



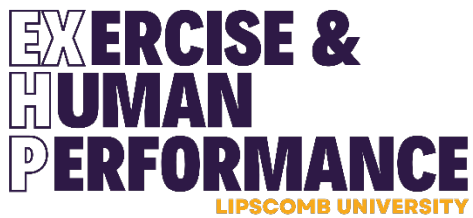
2025 Midwest Chapter of The American College of Sports Medicine Annual Meeting

Long Program

Amway Grand Plaza Hotel
Grand Rapids, Michigan
October 15-17, 2025

Thank You To Our Exhibitors

Silver Level



Thank You To Our Graduate Fair Members

Gold Level



NORTHERN ILLINOIS UNIVERSITY

**Department of Kinesiology
and Physical Education**

College of Education

The
University
of Akron

Silver Level

University of Wisconsin
Eau Claire

**Master of Science in
Exercise Physiology**



MIAMI UNIVERSITY

COLLEGE OF EDUCATION, HEALTH & SOCIETY

Department of Kinesiology, Nutrition and Health



HEALTH PROFESSIONS

**MASTER OF SCIENCE IN
EXERCISE PHYSIOLOGY**

CENTRAL MICHIGAN UNIVERSITY



RIPON
— COLLEGE —



**UNIVERSITY
of MARY**

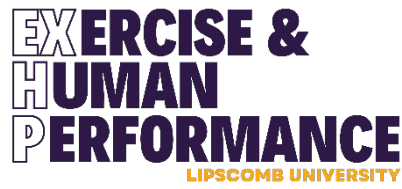
Calvin  *Kinesiology*



**SHERMAN COLLEGE
of CHIROPRACTIC**

**MASTER OF SCIENCE
EXERCISE PHYSIOLOGY**

 **John Carroll**
UNIVERSITY



Bronze Level



ST. CATHERINE
UNIVERSITY



NORTHERN MICHIGAN
UNIVERSITY

Continuing Education Credit (CEC)

ACSM CEC Certificate

Participant Name

Midwest Chapter of the American College of Sports Medicine

Provider Name

2025 Midwest Chapter of the American College of Sports Medicine
Annual Meeting (Grand Rapids, Michigan)

Course Title

Approved Provider Number: #650390

CECs: 12.0

Kevin D. Ballard

Lead Program Administrator Signature





Board of Directors



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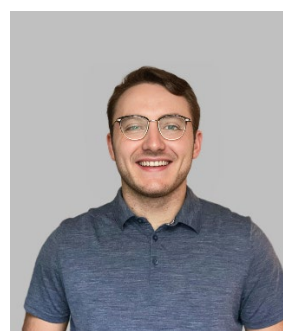
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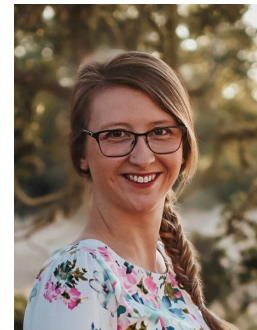
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Dr. Terence Moriarty
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Dr. Matthew Kilgas
Member-At-Large, Year 1



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Special Events

Wednesday (10/15/2025)

2:00 pm – 4:00 pm	Board of Directors Meeting (Pearl Room)
5:30 pm – 7:30 pm	Registration (Center Concourse)
6:00 pm – 7:30 pm	Health Initiatives On Campus Showcase (Center Concourse)
7:30 pm – 10:00 pm	MWACSM Social (Imperial Ballroom)

Thursday (10/16/2025)

8:00 am – 12:00 pm	Registration (Center Concourse)
8:00 am – 12:00 pm	Graduate School Fair (Center Concourse)
8:00 am – 5:00 pm	Exhibitor Fair (Crown Foyer)
12:00 pm – 2:00 pm	Keynote Presentation and Lunch (Ambassador Ballroom)
2:00 pm – 3:30 pm	Badge Pick-Up (Center Concourse)
3:20 pm – 3:35 pm	Movement is Medicine Activity Break (Grandview, Pearl, and Haldane Rooms)
4:30 pm – 5:30 pm	Leadership & Mentoring Program Speed Mentoring Event (Ambassador Ballroom)
8:00 pm – 10:30 pm	Quiz Bowl (Ambassador Ballroom)

Friday (10/17/2025)

10:00 am – 12:00 pm	Keynote Presentation, Brunch, and Business/Awards Meeting (Ambassador Ballroom)
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Thursday (10/16) Morning Sessions

Professional Presentations

8:00 am – 8:50 am

EXERCISE IS MEDICINE-ON CAMPUS: STRENGTHENING IMPACT THROUGH MENTORSHIP

Cassandra Ledman, Whitney Morelli, Isaac Wedig, Devon Mosquera, Jeremy Steeves, John Durocher, Christopher Schwartz
(Grandview Room)

Moderator: Emerson Sebastião

Session Overview: This session will introduce attendees to the structure and goals of the Midwest ACSM Exercise is Medicine-On Campus (EIM-OC) Mentorship Program, how it works, who it's for, and how to get involved as a mentee or mentor. Additionally, we will highlight the inaugural grantees and showcase the successes, lessons learned, and future directions of this new program. Panelists will include program participants, including representatives from both the mentee and mentor institutions. Panelists will share how they have developed and implemented EIM-OC initiatives at their institutions with guidance from experienced mentors. The panel will include a diverse group of mentees and mentors who represent a range of institution types and project scopes, from campus-wide referral programs to community-engaged interventions. A live Q&A and moderated discussion will allow for audience interaction, including questions about joining or mentoring in the EIM-OC program. Finally, additional resources from the national ACSM EIM-OC program on how to get started will be shared as well.

The panel will include EIM-OC Representatives from the following schools:

Mentee schools: Northern Michigan University, Oakland University, Xavier University

Mentor Schools: Purdue University, St. Ambrose University, Purdue Northwest University



Cassandra Ledman, MS, FCEPA, ACSM-CEP, NBC-HWC
Clinical Associate Professor, Department of Health and
Kinesiology, Purdue University



Whitney Morelli, PhD
Assistant Professor in the Department of Physical Medicine and Rehabilitation and core faculty member of the Cancer Center at the Medical College of Wisconsin



Isaac Wedig PhD, CSCS
Assistant Professor, School of Health and Human Performance, Northern Michigan University



Devon Mosquera, MS, AT, ATC
Coordinator, Fitness Programs & Services, Oakland University



Jeremy Steeves, PhD, ACSM-EP, FACSM
Associate Professor, Program Director, Exercise Science,
Department of Sport Science & Management, Xavier University



John Durocher, PhD, ACSM-EP,
Nils K. Nelson Professor of Integrative Human Health at Purdue
University Northwest



Christopher Schwartz, PhD
Associate Professor, Department of Health Science, St. Ambrose
University

8:00 am – 8:50 am

EXERCISE ONCOLOGY: APPLYING EVIDENCE TO CLINICAL CARE

Leah Luhring, FACSM (Pearl Room)

Moderator: Mallorece Rice



Leah is a Master's prepared Exercise Physiologist with 3 years of experience at the University of Cincinnati Health in the cardiopulmonary rehabilitation and cancer wellness program. Leah holds the American College of Sports Medicine ACSM-EP certification. She is currently a member of ACSM Cancer SIG.

Session Overview: As cancer care evolves, so too does the role of exercise in improving patient outcomes across the continuum of diagnosis, treatment, and survivorship. This session will explore the critical role of clinical exercise professionals in supporting individuals with cancer through personalized, evidence-based interventions. Objectives include how to apply current guidelines for cancer exercise prescription and adapt programs for unique clinical considerations such as bone

metastases, lymphedema, peripheral neuropathy, cardiotoxicity, and cognitive impairment. Emphasis will be placed on translating research into real-world practice, ensuring safety, and optimizing functional recovery at every stage—from rehabilitation to post-treatment rehabilitation.

Learning Objectives:

1. Describe the cancer care continuum and its implications for exercise prescription,
2. Apply evidence-based exercise guidelines and create individualized exercise program
3. Identify and manage common treatment-related considerations
4. Recognize the role of exercise professionals within the interdisciplinary oncology care team

8:00 am – 8:50 am

HYBRID TRAINING: USING SCIENCE TO BE GOOD (NOT NECESSARILY GREAT) AT MULTIPLE ACTIVITIES

Nicholas Mortensen (Haldane Room)

Moderator: Daniel Carl



Dr. Nicholas Mortensen is an Assistant Professor of Kinesiology at Michigan State University, where he oversees the Strength and Conditioning Concentration within the Applied Sport Sciences Master's program. His research focuses on strength and conditioning protocols across different disciplines and abilities, as well as suitable nutrition strategies to enhance performance and recovery. He is a Certified Strength and Conditioning Specialist (CSCS) through the National Strength and

Conditioning Association. Additionally, he has experience working in various strength and conditioning, corporate wellness, and clinical health fitness settings.

Session Overview: Hybrid (concurrent) training often blends aerobic and resistance training sessions within weekly exercise routines. However, there is ongoing debate about the most effective approach and whether practitioners should implement this style with their clients. In this presentation, you will learn how to effectively utilize hybrid training to achieve various athletic performance and health-related goals. Additionally, you will discover how to apply appropriate short- and long-term training and recovery strategies for effective periodization programming utilizing both objective and subjective metrics to inform your training decisions.

Learning Objectives:

1. Describe what hybrid training is and how it can be used across all populations/ skill levels
2. Apply the most effective ways to design and periodize hybrid athlete programs to maximize adaptations and recovery needs

9:00 am – 9:50 am

CLINCIANS AS EDUCATIONAL INNOVATORS IN UNDERGRADUATE INSTITUTIONS

Scott Fenstermacher (Grandview Room)

Moderator: Emily Post



Scott Fenstermacher completed his Bachelor of Science in Exercise Science at Taylor University and his Doctor of Physical Therapy at the University of Delaware. He is a board-certified specialist in geriatric and orthopedic physical therapy with ten years of clinical experience. He is currently an Assistant Professor in the Kinesiology department at Taylor University and a co-director of the Invitation Health and Wellness Program.

