepared Clinical Exercise Physiologist with over 20 years' experience in cardiopulmonary exercise testing in pediatric and adult congenital patients. She is currently the Cardiopulmonary Exercise Lab Supervisor at Cincinnati Children's Hospital. Sandy holds the American College of Sports Medicine ACSM -CEP certification and the RCEP distinction. Sandy is active in several professional organizations and is currently serving on the Midwest ACSM (MWACSM) board of directors as the co-chair of the clinical committee and the Clinical Exercise Physiology Association (CEPA) registry committee. Additionally, she is currently a committee member of the ACSM Strategic Health Initiative – Youth Sport & Health group. Previously, she has held positions as the Member-At-Large with both MWACSM and CEPA. Sandy has ongoing involvement in research projects and publications and our labs educational and internship programs.

Abstract:
This interactive panel, featuring prominent Clinical Exercise Physiologists, will spend time discussing employment opportunities in the growing profession. The ACSM-CEP is an allied healthcare professional trained to work with chronic diseases in a wide-variety of medically supervised environments. The presentation will focus on the importance of completing clinical internships, the ACSM certification credential and professional membership with the Clinical Exercise Physiology Association (an ACSM Affiliated Society). Bring along your questions and learn about occupation opportunities upon graduating with your Bachelor or Master's degree in exercise science/kinesiology. The CEP panel is ideal for both faculty and students to learn more about career paths and recommended tools for success.

Symposium #18: Discovery Room, 4:00-4:50pm

Eccentric Contraction-Induced Injury And Muscle Weakness: An Up-To-Date Review

Session Moderator: Brian Rider, Hope College

Presenters and Institutional Affiliations:

Corey Baumann, Ph.D. FACSM, Ohio University, Athens OH

Dr. Corey Baumann received his Ph.D. in Kinesiology from Georgia State University and completed his post-doctoral training at the University of Minnesota. In 2020, he was hired as an Assistant Professor in the Department of Biomedical Sciences at Ohio University. Dr. Baumann's research goals are to identify sites and mechanisms that increase the stress buffering capacity of the neuromuscular system, which ultimately can be targeted to improve function and health span in aging, frail, and myopathic populations. To accomplish this work, Dr. Baumann uses various physiological techniques and equipment to assess muscular function in mice that includes a rotarod, treadmill, running wheels, grip strength meter, and ex vivo and in vivo muscle contractility testing. In parallel to these functional measures, Dr. Baumann measures stress responsivity in models and conditions of muscular dystrophy, disuse atrophy, aging, hormone regulation, fatigue, and various injuries (e.g., eccentric contraction-, cardiotoxin-induced).

Abstract:
It is well-established that working out or exercising results in peripheral adaptions that eventually increase the muscle's force producing capacity. However, what is less obvious, is that muscle endures numerous injuries before "gains" will be observed. Furthermore, it is often not apparent that each individual injury damages the muscle causing transient bouts of weakness. Weakness due to eccentric contraction-induced injury is immediate and can take days to weeks to fully recover, depending on the severity of the exercise protocol or regimen. The mechanisms for strength loss have classically been thought to be the result of structural damage to force generating proteins and myofiber death. The objective of this tutorial is to present data to demonstrate how this classical view has changed over the past several decades. This presentation will provide extensive evidence that most of the strength loss following eccentric contraction-induced injury is due to a failure in excitation-contraction coupling processes. Moreover, depending on the condition, this failure may be due to an inability to trigger calcium release from the sarcoplasmic reticulum or an inability of the fiber to generate and/or conduct an action potential. Finally, this presentation will provide insight into how eccentric contraction-induced weakness and excitation-contraction coupling failure are influenced when repeated bouts of injury are performed.

Learning Objectives:
1. Attendees should be able to appreciate that eccentric contractions cause injury as observed by skeletal muscle weakness.
2. Attendees should be able to appreciate that excitation-contraction coupling failure contributes to eccentric contraction-induced weakness.
3. Attendees should be able to appreciate that mechanisms of excitation-contraction coupling failure are complex.

Symposium #19: Studio 1, 4:00-4:50pm

Defining Exercise Effects Using Systems Biology

Session Moderator: Kyle Timmerman FACSM, Miami University

Presenters and Institutional Affiliations:

Monica Hubal, Ph.D., IUPUI, Indianapolis IN

Dr. Monica Hubal currently works at Indiana University-Purdue University Indianapolis. She is an Associate Professor of Kinesiology, an Adjunct Associate Professor of Cellular and Integrative Physiology, a research scientist at the Diabetes Translational Research Center and is affiliated with the Indiana Center for Musculoskeletal Health. Dr. Hubal's main research interests are elucidating what factors make some people more prone to obesity, type 2 diabetes, and cardiometabolic disease (especially earlier in life) and identifying ideal intervention strategies to regain health. With dual training backgrounds in exercise physiology and genetic medicine, much of her research involves integrating genetic and molecular data with physiological phenotype information.

Abstract:
Given intersubject variability in exercise response, large cohorts are needed to study the molecular drivers of exercise response. The STRRIDE studies represent >300 subjects with high cardiometabolic risk (metabolic syndrome) tested before and after 9 months of defined exercise training. Exercise groups differed by mode (endurance vs resistance) and dose of exercise (matched groups of intensity and duration). Extensive clinical phenotyping included fitness capacity, body composition and various blood measures. Molecular data included

DNA, skeletal muscle RNA and metabolites, and circulating biomarkers. Innovative causal analyses techniques provide identification of key biological pathways that drive exercise responses. A systems biology approach of assimilating data across multiple scales (DNA, RNA, protein, organ, whole body) provides a template for understanding exercise responses, including key drivers that could be modified by future therapeutics. This talk will be largely a tutorial format, orienting people to systems biology from the ground up and using STRRIDE results to demonstrate cutting edge research findings.

Learning Objectives:
1. Understand the concept of systems biology to model the effects of exercise training and detraining.
2. Distinguish causal from associative mathematical modeling
3. Understand the role of muscle gene expression and circulating metabolites in exercise response models that specify mode (aerobic vs resistance exercise) and dose (intensity and duration) of training.

Symposium 20: Vision Room, 4:00-4:50pm

Exercise As An Aging Mimetic: New Perspectives On Mechanisms Behind Exercise Is Medicine

Session Moderator: Gary Long, University of Indianapolis

Presenters and Institutional Affiliations:

Wesley Lefferts, Ph.D., Iowa State University, Ames IA

Dr. Wesley Lefferts is a cardiovascular exercise physiologist with interests in 1) understanding vascular mechanisms of aging and their role in influencing brain and the heart, and 2) identifying vascular mechanisms through which behavior such as exercise benefits the brain and the heart. Within these areas, I have particular interests in large artery stiffness and brain blood flow, and how differences in vascular function between men and women in middle age influence later-life brain and heart health. My work utilizes non-invasive vascular techniques to assess heart function, blood flow, artery stiffness, and cognitive function to address these research avenues.

Abstract:
Age-related chronic diseases are among the most common causes of mortality and account for a majority of global disease burden. Preventative lifestyle behaviors, such as regular exercise, play a critical role in attenuating chronic disease burden. However, the exact mechanism behind exercise as a form of preventative medicine remains poorly defined. Interestingly, many of the physiological responses to exercise are comparable to aging. This talk explores an overarching hypothesis that exercise protects against aging/age-related chronic disease because the physiological stress of exercise mimics aging. Acute exercise transiently disrupts cardiovascular, musculoskeletal, and brain function and triggers a substantial inflammatory response in a manner that mimics aging/age-related chronic disease. Data indicate that select acute exercise responses may be similar in magnitude to changes seen with +10-50 years of aging. The initial insult of the age-mimicking effects of exercise induces beneficial adaptations that serve to attenuate disruption to successive “aging” stimuli (i.e. exercise). Ultimately, these exercise-induced adaptations reduce the subsequent physiological stress incurred from aging and protect against age-related chronic disease. This

talk will examine this hypothesis by comparing physiological responses to aging versus acute exercise and propose future directions and gaps in understanding based on this hypothesis.

Learning Objectives:
1. Understand the parallels between aging/age-related chronic disease and acute exercise
2. Understand the importance of stress adaptation in exercise-induced adaptation
3. Understand the role of cross-tolerance in exercise's protection against age-related chronic disease

<u>Symposium #21:</u> Network Room (2nd Floor), 4:00-4:50pm

Five Key Ingredients To A Client-Centered Approach For Exercise Science Professionals

Session Moderator: Trent Cayot, University of Indianapolis

Presenters and Institutional Affiliations:

Mindy Mayol, Ph.D., University of Indianapolis, Indianapolis IN

Dr. Mindy Hartman Mayol, ACSM EP, is an Associate Professor in the College of Health Sciences' Department of Kinesiology, Health & Sport Sciences at the University of Indianapolis (UIndy) teaching in both the Bachelor and Master of Exercise Science programs. Mayol received her PhD in Health & Rehabilitation Sciences from Indiana University Indianapolis with a Functional Participation/Limitation concentration and minor in Public Health: Social and Behavioral Sciences. She received a B.S. degree in Exercise Science and a M.S. degree in Applied Sport Science from Indiana University Bloomington. Mayol is a Certified Exercise Physiologist with the American College of Sports Medicine (ACSM) and is in her second term appointment for ACSM's Certification-related Content Advisory Committee. She published the 3rd edition of her textbook, *Wellness: The Total Package* (2019) focusing on multi-dimensional wellness for the emerging adult population. In addition, her research line includes sport motivation, psychosocial return to play factors, and multi-dimensional wellness in collegiate student-athletes.

Abstract:
The use of the biopsychosocial approach in Exercise Science and related disciplines has vastly evolved in its use with athletes, patients and clients over time as we professionals strive to help others achieve optimal functioning and performance. This approach has aided us in the ability to create opportunities for successful experiences and to better connect with those we are serving through our communication and interactions. The purpose of this presentation is to discuss five key ingredients of how to best connect and communicate with patients, clients and

athletes at the human level. More specifically, the presentation will explain how the Biopsychosocial Model provides a structure for the use of specific coaching psychology strategies and will provide in-person applications of these strategies during the session.

Learning Objectives:

1. Attendees should be able to define the variables that are included in the Biopsychosocial Model.
2. Attendees should be able to describe how building trust and demonstrating empathy provides the opportunity to better connect and build rapport and to create an efficacious environment when working with others.
3. Attendees should be able to describe how using effective communication and connection skills such as reflective listening statements, open-ended inquiry, affirmations, summaries and non-verbal communication demonstrate active approaches in showing empathy and listening.
4. Attendees should be able to determine sources of motivation in patients, clients and athletes as well as use goal setting strategies including personal rulers to aid in providing successful beginnings and experiences for others.
5. Attendees should be able to define ambivalence and describe strategies to explore and resolve ambivalence to assist patients, clients and athletes with obstacles and to further bolster self-efficacy.

Schedule – Friday Afternoon: Free Communication / Slides

Free Communication/Slides #5: Studio 1, 2-3:00pm

Session Moderator: Jacob Caldwell, University of Wisconsin-La Crosse

2:00-2:15pm

THE G-SUIT HAS NO EFFECT ON PERFORMANCE DURING THE WINGATE ANAEROBIC TEST IN COLLEGIATE ATHLETES

Faith Kurtz, Curtis Cornell, Madison Radcliffe, James Sackett, Cornerstone University, Grand Rapids MI

The G-Suit is a wearable device that enhances axial load on the human body. An augmented axial load has recently been shown to enhance core muscular activation. Greater core muscular activation may improve athletic performance. **PURPOSE:** The purpose of this investigation was to examine the effects of wearing the G-Suit on performance and muscular activation during the Wingate Anaerobic Test (WAnT) in collegiate athletes when compared to not wearing the G-Suit. **METHODS:** Eleven male collegiate athletes (age: 20 ± 2 y; BMI: 25.5 ± 3.0 kg/m2) completed the WAnT in three separate conditions: wearing the G-Suit for the entirety of the visit (G-Suit), not wearing the G-Suit (Control), and wearing the G-Suit during the warm-up only (Warm-Up). Following a standardized warm-up, subjects completed a WAnT in which they cycled as hard as possible for 30 seconds against 7.5% of their body weight in kg. Peak power (W), mean power (W), and fatigue index (%) were measured during the WAnT. Subjects reported whole body feeling before and after the WAnT (-5 = very bad, 0 = neutral, 5 = very good). Electromyography was measured for the rectus abdominis (RA) and the serratus anterior (SA) and expressed as a percentage (%) of maximal voluntary isometric contraction. Data were analyzed using repeated measures one-way ANOVA. **RESULTS:** There were no statistical differences between conditions for peak power (G-Suit: 873 ± 251 W, Control: 889 ± 226 W, Warm-Up: 872 ± 254 W; p = 0.69). There were no statistical differences between conditions for mean power (G-Suit: 361 ± 87 W, Control: 361 ± 87 W, Warm-Up: 350 ± 90 W; p = 0.09). There were no statistical differences between conditions for fatigue index (G-Suit: 58 ± 8%, Control: 60 ± 12%, Warm-Up: 61 ± 9%; p = 0.21). There were no statistical differences for feeling change (G-Suit: -3.5 ± 3 a.u., Control: -2.5 ± 3

a.u., Warm-Up: -2.5 ± 2 a.u.; p = 0.15). There were no statistical differences between conditions for RA activity (G-Suit: 21 ± 14%, Control: 42 ± 62%, Warm-Up: 25 ± 17%; p = 0.33) and SA activity (G-Suit: 35 ± 18%, Control: 48 ± 34%, Warm-Up: 59 ± 56%; p = 0.33). **CONCLUSION:** The increased axial load by the G-Suit during Warm-Up or G-Suit did not enhance performance and muscular activation during the WAnT compared to Control. Thus, wearing the G-Suit may not improve anaerobic capacity.

2:15-2:30pm

MUSCLE ACTIVATION OF THE THIGH IN OLDER ADULTS DURING LOWER EXTREMITY ASSESSMENT

Vitor Siqueira, Christopher Hill, Clayton Camic, André Gurjão, Dalmo Machado, Emerson Sebastião, Northern Illinois University, DeKalb IL

Older adults tend to suffer muscle atrophy and impairment of the neuromuscular system as they age, negatively impacting activities of daily living. Thus, assessments utilized to identify and analyses these potential age-related changes in neuromuscular function can be a valuable component in developing exercise prescriptions in older populations**. PURPOSE:** To compare muscle activation of the thigh during two distinct lower extremity assessments. **METHODS:** Sixty-four elderly active individuals (65.0±6.1 years) enrolled in a senior fitness program volunteered to participate in the study. Lower-extremity assessments included: a) maximal leg muscle strength using an isokinetic dynamometer (maximal strength (MS)); peak torque extension (PTE) and flexion (PTF)) and b) functional muscle strength, using the 30-second chair sit and stand test (30CSTS) (functional strength (FS)). During both assessments, which were completed in separated visits, eletromyographic data were collected from the rectus femoris (RF), vastus medialis (RM), vastus lateralis (VL) and biceps femoris (BF) muscles. **RESULTS**: Mean PTE was 96.9 Nm (±38.7) and PTF 55.40 Nm (±20.4). Mean number of repetitions in the 30CSTS test (i.e., FS) was 15.3 (±4.4). The normalized muscle activation for MS and FS respectively was RF (76.21% and 49.52%), VM (76.04% and 47.59%), VL (76.94% and 49.48%), BF (64.56% and 37.09%). Repeated measures ANOVA revealed a significant main effect for assessment ((F 1, 63) = 117.329; $p < 0.01$; $\eta 2 = 0.651$) and muscle (RF, VM, VL, BF) ((F 2.651, 167.007) = 58.231; $p < 0.01$; $\eta 2 = 0.480$), but no interaction ((F 2.422, 152.584) = 0.170; $p > .05$; $\eta 2 = 0.003$). Follow up pairwise analysis showed a significant increase in muscle activity during the MS assessment compared to the FS (mean difference (MD): 27.522mV%, $p < 0.01$) with the biceps femoris muscle depicting significantly ($p<0.01$) lower activation compared to the other analyzed muscles. **CONCLUSION:** The findings suggest that assessments of lower extremity using isokinetic methods result in higher muscle activation compared to commonly used functional tests (i.e., 30CSTS). Among the four muscles analyzed, the biceps femoris displayed the lowest activation independent of the assessment.

2:30-2:45pm

2:45-3:00pm

EXCESSIVE ALCOHOL INTAKE DOES NOT IMPAIR SKELETAL MUSCLE RECOVERY

Austin Brown, Muni Swamy Ganjayi, Samantha Moser, Cory Baumann FACSM, Ohio University, Athens OH

PURPOSE: Ethanol (EtOH) intake results in skeletal muscle damage that manifests in atrophy and weakness. To date, most research has examined outcomes of EtOH-induced muscle dysfunction under basal or unstressed conditions despite physical stress (e.g., contraction-induced injury) being a normal occurrence in a physiological setting. Due to the damage sustained by EtOH intake, in combination with repeated bouts of physical stress, muscle atrophy and weakness would theoretically be exacerbated in those we drink excessively. Therefore, this study set out to determine if recovery of strength (i.e., tetanic isometric torque) is impaired following repeated bouts of eccentric contraction-induced injuries to muscle exposed to excessive short-term (Experiment #1) and long-term (Experiment #2) EtOH consumption. **METHODS:** Twenty male and female mice (n=10/sex) were assigned to receive either 20% EtOH in their drinking water or 100% water. Anterior crural muscles were exposed to repeated bouts of physical stress using in vivo eccentric contractions, with maximum tetanic isometric torque being measured immediately pre- and post-injury. A total of ten bouts were completed with 14 days between bouts 1-5 (Experiment #1) and 6-10 (Experiment #2). Bouts 5 and 6 were separated by a period of 12 weeks. **RESULTS:** Mice consuming EtOH had BACs up to 270 mg/dL. In Experiment #1, five bouts of eccentric contractions did not reduce recovery of torque, regardless of sex or EtOH

treatment ($p \geq 0.173$). Similarly, in Experiment #2, pre−injury torques did not differ from day 14 values regardless of sex or treatment ($p \geq 0.322$). However, a group effect was identified in female mice for bouts 1 and 5 during Experiment #2, with female EtOH mice being weaker than controls ($p \leq 0.002$). **CONCLUSIONS:** Excessive short-term or long-term EtOH consumption in a mouse model does not affect the muscle's ability to regain tetanic isometric torque after repeated bouts of eccentric contractions. These findings suggest that excessive EtOH intake will damage skeletal muscle and induce weakness; however, continued episodes of physical stress do not appear to intensify reductions in overall muscular strength.