Session Overview: An increasing number of undergraduate students in Exercise Science and Kinesiology are pursuing careers in healthcare related fields such as physical therapy, occupational therapy, nutrition, or athletic training, which demand the completion of rigorous graduate level educational requirements. Innovative educational programs during their undergraduate coursework, provided by faculty members with clinical experience in these fields, can provide immersive learning opportunities that improve the educational experience for these students and develop requisite skills such as professionalism, communication, and critical thinking to facilitate their success in future graduate coursework and clinical experiences. These programs also have potential to provide distinct institutional benefits, such as student recruitment, campus community wellness, and research opportunities. The purpose of this symposium is to overview unique, innovative programs developed at Taylor University led by a licensed physical therapist who transitioned to a tenure track teaching faculty position within the Kinesiology department of a liberal arts undergraduate institution. This talk will describe the programs which have been successfully implemented as well as the strengths and challenges of this transition for the educational experience of the students, department, and institution.

Learning Objectives:

1. Following this session, attendees should be able to identify key considerations and opportunities for clinicians transitioning from clinical practice to faculty roles in higher education.
2. Following this session, attendees should be able to describe innovative undergraduate educational programs that clinicians are uniquely positioned to develop and lead within Exercise Science and Kinesiology curricula.
3. Following this session, attendees should be able to evaluate the educational and institutional impact of clinician-led programming, including benefits and challenges for students, academic departments, and the institution.

9:00 am – 9:50 am

THE IMPORTANCE OF DIAGNOSTIC AND THERAPEUTIC EXERCISE INTERVENTION FOR ATHLETIC PATIENTS FOLLOWING ACUTE CARDIOPULMONARY EVENT

Brenna Geier, Mira Shekaran (Pearl Room)

Moderator: Sandy Knecht



Brenna Geier is a dedicated Exercise Physiologist at Ann & Robert H. Lurie Children's Hospital of Chicago, bringing over five years of experience working with both adult and pediatric populations. She specializes in exercise diagnostic testing and consultations, with additional experience in cardiopulmonary rehabilitation. Brenna leads the hospital's preventive cardiology exercise program, where she plays a key role in both patient care and program development. Passionate about delivering high-quality, personalized care, she is committed to helping young patients build strong foundations for lifelong heart health.



Mira Shekaran is an Exercise Physiologist at Ann and Robert H. Lurie Children's Hospital of Chicago, specializing in pediatric care. With over three years of experience, she has worked extensively with patients who have complex congenital heart disease, heart transplants, and cardiomyopathies and a variety of pulmonary diagnoses. Mira leads program development for both inpatient and outpatient cardiac and pulmonary rehabilitation, ensuring comprehensive treatment plans for her patients. She also has experience with exercise diagnostic testing and exercise consultation services.

Session Overview: The utility of diagnostic exercise testing and therapeutic exercise intervention (DET&EI) is well known for patients with cardiopulmonary symptoms or congenital or acquired heart disease. In asymptomatic or athletic patients, DET&EI may be overlooked following a cardiac event or intervention, resulting in an increased risk for arrhythmia, deconditioning, and poor psychological outcomes. This session will utilize case studies to demonstrate the importance of DET&EI in athletic patients. We will show how DET&EI allows exercise physiologists to assess important clinical changes, improve exercise self-efficacy and communicate directly with the clinical team to guide patient progress. By using a 1-on-1 rehabilitation model, exercise programming is tailored specifically to patient goals while monitoring hemodynamics, symptoms, and telemetry. In individualized settings, physiologists are better able to ascertain the patient's perception of their condition, anxieties surrounding return to physical activity, and demonstrate patient improvements with training. This practice enables patients to safely and confidently resume their prior, physically active lifestyles. This practice allows patients to safely and confidently return to their prior, physically active lifestyles. Overall, this session will highlight the value and need for incorporating DET&EI services into the management and care of athletic patients following a cardiopulmonary event.

Learning Objectives:

Following this session participants will be able to:

1. Understand the importance of DET&EI in athletic or asymptomatic patients
2. Create personalized, monitored exercise programming with the goal of return to sport
3. Assess the value of DET&EI pertaining to patient outcomes

9:00 am – 9:50 am

**ANABOLIC RESISTANCE AND CARDIAC DYSFUNCTION
FOLLOWING EXERCISE IN GROWTH-RESTRICTED MICE**
David Ferguson, FACSM (Haldane Room)

Moderator: Lydia Caldwell



David Ferguson's research focuses on the effects of early life growth-restriction on chronic disease risk. Children who are malnourished in early life have a higher incidence of chronic disease in adulthood. The goal of his laboratory is to investigate the molecular mechanisms in a mouse model that occur due to growth-restriction and propose therapeutic countermeasures to increase functional and decrease mortality rates. Ferguson's research has been funded by private industry, the American Heart Association and the National Institutes of Health. His work has been published in *Medicine and Science in Sport and Exercise*, *Journal of Physiology* and *Nature*.

Session Overview: Early-life growth restriction (GR) affects over 160 million children globally each year and is linked to increased risk of chronic disease, frailty, and reduced physical capacity in adulthood. This session presents findings from two complementary studies using murine models to explore how

GR-induced during gestation or postnatal development-impacts physiological and molecular responses to exercise. We examine both voluntary physical activity (wheel running) and structured eccentric exercise (downhill running) to assess adaptations in skeletal and cardiac muscle. Results reveal that GR mice exhibit anabolic resistance, impaired mTOR signaling, and maladaptive cardiac remodeling, particularly in females. These findings suggest that early nutritional environments program long-term exercise responsiveness and may contribute to health disparities. This work has implications for designing targeted interventions in populations at risk for early-life undernutrition and highlights the importance of considering developmental history in exercise science and public health strategies.

Learning Objectives:

1. Describe how early-life growth restriction alters skeletal and cardiac muscle development and function across the lifespan.
2. Explain the molecular mechanisms-such as mTOR signaling and MuRF1 expression-that underlie anabolic resistance in growth-restricted mice.
3. Compare the physiological outcomes of different exercise modalities (eccentric vs. voluntary) in growth-restricted versus control mice.
4. Discuss the translational implications of growth restriction on exercise responsiveness and chronic disease risk in undernourished populations.

10:00 am – 10:50 am

LEVERAGING AI TO ENHANCE CASE-BASED LEARNING AND SIMULATED PATIENT INTERACTIONS IN HEALTH SCIENCES EDUCATION

Kyle Timmerman, FACSM, Jon Stavres (Grandview Room)

Moderator: Jeremy Steeves



Kyle Timmerman, PhD, FACSM is a Professor and Interim Chair in the Department of Kinesiology, Nutrition, and Health (KNH) at Miami University. His work has been funded by the NIH and corporate entities. His research has focused on 1) anti-inflammatory effects of exercise, 2) muscle protein metabolism, and, more recently, 3) active transport. He has published 53 journal articles. His work has been cited more than 8,000 times.



Jon Stavres, PhD is an Assistant Professor in the Department of Kinesiology, Nutrition, and Health (KNH) at Miami University. His research focuses on cardiovascular and autonomic control in humans, with a particular emphasis in cardiometabolic disease. His work has been funded by the NIH, AHA, and other foundational entities. He received his PhD from Kent State University and completed his postdoctoral training at the Penn State Heart and Vascular Institute (HVI).

Session Overview: Artificial intelligence (AI) offers transformative opportunities for interactive learning in health sciences education. This session will explore two AI-assisted pedagogical strategies designed to enhance student learning and engagement in exercise science and dietetics. First, we describe

how AI tools like ChatGPT can be used to generate structured, adaptable case studies aligned with course objectives. These AI-created cases facilitate critical thinking, clinical reasoning, and the development of personalized interventions while reducing instructor workload. Second, we will demonstrate how ChatGPT can serve as a dynamic, virtual patient. By prompting the AI to simulate individual patient responses, students engage in realistic clinical conversations that mirror real-world variability and decision-making. This approach supports the development of soft skills, including communication and empathy, while reinforcing core course concepts. In addition, AI can be leveraged to generate grading rubrics tailored to the learning objectives of each case, enhancing transparency for students and simplifying assessment for faculty. Both strategies provide scalable, high-quality learning experiences adaptable to diverse teaching formats. The session will include examples, implementation tips, and discussion of preliminary classroom outcomes.

Learning Objectives:

1. Describe two AI-assisted approaches to case-based learning in health sciences education.
2. Identify the benefits and limitations of using AI to generate case studies and simulate virtual patients.
3. Apply strategies for integrating AI tools into their curriculum to enhance student engagement and learning outcomes.
4. Discuss the role of AI in promoting scalable and personalized teaching practices across instructional modalities.

10:00 am – 10:50 am

**STRENGTH IN MOTION: THE IMPACT OF KARATE ON
INDIVIDUALS LIVING WITH PARKINSON'S DISEASE**

Terry Dibble (Pearl Room)

Moderator: Garrett Griffith



Terry currently works as a Special Instructor in the School of Health Sciences, Human Movement Sciences Department. He is responsible for the practicums and internships for the Undergraduate and Graduate students in the Exercise Science Program. Terry has a Master's Degree in Exercise Science (1991) and Psychology (2023). Terry has taught at Oakland University since 1998, in the School of Health Sciences. He is currently working on his PhD in Human Movement Sciences in the School of Health Sciences. His dissertation is investigating the impact on dual motion activity (Karate) on fall risk, stability, and walking speed.