Free Communication/Slides #6: Studio 1, 3-4:00pm

Session Moderator: Andrew Jagim, Mayo Clinic

3:00-3:15pm

EXERCISE ECONOMY IS NOT AUGMENTED DURING AXIAL LOADING INDUCED VIA THE G-SUIT IN COLLEGIATE ATHLETES

Sandra Fredericks, Mikayla Johnson, Emily Schaffsma, James Sackett, Cornerstone University, Grand Rapids MI

The G-Suit enhances the feeling of gravity via providing axial load to the body. Previous findings indicate that an increased axial load enhances deep core muscular activation. A strong core during running appears to improve performance via providing a stable base for force transfer through the extremities. **PURPOSE:** This study aimed to determine if wearing the G-Suit influences cardiorespiratory variables and exercise economy in collegiate athletes when compared to not wearing the G-Suit. **METHODS:** Eleven participants (age: 23±5 y, BMI: 25±3 kg/m², 3 females) participated in three randomized visits: Control (not wearing the G-Suit at all), G-Suit (wearing the G-Suit throughout the entire visit), and Warm-Up (only wearing the G-Suit during a standardized warm-up). During each visit subjects completed a standardized warm-up followed by a graded exercise test (GXT) consisting of exercising on a treadmill where speed and grade increased every two minutes until volitional exhaustion. Cardiorespiratory data (i.e., tidal volume, respiratory frequency, ventilation, respiratory quotient, heart rate, and VO2) were collected continuously and analyzed at the end of each stage. Rate of perceived exertion (RPE) was reported at the end of each stage. Data were analyzed using a repeated-measures two-way ANOVA. **RESULTS**: There were no significant differences between tidal volume ($p=0.95$), respiratory frequency ($p=0.96$), ventilation ($p=0.99$), respiratory quotient ($p=0.99$), heart rate ($p=0.99$), and RPE ($p=0.91$) at any stage between Control, G-Suit, and Warm-Up. There were also no significant differences in exercise economy (i.e., VO2; 42.3 ± 8.4 mL/kg/min, 42.7 ± 8.3 mL/kg/min, 43.1 ± 8.4 mL/kg/min; $p=0.99$), gross efficiency (17.9 ± 3.4%, 16.5 ± 2.4%, 15.8 ± 2.1%; $p=0.19$), and net efficiency (18.2 ± 3.5%, 16.7 ± 2.4%, 16.0 ± 2.1%; $p=0.23$) at the end of the GXT (i.e., max) between Control, G-Suit, and Warm-Up. **CONCLUSION:** Overall, the results indicate that an enhanced axial load from wearing the G-Suit has no acute effects on cardiorespiratory variables or exercise economy in collegiate athletes. Thus, running performance is not enhanced while wearing the G-Suit when compared to not wearing the G-Suit.

3:15-3:30pm

HOW ENVIRONMENTAL FACTORS AFFECT MUSCLE CHARACTERISTICS DURING ANTERIOR CRUCIATE LIGAMENT (ACL) RETURN TO PLAY CRITERIA

Nathan Lee, David J. Dominguese, Kalyani Nair, Ana Gabriela Gubert Galvao, Chaciydah Heffner, Megan Loghry, Bradley University, Bradley University, Peoria IL

There is a high occurrence of knee ligament injuries associated with jumping, landing and multi-directional movement sports. At-risk movements associated with some sports contribute to anterior cruciate ligament (ACL) injuries. Various exercises, skills/tasks, and screening tools are used to train and evaluate at-risk movement mechanics for ACL injury and return to play criteria. What these tests and others don't tell us, is what are some of the characteristics that account for the differences seen in performance. A better understanding of the factors that

influence performance is warranted. **PURPOSE**: To understand factors (fatigue, air temperature/humidity, and biomechanical properties of tissue) that affect ACL return to play criteria using the hop test cluster (HTC): single-leg (SL) vertical jump (SLVJ), SL hop for distance (SLHD), and SL lateral hop (SLLH). **METHODS:** Twenty-one recreational athletes (10 M, 11 F) performed the HTC bilaterally starting with their right leg and performed three trials of the SLVJ and SLHP and one trial of the SLLH in a randomized order, with 30 sec recovery between trials and three min. between HTC tests. The HTC were performed in the control temperature (20.8℃ ±2.4). Fifteen min. Recovery occurred between the control temperature followed by the cold temperature (8℃ ±1.1) in a closed environmental chamber. The HTC test was repeated and the protocol was replicated. Measurements were taken to quantify stiffness, frequency, decrement, creep and stress relaxation properties of tissue for the anterior thigh and leg, and posterior thigh and leg using the Myoton device after each trail of the HTC test. **RESULTS:** 2-way ANOVA analysis shows that temperature does not significantly affect the biomechanical properties of stiffness. Significant differences were observed between all muscle groups in stiffness ($p<0.001$) except for decrement. Differences were observed in the performance of the HTC test regardless of temperature, gender, and dominant leg in SLHP (≅ 9%). **CONCLUSION**: Such novel studies enable us to better understand muscle biomechanical properties of tissue that can then be associated to help understand the effects muscle fatigue and temperature has on performance. Future work will involve analysis at higher temperatures, dominant vs. non-dominant legs, and gender.

Funding: University Research Committee Faculty Research Fellowship

3:30-3:45pm

THERAPEUTIC EFFECTS OF CANNABIDIOL FOR INFLAMMATION-DRIVEN, NON-COMMUNICABLE DISEASE

Joseph Morell, Ohio University, Athens OH

INTRODUCTION. Chronic, non-communicable diseases such as type 2 diabetes and heart disease pose a significant health and economic burden globally. In recent years, non-communicable disease pathogenesis has been largely associated with chronic inflammation, defined as a systemic, low-grade inflammatory response triggered by nonpathogenic stimuli that remains unresolvable. Cannabidiol (CBD), a phytocannabinoid derived from the *Cannabis sativa* plant, has a growing consumer interest in the United States for its potential anti-inflammatory capabilities. **LITERATURE REVIEW**. While CBD's exact therapeutic mechanism of action remains largely unknown, numerous (N=65+) biological targets have been identified both within and outside of the endocannabinoid system, suggesting broad applications for inflammation management. For example, several studies have revealed that CBD may have an inhibitory and/or apoptotic effect on a variety of immune cells. **RESEARCH QUESTIONS**. This review article is aimed to assess CBD's efficacy in reducing levels of chronic inflammation in human and animal models and evaluate whether CBD could be an effective therapeutic for the prevention and/or management of chronic, non-communicable disease associated with chronic inflammation. **VALUE**. This review may help the development of cannabidiol as a new therapeutic for numerous inflammation-driven, non-communicable diseases. **METHODS**. The literature search will be conducted through Ohio University's Library's ArticlesPlus database, PubMed, and Google Scholar. Key search words will include (Cannabidiol OR CBD) AND (chronic inflammation OR inflammatory disease*) AND (diabet* OR heart disease OR cardiovascular disease OR non-communicable disease*), and articles will be chosen based on relevancy and timeliness. When possible, articles will be filtered by human subjects. **PROJECTED LIMITATIONS**. Expected limitations include the author's potentially limited selection of markers of chronic inflammation; the limited availability of studies evaluating CBD's ability to reduce chronic inflammation (as opposed to acute inflammation); inconsistencies in the origin, purity, composition, and vehicle administration of CBD across research studies, which all may impact therapeutic homogeneity.

3:45-4:00pm

EXPECTATIONS OF EXERCISE AND PATIENTS' TOLERANCE TO DAILY ACTIVITIES THROUGH THE PERSPECTIVE OF CARE PROVIDERS

Jacqueline Groen, Joshua Haworth, Susan Duong, Oakland University, Rochester MI

Osteoarthritis care is complicated due to the complex diagnostic process and progressive nature of this disease. Symptom severity and patient tolerance vary, leading to diverse impairments to daily life activities. Often providers

need to rely on patient information that may be misinterpreted due to lack of self-knowledge by the patient or understanding from the provider's perspective. This leads to an empathy gap between patients and providers. To help understand this gap, we explored the relationship between exercise preference and tolerance of clinicians, as well as their expectations of pain, stiffness, and mobility that they expect an average patient to report. The Preference for and Tolerance of the Intensity of Exercise Questionnaire (PRETIE-Q) measured exercise disposition, whereas a modified version of the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) measured expectations of patient pain, stiffness, and mobility limitations. We modified this to be from the lens of the provider about their expectations of patient state. These were completed by 36 practicing or in training clinicians, including physicians and physical therapists. The PRETIE-Q revealed a moderate preference (22.82,+-2.91) and tolerance (24.36+-3.07), with significant difference between the two dispositions ($p<0.05$). Expectations of pain (10.08, +-2.92), stiffness (4.89,+-1.05), and mobility limitations (37.16, +-8.45) differed from patient reports found in the literature. Pearson correlations (alpha=0.05) revealed no significant relationship between the subcategories that make up WOMAC and PRETIE-Q. These results combine to provide better understanding of the intersection of provider's exercise dispositions and their expectations of osteoarthritis patient health status. Our providers were not completely in tune with the realities of patient health, though this does not appear to be linked to their own exercise disposition.

Schedule – Friday Afternoon: Poster Session

Poster Session #4: Regency Ballroom E & F (2nd Floor), 2:15-3:30pm

Board 1

RELIABILITY OF ACCELERATION ASSESSMENT USING A LINEAR POSITION TRANSDUCER DURING SEGMENTAL THIRDS OF THE SQUAT

Yousuf Abu-Amara, Jennifer Rivera, Rayan W Gant, Emily C Tagesen, Anthony G Pinzone, Edward Z Pelka, Modesto A Lebron, Adam R Jajtner, Kent State University, Kent OH

PURPOSE: Assess inter-set and session reliability of a linear position transducer (LT) at four intensities of the back squat (BS) across three segments. **METHODS:** Seventeen individuals with six months of resistance training experience (24 ± 4yrs, 1.71 ± 0.07m, 80.8 ± 11.2kg) completed the study. Participants visited the laboratory three times separated by ≥48 hours, providing written informed consent and completing a one-repetition maximum (1RM) of the BS on Visit 1. Visit 2 and 3 consisted of two sets of three reps at 30, 50, 60, and 70% 1RM with three minutes of rest between sets. The LT was placed on the medial side of the barbell sleeve with the retractable belt perpendicular to the floor. Position was measured at a frequency of 100Hz with velocity determined as change in position over time and filtered with a 0.10s rolling average. Repetitions were identified by a displacement of 15cm with each repetition starting at a filtered velocity of 0.05m•s-1. Position data was used to segment the concentric movement into bottom (BOT), middle, (MID), and top (TOP). Average acceleration (ACC), which was defined as change in velocity over time, was then determined in each phase. ACC was assessed as the average of the three reps in each set (AR) or taken as the repetition with the highest mean velocity (BR). Inter-set and session reliability for ACC was then determined using Interclass Class Correlations (ICC) and paired samples t-tests. **RESULTS:** AR reliability was greater than BR; as such AR data is presented. Excellent ICCs were observed for 30-60% 1RM across all phases between sets (ICC3,k = 0.909-0.984),

with one exception (TOP 50%; ICC3,k = 0.842). Poor inter-set ICCs were observed at 70% 1RM across all thirds (ICCs < 0.50). For inter-session reliability, all phases at 30% showed good reliability (ICC3,k = 0.817 - 0.893), while variable ICCs were observed at 50% and 60% 1RM (ICC3,k =0.707-0.917; ICC3,k= 0.584-0.911, respectively) across phases. Poor ICCs were observed during 70%1RM (ICC3,k < 0.50). Differences were observed between sets at 30% TOP and 60% MID ($p<0.05$), while no differences were found between sessions. **CONCLUSION:** The LT can reliably assess ACC for lower intensities, though reliability is reduced at higher (70% 1RM) intensities. Inter-session comparisons should be taken with caution as variable reliability was observed.

Board 2

THE EFFICACY OF REFLEXIVE PERFORMANCE RESET

Laine Anthony, Jaxson, Savieo, Logan, Fritz, Sarah, Buresh, Melissa, Cook, Indiana Wesleyan University, Marion IN

PURPOSE: This study was designed to put Reflexive Performance Reset's (RPR) impact on athletic performance to the test. Due to how new this phenomenon is, there is little evidence supporting these claims. It is said to have a positive impact on strength, agility, and power. RPR is being utilized on multiple platforms across the globe. Coaches, trainers, and athletes alike are implementing this technique into their training regime. Coaches like Mike Clark (3x NFL Strength Coach of the Year) and Brandon Aiken (AD/Head Strength Coach at the University of South Carolina-Aiken) tout reflexive performance reset's (RPR) efficacy in this area, and while the literature is sparse, effectively activating the nervous system may positively impact athletic success. **METHODS:** Thirty-one participants (12 males & 19 females; 16 athletes & 15 nonathletes) were selected from the Indiana Wesleyan University student body to conduct a series of three tests - broad jump (BJ), handgrip dynamometer (HG), and cone agility drill (cone) - all of which are commonly used to measure athletic performance. The participants performed a series of 2 trials. In the first trial, the participants performed each of the aforementioned drills and their scores were recorded. After at least 48 hours, the participants conducted their second trial. In the second trial (intervention), the participants self-administered RPR and then underwent the same tests as the first trial. The data was analyzed using a paired T-test to find statistical significance. **RESULTS:** There were statistically significant increases in broad jump ($p < 0.00$), R HG strength ($p < 0.013$), and cone ($p < 0.001$) second trial (intervention) but not L HG ($p = 1.00$). **CONCLUSION:** The data suggests that RPR trends towards being able to significantly increase athletic performance as measured by BJ, HG strength, and cone agility. Although there are many factors to consider, it seems clear that RPR did positively impact athletic performance.

Board 3

INDIVIDUALIZED OCCLUSION PRESSURES DO NOT PROVIDE VALID OR RELIABLE ASSESSMENTS OF MITOCHONDRIAL FUNCTION

Jayna Badgero, Taylor Peck, Brittany Smeets, Nathanial R, Eckert, Gary M, Long Trent E, Cayot, University of Indianapolis, Indianapolis IN

PURPOSE: Changes in mitochondrial function can be non-invasively examined using a near-infrared spectroscopy (NIRS) assessment. Traditionally, high occlusion pressures (HO, 250 mmHg) are intermittently applied to the limb in order to temporarily inhibit blood flow. The purpose of the study was to investigate the concurrent validity and between session reliability of using individualized occlusion pressures (100% limb occlusion pressure, IO) during the NIRS assessment. **METHODS**: 17 healthy, adults (age = 23 ± 1 yrs, height = 1.70 ± 0.14 m, weight = 76.4 ± 13.5 kg, 8 females & 9 males) reported to the laboratory for two visits. IO was determined by slowly increasing cuff pressure around the upper arm until the radial pulse could no longer be heard via handheld Doppler ultrasound. Subjects performed 15-sec maximal isometric handgrip and passively rested while a randomized intermittent occlusion protocol (HO, IO) was performed on their upper arm. The NIRS response was measured distal to the occlusion cuff on the flexor digitorium superficialis. 10 minutes of recovery was provided between each intermittent occlusion protocol (HO, IO) NIRS assessment. Raw NIRS data was corrected for blood volume changes and the linear slopes during each intermittent occlusion were identified. NIRS recovery rate constants were then determined fitting an exponential decay function to the linear slope versus time graph. Concurrent validity of the NIRS recovery rate constants between occlusion protocols (HO, IO) were assessed via Pearson's product moment correlation

coefficient. Between session reliability of the NIRS recovery rate constants for each occlusion protocol (HO, IO) were examined using a mixed, absolute agreement intraclass correlation. **RESULTS**: No significant relationship (r = 0.109, p = 0.538) was found for the NIRS recovery rate constants between HO (0.043 ± 0.045 s-1) and IO (0.054 ± 0.053 s-1). HO (Visit 1 = 0.037 ± 0.039 s-1, Visit 2 = 0.048 ± 0.051 s-1, ICC = 0.744, p = 0.004) resulted in "moderate" between session reliability while IO (Visit 1 = 0.063 ± 0.059 s-1, Visit 2 = 0.046 ± 0.046 s-1, ICC = 0.188, p = 0.341) had "poor" reliability. **CONCLUSION**: We suggest not to use the IO protocol during the NIRS mitochondrial function assessment as IO was neither valid nor reliable in identifying the NIRS recovery rate constant.

Board 4

THE INFLUENCE OF AEROBIC FITNESS AND GRIP STRENGTH ON ARTERIAL STIFFNESS, BLOOD PRESSURE AND ATHEROSCLEROSIS

Jacob P. Brown, Sydney L. Cindrich, Shania J. Kelly, Jacob D. Meyer, Wesley K, Lefferts, Iowa State University, Ames IA

Blood pressure, arterial stiffness, and subclinical atherosclerosis are key measures of vascular health and are associated with cardiovascular disease. High aerobic fitness and muscular strength may reduce CVD burden through beneficial associations by improving blood pressure, and arterial stiffness, and subclinical atherosclerosis. **PURPOSE:** Investigate the relations of aerobic fitness and grip strength with blood pressure, arterial stiffness, and subclinical atherosclerosis in adults. **METHODS:** Adults (n=38, 40+13 yrs, 55.2% female) engaged in fitness testing and cerebrovascular collection. Grip strength was assessed using a hydraulic hand dynamometer. Aerobic fitness was assessed via a modified Balke treadmill protocol to exhaustion with grade increasing +2.5% stage until 12.5% after which only speed increased (+0.5 mph/min). VO2peak was based on the highest recorded 15-s value when 2 of 3 criteria are satisfied: (i) respiratory exchange ratio ≥ 1.10; (ii) peak heart rate ≥85% of age-predicted maximum (220-age); or (iii) peak rating of perceived exertion ≥17. Atherosclerosis was assessed as carotid intima-media thickness (cIMT) via ultrasound. Brachial systolic, diastolic, and mean blood pressure were measured via automated, oscillometric cuff. Arterial stiffness was assessed as carotid-femoral pulse wave velocity (cfPWV) via tonometry. Subclinical atherosclerosis was assessed as carotid intima-media thickness (cIMT) via ultrasound. Multiple linear regression models were created to test the relationship between normalized grip strength (grip strength/body weight) and aerobic fitness on vascular outcomes after adjusting for age and sex. **RESULTS:** Grip strength was significantly associated with lower cIMT (β= -0.18, p= 0.01) and lower cfPWV (β= -201.84, p= 0.004). Aerobic fitness was significantly associated with lower cIMT (β= -0.003, p= 0.04), lower diastolic blood pressure (β= -0.34, p= 0.03), and lower cfPWV (β= -4.08, p= 0.02). **CONCLUSION**: High aerobic fitness and grip strength were both beneficially associated with lower subclinical markers of atherosclerosis and arterial stiffness. These findings suggest that increasing either aerobic or muscle-strengthening activities may have protective effects on the vasculature and lower cardiovascular disease risk.

Board 5

ASSESSING LEG MUSCLE DISPARITIES BETWEEN ACL-RECONSTRUCTED COLLEGE ATHLETES AND HEALTHY COLLEGE ATHLETES USING ISOKINETIC DYNAMOMETRY

Emily Carter, Anne Park-Braswell, Lauren Turner, Aaron Harris, Indiana Wesleyan University, Marion IN

PURPOSE: 70 percent of ACL injuries occur in non-contact settings, resulting in many types of sporting activities. Specific muscle imbalances in the lower extremities after the ACL injury may be correlated with susceptibility of reinjury. Thus, the purpose of this study was to compare muscle strength patterns in the hamstrings and quadriceps between subjects with Anterior Cruciate Ligament Reconstruction (ACLR) and healthy matched control subjects. **METHODS:** A total of thirty-two participants, 16 ACLR and 16 healthy matched controls (HMC), participated in

this study (14 Male, 18 Female). Flexion/Extension ratios and individual leg deficit were recorded using an isokinetic dynamometer. To compare differences in the flexion/extension muscular strength ratio between ACLR and HMC group, the ACLR leg was matched with the HMC leg according to dominance. Independent T-tests were run to identify a difference in the ratio of hamstrings to quadriceps, in addition to muscular deficit between the ACLR group and the HMC group. Additionally, a paired-sample T-test was conducted to determine the muscular differences between the injured and uninjured sides in the ACLR group. **RESULTS:** There were no significant differences in the hamstring to quadriceps ratio or the muscular deficits between the ACL and HMC group ($p>.05$). The paired T-test demonstrated nearly significant differences ($p=0.054$) between the right and left hamstrings at a speed of 180 deg/sec. **CONCLUSION**: There were no significant differences in the ratio of hamstrings to quadriceps and muscular deficits when compared between the ACLR group to the HMC group. Nearly significant data was found in hamstring strength of the injured and non-injured limb of the ACLR group, showing weaker average peak torque values in the ACLR limb. Limitations include small sample size, possible exercise prior to testing, and type of ACL surgery. Further research is still needed to determine the best methods for finding deficit trends in ACLR athletes in order to best prehab and rehab an ACL reconstruction.

Board 6

IMPACT OF PLATED RUNNING SHOES ON PHYSIOLOGICAL AND PSYCHOLOGICAL VARIABLES

Melissa Cook, August Hubbard, Emily Tripp, Lindsey Schroeder, Indiana Wesleyan University, Marion IN

PURPOSE: The aim of this research was to determine if midsole materials of plated shoes (PS) and traditional shoes (TS) impact physiological and psychological components of energy expenditure when running. Each of the variables examined are strong indicators of fatigue. The researchers hypothesized there would be a significant decrease in energy expenditure in PS compared to TS**. METHODS:** The subjects were 11 cross country and track athletes from Indiana Wesleyan University and 10 recreational runners. Each participant completed 2 running tests for 5 minutes each, one with PS and the other with TS. Each participant ran at an individualized calculated speed. The variables examined with a metabolic cart were volume of oxygen consumed (VO2), volume of carbon dioxide produced (VCO2), and calories (kcals), along with the rating of perceived exertion (RPE), and heart rate (HR). A post-test survey was administered to record the subjects' opinions of how each shoe felt. **RESULTS**: A Wilcoxon test examined the results in terms of RPE for PS and TS. A significant difference was found in the results ($Z=1.96$, $p=.04$). A paired t-test examined the results in terms of VO2, VCO2, kcals, and HR in PS and TS. Significant differences were found for VCO2 ($p=.05$) and kcals ($p=.04$). **CONCLUSION:** Plated shoes have significant physiological and psychological effects on energy expenditure. The insignificant findings in this study trend in the direction of significance. Research with additional subjects is needed to further support these conclusions for the significant and insignificant variables.

Board 7

LONGITUDINAL EFFECT OF ATHLETE WORKLOAD ON COUNTERMOVEMENT JUMP CHARACTERISTICS

Katherine Curtis, Bill Burghardt, Karin Pfeiffer FACSM, Michigan State University, East Lansing MI

The countermovement jump (CMJ) is frequently utilized to assess fatigue in athletes. CMJ mean power is a reliable variable for monitoring neuromuscular fatigue. Athlete workload can be assessed using wearable technology that represents the sum of the accelerations across all axes of a tri-axial accelerometer during movement and is used in the periodization of training programs. Previous studies have analyzed the relationship between fatiguing protocols and CMJ variables. However, there is a lack of research examining the relationship between athlete workload assessed by wearable technology and CMJ peak power. **PURPOSE**: The purpose of this study was to analyze the effect weekly change in player load has on peak power and concentric mean power in a CMJ. The hypothesis was that an inverse relationship would be observed between athlete workload and CMJ peak and concentric mean power. **METHODS**: Collegiate American football players (n=96) completed a CMJ test once a week over the course of eight weeks. Testing included performing three countermovement jumps on standardized equipment, and characteristics of the jumps (peak power and concentric mean power) were documented. Body weight was included in the calculation of scores. Fixed effects regression for repeated measures was used to examine effect of athlete

workload on CMJ characteristics. **RESULTS:** Due to listwise deletion in analyses (players were not assessed certain weeks due to injuries and other factors), 68 participants were retained for final analysis with average concentric mean power of 3218 (sd=517) watts. The full model was significant, $F(1, 66)=38.81$, $p<0.05$). However, no effects of player workload were observed on peak power ($p>0.05$). A very small but significant effect (R2 change <0.01) was shown for concentric mean power ($\beta=.055$, $p<0.05$). **CONCLUSION**: Most of the change in characteristics of CMJ (85% of the variance) was explained by variation between athletes. Athlete workload contributed less than 1% of the variance in concentric mean power. Although current results suggest negligible relationship between athlete workload and CMJ, other athlete populations (e.g., women's sports, other sports) should be examined. Additionally, other performance indicators aside from CMJ may be negatively affected by workload and should be examined in the future.

Board 8

INFLUENCE OF CARDIORESPIRATORY FITNESS ON VENTILATORY THRESHOLD

Ryan Hughes, Anna,Souzis, James Peterman, Leonard Kaminsky, Mitchell Whaley, Bradley Fleenor, and Matthew Harber FACSM, Ball State University, Muncie IN

BACKGROUND: Reference standards for ventilatory threshold (VT) have recently been established by the Fitness Registry Importance of Exercise National Database (FRIEND) registry based on age and sex. Based on these values, on average VT occurs at 51-74% of VO2max. The reason for variability in these values is unknown and may be influenced by fitness level. Purpose: To examine the impact of fitness level on VT expressed as a percentage of VO2max in apparently healthy men and women of varying fitness levels. **METHODS:** Participants included 1,784 self-referred male and female participants from the Ball State Adult Fitness Longitudinal Lifestyle STudy (BALL ST) cohort that performed resting health measurements and a maximal cardiopulmonary exercise test (CPET) between 1992 and 2020. Percentage of VT to VO2max was determined by dividing the confirmed VT by the confirmed VO2max derived from the CPET. Fitness level was determined by using the FRIEND registry percentiles with low fit being 33rd percentile, moderate fit 33rd-66th percentile, and high fit is >66th percentile. An ANCOVA was performed to determine the differences between fitness levels controlling for age and sex. **RESULTS:** The mean percentage for VT to VO2max was higher in low fit ($65.2 \pm 10.4\%$) than the moderate ($61.3 \pm 10.9\%$) and high fit populations ($60.8 \pm 10.9\%$) ($p < 0.05$). **CONCLUSION:** Low fit individuals have a higher VT when expressed as a percentage of VO2max, and thus likely have a higher range for moderate intensity exercise compared to higher fitness level populations relative to their own exercise capacity. Exercise physiologists should take this information into consideration when prescribing exercise to this population.

Board 9

EXAMINING INTERNAL TRAINING LOADS ACROSS PRACTICE, GAMES AND PLAYING POSITION IN COLLEGIATE SOCCER PLAYERS

Hayley Jones, Gary Long, University of Indianapolis, Indianapolis IN

INTRODUCTION: Soccer is a demanding sport that requires athletes to be well trained in preparation for competition. While significant work has been done to analyze the demands of game play in elite-level soccer, there is a lack of study on collegiate players based in the US. This is surprising as the collegiate soccer season is protracted, potentially leading to higher workloads than previously described. Recently technological advances have allowed for the precise measurement of internal (e.g., heart rate) and external (e.g., sprint distance, accelerations) training loads, however, these have not been well established at this level of competition. **RESEARCH QUESTIONS**: (a) Are internal training loads for Division II soccer players similar to those reported at different levels of competition? (b) do internal loads vary across training and competition and/or (c) playing position? VALUE: Our findings will help in understanding the physiological demands placed on college soccer players in training and match-play, and potentially help design training programs to better prepare athletes for those demands. To our knowledge, this is the first study to consider internal loads at this level of competition. **METHODS**: 25-30 healthy, male collegiate soccer players will be recruited for this study and analyzed across the entire 2022 season. The Polar Team Pro© GPS and heart rate monitoring system will be used to analyze internal loads for each player in practice and games. This system has been validated and is commonly used in soccer research. Repeated measures analysis of variance (ANOVA) will be used to compare internal loads across training, competition, and playing

positions. **LIMITATIONS:** Our analysis is limited to one team over the course of one competitive season. Variability within groups may make it challenging to elucidate differences by playing position.

Board 10

RELATIONSHIP BETWEEN COGNITION, HITTING ASSESSMENTS, AND IN-GAME BATTING PERFORMANCE IN COLLEGIATE BASEBALL AND SOFTBALL PLAYERS

Rachel Landis, Kara Tucker, Nicholas, Siekirk, Bradley Kendall, Taylor University, Upland IN

Cognitive abilities (e.g., information processing, reaction time, etc.) and movement execution appear to be essential factors relating to batting performance. However, research has primarily focused physical characteristics related to movement execution such as strength, power, and acceleration. While cognitive abilities are involved in hitting, it is unclear to what extent they relate to in-game hitting performance. **PURPOSE**: The purpose of this investigation was to examine the relationship between preseason cognitive assessments, off-field preseason hitting assessment, and in-game batting performing in collegiate baseball and softball athletes. **METHODS**: Collegiate varsity baseball (n = 10, 20.5 ± 1.0 years) and softball (n = 16, 20.3 ± 1.3 years) underwent Flanker Task and Trail Maker Tests A (TMT-A) and B (TMT-B) 24 hours prior to a pre-seasoning indoor hitting assessment. During pre-season hitting assessment, athletes selected 10 underhand pitches and were outfitted with commercially available measurement tools (i.e., HitTrax and The Blast) to quantify swing characteristics. Batting average (BA), slugging percentage (SLUG) and on-base percentage (OBP) was obtained from subsequent 14 non-conference baseball and softball games. **RESULTS**: The data from this study demonstrated a relationship between the ball's exit velocity ($r = .501$), bat velocity ($r = .524$) and average distance traveled ($r = .449$) during the hitting assessment and in-game BA, $p < 0.05$. No relationship between hitting assessment outcomes and OBP or SLUG were detected, $p > 0.05$. Furthermore, the Flanker-Task, TMT-A and TMT-B were not related to in game batting outcomes, $p > 0.05$. **CONCLUSION:** In this study, cognitive variables were not related to in-game performance. These data suggest that off-season preparation should be designed to maximize swing velocity while maintaining performance (i.e., skill) of the coordinated swing.

Board 11

THE EFFECTS OF POST-WARM-UP RECOVERY TIME ON SWIM PERFORMANCE

Samantha Loudermilk, Brian Wright, DePauw University, Greencastle IN

Competitive swimmers are faced with a range of post-warm-up recovery times (PWRTs) during competitions. Previous exercise science literature suggests that the optimal PWRT is between 8-20 minutes. However, research specific to competitive swimmers has focused on comparisons to longer PWRTs. Further, there is limited research comparing multiple PWRTs, especially PWRTs less than 20 minutes. **PURPOSE** To investigate the impact of PWRTs ranging from 5-20 minutes prior to swim performance. **METHODS** Baseline heart rate and core temperature were estimated at the start of each session. Swimmers then completed a standardized swim warm-up. Measures of heart rate (HR), tympanic temperature (TT), and RPE were estimated upon completion. Participants were then randomly assigned one of four groups to rest for either 5 min (5PWRT), 10 min (10PWRT), 15 min (15PWRT), or 20 min (20PWRT). Each participant completed all conditions on different days. Heart rate, temperature, and RPE were recorded at the end of the PWRT. Lastly, participants completed a maximal swim of 100 yards. Total time and splits at each 50 yards were recorded, in addition to HR, TT, and RPE immediately after the completion of the swim. **RESULTS** Pairwise comparisons displayed a significant difference ($p < 0.05$) between baseline HR and PWRT HR in all conditions (5PWRT; 85 ± 10.1 vs 104 ± 15.5 bpm, 10PWRT; 79 ± 8.8 vs 103 ± 17.9 bpm, 15PWRT; 84 ± 10.6 vs 99 ± 14.4 bpm, 20PWRT; 82 ± 8.7 vs 98 ± 13.5 bpm). TT was significantly lower when compared to 15PWRT and 20PWRT 95.5 ± 1.8° vs 97.5 ± 0.8° and 97.6 ± 0.7° respectively; $p < 0.05$). Pairwise comparisons for heart and swim performance displayed no difference between PWRTs. **CONCLUSION** While there were no differences between performance and physiological variables across the PWRT conditions, heart rate remained significantly elevated in all PWRT conditions compared to baseline.

Board 12

COMPARING BODY COMPOSITION METHODS FOR AIR FORCE RESERVE OFFICERS' TRAINING CORPS CADETS

Trey R. Naylor, Jessica E. Kiss, Adam M. Fullenkamp, David K. Garon, University of Kentucky, Lexington KY

For Reserve Officers' Training Corps (ROTC) cadets, body composition is used as a predictor of fitness, qualification for enlistment, determination of load carriage, and duty fulfillment. However, the current method of measuring body composition in the United States military lacks validity and has left a gap that challenges researchers to investigate methods of measuring body composition deemed suitable for the military population. **PURPOSE:** To compare body composition methods, including the military's method of circumference-based measurements, to identify a suitable method for Bowling Green State University's Air Force ROTC program. **METHODS:** Anthropometric data (height and weight) and body composition measurements (air displacement plethysmography (ADP), bioelectrical impedance analysis (BIA), skinfolds, and circumferences) were collected on 24 participants (Male: n = 21; Female: n=3). A repeated measure analysis of variance (ANOVA) was used to compare body composition measurement data. BMI and circumference results were displayed as a percentage of compliance according to the Air Force Instruction (AFI) guidelines. ADP was used as the "gold standard" of comparison for body composition. **RESULTS:** A significant difference between skinfolds and BIA occurred ($p=0.025$). According to BMI, seven cadets fell into the non-compliant category, while one cadet was non-compliant using the military's method of circumference-based measurements. The military's circumference-based method underestimated body fat compared the "gold standard" ADP, however these differences were not statistically significant. **CONCLUSION**: The findings from this investigation suggest that the military's circumference-based method can appropriately provide accurate body composition results amongst Air Force ROTC cadets. It is recommended that further research be conducted to continue to collect data on body composition methods that provide accurate results and are easy to implement for Air Force ROTC cadets.

Board 13

RELATIONSHIP OF PHASE ANGLE TO PERFORMANCE METRICS IN NCAA DIVISION I FOOTBALL PLAYERS

Kelsey Morgan, Jason White, Angela R. Hillman, Anna Brooks, Sharon Perry, Cheryl Howe, Ohio University, Athens OH

Body composition is a marker used to track athlete health and improve sports performance. Measuring BC via bioelectrical impedance analysis (BIA) can provide fat-free mass (FFM), fat mass (FM), and phase angle (PHA), an indicator of cellular health and integrity. Previous research has determined that PHA can be predictive of muscle strength, however, limited data exist in regard to phase angle and its relationship to strength, speed, and power metrics in athletes. **PURPOSE:** To identify relationships between PHA and 1RM, handgrip strength (HG), vertical jump (VJ), standing long jump (SLJ), and 40-yard dash (40) in football players. **METHODS**: NCAA Division I men's football athletes (n=73) participated. Over a one-week period and under the supervision of certified strength and condition specialists, athletes performed 1RMs for the bench press, squat and power clean exercises. Maximal efforts on VJ, SLJ, HG, and 40-yard dash were also collected. BF%, FM, FFM and PHA were assessed via BIA (InBody 770) according to manufacturer guidelines. **RESULTS**: As expected, there were strong correlations between body composition and speed and power variables in NCAA Division I football players. However only VJ was significantly correlated to PHA, and this was weak ($r = 0.26$, $p = 0.03$). **CONCLUSIONS:** This data indicates that in NCAA Division I football players there is not a relationship between FFM, FM, BIA and PHA. However, PHA and VJ had a weak positive correlation. This may in part be due to a large number of freshmen and sophomore players (n=50) who have not yet developed the strength and power profile of older athletes. Continued testing during a player's career may better establish if PHA is correlated to strength, speed, and power.

Board 14

THE EFFECT OF ATTENTIONAL FOCUS IN DYNAMIC STABILITY IN INDIVIDUALS WITH KNEE LIGAMENT INJURIES

Anna Stevens, Christine Martin, and Kyoungyoun Park-Braswell, Indiana Wesleyan University, Marion IN

PURPOSE: Knee ligament injuries are common in sports that require cutting and rapid agility movements. With the utilization of balance tests in post-injury rehabilitation, along with attentional focus of instruction, one can decrease the chances of a secondary injury. The purpose of this study is to identify the impact of attentional focus cues during dynamic balance tests in individuals with knee ligament injuries. **METHODS:** Twenty collegiate athletes (10 male and 10 female) volunteered for this study. All participants were at least one year post surgery and had a previous knee ligament injury. Each day, two dynamic stability tests were conducted: star excursion balance test (SEBT) and vertical drop jump (VDJ). The difference between each day was the instruction given: internal focus or external focus. For the SEBT, the internal instruction given was "focus on keeping the stationary knee from bowing in" and the external instruction was "hold the bar with one hand and focus on keeping it horizontal the entire time throughout the movement". For the VDJ, the internal instruction was "land with 2 feet on the platform. Focus on your knees not going over your toes. This instruction asked them to focus on their body movements. Then, the external instruction was "land in line with the cones in front of you. This instruction asked them to focus outside of their body movements. Testing occurred on two days, with at least 24 hours between testing days. **RESULTS:** There is no significant difference between either attentional focus in dynamic stability tests performed by those with a knee ligament injury, $t(19) = -.818$, $p>.424$ (VDJ), $t(19) = 1.26$, $p>.223$ (ESE), and $t(19) = .678$, $p>.506$ (ISE). While there was no significant difference between the two types of instruction amongst the participants, additional analyses were run to compare between the two genders. This revealed that certain trials of the SEBT had better outcomes in males than females with external focus. **CONCLUSION**: There was not an attentional focus (external or internal) of instruction that exhibited better outcomes in either dynamic stability tests, despite prior research that has shown an external focus produced better results.

Board 15

DOES THE ACUTE CONSUMPTION OF A COMMERCIALLY AVAILABLE ENERGY DRINK AFFECT METABOLISM AND FAT BURNING?

Ane Erasmus, Amy Lane, Kyle Timmerman FACSM, Miami University, Oxford OH

The consumption of energy drinks has become increasingly popular, especially among college-aged individuals. These thermogenic drinks vary in caloric content and typically contain caffeine in amounts greater than one to two cups of coffee. The marketing claims such as "increased energy", "increased attention/alertness", "increased metabolism", and "increased fat-burning" are raising the sales of these drinks. The **PURPOSE** of this study was to independently investigate the effect of the acute consumption of a commercially available, sugar-free energy drink on one's resting metabolism and rate of fat utilization, and ultimately evaluate the marketing claims made. **METHODS**: Utilizing a double-blinded crossover study design, twenty participants (21.6 ± 0.7y, 6M/14F) completed two resting metabolic rate studies following the consumption of 1) a commercially available energy drink (ED) and 2) a similarly flavored placebo beverage (PLA, 0 calorie sparkling water). Resting metabolic rate (via indirect calorimetry) was measured for a 30-minute period one hour after the consumption of the beverages. The trials were separated by at least a week. **RESULTS**: The ingestion of the commercially available energy drink resulted in an elevated metabolic rate compared to the placebo (ED: 72.5 ± 12.9 Kcal/hr, PLA: 67.9 ± 13.9 Kcal/hr, $p = 0.03$). The rate of fat utilization did not significantly increase following ingestion of the energy drink compared to placebo (ED: 55.22 ± 16.84 Kcal/hr, PLA: 51.95 ± 14.84 Kcal/hr, $p = 0.37$). **CONCLUSION**: The claim that the commercially available energy drink "accelerates metabolism" was supported by the results of this study while the claim that it "burns body fat" was not supported.

Board 16

A COMPARISON OF RESTING METABOLIC RATE USING INDIRECT CALORIMETRY, THE INBODY 770 AND PREDICTION EQUATIONS.