Session Overview: There has been a significant increase in the prevalence of Parkinson's Disease in the United States as well as world-wide. Determining what works for primary, secondary, and tertiary prevention is critical. Finding non-medicinal methods to treat Parkinson's is also very critical to minimize the motor and non-motor signs and symptoms of this disease. Research has studied different forms of physical activity to enhance the quality of life for Parkinson's Patients, such as boxing and dance. A case study was completed to investigate the impact of Karate on the balance, stability, and Life Satisfaction of individuals living with Parkinson's Disease. We pretested 7 individuals, provided a 10 week, 2 times per week exercise intervention and then post tested them. There will be a 3 month and 6 month follow up starting in July. This study is unique in that the focus is on a Martial Art training program, which has limited research within this population, and using a validated tool to objectively measure balance and stability (Btracks™). This session will examine the results of a 10-week Karate training session on individuals who live with Parkinson's Disease. A discussion related to the assessment using the BTracks™ Unit to assess balance and stability will be presented. Grip Strength, stride length, and life satisfaction were also measured and will be discussed in the session. This research supports the importance of physical activity for individuals with Parkinson's Disease.

Learning Objectives:

Following the presentation, the attendees will be able to:

1. Understand the benefit of dual task activities.
2. Gain an appreciation for the motor and non-motor symptomology of Parkinson's Disease patients and the history of the disease.
3. Recognize the importance of challenging the participants beyond what they believe they can accomplish.

10:00 am – 10:50 am

MAKING WEIGHT THE RIGHT WAY: WEIGHT REDUCTION AND NUTRITION RECOMMENDATIONS FOR WRESTLERS

Andrew Jagim (Haldane Room)

Moderator: Alex Claiborne



Dr. Jagim is the Director of Sports Medicine Research at Mayo Clinic Health System in La Crosse, Wisconsin. His research focuses on how nutrition and exercise-related strategies influence the performance and health of athletes. This work has led to 130 publications in peer-reviewed journals and presentations at numerous national conferences. Dr. Jagim is also a certified strength and conditioning specialist through the National Strength and Conditioning Association and a certified sports nutritionist. He works closely with high school and collegiate wrestlers regarding performance nutrition strategies and weight management efforts.

Session Overview: This presentation will provide a summary of the weight certification process used to determine minimal wrestling weights in the United States at both the high school and collegiate level for men's and women's wrestling. Additionally, the presentation will highlight known health risks associated with excessive or frequent weight cycling in wrestling such as excessive fluid loss, low energy availability and female athlete triad. Lastly, the presentation will provide recommendations on evidence-based strategies for safe and effective weight-reduction strategies to help wrestlers "make weight" for competition.

Learning Objectives:

1. Know the steps involved in the weight certification process for men's and women's wrestling at the high school and collegiate levels.
2. Understand the health and safety concerns of excessive weight cutting and frequent weight cycling in wrestling.
3. Know the evidence-based guidelines for safe and effective weight-reduction strategies as part of a wrestler's weight management strategy.

11:00 am – 11:50 am

LEVERAGING GENERATIVE AI TO CREATE OPEN EDUCATIONAL RESOURCES

Matthew Kilgas (Grandview Room)

Moderator: Steve Elmer



Dr. Matthew Kilgas is an Associate Professor in the School of Health and Human Performance at Northern Michigan University (NMU) and the 2025–2027 NMU Teaching and Learning Scholar. His research focuses on exercise-based interventions to restore musculoskeletal function and improve performance in clinical and athletic populations. An active advocate for open education, Dr. Kilgas is leading the development of two OER textbooks and exploring the use of generative AI to support instructional design. He teaches graduate and undergraduate courses in exercise physiology, chronic disease management, and research methods.

Session Overview: This session explores the potential use of generative AI in the creation of Open Educational Resources (OER). OER are teaching materials that can be retained, reused, revised, remixed, and redistributed due to their license. During the 2021-2022 academic year, college students spent up to \$1,240 per year on books; this cost led 63 percent of students to decide not to purchase a textbook. OER may help reduce this financial barrier by providing access to free or low-cost instructional materials. Additionally, the use of OER allows instructors to customize course materials, better aligning them with learning objectives. OER are in the public domain; therefore, instructors can use generative AI to assist in writing, revising, and formatting, accelerating the development of OER. This session will highlight Northern Michigan University's successful OER initiative and showcase how generative AI was used to assist in the creation of a personal well-being textbook built with LibreTexts. Furthermore, we will detail a proposed study that utilizes surveys and focus groups to investigate students' perceptions of course material affordability. This research aims to inform future OER development, with a focus on understanding the diverse experiences of students, including those who are Pell or TIP eligible or facing housing insecurity, to ensure equitable access and improved outcomes for all.

Learning Objectives:

1. Define Open Educational Resources (OER) and explain how open licensing enables instructors to use this content.
2. Demonstrate how generative AI tools can support the creation, revision, and formatting of OER.
3. Describe how OER contributes to equitable access by reducing financial barriers to course materials.

11:00 am – 11:50 am

DYSAUTONOMIA AND SPORTS-RELATED CONCUSSION

Robert Baker, FACSM (Pearl Room)

Moderator: Nicholas Mortensen



Dr. Baker received his Medical Degree and Doctorate (PhD) from the University of Illinois, Urbana-Champaign. He has been a Certified Athletic Trainer since 1986. He completed residency in Family Medicine at MSU-Kalamazoo Center for Medical Studies. In 1999, he completed a fellowship in Sports Medicine at Michigan State University. Currently, Dr. Baker is the Director of the Primary Care Sports Medicine Fellowship at Western Michigan University School of Medicine Clinics. He is the Team Physician for Western Michigan University and Professor of Clinical Medicine at Michigan State University and Western Michigan University, Homer Stryker, MD School of Medicine.

Session Overview: Dysautonomia has garnered much attention in the last years since COVID. Postural orthostatic tachycardia syndrome (POTS) is becoming a much more common diagnosis in athletes. This session will be clinically directed with an illustrative case in an athlete. The role of dysautonomia in prolonged sports related concussion symptoms. Comparisons will be made regarding POTS and persistent concussion symptoms. Techniques for diagnosis and implications for treatment of dysautonomia will be presented. Special consideration of measurement of heart rate variability HRV will also be presented, with discussion of mobile devices.

Learning Objectives:

1. To compare post-concussion recovery among the neurological domains of symptom evaluation, cognition, balance, ocular-motor, and autonomic nervous system [using the surrogate of heart rate variability (HRV)] and with the clinical determination that an athlete has recovered.
2. To describe the neurological effects of concussion within these domains and any association among the domains affected by postural orthostatic tachycardia syndrome (POTS).
3. To describe longitudinal patterns of recovery from concussion within these domains.

Overview of Student Presentations

9:00 am – 10:00 am Poster Session #1 (Crown Foyer)

10:00 am – 11:00 am Poster Session #2 (Crown Foyer)

11:00 am – 12:00 pm Oral Session #1 (Haldane Room)

Moderator: Terence Moriarty



Thursday (10/16) Afternoon Sessions

Keynote Presentation and Lunch

12:00 pm – 2:00 pm

**EXERTIONAL HEAT STROKE: A PUBLIC HEALTH CRISIS
IN A WARMING WORLD-EXPLORING CURRENT EFFORTS
TO MITIGATE THE RISKS**

Douglas Casa, PhD, FACSM, ATC, FNAK, FNATA (Ambassador
Ballroom)



Dr. Casa is a Board of Trustees Distinguished Professor and Chief Executive Officer of the Korey Stringer Institute in the Department of Kinesiology at the University of Connecticut. Dr. Casa earned his bachelor's degree in biology from Allegheny College in 1990; his master's degree in athletic training from the University of Florida in 1993; and his doctorate in exercise physiology from the University of Connecticut in 1997.

Dr. Casa will identify and describe current best practices for exertional heat stroke prevention, recognition, treatment, and return to activity. He will compare accuracy of various temperature assessment devices in exercising individuals and acceptable cooling modalities to use in the event of exertional heat stroke. He will also discuss strategies for implementing policies to keep laborers, warfighters, and athletes safe during sport and physical activity. Dr. Casa will share a compilation of resources available in order to provide employers evidence of gaps in their current policy and procedures for dealing with possible cases of exertional heat stroke.

Professional Presentations

2:30 pm – 3:20 pm

CARDINAL FIT: ELEVATING THE CURRICULUM WITH AN INTEGRATED EXERCISE IS MEDICINE-ON CAMPUS PROGRAM

Marilyn Skarbek (Grandview Room)

Moderator: Jon Stavres



Marilyn holds a BS degree in Nutrition and a MS degree in Exercise Physiology with a specialization in Preventive and Rehabilitative Cardiovascular Health. She is certified as a Clinical Exercise Physiologist (ACSM-CEP) and as a Strength and Conditioning Specialist (NSCA-CSCS). She is an Associate Professor of Exercise Science at North Central College and the owner of MGS Health Partners, a clinical exercise physiology practice. She has worked with multiple populations including generally healthy individuals, athletes, and those with chronic disease. She has authored a textbook for exercise science students and has been quoted in exercise related publications.

Session Overview: An Exercise is Medicine - On Campus program has the potential to significantly elevate your academic program! Integrating EIM-OC programming into your curriculum can enhance rigor and add distinctiveness to your curriculum, improve student learning outcomes, drive student enrollment, and support student and faculty research. Learn how a college successfully integrated a hands-on, client serving EIM-OC program into the curriculum and how the integration has supported students, faculty, and the community. Attendees will receive information on how to utilize their new or existing EIM-OC initiative to provide exercise and wellness related services to clients and how to integrate those services with academic programming to support student learning. Tips on navigating barriers, resource management, and curriculum development will be included.

Learning Objectives:

1. Identify opportunities within a new or existing EIM-OC program to serve the campus community.
2. Identify areas in a curriculum that can successfully support integration with an EIM-OC initiative.
3. Determine how to effectively utilize EIM and institutional resources to support integration of EIM programming in the curriculum.