Katelyn Golden, Angela Hillman, Ohio University, Athens OH

PURPOSE: Many equations exist to predict resting metabolic rate (RMR) when it is not possible to measure it using indirect calorimetry with a metabolic cart. Additionally, specialized whole-body bioelectrical impedance (BIA) machines can utilize measured body composition parameters to estimate RMR. However, how these compare to measured RMR via indirect calorimetry is not clear. The purpose of this study was to compare RMR values from BIA, prediction equations and indirect calorimetry. **METHODS:** Adult males (n = 11; age: 28 ± 9 years; height:

175 ± 6 cm; weight: 74 ± 10 kg; lean muscle mass: 64 ± 8 kg) reported to the lab for 4 assessments after having fasted for 10 hours. During each trial, participants completed a BIA analysis (InBody 770) followed by 30 minutes of RMR measurement via indirect calorimetry. Comparisons between measured RMR, predicted BMR provided by the BIA, and male specific RMR prediction equations were made. **RESULTS:**There was a significant difference in the calculated Cunningham RMR and value from the BIA despite the BIA using the same equation ($p < 0.001$, mean difference (md): 155 kcal/day). Additionally, measured RMR was significantly greater than the BIA ($p=0.004$, md=114 kcal/day), Harris-Benedict ($p=0.02$, md=85 kcal/day), De Lorenzo ($p<0.001$, md=302 kcal/day), Owen ($p<0.001$, md=223 kcal/day), FAO Age 30-60 ($p<0.001$, md=108 kcal/day), Oxford Age 18-30 ($p=0.002$, md=119 kcal/day), and Oxford Age 30-60 equations ($p<0.001$, md=208 kcal/day), while measured RMR was significantly lower than the Livingston equation ($p<0.001$, md=370 kcal/day). **CONCLUSION:** In comparison to measured RMR, most of the prediction equations were significantly lower for RMR (average 150 kcal/day). Furthermore, it was discovered that the basal metabolic rate reported from the InBody 770 BIA is significantly different from the value calculated with the prediction equation stated in the manual (Cunningham). More studies should be performed to further test these equations and their accuracy in a larger population.

Board 17

AN ANALYSIS OF HUNGER HORMONES AFTER CONSUMPTION OF PROTEIN OR CARBOHYDRATE BREAKFAST DRINK

Sophia Miller, Lane Cullums, Angela Hillman, Ohio University, Athens OH

PURPOSE: Previous research suggests that protein ingestion may decrease the feelings of hunger throughout the day. The purpose of this study was to investigate the feelings of hunger and the blood concentrations of glucose, insulin and peptide YY (PYY) throughout the day following the ingestion of a carbohydrate-based drink, a protein-based drink or a non-caloric control drink. **METHODS** 11 healthy active adult males (age: 28 ± 9 years; height: 175 ± 6 cm; weight: 74 ± 10 kg; BF: 15 ± 3%) reported to the lab for 4 trials separated by 1 week. Participants arrived at 8 am and completed 30 min of resting metabolic rate measurement (RMR), then received breakfast or none (control). Breakfast consisted of either 25g of whey protein isolate (PRO), 25g of maltodextrin (CHO) or non-caloric control (NON-CAL) in 12 oz of water. Participants then complete 45 min RMR followed by 45 min running at a speed 55-60% VO2max. Venous blood samples were collected upon arrival to the laboratory, pre-exercise, post-exercise and pre-lunch. Participants complete a series of visual analog scales (VAS) detailing their hunger throughout the trials. **RESULTS** Average blood glucose for PRO trials was significantly lower than the average blood glucose for the NON-CAL trials. Insulin levels increased after consuming breakfast in all trials except for the NON-CAL breakfast. During the CON, CHO and PRO trials, insulin decreased post-exercise compared to the post-breakfast values. In the PRO and CON trials, insulin continued to decrease at the post-lunch time point, whereas the CHO trial insulin values did not continue to decrease. The PYY concentration did not change over time and were not different between conditions. Participants were significantly hungrier pre-lunch (mean VAS=62 mm) than baseline and hunger decreased post-lunch (mean difference=58 mm) and 2 hours post-lunch (mean difference=41 mm). Feelings of hunger were significantly greater pre-dinner (mean VAS=60 mm) than post-dinner (mean difference=53 mm) and 2 hours post-dinner (mean difference=43 mm). **CONCLUSION** The results of our study do not suggest that consuming a high protein breakfast will significantly reduce the feelings of hunger and increase satiety throughout the day. Additionally, protein ingestion did not significantly impact blood glucose, insulin or satiety hormones (PYY).

Board 18

IMPACT OF LIVE HEALTHY KIDS ON NUTRITIONAL KNOWLEDGE AND FOOD PREFERENCES

Hannah Moore, Ohio University, Athens OH

INTRODUCTION. In Appalachia, health disparities are prevalent along the lifespan, which providing nutrition education at a young age may work to combat. Teaching a plant-based diet may further the effectiveness because of its ability to fight chronic lifestyle related diseases. **LITERATURE REVIEW.** Current research shows that nutritional knowledge is influenced by nutrition education, which influences lifelong health. This importance is understood, but the effectiveness of nutrition curriculums, specifically a plant-based curriculum is limited. Following a plant-based diet is known to improve health outcomes, but children are often not exposed to it. **RESEARCH QUESTIONS.** Live Healthy Appalachia is an Athens, Ohio-based, nonprofit organization which aims

to promote health and wellbeing in the Appalachian region. One educational opportunity provided is Live Healthy Kids (LHK), a 22-week nutrition education program that seeks to educate 2nd grade children on the merits of healthy eating, how to identify and choose healthy foods, and how to prepare those food choices in a safe and healthy manner. This study will evaluate the effectiveness of the LHK program, at meeting its stated learning objectives by comparing the nutritional knowledge and preferences of two economically and educationally similar school districts where one provides nutrition education and the other serves as the control condition. It aims to discover if there is a measurable difference in nutritional knowledge and food preference between students who receive LHK lessons and those who do not. **METHODS.** The LHK Survey and Preference Test will be administered at both schools at the beginning and end of the 22-week period. At the intervention school, students will receive the weekly curriculum. Parents will be provided with a LHK Parent Survey to complete at the same timepoints. These methods will enable the comparison of two demographically similar school districts. The collected data will determine the effectiveness of the LHK curriculum on 2nd grade students in Appalachia. **PROJECTED LIMITATIONS.** It is unknown if child will complete the questionnaires truthfully or if they will experience peer influence. Since the intervention will not be evaluated, it will be unknown if the intervention will be administered correctly and completely.

Board 19

THE RELATIONSHIP BETWEEN BMI, WAIST CIRCUMFERENCE, WAIST TO HEIGHT RATIO, PERCENT FAT AND RESTING METABOLIC RATE

Laina Runyon, David Q. Thomas, FACSM, Kristen M. Lagally, FACSM, Illinois State University, Normal IL

Overweight and obesity are major problems in the United States. It has been speculated that resting metabolic rate is related to body fatness. **PURPOSE**: The purpose of this study was to determine the relationship between body mass index (BMI), waist circumference (WC), waist to height ratio (WHtR), percent body fat (%BF) and resting metabolic rate (RMR). **METHODS**: Eighteen (6M, 12F) volunteers (mean age=21.9+1.5 years) participated in height (Ht), mass, WC, %BF, and RMR measurements in a single session. Ht and mass were measured on a clinical stadiometer. BMI was calculated as mass in kilograms divided by the square of their Ht in meters. WC was measured using a standard measuring tape with the measure taken at the narrowest part of the trunk between the ribs and iliac crest. WHtR was calculated by dividing WC by Ht. RMR was assessed using a metabolic cart that measured oxygen consumption and carbon dioxide production. Fat mass was assessed using air displacement plethysmography. RMR was divided by mass to provide a measure of RMR relative to body mass (RMR/kg). Means and standard deviations were determined for all variables. Pearson product-moment correlations were used to statistically analyze the results. **RESULTS**: Means and standard deviations for each variable were: Ht 169.4+11.8 cm; Mass 81.1+ 19.1 kg; RMR 1669+ 429 kcals/d; BMI 28.1 + 5.2 kg/m2; WC 84 +12 cm; WHtR 0.50 + 0.07, RMR/kg 20.8 + 4 kcals/d, and fat mass 31.2+12 %. Correlations between RMR and the anthropometric variables were: BMI r = 0.51, R2 = 0.26; WC r = 0.62, R2 = 0.39; WHtR r = 0.35, R2 = 0.12, and % BF r= -0.43, R2 = 0.18. Correlation between RMR/kg and anthropometric variables were: BMI r = -0.34, R2 = 0.12; WC was r = -0.32, R2 = 0.10; WHtR r = -0.33, R2 = 0.11, and % BF r = -0.34, R2 = 0.12 . **CONCLUSIONS:** Results indicate weak to moderate correlations among both absolute and relative RMR and anthropometric variables. The relationships between RMR/kg and anthropometric measures were inverse, suggesting lower metabolic rates per unit of mass and lower metabolically active tissue in those with high body fatness levels.

Poster Session #5: Regency Ballroom E & F (2nd Floor), 3:35-4:50am

Board 1

ASSOCIATION BETWEEN SERUM VITAMIN D C3-EPIMER LEVELS AND CARDIORESPIRATORY FITNESS IN PATIENTS WITH ADVANCED CKD

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PURPOSE: Epimeric vitamin D levels decline in progressive chronic kidney disease (CKD). However, whether circulating levels of 3-epi-25-hydroxyvitamin D3 [3-epi-25(OH)D3] are associated with cardiorespiratory fitness (CRF) in patients with advanced CKD is currently unknown. The purpose of this study was therefore to examine the relationship between circulating vitamin D metabolites and cardiovascular functional and structural indices. **METHODS:** A total of n=165 patients with advanced CKD were included from two groups: patients who underwent kidney transplant (KT group, n=76) and patients on the transplant waitlist who did not undergo kidney transplant (NT group, n=89). All patients underwent cardiopulmonary exercise testing (CPET) and echocardiography at baseline (BL), 2 months, and 12 months. **RESULTS:** The study cohort was stratified into quartiles of baseline 3-epi-25(OH)D3 serum levels (Q1: <0.4 ng·mL-1, n=51; Q2: 0.4 ng·mL-1, n=26; Q3: 0.5-0.7 ng·mL-1, n=47; Q4: ≥0.8 ng·mL-1, n=41). After adjusting for age, sex, body mass index, mean arterial pressure, dyslipidemia, and intact parathyroid hormone levels, patients with the lowest 3-epi-25(OH)D3 levels (Q1) exhibited a significantly impaired VO2Peak (median [IQR]=18.4 [16.2-20.8] mL·min-1·kg-1) compared to patients in Q4 (20.8 [18.6-23.2] mL·min-1·kg-1; p=0.009). Additionally, VO2AT was lower in patients in Q1 (p=0.015) and Q2 (p=0.011) compared to Q4. No significant differences were observed between quartiles in LVMI (p=0.72). The KT group had lower levels of 3-epi-25(OH)D3 compared to NT at BL (p=0.004), but these levels increased following kidney transplantation and were significantly higher than NT at 12 months (p<0.001). We also found that longitudinal 3-epi-25(OH)D3 levels were significantly associated with longitudinal VO2Peak (KT: ß [SE] =2.53 [0.56], p<0.001; NT: 2.73 [0.70], p<0.001) and VO2AT (KT: ß [SE] =1.58 [0.31], p<0.001; NT: 1.37 [0.35], p<0.001) in both groups after adjusting for baseline covariates. **CONCLUSION:** Decreases in vitamin D C3-epimer levels may play a role in the poor CRF seen in patients with advanced CKD. Further research is warranted to elucidate the mechanisms by which C3-epi-25(OH)D3 may regulate exercise capacity.

Board 2

HENRY GETS MOVING IN DELAWARE COUNTY: YOUTH ACTIVITY PROGRAM UNDERGRADUATE PILOT STUDY

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INTRODUCTION: Henry Gets Moving is an Immersive Learning Pilot Program conducted by Ball State University in Muncie, Indiana. The program was born from an initiative to reduce obesity, especially in children, by making positive changes in healthy lifestyle behaviors. The project is based on the Henry Gets Moving book, that has an overall focus on getting moving and eating healthy. Undergraduate Exercise Science students work with students from local elementary schools in Delaware County in the areas of exercise and nutrition. **LITERATURE REVIEW:** As of 2018, Muncie recorded a high prevalence (31.5%) of overall obesity, with childhood obesity rates as high as 18% (Data USA, 2018). Also, one-third of Muncie and one-fifth of those under 17 have a BMI over 30 kg/m2 and are considered obese. The goals of this project are to provide education to students in the areas of exercise and nutrition, and materials given are shared with parents and guardians. **RESEARCH QUESTIONS**: Based on the data collected in Muncie and the implementation of Henry Gets Moving in multiple schools across the county, it would be important to determine if the project influences children to maintain a healthy lifestyle, and if so, do those changes help decrease the obesity levels. **VALUE**: With high levels of obesity, other chronic conditions are on the rise in our community, therefore, it is imperative that children and adults hear about the importance of how to make a change. This project has been implemented in other schools across the nation and was adapted by Ball State to combat the growing problem in our community. **METHODS**: One of the best methods found for examining our research question is collecting testimonials from children, parents, and teachers. We will be collaborating with the Computer Science department on campus to develop an app for children to track their activity and to help parents find useful resources. This would be a great way to collect data on the about of exercise students get daily. **PROJECTED LIMITATIONS**: To truly see a decrease in obesity and an increase in healthy lifestyle choices of children in Delaware County, Henry Gets Moving will need to be spread to more local schools. With increasing educational requirements in public schools, it may be hard to get schools to set aside time for reading our book and putting those ideas into practice.

Board 3

ASSESSING A PHYSICAL ACTIVITY, MENTAL HEALTH, AND RESILIENCY PROGRAM TO SUPPORT NIH POSTBACCALAUREATE RESEARCH EDUCATION PROGRAM (PREP) TRAINEES

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PURPOSE: A key barrier to physical activity (PA) is identifying enjoyable and attainable PA experiences. To support people in adopting active lifestyles, it is helpful to provide support to improve health. This pilot study aimed to determine if engaging in a guided PA education and implementation program can promote improvements in resiliency, mental, physical, and emotional health in underrepresented minority (URM) research trainees. **METHODS:** Six participants (n = 6), age = 23.17 ± 1.16 yrs, weight = 75.50 ± 11.74 kg, 66.7% non-Hispanic black, 33.3% Hispanic, and 66.7% female, were enrolled. Each participant was given 1) a Fitbit Inspire to monitor their PA, 2) American College of Sports Medicine Exercise is Medicine® modules and quizzes, to learn about the benefits of PA at their own pace, and 3) eight week fitness memberships. Daily step counts were collected continuously from November 2021 until May 2022. PA, body composition, mental status and physical function were assessed at baseline, 8 weeks, and 16 weeks through total average steps, a brief resiliency scale, a self-efficacy scale, a patient health questionnaire, a 6-min walk test, an extended timed-up-and-go test, and the Bod Pod. One-way RM ANOVA's were conducted for each dependent variable across time to compare the efficacy of PA education on mental and physical status. **RESULTS:** One-way RM ANOVA's showed no statistically significant change in PA engagement, mental and physical status. However, small to medium effect sizes were observed ($\eta 2 = 0.06$-0.35). For example, ANOVA indicated no significant time effect for total average steps ($F(1.097\text{-}5.485) = 2.668 p = 0.16$, partial $\eta 2 = 0.35$]. **CONCLUSION:** Outcomes of this pilot intervention were inconclusive at promoting PA and mental health improvements in URM trainees. Because of the small sample size (n = 6), the detection of statistical power and effects sizes likely influenced results. Additional participants are enrolled to address this limitation, although NIH only supports six participants per institution each year, thus we are seeking the partners from other universities. Findings will advance the literature by providing information on the development of PA education and program implementation.

This pilot research was supported by the National Institutes of NIH/NIGMS R25GM109432 supplement.

Board 4

INFLUENCE OF SHORT-TERM ELECTRIC BIKE USE ON PHYSICAL ACTIVITY AND ARTERIAL STIFFNESS IN HEALTHY ADULTS

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PURPOSE: Riding an electric bike (EB) is a form of moderate-intensity aerobic physical activity (PA). Aerobic exercise training decreases central arterial stiffness, contributing to a reduction in cardiovascular disease risk. We determined the effects of riding an EB for one week on PA levels and central arterial stiffness in healthy adults. **METHODS:** Twelve healthy adults [9 women; 49 ± 13 y (range = 28-66 y); BMI = 26.3 ± 5.7 kg/m2 (19.3-38.9 kg/m2)] were monitored for one week without an EB (no EB) and one week with an EB. Participants were instructed to ride the EB a minimum of 4 d/wk for 30 min/d. An accelerometer was attached to the thigh at the beginning of week 1 (day 1) to continuously track daily steps, moderate-to-vigorous intensity PA, cycling time, and sedentary time for 14 days. Blood pressure was measured at day 1 and day 14 following 5 min of seated rest. Carotid-femoral pulse wave velocity (cf-PWV) was measured at day 1 and day 14 by a trained investigator following 10 min of supine rest. Paired samples t-tests were used to compare data between trials. Data are mean ± SD. **RESULTS:** Compared to no EB, daily steps (no EB: 9975 ± 4492 steps/d; EB: 11820 ± 3421 steps/d; $p = 0.03$), moderate-to-vigorous intensity PA (no EB: 35 ± 25 min/d; EB: 44 ± 18 min/d; $p = 0.12$), and cycling time increased (no EB: 2.4 ± 3.6 min/d; EB: 19.2 ± 11.1 min/d; $p<0.001$) with EB use, whereas sedentary time decreased (no EB: 572 ± 125 min/d; EB: 485 ± 126 min/d; $p = 0.04$) with EB use. Compared to day 1, resting blood pressure (day 1: 116 ±12/74 ± 9 mmHg) was unchanged at day 14, whereas cf-PWV decreased at day 14 (day 1: 7.6 ± 1.2 m/s; day 14: 7.1 ± 0.9 m/s; $p = 0.04$). **CONCLUSION:** Compared to no EB, our findings show that riding an EB for 1 week

decreased central arterial stiffness in healthy adults. Future studies are needed to determine the long-term effects of riding an EB on indices of cardiovascular health.

Grant Funding: Miami University Summer Scholars Program and Student Technology Grant provided support for this research.

Board 5

THE INFLUENCE OF A STUDENT-LED HEALTH COACHING PROGRAM ON SAU EMPLOYEES

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PURPOSE: Health coaching - helping individuals gain the knowledge, confidence, and tools to reach their self-identified health goals - is emerging as an important role for health and fitness professionals. It was hypothesized that an 8-week student-led health coaching pilot program would improve the overall health and well-being of participants, and that self-perceived knowledge, confidence, and tools of physical activity and health information would be improved. **METHODS:** Upper-level Kinesiology student volunteers were trained as Student Health Coaches. St. Ambrose University (SAU) employees were recruited for participation yielding 8 faculty and staff clients. Participants' psychological well-being, biometric health measures, and self-perceived knowledge, confidence, and tools related to physical activity and health were assessed pre-and post- an 8-week health coaching program. Self-perception was assessed using a Likert-style scale (0 low - 5 high). Psychological well-being was assessed using the 42-item psychological well-being scale, developed by Ryff (1989). Biometrics assessed included resting blood pressure, heart rate, waist/hip circumference, and body composition. **RESULTS:** Prior to health coaching, 100% of participants (n=8) described their overall knowledge of physical activity guidelines and health recommendations as either "basic" (50%) or "adequate" (50%). After the 8-week program, 75% of participants described their knowledge as "adequate" and 25% as "superior." Prior to health coaching, only 50% of participants felt that they had the tools to improve their nutrition habits. After the program, 100% of participants felt they had the tools to improve their nutrition habits. Psychological well-being assessment showed a trend toward an increase in a sense of "purpose in life" and "self-acceptance." **CONCLUSION:** Early descriptive data indicate that student-led health coaching had a positive impact on the employee participants. Future work aims to expand the number of coaches and participants.