2:30 pm – 3:20 pm

FROM THE CLASSROOM TO CLINICAL IMPACT:
EXPLORING CEP CAREERS TODAY AND TOMORROW

Cassandra Ledman, Sandy Knecht, Malloree Rice, David Running
(Pearl Room)

Moderator: Brian Rider



Cassandra Ledman, MS, ACEM-CEP, NBC-HWC, is a Clinical Associate Professor at Purdue University, where she teaches undergraduate and graduate courses in Clinical Exercise Sciences and Health and Wellness Coaching. She led Purdue's program to NBHWC accreditation and chairs the university's Exercise is Medicine® On Campus initiative. Cassandra is actively involved in the Midwest Chapter of ACSM, serving as Membership Committee Co-Chair, EIM-OC Committee Member, and former Board member. She is also President-Elect of the Clinical Exercise Physiology Association (CEPA), where she leads advocacy efforts for accreditation and professionalization. Her

academic and research interests focus on experiential learning, professional identity formation, and preparing students to optimize patient outcomes through evidence-based CEP, HWC and lifestyle medicine approaches in preventive care and chronic disease management.



Sandy Knecht, MS, ACEM-CEP, is a master's prepared Clinical Exercise Physiologist with over 25 years' experience in cardiopulmonary exercise testing in pediatric and adult congenital patients. She is currently a Senior Clinical Exercise Physiologist and the Internship Coordinator at Cincinnati Children's Hospital. Sandy holds the American College of Sports Medicine ACSM -CEP certification with the RCEP distinction and the AACVPR's CCRP certification. 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, Clinical Exercise Physiology Association (CEPA) as a member of the credentials committee and North American Society for Pediatric Exercise Medicine (NASPEM) as the clinical position on the board of directors. She

also holds committee positions with ACSM's CCRB, EIM pediatric committee, and the SHI Youth Sports & Health committee. Previously, she has held positions as the Member-At-Large with both MWACSM and CEPA and a member of CEPA's registry committee. Sandy has ongoing involvement in research projects, publications, and our cardiopulmonary lab's educational and internship programs.



Malloree Rice, MS, ACSM - CEP, CCRP is a Master's prepared Clinical Exercise Physiologist with 9 years of experience in cardiopulmonary exercise testing and cardiopulmonary rehabilitation. She is currently a Clinical Exercise Physiologist and Internship Coordinator at the University of Cincinnati Health in the cardiopulmonary rehabilitation and cancer wellness program. Malloree holds the American College of Sports Medicine ACSM -CEP certification with the RCEP distinction and is a Certified Cardiac Rehabilitation Professional through American Association of Cardiovascular and Pulmonary Rehabilitation. She is currently a member of Clinical Exercise Physiology Association (CEPA) credentials committee and Cardiovascular Credentialing International Certified Cardiographic Technician (CCT) Exam committee. Malloree has served as the clinical member at large for the Clinical Exercise Physiology Association and President of the Ohio Association of

Cardiovascular and Pulmonary Rehab.



David Running, ACSM-CEP, is an ACSM CEP with 14 years of experience in Exercise Testing, Cardiac Rehabilitation, and Pulmonary Rehabilitation. He is currently the Manager and Internship Coordinator at University of Michigan Health- West Cardiovascular Rehabilitation. David has been a member of ACSM since 2012 when he received his CEP. David is currently a member of the Clinical Exercise Physiology Association. He is also part of the Student Advisory Committee with the MSCVPR, as well as a Member of the GVSU Exercise Science Advisory Committee. David has worked in Cardiac Rehab at UM West since the program's beginning in 2017.

Session Overview: This interactive panel discussion is designed for students and early-career professionals seeking to establish and advance their careers in clinical exercise physiology. Featuring panelists from CEPA leadership, academia, and clinical practice, the session offers a multi-perspective view on the evolving opportunities in the field. Recent efforts advocate for the clinical exercise physiologists, including the characterization of practice patterns, salary trend analyses, and collaborative initiatives to expand clinical autonomy, will serve as the foundation for discussion. Attendees will gain a comprehensive overview of CEP career pathways, highlighting key competencies, professional growth strategies, and advocacy efforts spanning various healthcare settings and patient populations.

Panelists from Cincinnati Children's Hospital, University of Michigan Health, UC Health & Purdue University will discuss:

- Career development in CEP-certifications, credentialing, and specialization opportunities.

- Salary trends and employment considerations-factors influencing professional stability and advancement.
- Navigating the healthcare landscape-how CEP professionals can integrate into various clinical settings.
- Strengthening autonomy and impact-strategies for advocating for CEP roles within interdisciplinary healthcare teams.
- Professional networking and mentorship-leveraging connections to propel career progression.

Learning Objectives:

1. Understand the foundational factors influencing success as a clinical exercise physiologist.
2. Identify pathways for both personal career advancement and broader contributions to the field.
3. Recognize the unique roles and diverse clinical populations served by clinical exercise physiologists.
4. Explore effective strategies for networking, advocacy, and securing professional opportunities.

2:30 pm – 3:20 pm

RELATIVE ENERGY DEFICIENCY IN SPORT: CLINICAL RECOGNITION, CONSEQUENCES, AND INTERVENTION STRATEGIES

Jill Moschelli, FACSM (Haldane Room)

Moderator: James Sackett



Dr. Jill S. Moschelli, MD, MBA, FACSM, FAAFP, is a board-certified family and sports medicine physician, fellowship-trained in primary care sports medicine. She serves as Program Director of the MSU Primary Care Sports Medicine Fellowship and Associate Professor at Michigan State University. A team physician for USA Women's Ice Hockey and MSU Athletics, she is active in leadership roles with ACSM and AMSSM. Dr. Moschelli is a published researcher, national presenter, and advocate for female athlete health, with extensive experience in academic medicine, clinical education, and elite athletic event coverage.

Session Overview: Relative Energy Deficiency in Sport (RED-S) is a critical yet often underrecognized clinical condition that affects athletes across all levels and disciplines. Rooted in an imbalance between dietary energy intake and energy expenditure, RED-S has wide-ranging physiological and psychological consequences, including impaired metabolic rate, menstrual function, bone health, immunity, cardiovascular health, and mental well-being. This session will explore the current evidence on the pathophysiology, clinical presentation, and consequences of RED-S, drawing from both emerging research and case-based applications. Practical intervention

strategies—including return-to-play guidance, nutritional rehabilitation, and multidisciplinary management—will also be discussed. This topic is timely and highly relevant, as RED-S continues to impact athletic performance, health outcomes, and long-term well-being, and it demands greater awareness and evidence-based clinical action among exercise professionals, clinicians, and educators alike.

Learning Objectives:

Following this session, attendees will be able to:

1. Identify key clinical signs, symptoms, and risk factors associated with Relative Energy Deficiency in Sport (RED-S).
2. Understand the short- and long-term physiological and psychological consequences of RED-S in athletes of all genders.
3. Apply evidence-based strategies for screening, diagnosis, and interdisciplinary management of RED-S.
4. Develop effective return-to-play and prevention protocols that consider nutritional, medical, and sport-specific factors.

3:20 pm – 3:35 pm

MOVEMENT IS MEDICINE ACTIVITY BREAK

EIM-OC team members will lead the audience through some light stretching, mindful breathing, and a few select qigong/yoga poses (Grandview, Pearl, and Haldane Rooms)

Professional Presentations

3:40 pm – 4:30 pm

HACKING UP A LUNG? IMPACT OF AEROBIC EXERCISE ON IMMUNE FUNCTION

Bradley Kendall, Brandon Dykstra, FACSM (Grandview Room)

Moderator: Robert Baker



Bradley Kendall is an associate professor of kinesiology at Taylor University. His teaching interests include neuromuscular physiology, strength and conditioning, and research methods. Over the past 5 years, his scholarly pursuits have included immune function in response to exercise, exercise and its impact on cognition, and implications of diabetes on postural control. He earned a BA from Bethel University, MS from Western Michigan University, and PhD from the Wayne State University.



Brandon Dykstra is an associate professor of kinesiology at Taylor University. His teaching interests include cardiorespiratory physiology, exercise assessment, and endurance training. Over the years, his scholarly pursuits have included immune function in response to exercise, pediatric exercise metabolism, and pediatric autonomic function. He earned a BA from Calvin College and an MS and PhD from the Human Performance Laboratory at Ball State University.

Session Overview: Research on exercise and immune function dates back to the late 19th century. However, by the early 2000s, research supported that the immune system appeared to be more impacted following acute exercise compared to chronic exercise. For example, following acute exercise, individuals appear to

experience some degree of altered immunity for a period of time referred to as the 'open window' hypothesis. However, over the past two decades, a number of studies have continued this work to better understand (1) if exercise modality impacts immune response to exercise, (2) how intensity and duration alter immune function in response to acute exercise, (3) if training status and fitness level impacts the changes following exercise, and (4) potential physiologic explanations for the connection between exercise and immune function. The purpose of this symposium is to (1) give a general description of standard methods of assessing the relationship between exercise and immune function, (2) discuss the history and findings of early work on exercise and immune function and (3) explain more recent work on how exercise intensity, duration, and individual characteristics impact immune response following exercise. The findings will be summarized to provide practical application, both for competitive and recreational exercisers. Along the way, the remaining knowledge gaps will be highlighted.

Learning Objectives:

1. Attendees will learn the history of exercise and immunology research.
2. Attendees will learn the current state of knowledge regarding the interaction between exercise and immune function.
3. Attendees will learn which questions remain to be answered and the trajectory of exercise and immune function research.

3:40 pm – 4:30 pm

BUILDING BETTER MUSCLE: STRENGTH, SIZE, AND THE SCIENCE BEHIND MUSCLE QUALITY

Dakota Deiwert, Youngjun Lee (Pearl Room)

Moderator: Adam Coughlin



Mr. Deiwert is a Ph.D. candidate and research assistant at Indianapolis University Indianapolis. His current research interests are the underpinnings of muscle quality, how it may be altered in individuals with obesity and/or type 2 diabetes, and how to improve muscle quality with resistance training in these individuals.



Mr. Lee is a Ph.D. candidate in Biomedical Engineering at Purdue University. His research focuses on the use of artificial intelligence and radiomics to analyze musculoskeletal health, particularly bone quality under chronic disease conditions. He has applied advanced imaging techniques and machine learning algorithms to improve non-invasive assessment of bone changes and composition. His work aims to enhance early detection and monitoring of musculoskeletal deterioration, especially in vulnerable populations such as those with chronic kidney disease or diabetes.

Session Overview: Muscle quality (MQ) combines strength and size into a single outcome of overall function and is calculated as the strength of a muscle group(s) divided by the size of the associated muscle(s) for a given movement. Factors that can increase MQ include resistance training (RT), while aging and obesity are known to decrease MQ. Most recently, there is a focus on maintaining high MQ during weight loss from drug therapies like Ozempic. Mr. Deiwert will summarize basic tenets of muscle quality and highlight its modifiers, with specific emphasis on sex, adiposity, age, and the interaction of these factors with resistance training results. Mr. Lee will focus on the assessment of muscle size and describe innovative analytic approaches to enhance measurement efficiency and accuracy. His portion will cover imaging-based methods like image segmentation and how new computational tools can provide detailed non-invasive insights into muscle composition. These strategies allow MQ evaluation across diverse populations and can complement traditional strength testing by offering detailed structural information. Overall, the goal of this session is to discuss the measurement and translatability of MQ as a key measure of muscle health in healthy and special populations.

Learning Objectives:

1. Identify the variables needed to calculate muscle quality.
2. Identify best practices for strength testing and assessment of muscle size from imaging.

3. Understand what factors modify muscle quality towards improvement (like RT) or impairment (like aging or excess adiposity).

3:40 pm – 4:30 pm

METABOLIC SYNERGY: HOW OBESITY & DIABETES FUEL CANCER - AND EXERCISE IS THE ANTIDOTE

Craig Broeder, FACSM (Haldane Room)

Moderator: **TBD**



Craig E. Broeder, Ph.D., FACSM, FNAASO, is Founder and CEO of Exercising Nutritionally, LLC, a clinical research company advancing evidence-based preventive wellness and human performance. A fellow of the American College of Sports Medicine and past president of MWACSM, he has led research on nutrition and exercise across populations from children to elite athletes. He served as lead physiologist for Red Bull's international endurance projects, featured on 60 Minutes Sports, ESPN, Outside Magazine, and the Red Bull Channel. In 2009, he established the ACSM "Kay and Craig Broeder Preventive Exercise & Nutrition is Medicine Cancer Fund."

Session Overview: Obesity and type 2 diabetes are powerful, modifiable drivers of several cancers-including breast, colorectal, endometrial, liver, and pancreatic. These metabolic disorders fuel tumor development through chronic inflammation, hyperinsulinemia, elevated IGF-1, and disrupted adipokine and sex hormone signaling. This talk explores the molecular mechanisms that connect these conditions and highlights how exercise serves as a potent preventive and adjunctive therapy. Drawing from current clinical translational research, a comparison how endurance and resistance training impact insulin sensitivity, inflammation, immune function, and tumor biology. Endurance training activates mitochondrial and AMPK pathways that lower insulin and systemic inflammation, while resistance training builds lean mass, enhances glucose disposal, and counters treatment-related sarcopenia. The presentation emphasizes combined training as the most effective approach to breaking the obesity-diabetes-cancer cycle, with evidence-based exercise prescriptions for prevention, survivorship, and improved clinical outcomes.

Learning Objectives:

1. Describe the molecular mechanisms by which obesity and type 2 diabetes promote cancer development, including roles of hyperinsulinemia, IGF-1 signaling, chronic inflammation, and adipokine dysregulation.
2. Differentiate the specific molecular effects of endurance versus resistance training on cancer-related pathways, including AMPK activation, mTOR signaling, myokine release, and modulation of systemic inflammation.
3. Analyze current research evidence on how each exercise modality influences cancer risk, treatment response, and survivorship outcomes in metabolically compromised populations.

4. Design evidence-based exercise prescriptions that integrate both endurance and resistance modalities to address the metabolic-oncologic interface and improve patient-centered cancer outcomes.

4:40 pm – 5:30 pm

RESEARCH CAREERS AND OPPORTUNITIES IN CLINICAL EXERCISE PHYSIOLOGY

Garett Griffith, FACSM, Steve Elmer (Grandview Room)

Moderator: **TBD**



Dr. Garrett Griffith is an Assistant Professor at Northwestern University, where he directly oversees clinical exercise physiology-based research studies in patient populations including Parkinson's disease, cystic fibrosis, and more. Dr. Griffith has worked with grant-sponsored and industry-funded research studies, and has overseen student and early career research staff in various research settings.



Dr. Elmer is a faculty member in the Doctor of Physical Therapy Program at St. Catherine University. He teaches courses in kinesiology, exercise physiology, and research methods. His research goals are to find better ways to restore musculoskeletal function, maintain health, and improve performance in healthy and clinical populations. Specifically, his research is focused on three key areas: 1) mechanics of skeletal muscle contraction, 2) coordination of locomotor tasks, and 3) exercise interventions to improve physical conditioning and mobility. Applications for his research range from basic aspects of muscle contraction to applied human performance in a variety of settings including injury, rehabilitation, ergonomics, and sport.

Session Overview: A degree in clinical exercise physiology confers a breadth of clinical and analytical skills which position clinical exercise physiologists as highly capable members of clinical research teams. The exercise testing, prescription, and consultation experience held by students graduating from these programs can allow them to play integral roles in the development of exercise-based clinical research protocols, implementation of those protocols,

and training of research coordinators, principal investigators, and other members of the clinical research study team. Further, there is a need for translation of these research findings into clinical practice through updates to and development of exercise-based guidelines. This session will highlight completed and ongoing exercise-based research studies, in which clinical exercise physiologists played central parts in the study team. Further, we will showcase skills and provide strategies that clinical exercise physiologists can use to advance the body of literature which provides support for exercise-based interventions. Additionally, the session will showcase how clinical exercise physiologists have the knowledge, skills, and abilities to improve research workflow and serve as an integral part of the research team.

Learning Objectives:

Following this presentation, attendees will be able to:

1. Understand how exercise-based research studies can inform guidelines in clinical populations, using examples in Parkinson's disease and cystic fibrosis.
2. Identify what knowledge, skills, and abilities they have which are directly transferrable to research settings.
3. Understand how research opportunities exist in their current environment, and how they can use research to open new professional pathways.

4:40 pm – 5:30 pm

EXPLORING HEALTH BEHAVIORS AMONG COLLEGIATE ATHLETES

Emily Van Wasshenova (Pearl Room)

Moderator: **TBD**



Dr. Emily Van Wasshenova is an assistant professor at Oakland University in Rochester, Michigan. She leads the Health Behavior and Promotion Research Lab, focusing on understanding and promoting physical activity and other health behaviors using theory-driven approaches. She is also the faculty director of the Community Health Engagement and Empowerment Research (CHEER) Lab, which provides undergraduate students with research skills training and opportunities to engage in real-world health research and service through faculty-led research projects. Dr. Van Wasshenova also serves as the Communication Chair for MWACSM.

Session Overview: Collegiate athletes' health behaviors have significant implications for their athletic performance, current well-being, and long-term health. This session will review the current literature and present original research exploring the health behaviors of NCAA Division I student-athletes (n=159), with a focus on differences between those in lean sports, where body leanness is emphasized for performance, and non-lean sports. Our findings offer insight into the patterns of health behaviors, including nutrition, supplement use, disordered eating, screen time, alcohol and drug use, aggression, and sexual behavior. We will also discuss ongoing work exploring how health behaviors might serve as a proxy for identifying athletes who may benefit

from mental health referrals, an important approach given increasing attention to athlete mental health. This presentation will help attendees understand athletes' health behaviors and strategies for supporting athlete wellness on campus and foster connections among institutions for future projects.

Learning Objectives:

1. Describe health behaviors prevalent among student-athletes and how these differ by sport team (lean and non-lean sports) and gender.
2. Discuss the relationship between specific health behaviors and mental health in student-athletes.
3. Identify strategies for supporting athlete wellness on campus.

Overview of Student Presentations

2:30 pm – 3:30 pm	Oral Session #2 (Haldane Room) <i>Moderator: Daniel Carl</i>
2:30 pm – 3:30 pm	Poster Session #3 (Crown Foyer)
3:30 pm – 4:30 pm	Oral Session #3 (Haldane Room) <i>Moderator: Alex Claiborne</i>
3:30 pm – 4:30 pm	Poster Session #4 (Crown Foyer)



Friday (10/17) Morning Sessions

Professional Presentations

8:00 am – 8:50 am

FIREFIGHTER READINESS: ANALYZING RECRUIT TRAINING & SAFETY MEASURES

Dan Carl, FACSM, Alyson Saxton (Grandview Room)

Moderator: **TBD**



Daniel L. Carl, Ph.D., 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 MWACSM including service as Secretary and Member-at-Large. He is a Fellow of the American College of Sports Medicine including National service as Chair of the Certification-related Content Advisory Committee. Dan is the current UC Past-Chair of Faculty and serves as Program Director of Health Sciences. He conducts research in Stroke Rehabilitation (NIH/NICHHD R01HD093694) HIT Stroke Trial, and in collaboration with the Cincinnati Fire Department on Firefighter Health, Wellness and Safety.



Alyson Saxton is an undergraduate student at the University of Cincinnati studying in the Health Sciences program with an emphasis in the Pre-Physician Assistant track. Alyson is a member of the Health Science Club and an Ambassador for the Pre-Professional Advising Center. Alyson's research involvement with the Cincinnati Fire Department serves as her Senior Capstone requirement.