Grant funding: This project was funded under the Barry and Linda Franklin Exercise is Medicine on Campus Microgrant Program; Physical Activity Screening and Education Grant.

Board 6

EFFECTIVENESS OF AN UNDERGRADUATE DELIVERED DIABETES PREVENTION PROGRAM

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Over forty-five percent of Americans have at least one diagnosed chronic disease, often related to poor lifestyle habits. It is estimated that 70-90% of these chronic diseases can be prevented through lifestyle modifications. The National Diabetes Prevention Program (National DPP), through the Centers for Disease Control and Prevention (CDC), has been shown to effectively reduce risk of type II diabetes. However, adherence to and implementation of such programs has been limited **PURPOSE**: Examine the effectiveness of the National DPP delivered by undergraduate students in a supervised clinical setting. **METHODS**: Patients meet individually with an undergraduate health educator every week. During each session, patients complete a 20-minute coaching session going through educational material covering nutrition, physical activity, sleep, and stress. Each visit patients also complete a 20-minute individualized exercise program focusing on strength, mobility, and cardiovascular fitness. Goals of the program are to lose 5-7% of initial bodyweight, increase daily activity, and improve functional outcomes. All measures are assessed every three months. **RESULTS**: Forty-six patients (32 females, 14 males) were enrolled in this program during the previous year. Currently, 23 patients have successfully completed the program, 13 patients are still enrolled, and 10 patients have dropped out. Patients who completed the program have an average weight loss of 24.9 ± 20.9 lbs and increased average weekly steps from 4468.9 ± 2401.1 steps/day to 7523.4 ± 2451.5 steps/day. Additionally, functional improvements in mobility, gait speed, and walking capacity were

evidenced on the 4-square step test (8.1 ± 2.2 seconds to 6.8 ± 2.0 seconds), the 8-foot up-and-go test (7.0 ± 2.0 seconds to 6.0 ± 2.1 seconds), and the 6-minute walk test (486.7 ± 128.7 yards to 542.0 ± 67.9 yards), respectively. **CONCLUSIONS:** The results from this study support the National DPP as delivered by undergraduate students to be a feasible and effective tool to reduce risk factors of diabetes and promote improvements in functional fitness. Moreover, compared to other modes of delivery (e.g., group settings, virtual, etc.), this model has yielded higher adherence rates warranting further investigations on feasibility and effectiveness in larger settings.

Board 7

VALANCED AFFECT FOLLOWING ACTIVE AND PASSIVE RECUMBENT CYCLING

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This study may help provide evidence that active and passive (motor-driven) cycling have similar effects on the affective feedback of participants.. **LITERATURE REVIEW:** Congruent with reviewed literature and preliminary data, active and passive cycling showers improved affect. HR increased in active but not passive and no data has been seen yet for the Feeling scale. This is an expansion study of recumbent cycling (vs. upright cycling). Research **QUESTION:** Will calmness in individuals increase and their heart rate decrease 30-min post-exercise? **VALUE**: In this study individuals will be reclined, and the last data collection point will be 30-min post exercise. This study may indicate whether AC and PC impart significant changes in affective measures. **METHODS:** Heart rate (HR), Rating of Perceived Exertion (RPE), Feeling Scale (FS), Felt Arousal Scale (FAS), and affect [Calmness, Tension, Energy, Tiredness, State Anxiety (SA)] will be recorded in 30 participants (15 female; age 18-35 yrs.) before, during immediately after, and 30-min after each (PC, AC) 35-min cycling bout. Each session will consist of identically paced warm-ups (2.5-min@35 r·min-1), exercise bout (30-min@65 r·min-1), and cool-down (2.5-min@35 r·min-1) at a self-selected intensity of hard (15 RPE). **PROJECTED LIMITATIONS**: Projected Limitations may be the recruitment of naturally cycling participants and potential lack of generalizability.

Board 8

COGNITIVE AND PHYSICAL OUTCOMES AFTER 12 WEEKS OF DUAL TASK VS. EXERCISE ONLY PROGRAM FOR OLDER ADULTS

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PURPOSE: Regular exercise and problem solving activities have been shown to enhance cognition. The combination of physical and mental activities that occur during Dual task (DT) exercise, performed regularly, may be more effective than exercise alone (EO) for some cognitive and physical outcomes. This study compared effects of DT and EO on physical and cognitive function in 36 healthy adults who participated in a 3 month exercise program to determine the effects of adding problem solving activities to exercise sessions. **METHODS:** Thirty six healthy adults participated in twice weekly exercise programs for 12 weeks. They were randomly assigned to one of three groups: (DT, n=11, mean age=66.5±2.3 yr; EO, n= 15, mean age= 68.0±2.0 yr; Control, n=10, mean age= 58.9±5.4 yr). Measures of cognition included executive function, memory and delayed recall were performed on a Cognivue® device and Response Time and Accuracy cognitive tests on a SMARTfit® board (Sfb) were performed when sitting and when performing a dual task. Physical function included lower body strength, balance, and body composition. All tests were assessed at baseline, 6 weeks, and again at 12 weeks of the program. **RESULTS:** ANOVA p-values were calculated and singular comparisons made. Lower body strength and body composition did not differ among groups ($p>0.05$). Balance scores differed among the groups ($p=0.04$)with EO performing better than Control ($p=0.04$). Two cognitive variables (Sfb Response Time-Cognitive only ($p=0.001$), Sfb Accuracy-Cognitive Only ($p=0.03$) differed and Sfb Accuracy in a Dual Task approached significance ($p=0.08$), with the DT and EO outperforming Control. Improvements in Sfb Cognitive performance was highest in the DT (26.36±3.31), followed by EO (mean=19.64±4.17), and Control (mean=7±3.30) from over time ($p=0.05$).
CONCLUSION: Participation in twice weekly hour long exercise sessions with (DT) or without (EO) problem solving for 12 weeks improved balance and some cognitive functions.

Board 9

A FOOD PHARMACY'S IMPACT ON CARDIOVASCULAR DISEASE RISK FACTORS

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INTRODUCTION: The Appalachian region faces chronic disease rates greater than any region of the United States. Heart disease, specifically, is the primary cause of death in the US and the highest prevalence is found in West Virginia. **LITERATURE REVIEW:** Chronic diseases are costly, yet preventable health conditions. There is evidence for prevention, management, and reversal of these diseases with lifestyle change, such as including more plant-based foods, to treat modifiable CVD risk factors. **RESEARCH QUESTIONS:** The study will assess if FARMacy, a lifestyle intervention program, will impact the following CVD risk factors: glycosylated hemoglobin (HbA1c), hypertension, body mass index (BMI), dietary habits, blood pressure, and lipids. **VALUE**: West Virginia FARMacy is prescribing healthy food to fight chronic disease in West Virginia. FARMacy will enhance the existing knowledge of chronic disease treatment through lifestyle modification by demonstrating health outcomes of a population enrolled in a program that provides produce, health education, and social support. **METHODS:** Participants of FARMacy in Tyler County, WV will meet weekly for a 2-hour session and provided with locally sourced produce coupled with education and group wellness coaching focused on plant-based food, cooking, and physical activity. Baseline data was collected prior to the program, consisting of demographics, a readiness assessment, dietary habits, height, weight, blood pressure, lipids, and HbA1c. Participant's (N=39, 23.1% men, 60.9±11.7 y) average biometrics were: BMI 33.8 kg/m2, blood pressure 143.9/80.9 mmHg, HbA1c 6.09%, triglycerides 179.4 mg/dl, total cholesterol 180.7 mg/dL. On the readiness assessment, the average score for "being ready", with 10 being very ready, was 8.9 (range: 5-10); for "being confident", with 10 being very confident, was 8.3 (range: 5-10). Data collection will be repeated at the end of the program and analyzed for change of modifiable risk factors over time. **PROJECTED LIMITATIONS** include error associated with the BP monitors, self-reported height, and inaccuracy of weight scales. Additionally, the nature of free-living lifestyle intervention programs permits lack of control over how much participants implement the education and resources given through the FARMacy program.

Board 10

EFFECTS OF SHORT-TERM ELECTRIC BIKE USE ON CONTINUOUS BLOOD GLUCOSE LEVELS IN HEALTHY ADULTS

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PURPOSE: Riding an electric bike (e-bike; EB) is a form of moderate-intensity exercise that can convey health benefits related to blood glucose regulation, an important component for metabolic and cardiovascular health. The purpose of this study was to compare continuous blood glucose levels during a week that included EB with no EB. **METHODS:** Continuous blood glucose in healthy adults (N=16, mean age= 60.5±1.23) were monitored for one week without an EB and one week with an EB. Participants were instructed to ride the EB a minimum of 4 d/wk for 30 min/d. An accelerometer was attached to the thigh at the beginning of week 1 (day 1) to continuously track daily physical activity for 14 days. A continuous glucose monitor (CGM) was attached to the arm to measure glucose every 15 minutes throughout the 2 weeks. **RESULTS:** The effect of EB use on physical activity METs score was significant with a mean increase of 1.73±0.57 MET min•day-1 (p=0.008). Compared with noEB week, sedentary time decreased by 83.47 min during the EB week (p=0.013). Rested fasting glucose levels did not change when measured on day 1 and day 14 (mean difference=-1.17±2.34, p=0.62). However, continuous glucose monitoring revealed a significant difference in percent of time blood glucose levels were outside the normal range (70-120 mg•dl-1) with the EB week reporting 5.67±1.84% less time per day than the noEB week outside the normal range (p=0.008). **CONCLUSION:** Compared with a week with no access to an EB, riding an EB for at least 30 minutes for four days in one week was enough activity to contribute to a shift in continuous glucose levels to a healthier range for a greater part of the average day. Ebike riding is a viable mode of physical activity and is shown to positively impact daily glucose regulation, which is important for metabolic and cardiovascular health.

Grants Funding: University Summer Scholars and Student Technology Grant provided support for this research.

Board 11

FIBER TYPE SPECIFIC MYOCELLULAR CHARACTERISTICS WITH LIFELONG ENDURANCE EXERCISE IN WOMEN

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PURPOSE: This investigation aimed to examine skeletal muscle fiber type specific differences in fiber size, myonuclear and satellite cell content, and capillarity with lifelong endurance exercise. **METHODS**: Healthy women (n=27) were sorted into three groups: young exercisers (YE: n=10, 25±2 y, VO2max 44±8 ml/kg/min), lifelong exercisers (LLE: n=7, 72±4 y, VO2max 26±5 ml/kg/min), and old healthy controls (OH: n=10, 75±3 y, VO2max 18±3 ml/kg/min). Muscle biopsies from the vastus lateralis were immunofluorescently stained and analyzed for fiber type and size, myonuclear and satellite cell content, and capillarity. **RESULTS**: On average, 683±22 fibers were analyzed per subject. LLE and YE had a greater MHC I fiber type distribution (56.3±16.9% and 59.3±15.0%, respectively) compared to OH (41.2±10.7%; P<0.05 vs. YE, P=0.09 vs. LLE). In addition, LLE trended toward a lower MHC IIA/IIX hybrid fiber type distribution (5.1±5.6%) compared to OH (13.4±9.0%, P=0.09). Average fiber size was greater in YE (all fibers, 4,312±583 μm2) than OH (all fibers, 3,442±704 μm2, P=0.058), but not LLE (all fibers, 3,937±963 μm2. LLE women had a greater distribution of large MHC I fibers (>7,000 μm2, ~11%) compared to OH (~6%), and a lower distribution of small (<3,000 μm2) MHC IIA (~41% vs. ~52%) and MHC I/IIA, IIA/IIX, and IIX fibers (combined, ~46% vs. ~77%) compared to OH. LLE had approximately two times greater number of satellite cells per fiber (0.083±0.041) compared to YE (0.040±0.030, P<0.05). All-fiber capillarity (capillaries in contact with each fiber) showed a hierarchical pattern with YE (4.4±0.4) > LLE (3.5±0.4) > OH (2.4±0.7, P<0.05 across all groups). Fiber type specific capillarity did not differ between YE (MHC I: 4.8±1.2, MHC IIA: 4.0±0.4) and LLE (MHC I: 3.9±0.7, MHC IIA: 3.4±0.8), however, MHC I fiber capillarity in YE was greater than OH (3.0±0.8, P<0.05) and MHC IIA fiber capillarity in YE and LLE were greater than OH (3.1±1.4, P<0.05 vs. other groups). No differences in myonuclear domain were observed. **CONCLUSIONS**: The results of this study suggest that lifelong exercise elicits a positive effect on muscle fiber characteristics compared to old healthy controls. These data provide novel insights into the health benefits at the myocellular level with ~50 years of consistent endurance exercise.

BOARD 12

RURAL MEN'S PREFERENCES IN FOCUS-AREA AND DELIVERY OF A HEALTH PROMOTION INTERVENTION

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PURPOSE Over 80% of rural men are interested in physical activity programs, yet they are underrepresented in physical activity intervention studies. This is partially due to the difficulty in reaching rural communities. Tailoring interventions to rural men may improve recruitment and retention, but there is limited information to do so. The aim of this study is to better understand rural men's top health-related interest and preferred features of an intervention. **METHODS** Rural men, who completed an earlier study, were re-contacted via online survey system and invited to complete a follow-up survey. The survey asked rural men to identify health behaviors they were interested in improving (e.g., sleep). Participants were also asked to report how likely they were to use various remote intervention resources (e.g., exercise videos) to improve their health behaviors. To be included, participants needed to self-identify as male, be over 18 years old, and live in the United States in a town of less than 2,500 people or outside of a town. **RESULTS** Rural men (N =131) completing the survey were mostly White (89.5%), non-Hispanic (93.9%), college educated (84.2%), married (57.0%), and full-time workers (62.6%). Most rural men were interested in learning how to improve their fitness (selected by 84.0%), mental health (69.5%), and sleep (58.0%). On a scale of 1-extremely unlikely to 5-extremely likely, the majority of rural men said they would be "somewhat likely" or "extremely likely" to use an exercise video (72.5% selected these options; average rating = 3.7 ± 1.1), educational videos (67.9%; 3.7 ± 1.0), a step tracking device (64.1%; 3.7 ± 1.3), mobile app (59.6%; 3.5 ± 1.3), and a training plan (54.1%, 3.4 ± 1.2) to improve their fitness. **CONCLUSION** Our findings suggest rural men are most interested in improving their fitness, mental health, and sleep. Interventions tailored to rural men should be delivered through educational and exercise videos. Apps can also be used as a method of delivery. However, an intervention will likely want to utilize multiple components with options of apps or features to use, which may include educational and exercise videos, step tracking, and training plans. Funding:

This project has received funding from the Fraternal Order of Eagles (Pilot Program) and the Graduate and Professional Student Government of the University of Iowa.

Board 13

MOTHERS POORLY PERCEIVE CHILDREN'S FITNESS CHARACTERISTICS

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At least 14.7 million children and adolescents are obese, with about 20.7% being 6-11-year-olds. Parental recognition of their child's weight status ranges from 6-73%, and when examining overweight children, less than 50% of parents correctly identify their child as such. Parents have a strong influence on children's behavior and physical activity levels. **PURPOSE**: The purpose of this study was to examine maternal parents' ability to identify their child's body mass index (BMI) and measures of physical fitness (PF). **METHODS:** 200 males (10.8 ± 2.16 years), 170 females (11.2 ± 2.44 years) and their maternal parent volunteered to participate. Children were evaluated to determine BMI, body composition, muscular strength, flexibility, and aerobic fitness. Simultaneously, seated in a blinded room were the children's mothers who completed a questionnaire which described PF tests and provided categorical rankings based on normative data. BMI, body fat and fitness scores ranged categorically from poor to excellent. Classification for child BMI were: underweight (<5th percentile), normal weight (5th - <85th percentile), overweight (85th - <95 percentile) or obese (³95th percentile). The PF scores from the child were compared to the maternal perception of score. Descriptive statistics and bivariate correlation analyses were utilized with significance set at $p<.05$. **RESULTS**: The ability of the maternal parent to correctly identify fitness characteristics by categorical selection were: BMI (75.1%), body composition (46.5%), aerobic fitness (38.1%), muscular strength (31.1%), and flexibility (27.6%). The relationship between child scores and maternal perception of scores was highest for measures related to BMI and body composition (moderately strong) and weak for all other PF characteristics (BMI: $r = .68$, body composition: $r = .60$, muscular strength: $r = .25$, aerobic fitness: $r = .39$ and flexibility $r = .41$). **CONCLUSION**: A mother's ability to predict characteristics for children ranging in all weight ranges is more accurate than predicating PF characteristics. These results provide a context for the necessity of school-based or professional PF screenings as informative guidelines for parents.

Board 14

EFFECT OF ELECTRICALLY STIMULATED AND VOLUNTARY PLANTARFLEXION CONTRACTIONS ON MITOCHONDRIAL FUNCTION USING NEAR-INFRARED SPECTROSCOPY

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PURPOSE: To compare the recovery rate of mitochondria following electrically stimulated (ES) and voluntary (VOL) skeletal muscle contractions. **METHODS**: Ten recreationally active men and women (27 ± 3.3 years; 171.7 ± 5.5 cm; 77.2 ± 12.6 kg; 0.93 ± 0.46 cm lower limb adipose tissue thickness) volunteered to participate in this investigation. Participants were seated in a recumbent position with the right knee fully extended and ankle supported at 90o. The foot was attached to a force transducer and a blood pressure cuff was applied above the knee joint. A near-infrared spectroscopy (NIRS) device was placed on the posterior mid-line of the tibia at the largest circumference of the gastrocnemius. ES pads were placed directly superior and inferior to the NIRS device. Participants performed fifteen seconds of ES plantar flexion (2Hz with 60amps at a pulse duration of 500µs). Immediately after exercise six repeated arterial occlusions were performed. Each occlusion lasted 5 seconds(s) and was followed by 5s of recovery. After five minutes of rest the procedure was repeated with VOL contractions with real time feedback so they could match forces produced during ES. Recovery slopes and rate constants were calculated to determine the proficiency of the mitochondria to return the rate of oxygen consumption to baseline. A maximum ischemic calibration and blood volume correction was performed **RESULTS:** No significant differences were observed between ES (2.11±1.01) and VOL (1.47±1.22) rate constants. There was a significant interaction ($f = 13.85$, $p <0.001$), main effect of condition ($f = 28.72$, $p <0.001$) and main effect of time ($f = 24.11$, $p <0.001$). Post-hoc testing revealed significant differences in slope recovery between ES and VOL contractions at all time points: Immediately (4.05±2.07 v. 0.83±0.35; $p < 0.001$), 10s (2.29±1.06 v. 0.58±0.33; $p = 0.001$), 20s (1.8±0.95 v.

0.53±0.32; p = 0.002), 30s (1.32±0.79 v. 0.40±0.21; p = 0.004), 40s (1.14±0.52 v. 0.45±0.22; p = 0.002) and 50s (1.01±0.30 v. 0.41±0.22; p < 0.001) after cessation of contractions. **CONCLUSION**: No significant differences were observed in the rate of recovery. However, ES contractions evoked a larger magnitude of recovery due to a greater rate of oxygen consumption.