Session Overview: The National Fire Protection Association (NFPA) reported that in 2022, an estimated 65000 firefighter injuries occurred in the line of duty with the vast majority being cardiac or musculoskeletal related. A high mortality rate (45%) has been identified due to sudden cardiac death in firefighters associated with cardiovascular (CV) disease and low levels of physical fitness. The physical nature and emotional stress combine to strain the CV system raising the risk of a sudden cardiac event. These numbers are elevated

when the subsequent 24-hours post fire suppression are included. In addition, non-fatal on-duty CV events are also elevated, being estimated as high as 17-fold greater than SCD. Both fatal and non-fatal CV events are directly related to underlying CV risk factors such as smoking, hypertension, obesity and aerobic fitness levels. Although some injuries and illnesses cannot be eliminated, fire departments are expected to have safety measures in place to decrease risk. The first such safety measure is the training program recruits complete prior to advancing to active duty. This presentation will include analysis of two consecutive recruit training classes for enhancement of their training protocols and take an initial look at measures of stress associated with their participation in the recruit training program.

Learning Objectives:

1. Understand the need for physical fitness and overall cardiovascular health in firefighters.
2. Describe the need for physical agility in maintaining effectiveness in active-duty firefighters.
3. Describe the role that recovery plays in enhancing firefighter health and wellness.

8:00 am – 8:50 am

EXERCISE DURING PREGNANCY: INFLUENCE ON MATERNAL AND CHILD HEALTH OUTCOMES

Alex Claiborne (Pearl Room)

Moderator: **TBD**



Dr. Claiborne is an Assistant Professor in the Department of Kinesiology, Nutrition, and Health at Miami University, where he received his M.S. in 2018. He trained under Dr. Todd Trappe at Ball State University, where he obtained his Ph.D. in Human Bioenergetics in 2022. He received his postdoctoral training with esteemed researcher in the field of exercise during pregnancy, Dr. Linda May, at East Carolina University. Dr. Claiborne joined the faculty at Miami in the summer of 2025, and plans to continue work focused on exercise metabolism and energy balance in pregnant and non-pregnant individuals.

Session Overview: Exercise training during pregnancy is a popular modality to accentuate the health of pregnant individuals and their offspring. Evidence has long shown that exercise is safe during pregnancy, and interest in the practice is growing, as a wealth of benefits to maternal and child health outcomes have been discovered more recently. Still, there is currently a lack of attention in 3 specific areas: 1) safe and efficacious exercise dosage, 2) delineation of health effects between mother and child, and 3) cellular responses underlying child health. The proposed session aims to attend to the differences seen in maternal and child health outcomes, with the latter explained in part by infant cellular studies on mesenchymal stem cells (MSCs) harvested from the umbilical cord at delivery. Specifically, the order of presentation for the influence of exercise on health outcomes will be: 1) maternal weight status and metabolic health, indicated by fasted blood lactate measurement, 2) neonatal morphological and physical condition at birth, and 3) infant body composition at 1-month of age, with a cellular insight into the deposition of triglycerides in adipogenic infant MSCs. The influence of exercise during

pregnancy on maternal and child health outcomes will be presented as 1) exercise versus control, and 2) an exercise dose-response, to give preliminary insight into how varying levels of exercise might contribute to health.

Learning Objectives:

1. Exercise during pregnancy manages maternal weight status and metabolic health.
2. Higher doses of exercise improve neonatal outcomes at birth.
3. Exercise during pregnancy moderates infant adiposity at 1 month of age.

9:00 am – 9:50 am

**GROWING EVIDENCE: USING CLINICAL INSIGHTS TO
ADVANCE RESEARCH**

Lucie Silver, Megan Holmes, Karin Pfeiffer, FACSM, Irene
McKenzie (Grandview Room)

Moderator: Brian Parr



Lucie Silver is the Registered Clinical Exercise Physiologist at Health Optimization Services (HOS), working with families pursuing healthier lifestyles.



Megan Holmes is Professor and Director of the Physical Activity and Wellness at Mississippi State University, where she leads research focused on physical activity, child health, and rural health disparities.



Irene McKenzie is a Pediatric Nurse Practitioner with a diverse background across multiple pediatric specialties. She currently practices in HOS at Helen Devos Children's hospital, with a clinical focus on pediatric behavioral health and obesity.



Karin Pfeiffer is a Red Cedar Distinguished Professor in Kinesiology and Director of the Institute for the Study of Youth Sports at Michigan State University. Among other research areas, she conducts interventions to increase physical activity in children and adolescents.

Session Overview: Pediatric obesity remains a pressing public health challenge in the US. The American Academy of Pediatrics (AAP) released its first comprehensive Clinical Practice Guideline in 2023 for the Evaluation and Treatment of Children and Adolescents with Obesity. This session will explore how these guidelines are being implemented in real-world clinical settings by multidisciplinary treatment teams. This session will also discuss how those teams experience this work (e.g., challenges and opportunities) and facilitate collaboration across specialties. A Clinical Exercise Physiologist at Helen DeVos Children's Hospital will be a key presenter. She will not only provide critical insights to clinic life relevant to the session but also provide student attendees exposure to a possible career path as an allied health professional. This session will round out by discussing how clinical data can be harnessed to drive collaborative research and innovation in pediatric obesity treatment. Clinical data reflect the complexity of real-life patients and provide a living record of patient journeys, making findings more generalizable and a viable avenue for making treatment more personalized. An overview of collaborative research efforts (e.g., data registries, implementation science, etc.) will be discussed. Specific attention will be given to the ongoing partnership of the presenters and preliminary findings from these efforts.

Learning Objectives:

1. Demonstrate an understanding of the 2023 AAP Clinical Practice Guideline for the Evaluation and Treatment of Children and Adolescents with Obesity.

2. Demonstrate an understanding of the exercise physiologist's role in a multi-disciplinary care team approach and day-to-day operations of care team members, specifically focusing on real-world application of the AAP guidelines from first-hand clinical perspectives, highlighting the challenges and opportunities in day-to-day pediatric obesity management.
3. Identify strategies for integrating clinical care and research to build a learning health system that continuously improves pediatric obesity treatment through data-driven insights.

9:00 am – 9:50 am

BEYOND MUSCLE: DIETARY PROTEIN AND CARDIOMETABOLIC HEALTH IN ATHLETES

Christopher Kotarsky (Pearl)

Moderator: **TBD**



Dr. Christopher Kotarsky, PhD, CSCS, is an Assistant Professor in the Department of Rehabilitation, Exercise and Nutrition Sciences at the University of Cincinnati. His research examines how dietary protein, energy balance, and exercise impact muscle health and cardiometabolic risk across the lifespan. With a focus on both athletic and aging populations, his work addresses issues like sarcopenia, metabolic syndrome, and obesity. Dr. Kotarsky has published on topics ranging from plant-based protein in collegiate athletes to time-restricted eating and lean mass preservation in physically inactive adults.

Session Overview: This session takes a closer look at how dietary protein, specifically its source, relates to cardiometabolic health and body composition in collegiate athletes. Drawing on data from Division III male and female athletes, we'll explore patterns in protein intake (animal vs. plant), energy availability, and their associations with fat-free mass and broader health markers. We'll also consider how these relationships may vary by sex, and why that matters when supporting athlete health. While centered on young adults, the discussion touches on how early nutrition patterns, particularly protein quality and energy balance, may shape long-term trajectories in muscle preservation and cardiometabolic resilience, with relevance for aging and sarcopenia risk. Rather than offering blanket recommendations, this session encourages a nuanced understanding of protein quality, quantity, and energy balance, especially in a population often left out of nutrition research. For coaches, dietitians, and professionals working with young athletes, the goal is to highlight emerging questions, challenge assumptions, and share observations that can inform evidence-aligned practice.

Learning Objectives:

1. Identify how protein source and energy availability relate to fat-free mass and cardiometabolic health in collegiate athletes.
2. Discuss the potential long-term implications of protein intake patterns on aging-related muscle loss and overall health across the lifespan.

Overview of Student Presentations

8:00 am – 8:50 am Oral Session #4 (Haldane Room)
Moderator: Adam Coughlin

8:00 am – 9:00 am Poster Session #5 (Crown Foyer)

9:00 am – 9:50 am Oral Session #5 (Haldane Room)
Moderator: Kayla Dingo

9:00 am – 10:00 am Poster Session #6 (Crown Foyer)

Keynote Presentation, Brunch, and Business/Award Meeting

10:00 am – 12:00 pm INTEGRATIVE OMICS: MOLECULAR DRIVERS OF
EXERCISE BENEFITS
Monica Hubal, PhD, FACSM (Ambassador Ballroom)



Dr. Hubal is an Associate Professor in the Department of Kinesiology at Indiana University Indianapolis. She is dual-trained in exercise physiology and genetic medicine, making her a key inter-disciplinary expert in molecular exercise science and cardiometabolic research. Dr. Hubal graduated from Richard Stockton University with a B.S. with honors in biology in 1995 and received her M.S. in kinesiology from Texas A&M University in 1999. She earned her doctorate in exercise science from the University of Massachusetts at Amherst in 2006.

The research field of exercise ‘omics has evolved rapidly due to advances in methods, increased data availability and an increased understanding that most traits are highly complex. Exercise scientists have adopted genomic, epigenomic, transcriptomic, proteomic and other approaches to understand variability in complex traits like exercise response. While technologies have advanced within individual ‘omics, analytic approaches need to highlight integration of different data scales to fully understand the complex changes that happen with exercise. Dr. Hubal will present a basic tutorial about exercise ‘omics, how it is studied, and why integration across different levels is vital to understanding exercise. She will then present data from a robust integrative ‘omics study, highlighting the impacts of exercise amount and intensity on molecular changes, including significant sex differences in how males and females respond to exercise.

Student Oral Presentations

Oral session 1

Th 11:00-12:00 pm

Haldane Room

Moderator: Terence Moriarty

EIGHT WEEKS OF ADDITIONAL LEG RESISTANCE TRAINING DOES NOT IMPROVE MUSCLE OR FUNCTION PERFORMANCE IN OLDER ADULTS ENGAGED IN COMMUNITY-BASED PHYSICAL ACTIVITY PROGRAMS

Vitor Siqueira, Mingyi Ye, Emerson Sebastião

BACKGROUND: Community-based programs play a vital role in promoting physical activity among older adults (OAs). However, while many of these programs adopt a multi-component approach, they often overlook the inclusion of resistance training (RT), a key modality for maintaining muscle strength and functional independence. Even when RT is incorporated, it is frequently not implemented in alignment with current guidelines. **PURPOSE:** This study examined the effects of an additional 8-week RT program on neuromuscular and physical function parameters in OAs engaged in community-based physical activity programs.