Board 15

CHANGES IN BODY COMPOSITION MARKERS OVER PRESEASON CAMP IN NCAA DIVISION I FOOTBALL PLAYERS

David Filipowski, Jason White, Angela R. Hillman, Anna Brooks, Sharon Perry, Cheryl Howe, Ohio University, Athens OH

Body composition is a marker used to track athlete health and improve sports performance. Measuring BC via bioelectrical impedance analysis (BIA) can provide body fat mass (BFM), percent body fat (PBF), skeletal muscle mass (SMM), extracellular water to total body water ration (ECW/TBW), and phase angle (PHA), an indicator of cellular health and integrity. Previous research has determined that PHA can be predictive of muscle strength, however, limited data exist in regard to phase angle and its relationship to strength, speed, and power metrics in athletes**. PURPOSE:** To identify relationships between PHA, BFM, PBF, SMM, and ECW/TBW in football players during a 3-week preseason camp period. **METHODS:** NCAA Division I men's football athletes (n=18) participated. Over a three-week period, athletes completed body composition testing via BIA on three occasions. Testing took place once a week for each of the three weeks. BFM, PBF, SMM, ECW/TBW, and PHA were assessed via BIA (InBody 770) according to manufacturer guidelines. **RESULTS:** There was a very strong correlation between PHA and ECW/TBW ($p<0.001$, $r=0.85$). PHA significantly increased over the 3-week camp ($F=12.38$ $p<0.001$; W1: 7.3 ± 0.4, W2: 7.5 ± 0.4. W3: 7.5 ± 0.4) and ECW/TBW decreased over camp ($F=9.15$, $p<0.001$; W1: 0.367 ± 0.004, W2: 0.365 ± 0.004. W3: 0.364 ± 0.005). There was no statistical significance found in PBF, BFM, or SMM changes during camp. **CONCLUSIONS:** This data indicates that over the three-week collegiate preseason camp period there was significant change in PHA and ECW/TBW. Phase angle values increasing indicated their sensitivity to a period of high intensity and stress. Despite decreases in hydration, cellular health was maintained. As fitness levels increased and hydration decreased, the improvement in PHA suggests that regardless of perceived stress, cellular health improved.

Board 16

INFLUENCE OF ELECTRICAL STIMULATION AND VOLUNTARY PLANTARFLEXION CONTRACTIONS ON OXYGEN UPTAKE USING NEAR-INFRARED SPECTROSCOPY

Edward Pelka, B. Ryan Davis, Patrick Tomko, John McDaniel, Kent State University, Kent OH

PURPOSE: To compare skeletal muscle oxygen uptake ($m\dot{V}O2$) during work matched electrically stimulated (ES) and voluntary (VOL) plantarflexion contractions at various contraction frequencies and intensities. **METHODS**: Ten recreationally active men and women (27 ± 3.3 years; 171.7 ± 5.5 cm; 77.2 ± 12.6 kg) participated in this investigation. Participants sat in a chair with the right knee fully extended and right foot secured to a force transducer. A near-infrared spectroscopy (NIRS) device was placed at the largest circumference of the gastrocnemius with ES electrodes placed superior and inferior to the NIRS optode. Participants performed a series of ES and VOL plantarflexion contractions at frequencies of 1Hz and 2Hz. ES was administered for fifteen seconds at an electrical current of 30, 40, 50, 60, 70 and 80 amps in random order. Subsequently VOL contractions were performed at 1 and 2 Hz with real time force feedback enabling subjects to match forces produced during ES. Immediately following cessation of each set, a five second arterial occlusion was performed to measure $m\dot{V}O2$. A maximal ischemic calibration was performed via a three-to-five-minute arterial occlusion. NIRS data was corrected for blood volume shifts. Paired samples t-tests with a Benjamini-Hochberg post-hoc analysis were performed to determine if there were significant differences in $m\dot{V}O2$ between contraction frequencies and modality. **RESULTS:** ES resulted in a significantly greater $m\dot{V}O2$ slope at 1Hz (-0.08 ± 0.08 % $m\dot{V}O2$/s/kg vs -0.002 ± 0.02 % $m\dot{V}O2$/s/kg; p = 0.014) and 2Hz (-0.11 ± 0.10 % $m\dot{V}O2$/s/kg vs 0.001 ± 0.01 % $m\dot{V}O2$/s/kg; p = 0.012), as well as a significantly greater $m\dot{V}O2$ intercept at 2Hz (-1.88 ± 1.43 % $m\dot{V}O2$/s vs -0.69 ± 0.35 % $m\dot{V}O2$/s; p = 0.035) but not 1Hz (p = 0.535) when compared to VOL. 2Hz resulted in a significantly greater $m\dot{V}O2$ intercept when compared to 1Hz during ES (-0.62 ± 0.46 % $m\dot{V}O2$/s vs -1.88 ± 1.43 % $m\dot{V}O2$/s; p = 0.011), but not VOL (p = 0.139). Additionally, there were no significant differences between 1Hz and 2Hz $m\dot{V}O2$ slope for both ES (p = 0.361) and

VOL (p = 0.614). **CONCLUSION:** These data indicate ES results in a significantly greater skeletal muscle oxygen consumption, when compared to VOL plantarflexion contractions at similar work rates. However, differences in fiber activation relative to optical pathlength must be considered.

Board 17

ELECTRICALLY STIMULATED ISOMETRIC CONTRACTIONS INCREASE SORENESS AND REDUCE MAXIMAL KNEE EXTENSOR FORCE

Patrick Tomko, Sydney Gallagher, Edward Pelka, B. Ryan Davis, John McDaniel, Kent State University, Kent OH

PURPOSE: To examine changes in indirect markers of muscle damage from electrical stimulated (ES) contractions of the knee extensors. **METHODS**: Six recreationally active men and women (26.2 ± 2.1 yrs; 178.2 ± 6.5 cm; 75.4 ± 8.3 kg) participated in this study that required 3 testing visits. Participants completed 40 isometric contractions, with stimulation parameters set at 75 Hz, 400 pulse width, and contraction length of 6 seconds followed by 20 seconds of rest. Participants were seated in a custom-built chair equipped with a linear force transducer. Two sets of two sticky electrodes were placed over the anterior aspect of the thigh with two positive electrodes being positioned over the muscle bellies of the vastus lateralis and rectus femoris, and two negative electrode placed 5 cm below the inguinal ligament. Maximal muscle strength (MVC), perceived soreness (PS) via visual analog scale, and muscle swelling (mCSA) were assessed prior to exercise (baseline) and then 1-,24-, and 48-h post contractions. Paired samples t-tests were performed to determine significant differences in MVC, PS, and mCSA before and after the isometric contraction protocol. Specific force was also calculated for each participant. **RESULTS:** MVC was significantly lower from baseline to 24h; 15.26 ± 2.4 N vs. 12.41 ± 2.2 N, p > 0.01, and from baseline to 48h; 15.26 + 2.4 N vs. 12.8 ± 2.4 N, p = 0.18. Perceived soreness was significantly higher from baseline to 24h; 1.5 ± 3.7 mm. vs. 20.3 ± 12.3 mm., p = 0.01, from baseline to 48h; 1.5 + 3.7 mm. vs. 25.6 ± 13.2 mm., p = 0.05, and between 24h and 48h; 20.3 ± 12.3 mm. vs. 25.6 ± 13.2 mm., p = 0.04. Total mCSA significantly increased from baseline to 48h; 30.5 ± 5.1 cm2 vs. 31.5 ± 5.3 cm2, p = 0.046. Specific force significantly decreased from baseline to 24h; 0.50 ± 0.05 N/cm2 vs. 0.40 ± 0.04 N/cm2 , p >0.01, from baseline to 48h; 0.50 ± 0.05 N/cm2 vs. 0.41 ± 0.04 N/cm2, p = 0.02, 1h-24h; 0.51 ± 0.05 N/cm2 vs. 0.40 ± 0.04 N/cm2, and from 1h-48h; 0.51 ± 0.05 N/cm2 vs. 0.41 ± 0.04 N/cm2, p = 0.02. **CONCLUSION:** ES isometric contractions of only 20.7 % of MVC increased muscle soreness, reduced knee extensor strength, and increased muscle swelling up to 48h post exercise. These data suggest that prescription of ES and recovery within populations diagnosed with muscle paralysis should be investigated further.

Board 18

MUSCLE GROWTH DISCREPANCIES FOLLOWING TRAINING: CROSS-SECTIONAL AREA AND MUSCLE VOLUME

Andrew Veith, Heather Gordish-Dressman, Paul D. Thompson, Tom Price, Theodore J. Angelopoulos, Priscilla M. Clarkson, Paul M. Gordon, Niall M. Moyna, Linda S. Pescatello, Paul S. Visich, Robert F. Zoeller, Eric P. Hoffman and Monica J. Hubal, Indiana University Purdue University Indianapolis, Indianapolis IN

PURPOSE: We previously published a study showing high inter-subject sex-dependent variability with regard to muscle size and strength gains following progressive resistance training (RT). However, two dimensional cross-sectional area (CSA) of the muscle was reported rather than three dimensional (3D) muscle volume (MV). As muscle growth happens across 3D space, the current study compares variation in muscle volume to cross-sectional area in men and women following RT in a large subject cohort. **METHODS**: Healthy young (18-40 years old) untrained individuals were tested. Magnetic resonance imaging (MRI) was used to assess muscle volume and maximal voluntary contraction (MVC) and 1-repetition maximum (1RM) testing were used to measure muscle strength. Measurements were taken prior to and after a 12 week strength training program for the non-dominant biceps and triceps (EX). The dominant arm served as a non-exercised control (CON). Subjects were trained twice per week with progressively increasing loads for: biceps preacher curl, biceps concentration curl, standing biceps curl, overhead triceps extensions, and triceps kickbacks. **RESULTS**: In both men (N=249) and women (N=410), no significant differences were found in the untrained arm (p>0.05) for either CSA or MV. In the trained arm, women experienced significant gains in MV (p<0.01; +41678+/-2763 mm^3) but changes in CSA were not statistically significant (p=0.24; +450+/-21 mm^2). In the trained arm, men also experienced significant gains in MV (p<0.01; +75654+/-10591 mm^3) but changes in CSA were not statistically significant (p=0.24; +821+/-130 mm^2). Ranges

for CSA were -339.691 to 2,348.626 mm^2 in men and 150.756 to 872.305 mm^2 in women. Ranges for MV were -31,692.754 to 212,499.646 mm^3 in men and 14,291.672 to 77,276.239 mm^3 in women. **CONCLUSION**: As with our previous reporting, muscle growth following RT is highly variable, to the extent that two dimensional CSA increases following training are not statistically significant (even in a large cohort), while increases in volume are for both men and women. Future studies should take into account that 3D imaging of muscle growth capture larger effect sizes relative to 2D cross-sectional area.

Board 19

COMPARISON OF CO-CONTRACTION RATIOS OF COLLEGE ATHLETES AFTER KNEE INJURY DURING A LATERAL STEP-UP

Leah Maher, Elizabeth Leggett, Ben VonGunten, Indiana Wesleyan University, Marion IN

P**URPOSE**: The muscular imbalances may exist in the hamstring and quadriceps after serious knee injuries. The imbalances may put athlete at a higher risk of re-injury down the road. Identifying the co-contraction in the quadriceps and hamstring will enhance rehabilitations for knee injuries to prevent muscular imbalance and better prevent future injuries for athletes. Thus, the purpose of this study is to determine differences in lower extremity muscle activation following major knee injury, specifically in the contraction of the quadriceps and hamstrings during a lateral step-up. **METHODS**: Seventeen knee injured individuals (9 Female, 8 Male, 20 ± 1.23 years) and nineteen healthy controls (9 Female, 10 Male, 20 ± .98 years) were included. The adhesive interface wireless electrodes attached to the semitendinosus and vastus lateralis muscles on the previously injured or dominant leg. Electromyographic activity of the two muscles were measured during three single-leg lateral step-ups. The maximum amplitudes were averaged and inserted into the co-contraction ratio equation, which represented indication of muscular imbalances. **RESULTS**: There was no statistically significant difference in the co-contraction ratio between the injured and non-injured control group (p= .869, injured mean ratio= 1.238 mV, non-injured mean ratio= 1.206 mV); however, the injured group had a higher average contraction of their quadriceps (injured group= .5402 mV, non-injured group= .4244 mV). **CONCLUSION**: There is not concrete evidence to support that significant knee injuries cause muscular imbalances in the quadriceps and hamstrings. Further research is required to determine the scope and significance that knee injuries have on long term lower extremity health.

Board 20

BLOOD FLOW RESTRICTION RESISTANCE EXERCISE IN THOSE WITH INCOMPLETE SPINAL CORD INJURY

C. Eric Heidorn[1,2], Lisa Lombardo[2], John McDaniel[1], [1]Kent State University, Kent OH, [2]Cleveland VA Medical Center, Cleveland OH

Incomplete spinal cord injury (iSCI) can diminish the connection to muscles caudal to the level of injury resulting in a loss of strength and function. This can limit mobility and ability to complete exercise possibly leading to further muscular deficits such as muscle atrophy. Blood flow restriction (BFR) with low load resistance exercise improves muscular strength and size in able body populations but has yet to be fully investigated in those with SCI. **PURPOSE**: To examine the muscular effects of 8 weeks of BFR exercise in a group of individuals with iSCI. **METHODS:** Three individuals (6 limbs) with iSCI have completed the current study. Participants completed 8 weeks (20 sessions) of unilateral BFR knee extension/flexion exercise at 30% maximal isokinetic torque. Exercise included 4 sets (30-15-15-15 repetitions) with 1 minute of rest between sets. A rapid inflation cuff placed at the most proximal portion of the thigh was inflated to 70% arterial occlusion pressure for the duration of each unilateral exercise session. Surface stimulation was used in 1 participant to optimize exercise mechanics. A bilateral computed tomography scan of the thigh was completed to analyze changes in muscle cross-sectional area. Muscular strength was assessed with maximal isokinetic (60, 120, 180deg/s) knee extension/flexion. Muscular fatigue was assessed by assessing changes in knee extension/flexion torque pre and post a 5-minute fatiguing protocol. **RESULTS**: Knee extension torques for all trained limbs (pre vs. post training; mean ± S.D.) were 33.3 ± 20.1 vs. 42.0 ± 18.3 (p=0.006), 23.1 ± 12.5 vs. 30.3 ± 10.5 (p=0.041), and 15.3 ± 8.3 vs. 18.8 ± 7.5 (p=0.135) ft. lbs. at 60, 120, and 180deg/s, respectively. Knee flexion torques were 23.0 ± 9.7 vs. 26.5 ± 9.8 (p=0.078), 17.1 ± 5.0 vs. 22.3 ± 6.4 (p=0.189), and 15.2 ± 4.9 vs. 18.8 ± 5.6 (p=0.099) ft. lbs. at 60, 120, and 180 deg/s, respectively. Change in max torque after muscle fatigue protocol for knee extension and flexion was -0.34 ± 6.6 vs. -0.66 ± 8.8 (p=0.950) and -3.55 ± 5.6 vs. -4.8 ± 6.3 (p=0.720) ft. lbs., respectively. Muscle cross-sectional area of rectus femoris was 7.75 ± 3.4 vs. 7.88 ± 3.3 cm^2 (p=0.732). **CONCLUSION**: Preliminary participant data suggest encouraging results for the

use of BFR resistance exercise for improving muscle function in those with incomplete SCI. FUNDING: This project is funded by Veterans Affairs RR&D Merit Grant 1I01RX003562.

Schedule – Saturday Morning: Symposia

Symposium #22: Discovery Room, 9:00-9:50am

Measuring Athlete Loads: Data Science Or Smoke And Mirrors?

Session Moderator: Alex Montoye, Alma College

Presenters and Institutional Affiliations:

Valerie Smith-Hale, Ph.D., Notre Dame, South Bend IN

Dr. Valerie Smith-Hale is an Assistant Strength and Conditioning coach overseeing the Women's Soccer, Women's Tennis programs and Swim Sprint group at the University of Notre Dame. She obtained her BA in Exercise Science at Adrian College (Adrian, MI); MS in Exercise Science at Central Michigan University (Mount Pleasant, MI); and PhD at Wayne State University (Detroit, MI). Dr. Smith-Hale is a Certified Strength and Conditioning Specialist (CSCS) through the National Strength and Conditioning Association and specializes in working with the athletic population. Her expertise is in load and recovery management in collegiate.

Brian Rider, Ph.D., Hope College, Holland MI

Dr. Brian Rider is an associate professor of Kinesiology at Hope College in Holland, Michigan. He obtained his BA in Exercise Science from Adrian College (Adrian, MI) and his MS in Exercise Physiology from Oakland University (Rochester, MI). He earned his PhD in Kinesiology from the University of Tennessee (Knoxville, TN) and he is a certified strength and conditioning specialist (CSCS) through the National Strength and Conditioning Association (NSCA.) His research interests focus on examining commercially available activity tracking devices and ergogenic aids for improved exercise performance.

 **Tamara Hew-Butler, Ph.D. FACSM, Wayne State University, Detroit MI**

Dr Tamara Hew-Butler is a podiatric physician and associate professor of Exercise and Sports Science at Wayne State University in Detroit, Michigan. She obtained her BS in Kinesiology at the University of California at Los Angeles, CA; Doctor of Podiatric Medicine (DPM) at Temple University in Philadelphia, PA; and Philosophy Doctor (PhD) at the University of Cape Town, South Africa. Dr Hew-Butler is a Fellow of the American College of Sports Medicine (FACSM) and specializes in both sports medicine and exercise physiology. Her expertise is in exercise-associated hyponatremia and the endocrine regulation of water and sodium balance. She has published over 80 scientific articles and her work has been highlighted on radio shows, podcasts, newspapers, a comic strip and reality television show.

Abstract:
Scientific evidence suggests that inappropriately high or cumulative training loads increase the likelihood for injury. Accordingly, wearable devices and sensor technologies - which quantify internal and external load - have emerged to assist coaches, clinicians, and sports scientists in creating more individualized load management strategies. The downsides of load measurement devices include the immense amount of data collected, lack of scientific validity for most devices, conflicting views on the practical application of these data, and ongoing expense utilizing these devices. This session seeks to offer clarify regarding the definition, measurement, and management of internal and external "load", in the context of team sports. An overview of commonly used wearable devices, which measure both internal and external load, will be discussed. The pearls and pitfalls of wearable devices will also be examined, along with practical, evidenced-based, tips on the interpretation and practical application of load data. Lastly, serial measurement of body composition (and other outcomes) will be explored as potential secondary strategies assessing the clinical efficacy of load monitoring and management. The three speakers will share their scientific experience, with measuring load in collegiate and professional athletes, with the overarching goal of participant engagement regarding the pros, cons, and personal experience measuring load with a variety of measurement devices.

Learning Objectives:
1.Attendees will be able to identify key differences between internal and external load and the associated techniques used to measure each (Smith-Hale).
2. Attendees will be able to identify the pros, cons and practical applications of wearable devices that are commonly used to measure internal and external load (Rider).
3. Attendees will be able to identify key body composition metrics which may inform practitioners on the effectiveness of load management strategies (Hew-Butler).