METHODS: This quasi-experimental study enrolled 24 OAs (74.7 ± 6.4 years; 66% female, BMI 27.3 ± 4.0 kg/m²), who were allocated into either the intervention (IG, n=12) or control (CG, n=12). The IG engaged in 8 weeks of leg RT (leg press, leg extension, leg curl, and calf raise), twice a week for 40 minutes each session, in addition to their community program. The CG kept their regular community program routine. Neuromuscular parameters were collected using an isokinetic dynamometer adopting widely used protocols to extract values of muscle strength, power, and fatigue. Physical function tests included measures of functional power (Stair Climbing Power Test, SCPT), functional mobility (Timed Up and Go, TUG), and lower-extremity function (Short Physical Performance Battery, SPPB). All tests were completed pre- and post-intervention period. Descriptive and inferential statistics were used to analyze the data with significance set at $P < 0.05$. **RESULTS:** No significant time x group interaction was observed for Peak torque (IG; Pre 100.9 ± 35.6 ; Post 101.4 ± 44.2 Nm/s vs. CG; Pre 98.4 ± 40.7 ; Post 112.1 ± 63.5 Nm/s, $P = .427$), Peak power (IG; Pre 67.9 ± 20.7 ; Post 69.5 ± 29.7 vs. CG; Pre 72.1 ± 28.3 ; Post 75.1 ± 41.8 watts, $P = .219$) and, Fatigue Index (IG; Pre 50.1 ± 9.5 ; Post 44.9 ± 18.0 % vs. CG; Pre 42.1 ± 6.8 ; Post 41.9 ± 16.0 %, $P = .466$). Similarly for the physical function tests: SCPT (IG; Pre 5.3 ± 5.5 ; Post 3.7 ± 1.5 sec vs. CG; Pre 4.1 ± 0.8 ; Post 3.8 ± 0.7 sec, $P = .499$), TUG (IG; Pre 5.6 ± 5.8 ; Post 5.7 ± 1.7 sec vs. CG; Pre 5.7 ± 5.8 ; Post 5.6 ± 0.9 sec, $P = .492$), SPPB (IG; Pre 11.2 ± 2 ; Post 11.5 ± 1.7 points vs. CG; Pre 11.6 ± 0.6 ; Post 11.7 ± 0.4 points, $P = .550$).

CONCLUSION: Our findings suggest that an additional 8-week leg RT intervention does not enhance neuromuscular or physical function performance in active OAs.

THE IMPACT OF PACED VERSUS NORMAL SQUARE-STEPPING EXERCISE ON INTENSITY AND VOLUME IN OLDER ADULTS

Mingyi Ye, Emerson Sebastião

BACKGROUND: Square-Stepping Exercise (SSE) is a type of motor-cognitive training designed to improve function in older adults (OAs). However, little is known about the intensity demands of this exercise. **PURPOSE:** This study examined the intensity and volume of an acute SSE session in OAs under two different conditions. **METHODS:** 24 OAs (75.4 ± 6.8 years, BMI: 27.3 ± 4.8 kg/m²; 67% females) completed a single session of SSE under two conditions: normal pace (Normal) and paced by a metronome at 150% of participants' normal walking speed (Paced). For each condition, participants performed 3 different step patterns for 7 minutes each: Step 1 (S1, beginner), Step 2 (S2, intermediate), and Step 3 (S3, advanced). Conditions and steps were randomized prior to session start. Intensity was assessed via heart rate (HR) monitor and rate of perceived exertion (RPE). Volume was assessed via accelerometry and expressed as step count (SC) and percentage of time in moderate-to-vigorous physical activity (%MVPA). Data were analyzed using descriptive and inferential statistics, with significance set at $P < 0.05$. **RESULTS:** There was no significant condition $\times$ step pattern interaction ($P > 0.05$). However, significant main effects of condition were observed for all outcomes, except for %MVPA. HR, RPE and SC significantly increased under the Paced condition across all steps. HR: S1 (Normal: 98.0 ± 12.1 BPM vs. Paced: 114.1 ± 14.6 BPM; $P = 0.001$), S2 (Normal: 96.2 ± 12.4 BPM vs. Paced: 112.1 ± 15.9 BPM; $P = 0.001$), and S3 (Normal: 95.5 ± 11.2 BPM vs. Paced: 111.9 ± 15.8 BPM; $P = 0.001$); RPE: S1 (Normal: 11.5 ± 1.8 vs. Paced: 13.2 ± 1.9 ; $P = 0.045$), S2 (Normal: 10.6 ± 1.9 vs. Paced: 12.7 ± 2.0 ; $P = 0.002$), and S3 (Normal: 10.3 ± 1.7 vs. Paced: 12.7 ± 1.9 ; $P < 0.001$); SC: S1 (Normal: 345.6 ± 100.4 vs. Paced: 462 ± 146.7 ; $P = 0.028$), S2 (Normal: 308.2 ± 111.1 vs. Paced: 454.3 ± 156.8 ; $P = 0.002$), and S3 (Normal: 334 ± 76.4 vs. Paced: 471.8 ± 149.5 ; $P = 0.004$). There was a significant main effect of step pattern ($P < 0.001$) for %MVPA with S1 showing higher values ($86.4 \pm 14.9\%$) compared to S2 ($49.2 \pm 39.4\%$) and S3 ($47 \pm 38\%$). **CONCLUSION:** The findings suggest that both intensity and volume significantly increase under the Paced compared to the Normal condition. Additionally, step complexity appears to influence the %MVPA. These results suggest that adjusting pace and step complexity may be effective strategies for tailoring SSE to OAs.

INVESTIGATING SOCIAL COHESION AMONG OLDER ADULTS IN A LONGSTANDING COMMUNITY-BASED FITNESS PROGRAM

Alexia P. Hammonds, Shae Madula, Judith Mensah, & Emerson Sebastião

BACKGROUND: Social cohesion and its sub-dimensions are powerful facilitators of sustained physical activity, potentially by providing emotional, motivational, and social support.

PURPOSE: This study investigated group cohesion among older adults in the longstanding group-based Lifetime Fitness Program (LFP) and examined whether cohesion varied by weekly participation frequency. **METHODS:** 16 older adults (Mean $\pm$ SD; Age: 76.3 $\pm$ 6.7 years, BMI: 25.94 $\pm$ 3.64 kg/m², 68.8% female) completed the Physical Activity Group Environment Questionnaire (PAGEQ). This 21-item survey assesses four cohesion dimensions: Individual Attractions to the Group, Task (ATG-T, 6 items), Individual Attractions to the Group, Social (ATG-S, 6 items), Group Integration, Task (GI-T, 5 items), and Group Integration, Social (GI-S, 4 items). Each item is rated from 1 (very strongly disagree) to 9 (very strongly agree). Subscale scores contribute to an overall cohesion score, with higher scores indicating greater perceived cohesion. Data were analyzed using descriptive and inferential statistics and significance set at $P < 0.05$. **RESULTS:** The overall average cohesion score was 169.6 $\pm$ 13.7 (ATG-T: 50.6 $\pm$ 2.9, ATG-S: 47.9 $\pm$ 7.3, GI-T: 39.8 $\pm$ 3.3, and GI-S: 31.4 $\pm$ 4.5). The average item score for ATG-T and ATG-S were 8.42 $\pm$ 0.47, and 7.97 $\pm$ 1.21, respectively. For the GI-T and GI-S the scores were 7.95 $\pm$ 0.66, and 7.84 $\pm$ 1.12, respectively. Group analysis examining LFP participation frequency (5 days per week (LFP-5) vs. <5 days (LFP <5)) indicated a significant difference between groups - favorable to the LFP-5 group - for the ATG-T total score (LFP-5: 52.1 $\pm$ 1.8 vs. LFP <5 : 49.0 $\pm$ 3.0; $P = 0.027$), and consequently for item average score for ATG-T (LFP-5: 8.68 $\pm$ 0.30 vs. LFP <5 : 8.16 $\pm$ 0.49; $P = 0.027$). No significant differences ($P > 0.05$) between groups were observed for the overall cohesion score or total score or average item score of the other cohesion dimensions - ATG-S, GI-T, and GI-S. **CONCLUSION:** These findings suggest a high perception of cohesion among LFP participants, with those attending five days per week reporting stronger task-related motivation. This pattern reinforces the idea that frequent participation may enhance individual commitment through perceived group value. Strong group cohesion is known to promote adherence, engagement, enjoyment, connection, and support in physical activity settings, particularly for older adults.

ASSOCIATION BETWEEN HEMOGLOBIN AND ANAEROBIC PERFORMANCE IN COLLEGIATE WRESTLERS

Madeline Tabor, Ward Dobbs & Andrew Jagim

BACKGROUND: Wrestling requires repeated high-intensity anaerobic efforts, demanding muscular strength and metabolic efficiency. Hemoglobin, the oxygen-carrying protein in red blood cells, is essential for oxygen transport and recovery. While its influence on aerobic performance is well understood, its impact on anaerobic capacity in wrestlers remains unclear.