Symposium #22: Vision Room, 9:00-9:50am

Exercise Testing, Cardiac Rehabilitation, And Exercise Prescription In Pediatric And Adult Congenital Heart Disease Patients -A Career Spotlight

Session Moderator: Kevin Ballard FACSM, Miami University

Presenters and Institutional Affiliations:

Sandra K. Knecht, MS, RCEP, Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio

Ms. Sandy Knecht is a Master's prepared Clinical Exercise Physiologist with over 20 years' experience in cardiopulmonary exercise testing in pediatric and adult congenital patients. She is currently the Cardiopulmonary Exercise Lab Supervisor at Cincinnati Children's Hospital. Sandy holds the American College of Sports Medicine ACSM -CEP certification and the RCEP distinction. Sandy is active in several professional organizations and is currently serving on the Midwest ACSM (MWACSM) board of directors as the co-chair of the clinical committee and the Clinical Exercise Physiology Association (CEPA) registry committee. Additionally, she is currently a committee member of the ACSM Strategic Health Initiative – Youth Sport & Health group. Previously, she has held positions as the Member-At-Large with both MWACSM and CEPA. Sandy has ongoing involvement in research projects and publications and our labs educational and internship programs.

Abstract:
I would like to showcase a day in the life of an exercise physiologist working in a cardiopulmonary exercise lab treating pediatric and adult congenital heart patients via cardiopulmonary exercise testing (CPET), cardiac rehabilitation, and exercise prescription. Cardiac testing surveillance is vital to the ongoing health of these patients. CPET is recommended yearly for many patients with congenital heart defects. Cardiac Rehabilitation and Exercise Prescription provides medically supervised exercise, support, counseling and education which will help these patients improve their cardiopulmonary function and quality of life. Discussion will include: 1. Highlight a cardiopulmonary exercise lab which provides exercise testing, cardiac rehabilitation, and exercise prescription to patients 2. General review of program development and expansion of cardiac services 3. Discuss traditional inpatient and outpatient cardiac rehabilitation geared toward pediatric patients and adult congenital heart disease and new emerging cardiac rehabilitation options -telehealth and remote monitoring 4. Review new options for exercise prescription -apps, fitness equipment, monitoring equipment 5. Discuss clinical skills needed by Exercise Physiologist for patient testing, assessment, and prescription

Learning Objectives:
1. Describe the functions of a cardiopulmonary exercise physiology lab including exercise testing, cardiac rehabilitation, and exercise prescriptions in pediatrics and adult congenital heart disease patients
2. Discuss innovative ways to connect with patients -telehealth, remote
3. Discuss knowledge, skills, abilities (KSAs) needed for this career path

Schedule – Saturday Morning: Poster Session

Poster Session #6: Regency Ballroom E and F, 8:00-9:15am

Board 1

SENSORIMOTOR BOLD RESPONSE DECREASES OVER THE COURSE OF REHABILITATION FOLLOWING ACLR : A CASE STUDY

Ayush Mehra, Adam Culiver, Laura Schmitt, James Oñate, FNATA, The Ohio State University, Columbus OH

The utilization of functional magnetic resonance imaging (fMRI) to measure central nervous system (CNS) function suggests CNS changes occur with respect to sensorimotor function early, and years after anterior cruciate ligament reconstruction (ACLR). However, no longitudinal investigations examine what occurs to CNS function throughout ACLR rehabilitation. The purpose of this case study was to test the hypothesis that a decrease in activity over time would occur in brain regions associated with sensorimotor function during involved knee movement throughout rehabilitation following ACLR. A 17-year-old male football/baseball athlete (194.8 cm, 111.2 kg) underwent right ACLR (BTB graft). The participant completed 3 fMRI scans 2.2 months (m) (T1), 5.3m (T2), and 7.9m (T3) postoperatively. During scanning, the participant performed repeated knee flexion-extension for 30 seconds (s) followed by 30s of rest. A priori regions of interest (ROI) were selected from bilateral primary motor cortex (M1), primary (S1) and secondary (S2) somatosensory area, precuneus, and lingual gyrus. Data were preprocessed in FSL using methods as previously described. Move versus rest contrasts were performed at each time point and BOLD response in each ROI was analyzed with the following contrasts: T1-T2, T1-T3, T2-T3. There was significantly greater activation in bilateral M1 (T1>T2, T1>T3) but no differences from T2-T3, and significantly greater activation in contralateral S2 (T1>T2). No significant differences across time points were found in S1, precuneus, or lingual gyrus. Individuals post-ACLR have a greater active motor threshold1, an inhibitory consequence of injury requiring more activation to create movement. Greater bilateral M1 activation at earlier time points indicates a relative decrease in activation over time, suggesting a reduced inhibitory response in M1 throughout the course of rehabilitation. Individuals post-ACLR have increased S2 activity due to functional reorganization of sensory processing. A reduction in contralateral S2 activation from T1 to T2 indicates a relative decrease over time, which suggests that sensory reorganization may be occurring within 5m following ACLR. Future studies should develop interventions which can positively impact CNS reorganization following ACLR.

Board 2

THE RELATIONSHIP BETWEEN Y-BALANCE TEST PERFORMANCE AND HIP EXTENSOR STRENGTH

Elizabeth Richards, Kori Stump, Ethan Stump, Jessica Keller, Indiana Wesleyan University, Marion IN

Risk of injury is an important factor to assess for all individuals, regardless of athletic status. Lower limb injuries occur in both athletic and general populations. Therefore, studying the general population's risk for injury fills the current literature gap, benefitting clinicians and exercise participants. Hip extensor strength and the Y-Balance Test (YBT) separately have been researched as a predictor of lower extremity injury (Wilson et al. 2018). **PURPOSE:** This study explored a correlation between hip extensor strength values to anterior reach scores on the YBT in a general population. **METHODS:** Thirty-six students (9 males and 27 females) at Indiana Wesleyan University participated in this epidemiological surveillance. The hip extensor strength test protocol was borrowed from Wilson et al. (2018). The dynamic reachability procedure was based on the testing standards provided by Fusco et al. (2020). In one session, the participants performed the hip extensor strength and YBT. A Pearson's correlation was used to assess a relationship between YBT scores and isometric hip strength values in each leg. **RESULTS**: There was a weak correlation between right leg YBT scores and isometric strength values, $r_{34} = 0.12, p = 0.302$. However, a relationship in the left leg YBT score was moderately correlated with isometric strength value, $r_{34} = 0.35, p = 0.039$. **CONCLUSION:** The weak correlation for the right leg and the moderate correlation for the left leg suggests a need for further research to understand how this relationship may predict lower extremity injury. Due to the difference in correlation values, leg dominance should be assessed in future research. The Indiana Wesleyan University's Lilly Student Scholarship Award provided funding for the purchase of the Y-Balance Test Kit and incentives for study participants.

Board 3

UNDERGRADUATE PEDIATRIC WEIGHT MANAGEMENT IN RURAL INDIANA: A PILOT STUDY

Ian Hunt, Seth Culham, Alysia Anderson, Brandon Dykstra, Matt Renfrow, Taylor University, Upland IN

Pediatric weight management programs (PWMPs) exist to treat the epidemic of childhood obesity. Though effective, PWMPs are often limited in availability to poverty-stricken and under-resourced areas (e.g., urban

locations). Therefore, the purpose of this study was to pilot and implement a PWMP in rural Indiana. Live Well is a clinical, family based PWMP implemented by undergraduate students. The quasi-experimental study included a 12-week intervention with convenience sampling (N=19; 12 boys, 7 girls, age=12.1±3.5 y). Student coaches guided both patients and their caregivers through a series of four modules (nutrition, sleep, sedentary behavior, and physical activity) using motivational interviewing to improve existing lifestyle habits. Assessments were taken pre and post intervention and included height, mass, BMI, BMI percentile, 5210 Health Habits Survey, Sleep Habits Survey, PedsQL inventory, and Pre-PAQ, PAQC, or PAQA questionnaire (dependent on age). Mid-way through the intervention, height and mass were again measured and BMI and BMI percentile were calculated. Daily screen time decreased ($p = 0.002$) and a decrease in fast food consumption trended towards significance ($p = 0.069$). Weight increased from Pre-to-Mid ($p = 0.014$) and from Pre-to-Post ($p = 0.003$). Weight did not increase from Mid-to-Post ($p = 1.000$). Likewise, BMI did not increase ($p = 0.269$). These preliminary data suggest that undergraduate health coaching may be a viable delivery mode for PWMPs.

Board 4

NEUROMUSCULAR RESPONSES OF RUNNING TO EXHAUSTION AT THE VELOCITY ASSOCIATED WITH MAXIMAL OXYGEN UPTAKE

Nazia A. Saiyed, Christopher M. Hill, Clayton L. Camic, Northern Illinois University, DeKalb IL

The concept "vV ̇O2max" is defined as the minimum running velocity that elicits maximal oxygen uptake (V ̇O2max). **PURPOSE**: To examine the neuromuscular responses of the thigh and leg during a run to exhaustion at vV ̇O2max in elite runners. **METHODS**: Fifteen subjects (males: n = 10, females, n = 5; mean age ± SD = 21.7 ± 1.7 years; body mass = 68.8 ± 9.9 kg; running volume = 65.0 ± 41.8 km·wk-1) volunteered to visit the laboratory on two occasions. The first laboratory visit involved an incremental treadmill test to exhaustion with the measurement of gas exchange using a calibrated metabolic cart that began at 9.0 km·h-1 (females) or 10.0 km·h-1 (males) and increased 1.0 km·h-1 every two minutes until volitional fatigue for determination of their V ̇O2max and vV ̇O2max. For the second laboratory visit, wireless electromyographic (EMG) electrodes were placed on the right thigh and leg over the vastus lateralis, semitendinosus, and medial gastrocnemius muscles. Following a warm-up, each subject ran on the treadmill at a constant velocity of their vV ̇O2max to volitional exhaustion. A two-way analysis of variance (ANOVA) with repeated measures was used to determine significant ($p < 0.05$) mean differences in normalized EMG amplitude (%) for the three muscles across normalized time to exhaustion (%TTE). Follow-up analyses included one-way ANOVAs with repeated measures and paired-samples t-tests. **RESULTS**: The mean values for V ̇O2max, vV ̇O2max, and TTE at vV ̇O2max were 63.2 ± 9.3 mL·kg-1min-1, 16.0 ± 2.0 km·h-1, and 5.38 ± 1.03 minutes, respectively. For normalized EMG amplitude, there was no significant muscle x TTE interaction ($F(8,112) = 1.605$; $p = 0.131$; partial $\eta 2 = 0.103$) or main effect for muscle ($F(2,28) = 0.298$; $p = 0.745$; partial $\eta 2 = 0.021$), but there was a significant main effect for time ($F(4,56) = 41.223$; $p < 0.001$; partial $\eta 2 = 0.747$). Follow-ups indicated that estimated marginal means (collapsed across muscle) for normalized EMG amplitude decreased with each subsequent time point during the run to exhaustion (20%TTE = 89.2 ± 5.4% > 40%TTE = 82.4 ± 4.3% > 60%TTE = 78.8 ± 6.3% > 80%TTE = 77.1 ± 6.7% > 100%TTE = 73.4 ± 6.4%). **CONCLUSIONS**: These findings indicated that fatigue-induced decreases in muscle activation (as reflected by EMG amplitude) remain consistent across muscles of the thigh and leg while maintaining vV ̇O2max in college-aged runners.

Board 5

THE IMPACT OF MOBILITY AND OTHER DISABILITIES ON ANNUAL DENTAL EXAMINATIONS

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There are four main classifications of disability: cognitive, hearing, vision, and mobility. Mobility disability is defined by the Disability and Health Data System (DHDS) as "serious difficulty walking or climbing stairs." This study aims to compare the impact all four disabilities have on annual dental visits. Very little research has been done to compare the oral health status between the different disability categories. Regional variations were further investigated. Data was collected from the Centers for Disease Control and Prevention and the DHDS, 2020. Regional data was collected, as defined by the U.S Department of Health & Human Services (HHS.) The regions with the highest and the lowest population percentage visiting the dentist were identified. Statistical analysis was performed to quantify the association between annual dental visits for each disability category, compared to those

with no disability. HHS Region 1 includes Connecticut, Rhode Island, Massachusetts, Maine, New Hampshire, and Vermont. This region has the highest % population of annual dental visits for the general population. HHS Region 4 includes Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Alabama, Mississippi, and Florida. This region has the lowest % population of annual dental visits.48.5% of those with a mobility disability did not visit the dentist annually, the highest rate among all the disability categories. In HHS 4, this % further increases to 53.6%. This is significantly higher than the 29.4% in the national . non-disabled population. All disability categories did not visit the dentist at a much higher rate: cognitive disability 47.1%, hearing disability 43.6% and vision disability 46.9%. These results indicate that those with mobility disabilities see the dentist for annual check-ups the least when compared to other disabilities. This disparity was greatest in HHS 4. In comparison to the non-disabled population, 70% more do not have annual dental check-ups.

Board 6

BACKWARD WALKING AND ACUTE CHANGES IN DYNAMIC BALANCE

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PURPOSE: Much like its counterpart forward gait, backward gait elicits a slight lean to the rear so the individual's center of gravity is behind their base of support. Dynamic balance may be defined as the participant's ability to balance with their feet in one position while the rest of their body moves around the fixed point. Backward gait could affect dynamic balance due to the individuals being introduced to an unfamiliar task that requires them to develop new strategies and techniques to prevent falling. This study aimed to determine if there was an acute effect of backward gait on dynamic balance in young healthy adults. **METHODS:** The study included 15 college-aged participants who completed a Limits of Stability (LOS) balance test with a 3-minute bout of backward walking at a self-determined pace. Participants completed one practice trial and two baseline trials of the LOS protocol, where participants would stand on a portable force plate with each foot equidistant from the center and move in all directions as far as they could for 1 minute. There were at least 5 minutes between each baseline trial of the LOS. After baseline LOS trials, participants completed a timed 10-meter backward walk test, over ground. This measured walking speed was used to set the treadmill speed for a subsequent 3-minute bout of backward walking. Immediately after the bout of backward walking, participants completed a final trial of the LOS test. T-tests were conducted to compare baseline trials to each other along with comparing second baseline trials and post-backward walk trials to each other. Average LOS scores were also assessed for significance by gender to help determine possible intergender differences. **RESULTS:** There was no significant change in participants' dynamic balance between their first and second baseline trials ($p>0.05$) along with their second baseline trial and post-backward walk trial ($p>0.05$). Assessing the dynamic balance test scores by gender shows that male's average LOS area scores increased from 467cm^2 to 485cm^2 from their second baseline trial to the post-backward walk trial ($p=0.09$), and females showed an increase in average LOS area scores increasing from 440cm^2 to 445cm^2 ($p=0.38$) over the same trials. **CONCLUSION:** Backward walking on a treadmill does not show an acute effect on dynamic balance in healthy young adults. Further data may yield more insight into acute effects on balance.

Board 7

PASSIVE CALF STRETCHING PROTECTS FLOW MEDIATED VASODILATION IN THE POPLITEAL ARTERY AFTER TREADMILL EXERCISE

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INTRODUCTION: Passive stretching has been shown to improve vascular function, but it is unknown how this may impact the large conduit arteries after exercise. The purpose of this study was to examine the effect of passive stretching on popliteal artery endothelial function after exercise. We hypothesized that intermittent passive stretching would maintain vasodilatory capacity of the popliteal artery after 30 minutes of treadmill exercise relative to the sham control. **METHODS:** 13 subjects participated in 1 lab visit and underwent pre and post exercise flow-mediated vasodilation tests to assess local vascular function. Immediately after pretesting, subjects performed intermittent passive calf stretching; 5-minute stretch, 5-minutes of relaxation, repeated 4 times. Six subjects were

part of the sham-control group, minimal stretch, while the other seven performed passive stretching to moderate discomfort. Stretching was performed by having participants place their foot in a splinting device to ensure constant tension. Following the stretching protocol, participants completed a $\dot{V}O_2$ peak test to calculate 60% peak oxygen uptake. The participants thereafter completed 30-minutes of treadmill exercise at 60% $\dot{V}O_2$ peak. Doppler ultrasound was utilized during flow mediated vasodilation (FMD) test to observe and analyze percent vasodilation of the popliteal artery. A 2-way ANOVA was performed to compare group (sham vs. stretch) by condition (pre vs. post) differences. Statistical significance was set at $p<0.05$. **RESULTS:** After stretching, there was no significant reduction in %FMD after 30-minutes of treadmill exercise in the stretch group (1.41±1.19%), whereas there was a significant reduction (4.45±1.57%; $p<0.05$) in the sham control group after exercise. After normalizing the %FMD to shear stress the sham group maintained differences ($p<0.01$), while the passive stretch group remained similar pre-to-post ($p>0.05$). Baseline diameters were not different between groups ($p>0.05$). **CONCLUSION:** Passive stretching is gaining traction as a powerful vascular modulator that may lead to better vascular function. The current results indicate that intermittent passive stretching may help protect macrovascular dilatory function after 30 minutes of moderate-intensity exercise.

Board 8

ASSESSING THE RELATIONSHIP BETWEEN JUMP PERFORMANCE AND SPRINT FORCE-VELOCITY PROFILES OF COLLEGIATE MEN'S SOCCER PLAYERS

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INTRODUCTION: Sprint performance is vital to soccer players as they spend up to 10% of a game sprinting. Strength and conditioning coaches use many methods to develop speed in athletes. To develop effective training protocols, we need to better understand sprint kinetics. **LITERATURE REVIEW:** Top sprint performance requires high levels of force over a short ground contact time. In the acceleration phase, higher horizontal ground reaction forces (GRF) result in better acceleration. Vertical GRF is a determinant of maximal velocity running. Typically, assessing speed involves measuring time for a set distance. This method lacks information on how the athlete ran that time. Two athletes may have similar times and different force-velocity profiles. Increasing these athletes' speeds would require different training plans. As assessing sprint kinetics can be time-consuming, being able to use simple jump tests as a surrogate measure would benefit S&C coaches. **RESEARCH QUESTIONS:** Does jump performance correlate with different sprint kinetic parameters in DIII college soccer players? Value: Similar research has been done on track athletes. In team sports everyone may not achieve maximum velocities and rely more on acceleration phases of sprints. This research will show if using a broad jump and a CMJ is as effective as using a more time-consuming method of sprint analysis when examining sprint kinetics. **METHODS:** Subjects will be from a DIII collegiate men's soccer team. After a warm-up, subjects begin with a countermovement jump (CMJ), followed by a broad jump, and a 30m sprint. Each test will be separated by 5 minutes. For the CMJ subjects will jump as high as possible and land back on the jump mat. For the broad jump subjects jump horizontally. Horizontal distance from the starting point will be recorded. Subjects will then complete a 30m sprint. Markers will be placed every 5 meters and an iPad will be used to video record the trials. The MySprint app will create a force-velocity profile for each subject. Sprint variables include maximal theoretical horizontal force, maximal theoretical horizontal velocity, and maximal theoretical horizontal power. **PROJECTED LIMITATIONS:** Limitations include studying individuals of the same sport and sex. This limits the application to other sports, but we intend on using other sports in the future.

Board 9

THE EFFECTS OF AN 8-WEEK MALL WALKING PROGRAM ON BALANCE AND GAIT IN STROKE PATIENTS

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INTRODUCTION: While the effects of walking as a training mode to increase physical functioning of stroke patients are understood. There has been insufficient research into the use of community-based programs. **LITERATURE REVIEW:** Previous studies have focused on clinical, virtual, or simulated community environments as a means to test physical functioning. These studies showed benefits such as increased physical

functioning, lower fall risk, and better overall mood among patients. Though beneficial the widespread application of these is limited due to time and space constraints of these environments. Malls provide an all-year-round, affordable, and accessible environment to encourage walking. **RESEARCH QUESTION:** The purpose of the present study was to determine the effects of a mall walking program on the six-minute walk test (6MWT), gait characteristics, and postural sway of patients affected by stroke. **VALUE:** The goal of the mall walking program is to improve the gait and balance of the subjects. By increasing balance and gait characteristics, stroke patients may be at a decreased risk of falls or injury and increase their physical activity level which will benefit overall health. The mall walking program is designed to be affordable and inclusive which is aimed to encourage more patients to participate in a potentially beneficial program. **METHODS:** The program length is 8 weeks. In the first six weeks, the participants walk with the researchers twice a week at a local mall. Participants will walk for 40 minutes, not including rest times. Half of each session will walk backward, during which each subject will wear a gait belt and be monitored by a researcher. In the final two weeks, the participants will go to the mall twice a week on their own. During these sessions backward walking will be omitted. Pre- and post-program measures will be collected from a 6MWT and a postural sway assessment, during which participants will wear OPAL inertial sensors. These sensors will provide information regarding numerous gait and balance characteristics during the two assessments. **PROJECT LIMITATIONS:** The current design requires a 1:1 researcher-to-participant ratio. As this will be preliminary research, we will also assess the safety of such a plan, specifically if participants could walk backward without the need for 1:1 supervision.

Board 10

SQUAT DEPTH IN RELATION TO POTENTIAL INJURY OF THE KNEES AND LUMBAR

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INTRODUCTION: Squat is one of the most widely used exercises in the strength and conditioning community. It is considered having superior biomechanical similarities to athletic movements which could help enhance performance. It is also proven to be effective for improving leg strength and physical functioning in the general population. Although squat is a very popular exercise, it is associated with a high risk of overuse injury in the low back and the knees. **LITERATURE REVIEW:** Some research suggests that avoiding deep knee flexion could help reduce stresses in the lumbar and knee joints. However, it has yet to be confirmed that deep knee flexion is accompanied with high forces in the knee and lumbar regions. It was also suggested that increased forward trunk lean during squat reduces the tolerance of compressive loads and transfers those loads from muscles to passive tissues. To date, the mechanism of the squat related injuries in the knee and back regions is still not fully understood, particularly when it comes to the effect of range of motion (ROM). **RESEARCH QUESTION:** The purpose of the study is to examine the mechanics and muscle activation patterns in the knee and lumbar region during squats with different ROMs (120º, 90º, and 60º knee angles). The main research question is how squatting with different ROMs affects the biomechanics in the knee and lumbar regions. Specifically, does preforming a deep squat place greater mechanical load on the knees and lumbar compared to a partial or parallel squat. **VALUE:** Outcomes of this study will improve our understanding on the effect of ROM during squat on knee and lumbar health, as well as enable practitioners to develop customized squat exercise programs for athletes and general population. **METHODS:** Testing will be broken down into two collection days. On the first day, participants will perform a 1RM of the barbell back squat. On the second day, participants will perform squats with three different ROMs with a resistance level set at 65% of their max 1RM. 3D motion capture with force plates will be used to determine the mechanics of the squat movements to determine mechanical load. Electromyography (EMG) will be used to assess activation patterns of muscles in the leg and lumbar region. **PROJECTED LIMITATIONS:** Limitations that will be present is technique of the squat throughout subjects, age range, and a smaller sample size.

Board 11

CHANGES IN KINETIC, KINEMATIC, AND MUSCULAR ACTIVITY WITH VARIOUS DOWNHILL GRADIENT RUNNING CONDITIONS

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Due to the ease of accessibility, running has grown to become an extremely popular form of cardiovascular exercise. Long distance running has a multitude of benefits for both health and fitness, however certain risk factors and alterations in running strategy can cause for an increase in lower extremity injuries. Most studies in previous literature have considered only level running (LR) and uphill running (UR), yet downhill (DR) running is essential to understand how running of all conditions impact human movement. As seen in the previous literature, both graded running and changes in speed have shown to cause alterations in gait parameters, range of motion, ground reaction forces, power and strength, muscular activation, as well as joint loading. Despite the vast amount of previous research investigating lower extremity kinematic, kinetic, and muscular activity, there has been a lack of research related to extreme gradient DR (those at 15% decline or greater). The primary purpose of this study is to quantify the differences in mechanics and muscle activity at four different grades and three different speeds, where the goal will be to answer how range of motion, lower extremity joint loading characteristics, and lower limb electromyography (EMG) levels across four decline gradient conditions and three speed conditions. The secondary aim of this study is to allow for the collection of maximal oxygen uptake testing (VO2 max), to find metabolic equivalence values (MET) during DR, which has not been significantly studied in literature. The proposed set of methods for this study include twenty male and female adults, aged from 18-35 to complete a series of randomized gradient and speed conditions (0, -7, -14, and -21 degree gradients at 3.0 m/s, 3.5 m/s, and 4.0 m/s speeds). Each condition will be held at a duration of three minutes with a two-minute rest between each speed change and five-minute rest between each gradient change. With this set of methods, both grade and speed will be examined to determine the biomechanical impact of downhill running. External validity is a potential limitation of this study due to the lab instrumented equipment not simulating real life terrain and surface.

Board 12

PREPARATION OF MEDICAL STUDENTS TO PRESCRIBE EXERCISE AS MEDICINE

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The American College of Sports Medicine's Exercise is Medicine initiative encourages prescribing exercise to prevent and treat medical conditions. To do this, medical providers need to be comfortable with exercise guidelines and prescription. **PURPOSE:** The purpose of this study was to survey the knowledge of exercise prescription, testing, and physiology of Biomedical Masters Students (BMS) and Osteopathic Medical Students (OMS) in their 1st to 4th (I-IV) years. **METHODS:** We performed a cross-sectional analysis surveying students about their exercise instruction and comfort level prescribing exercise. Students were also asked specifics about how they would prescribe exercise. **RESULTS:** A total of 94 student responded to the survey. No differences were observed among the groups in questions related to their exercise education, as well as comfort and knowledge of exercise prescription and testing ($p>0.05$). Collectively, 21% and 30% of students were extremely likely or somewhat likely to prescribe exercise prior to a medication, respectively. 6% of students reported most of their learning on exercise was in formal lectures. Additionally, 18.1±39.2 hours were spent outside of class in the last year learning about physical activity, including social media (21% of time) and online videos (33% of time). Students selected very comfortable describing exercise benefits and changing exercise behaviors (53% and 29%, respectively), while students selected not being comfortable understanding exercise testing, prescriptions, physiology, and time course of adaptations (20%, 35%, 15%, and 24%, respectively). **CONCLUSION:** In summary, these data suggest a greater focus on teaching medical students on exercise prescription is needed as a part of the Exercise is Medicine initiative. Most students learned about exercise via online videos and social media. There appeared to be no differences among groups suggesting the need for further emphasis formal instruction.

Board 13

DOSE-RESPONSE EFFECTS OF CREATINE SUPPLEMENTATION ON COGNITIVE FUNCTION IN HEALTHY YOUNG ADULTS.

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PURPOSE: To determine if 6 weeks of creatine (CR) supplementation influences cognitive performance, and whether any such changes were related to changes in prefrontal cortex (PFC) activation during such cognitive tasks. We further aimed to explore if moderate-(10g/day) or high-dosing (20g/day) confers different physiological or cognitive adaptations, and if a minimum-effective dose of CR supplementation exists. **METHODS**: Thirty (M=11, F=19) participants were randomized to supplement with CR (CR10: n=10, 22±4 yrs, 10g/day, or CR20: n=10, 20±1 yrs, 20g/day) or placebo (PLA: n=10, 21±1 yrs, 10g/day) for 6 weeks. Participants completed a cognitive test battery (processing speed (PS), episodic memory (EM), and attention (AT)) on two separate occasions prior to and again upon completion of 6 weeks supplementation. A functional near-infrared spectroscopy (fNIRS) device was used to measure PFC oxyhemoglobin (O_2Hb) during the cognitive evaluation. A one-way ANOVA of % change ((post-pre/pre) *100) was used to determine pre- and post- differences between groups for cognitive performance scores and PFC O_2Hb. **RESULTS:** Participants showed no significant average relative % change in cognitive performance following CR supplementation or the placebo (PS: CR10: 4%, CR20: 19%, PLA: 19%; EM: CR10: 12%, CR20: 9%, PLA: 10%; AT: CR10: 8%, CR20: 12%, PLA: 5%). Although there was a trend for decreased PFC O_2Hb following both 10 and 20g/day CR supplementation (PS: CR10: -165%, CR20: -100%; EM: CR10: -15%, CR20: -26%; AT: CR10: 8%, CR20: -46%) and an increase in O_2Hb following the placebo (PS: PLA: 72%; EM: PLA: 82%; AT: PLA: -22%), there was no significant relative % change in PFC activation from pre to post timepoints. **CONCLUSION**: The results suggest that 6 weeks CR supplementation at a moderate or high dosage does not improve cognitive performance or change PFC activation in young adults. It may be the case that CR supplementation is only effective in improving cognitive function in individuals who have initially low basal levels of brain CR (e.g., diseased, sleep deprived). Future research is warranted to further understand the optimal dosing for cognitive improvements as well as relationships between changes in brain CR, cognitive processing, and brain hemodynamics following CR supplementation.

Board 14

EFFECTS OF HIGH-INTENSITY INTERVAL TRAINING VERSUS MODERATE-INTENSITY WALKING ON COGNITION IN OBESE WOMEN

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PURPOSE: Aerobic exercise has been proposed as a strategy to mitigate cognitive and mood-related consequences of overweight and obesity. The ideal exercise intensity for overweight and obese individuals seeking to gain cognitive and mood benefits remains to be determined. This study aimed to determine whether six weeks of home-based high-intensity interval training (HIIT) vs. moderate-intensity walking improves cognition, depression, and anxiety in overweight and obese women. **METHODS:** Twelve sedentary women characterized as overweight or obese were randomized into either a six-week HIIT (HIIT, n = 6, 26.6 ± 8.9 years, 37.4 ± 4.9% body fat) group or a six-week moderate-intensity walking (Walk, n = 6, 22.5 ± 3.7 years, 40.2 ± 4.1% body fat) group. Pre- and post-intervention, participants completed: 1) Air displacement plethysmography; 2) Aerobic fitness test (VO_2max); 3) Beck depression inventory-II (BDI-II), state-trait anxiety inventory (STAI-S, STAI-T), three-factor eating questionnaire (TFEQ); and 4) Cognitive battery with functional near-infrared spectroscopy (fNIRS) of the prefrontal cortex. A two-factor repeated measures analysis of variance was used to assess variables of interest **RESULTS:** No within or between group differences were observed for body fat, VO_2max, cognitive interference, processing speed, inhibitory control, or executive function. A significant interaction was observed for episodic memory suggesting that the walk group (58.7 ± 7.4 to 73.7 ± 2.1), but not HIIT group (62.5 ± 15.5 to 63.3 ± 12.5), improved significantly. A significant improvement in BDI-II was observed in the HIIT group (12.7 ± 4.3 to 6.0 ± 4.8) and walk group (17.5 ± 10.2 to 9.8 ± 9.0). Significant improvements in anxiety were observed in the HIIT group (STAI-S: 39.7 ± 8.6 to 28.7 ± 3.1, STAI-T: 45.8 ± 7.7 to 36.8 ± 5.0) and walk group (STAI-S: 37.0 ± 11.3 to 37.0 ± 11.3, STAI-T: 49.2 ± 14.8 to 41.8 ± 10.9). **CONCLUSION:** Six-weeks of home-based HIIT did not contribute to cognitive improvements across any domain. Six-weeks of walking contributed to episodic memory improvements. Both groups saw significant improvements in depression and anxiety. Results suggest that overweight or obese women may primarily yield mood but not cognitive benefits in response to six-weeks of aerobic exercise at either a high- or moderate-intensity level.

Board 15

IRON AND SEAMS: A CASE REPORT COMPARING FIREFIGHTING TO BASEBALL PITCHING

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BACKGROUND: 53% of all firefighter injuries are musculoskeletal injuries associated with overexertion, strains, or falls. For this population, there is limited research regarding injuries associated with the elbow. Firefighters perform many strenuous tasks, and improper techniques stress the arms leading to injuries like those experienced by baseball pitchers (BP). This case study documents the treatment of a firefighter's elbow injury using treatment similar to rehabilitating an ulnar collateral ligament injury (UCL) in BP. The goal of this case study was to provide a framework for applying care of a UCL injury of BP to a different patient population. **HISTORY OF THE CASE:** A 40-year-old male firefighter presented to physical therapy (PT) for chronic bilateral elbow pain. Patient had experienced pain in the posterior elbow for six months which was aggravated during triceps-focused strength training. Any activity using the arms increased pain with reduced grip strength and increased forearm pain. **PHYSICAL EXAM:** Tests included manual muscle testing, range of motion (ROM) assessments, and palpation of the triceps tendon and anconeus. **DIFFERENTIAL DIAGNOSIS:** Patient's medial elbow pain was similar to a baseball pitcher's UCL injury and may be from rotator cuff (RC) weakness. **TEST AND RESULTS:** Shoulder, elbow, forearm, and wrist ROM and strength (manual muscle test) were normal. Tenderness with palpation of the triceps tendon and anconeus was reported as well as pain during passive left elbow flexion. A QuickDash survey, a function, and disability measurement tool, found the patient's peak pain to be 40-50. **WORKING DIAGNOSIS:** PT to strengthen and mobilize the RC was provided. **TREATMENT AND OUTCOMES:** The patient was prescribed triceps isometric exercises and radial nerve glides. A progressive resistance program focused on elbow extension was implemented. Patient-reported pain relief, however, symptoms increased after a strenuous training event. **CLINICAL AND PRACTICAL IMPLICATIONS:** The rehabilitation of medial elbow pain in BP and firefighters differ. BP rest until the pain is resolved; however, firefighters must continue to work which can lead to a higher risk of injury. Using an established treatment framework can guide injury treatment when applied to different populations.

Board 16

AN INVESTIGATION INTO THE RATE OF DIABETES IN INDIVIDUALS WITH MOBILITY DISORDERS

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Diabetes is a chronic metabolic disease characterized by elevated blood glucose levels, which can lead to major organ damage. Approximately 40% of diabetic women and 25% of diabetic men report having a mobility disability due to their diabetes. However, limited research has been conducted assessing mobility disorders as the cause of diabetes. **PURPOSE**: To compare the rate of diabetes in those with a mobility disability (MD) with those with no disability. **METHODS**: All data were collected from the CDC's publicly accessible 2020 Disability and Health Data System (DHDS), which utilizes data from the Behavioral Risk Factor Surveillance System (BRFSS). MD was defined as a positive response to the question: "Do you have serious difficulty walking or climbing stairs?" For every state, the age-adjusted percentage prevalence of diabetes in those with a MD and those with no disability was analyzed. Pearson correlations were used to assess the association between rates of diabetes and rates of MD in individuals across all 50 US states. **RESULTS:** A statistically significant moderate positive correlation was found between diabetes rates and MD rates ($r(49) = 0.56$, $p < .00001$). Although the rate of diabetes in each state saw a moderate correlation between those with a MD and those without any disability, the prevalence was far greater in those with a mobility disability, with an average value of almost 293% greater than the national prevalence rate of diabetes. **CONCLUSIONS:** Our results indicate the probability of becoming diabetic is far greater if one has a mobility disorder. Those with a mobility disorder may have a varying degree of mobility; however, most are not meeting national physical activity recommendations. Diabetics with a mobility disorder need exercise plans tailored to meet the specific needs related to the challenges of blood glucose management. Finding alternative ways to help immobile individuals is vital in combating the rise of diabetes.

Board 17

CARTILAGINOUS DEFECT REPAIRED USING AN UP-AND-COMING CARTILAGE ALLOGRAFT MATRIX TECHNIQUE

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CLINICAL RELEVANCE: Cartilage is a complex arrangement of several biomaterials. The intricate nature and design of cartilage tissue has led to post-surgical complications in many cases following cartilage repair. Newer techniques are emerging to address such pathologies as well as promote quicker recovery outcomes. A new cartilage allograft matrix technique contains a mixture of chondrocytes and chondrogenic growth factors that adapt to the size and shape of the cartilage defect. When using the gold standard microfracture surgery, a patient would have a return to play timeline of 4-7 months. With the new technique, return to play decreases to 3-6 months and there is decreased chance of post-surgical failure. **HISTORY**: The case involves a 20-year-old collegiate women's soccer athlete who presented with left knee pain following the last game of her spring season. **PHYSICAL EXAM**: The patient was evaluated by the Athletic Trainer after the game. She was unable to walk following 90 minutes of play and was helped off the game field. The patient denied any blunt trauma or mechanism of injury. Physical exam was unremarkable. **DIFFERENTIAL DIAGNOSIS:** With no mechanism of injury and an unremarkable exam, the injury was treated conservatively as a potential soft tissue injury, meniscus pathology, or chondromalacia of the patella. **TEST & RESULTS**: Due to the timing of injury and the end of the academic year, patient care transitioned to off-campus health care personnel. Conservative therapeutic interventions were initiated through chiropractic care with minimal success. **FINAL DIAGNOSIS**: After failed conservative rehabilitation, diagnostic testing revealed a 4 mm cartilage defect on the medial condyle surface of the patella. **TREATMENT & OUTCOMES**: Surgical options were pursued, and a cartilage allograft matrix technique was chosen to repair the defect. Approximately 3 months after surgery, she was cleared to full soccer-related activity and had no further issues. **CLINICAL IMPACT**: This is a unique case as this cartilage allograft matrix technique has scarce research published due to it being a newer technique. No studies regarding long-term efficacy using the human body have been published. Prospective research and studies should further evaluate the method to understand its full capabilities regarding condylar defect repairs.

Board 18

EFFECTS OF SIMULATED MATCH FATIGUE ON SUPPORT LEG MECHANICS DURING KICKING

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Anterior cruciate ligament (ACL) injury is a looming presence for female soccer players due to its prevalence and devastating nature. Despite the significant research that has been dedicated to ACL injury prevention over the last decade, thousands of players still suffer this injury yearly and rates of re-tear and contralateral tear remain high. Previous research has identified biomechanical tendencies that put athletes at higher risk for ACL injury. It has also been found that fatigue can exacerbate these risk factors. As the knowledge base for risk mechanisms has been established, research can expand into more sport-specific scenarios. Recent validation of simulated match fatigue has allowed for further lab-based analyses of soccer-specific demands. As a match progresses, muscular force production in knee stabilizers declines, while landing ground reaction forces (GRF) increase. During kicking, knee flexion is primarily responsible for absorbing GRF, resulting in substantial knee flexion/extension moments in the support leg. Existing literature exploring the effects of soccer-specific fatigue on risk factors during kicking is still limited. The purpose of this study will be to examine the effects of match simulated fatigue on support leg mechanics based on leg preference during kicking. This study will further develop the understanding of match demands on soccer-specific movement patterns, which will aid practitioners as they continue to develop best-practice evaluation tools and prevention programs. This aim will be accomplished by observing maximal effort kicking using a 3D motion capture system with integrated force plates, before and after a simulated match fatigue protocol. Kinetic and kinematic variables will be examined alongside electromyography data for ACL injury risk factors in the support leg while using the preferred and non-preferred limbs. This approach is unique as it utilizes a validated fatigue protocol that includes technical and multi-directional movements, combined with an unstable ball condition and comparisons based on leg preference. Some limitations to external validity will be present since

players will be on a performance floor rather than on a grass playing surface, but the movement patterns have been designed to mimic match demands as closely as possible in a lab setting.