PURPOSE: This study examined the relationship between hemoglobin concentration and anaerobic performance in collegiate wrestlers over a competitive season. **METHODS:** Thirty-nine male NCAA Division III wrestlers (Age: 19.4 ± 1.3 yr; Body Mass: 80.7 ± 14.4 kg; Height: 177.9 ± 6.0 cm; Body Fat%: $14.0 \pm 6.3\%$) participated. Anaerobic capacity was assessed via Wingate testing at multiple time points to determine the relationship between hemoglobin levels and anaerobic power and capacity. Hemoglobin concentration was measured pre-season (timepoint [T] 1) and post-pre-season camp (T2) using a point-of-care hemoglobinometer. Anaerobic performance was assessed at T1, T2, mid-season (T3), and post-season (T4) via a 30-second Wingate test on a cycle ergometer loaded at 8.2% of their respective competitive weight class. Metrics included normalized mean power, peak power, and total work. Pearson correlations were used to evaluate relationships between hemoglobin levels (Hg1, Hg2) and anaerobic capacity across the season. **RESULTS:** Hemoglobin levels remained stable (Hg1: 15.28 ± 0.86 g/dL; Hg2: 15.24 ± 0.97 g/dL), while anaerobic performance declined over time. Mean power/kg decreased from 9.74 ± 1.24 at T1 to 8.88 ± 1.39 at T4; peak power/kg declined from 15.27 ± 2.04 to 13.41 ± 2.03 ; and total work fell from 22.59 ± 3.46 kJ to 20.08 ± 4.16 kJ. At T1, hemoglobin (Hg1) showed a moderate positive correlation with peak power/kg ($r = 0.34$, $p < 0.05$) and total work ($r = 0.29$, $p = 0.08$), suggesting that higher hemoglobin may support short-term anaerobic output. Similar but non-significant trends were seen for mean power/kg. Correlations at T2-T4 were weaker ($r = 0.10-0.25$) and not statistically significant.

CONCLUSIONS: Despite stable hemoglobin levels, anaerobic performance declined throughout the season. While hemoglobin may support early-season anaerobic output, it is not a strong predictor of performance changes. Fatigue, energy availability, and recovery likely have a greater impact. Future research should incorporate additional physiological and training variables to better understand performance fluctuations in wrestlers.

Moderator: Daniel Carl

**SEX-BASED DIFFERENCES IN NEUROMUSCULAR AND PHYSICAL FUNCTION
PARAMETERS IN ACTIVE OLDER ADULTS**

Vilma Gómez, Sandra Foxgrover-O'Malley, Ian Jun, Emerson Sebastião

BACKGROUND: Aging is associated with declines in all physiological systems, including the neuromuscular system. Such decline can negatively impact physical function and increase the risk for mobility disability and loss of independence. Understanding potential sex-based differences in these parameters may provide valuable insights for optimizing future interventions for older adults. **PURPOSE:** This study examined sex-based differences in leg muscle strength, fatigue resistance, and physical functional performance among older adults. **METHODS:** This cross-sectional study analyzed baseline data from the ALERT project - a 12-week additional leg-based resistance training intervention for older adults. A total of 23 active older adults (Age: 75.2 ± 6.1 years, BMI: 27.3 kg/m^2 , 66.7% females) were assessed for muscle strength (PeakTorque), power (PeakPower) and fatigue (fatigue index, FI), functional mobility (Timed Up and Go, TUG), functional power (Stair Climbing Power Test, SCPT), walking speed (10-meter Walking Test, 10MWT) and lower-extremity function (Short Physical Performance Battery, SPPB). Data were analyzed using descriptive and inferential statistics, with significance set at $P < 0.05$. **RESULTS:** Significant differences between older males (MA) and older females (FE) were observed for PeakTorque (MA: $125.2 \pm 45.9 \text{ Nm/s}$ vs. FE: $87.3 \pm 25.9 \text{ Nm/s}$, $P = 0.019$), PeakPower (MA: $92.5 \pm 23.6 \text{ W}$ vs. FE: $58.7 \pm 16.0 \text{ W}$, $P < 0.01$), and 10MWT (MA: $2.5 \pm 0.29 \text{ s}$ vs. FE: $3.1 \pm 0.68 \text{ s}$; $P = 0.033$). No significant difference between older males and females were observed for FI (MA: $55.2 \pm 14.4 \%$ vs. FE: $48.9 \pm 8.0 \%$, $P = 0.187$), TUG (MA: $3.9 \pm 0.8 \text{ s}$ vs. FE: $5.5 \pm 5.1 \text{ s}$; $P = 0.387$), SCPT (MA: $3.8 \pm 0.8 \text{ s}$ vs. FE: $5.3 \pm 4.8 \text{ s}$; $P = 0.379$) and SPPB (MA: 11.0 ± 0.5 vs. FE: 11.2 ± 1.8 ; $P = 0.475$). **CONCLUSION:** The findings suggest that physically active older males exhibit greater leg muscle strength, power, and walking speed than females but perform similarly in measures of fatigue resistance, functional mobility, functional power, and lower-extremity function. These findings may help guide sex-specific strategies to maintain function and independence in aging populations.

THE EFFECTS OF AN ACUTE BOUT OF HIGH INTENSITY INTERVAL TRAINING ON ESPORTS PERFORMANCE

Lilin Lan, Keegan M Reynolds, Kailey OConnor, Simran Kamboj, Nicholas J Hanson

Background: Cognitive performance is a crucial determinant of eSports performance. Recent studies have shown that acute bouts of exercise can enhance cognitive performance. It stands to reason, then, that eSports performance can be improved with an acute bout of exercise. Purpose: To investigate the effect of a single 20-min High Intensity Interval Training (HIIT) session on First-Person Shooter (FPS) gaming performance. Methods: Sixteen participants (15 male, 1 female; age 22.4 ± 3.0 years) with at least three months of FPS game experience were recruited. Participants completed two experimental sessions in counterbalanced order: 20-minute HIIT on a cycle ergometer and 20-minute seated rest, separated by a minimum of 24 hours. The HIIT protocol consisted of a 3-minute low-intensity warm-up, followed by eight 45-second high intensity intervals interspersed with seven 75-second active rest intervals at self-selected low intensity, and a 3-minute low-intensity cooldown. During high-intensity intervals, participants targeted an RPE of ≥ 18 on the Borg 6-20 scale and $HR \geq 85\%$ of age-predicted maximum HR. The resting condition involved sitting in a chair for 20 minutes. Gaming performance was assessed right before and 20 minutes after each condition, using an aim trainer program on a gaming desktop computer measuring Flicking, Clicking and Tracking skills. Data were analyzed using 2 (condition: exercise vs. control) x 2 (pre vs. post) repeated measures ANOVAs. Results: Results showed significant Time $\times$ Condition interactions for Flicking metrics (Kills per Second, Switch Speed) and Tracking metrics (Accuracy, Reactivity); all $p < .05$, η^2_p ranging from .234 - .413. Follow-up simple effects analyses showed significant improvements from pre to post in the exercise condition for all the four variables mentioned above; all $p < .05$, η^2_p ranging from .368 - .648, while no significant changes were observed in the rest condition (all $p > .05$). No significant interaction was observed in Clicking metrics. Conclusion: These findings demonstrate that a bout of HIIT can acutely enhance specific FPS performance components, particularly flicking and tracking skills. The results provide practical implications for esports players seeking performance optimization strategies and establish a foundation for future research examining optimal exercise parameters for different gaming skills.

THE IMPACT OF EXERCISE INTENSITY ON SIGA CONCENTRATION AND SECRETION RATE

Ethan Brown, Jared Stayte, Joshua Haworth, Brandon Dykstra, Brad Kendall

BACKGROUND: Secretory immunoglobulin A (SIgA) is secreted into saliva and is considered the first line of defense against airway pathogens. Acute exercise has been shown to impact salivary flow rate (SFR), SIgA concentration, and SIgA secretion rate (SR), but the extent to which these are impacted by exercise intensity remains less clear. **PURPOSE:** To further explore the effect of exercise intensity on SFR, SIgA concentration, and SR. **METHODS:** Participants (N=17) visited the lab 4 times. Visit one consisted of a graded VO₂max test on a cycle ergometer. Participants were then randomly assigned to a counterbalanced order of exercise conditions, which were completed on the other visits: 45% VO₂Peak for 60 minutes; 65% VO₂Peak for 30 minutes; 85% VO₂Peak for 10 minutes. Unstimulated saliva was collected for 5 minutes immediately before exercise and 5 and 30 minutes after exercise. Saliva volume was measured to calculate SFR (μg/min) and SIgA concentration (μg/ml) was determined using an enzyme-linked immunosorbent assay (ELISA). SR (μg/min) was computed from SFR and absolute SIgA concentrations. Data were analyzed using one-way repeated measures analysis of variance and post hoc tests when appropriate. Significance was set at $p \leq 0.05$. **RESULTS:** For SIgA concentration, there was an overall significant difference for the 65% condition ($F(2,32)=3.289$, $p=.05$, $\eta^2=.171$) but post hoc analyses did not reveal any differences between time points ($p>0.05$). There were no significant differences in absolute concentration for the 45% condition ($F(2,32)=2.133$, $p=.135$, $\eta^2=.118$) or 85% condition ($F(2,32)=3.047$, $p=.061$, $\eta^2=.16$). For SFR, there were significant differences for the 65% condition ($F(2,32)=3.759$, $p=.034$, $\eta^2=.190$) and 85% condition ($F(2,32)=4.513$, $p=.019$, $\eta^2=.220$). For the 65% condition, SFR 30 minutes post-exercise (mean=0.51 μg/min) was significantly higher than SFR 5 minutes post-exercise (mean=0.40 μg/min). For the 85% condition, SFR was significantly lower 5 minutes post-exercise (mean=0.37 μg/min) compared to pre-exercise values (mean=0.48 μg/min). For SR, there were no differences noted for the 45% condition ($F(2,32)=2.675$, $p=.084$, $\eta^2=.143$), 65% ($F(2,32)=1.604$, $p=.217$, $\eta^2=.091$), or 85% condition ($F(2,32)=2.754$, $p=.079$, $\eta^2=.147$). **CONCLUSION:** Acute cycling at 65% and 85% of VO₂Peak appear to transiently lower SFR. However, slight increases, although not significant, in SIgA concentration following exercise cessation allow SR to remain unaffected.

Moderator: Alex Claiborne

RELATIONSHIP BETWEEN INFLAMMATION AND SWEAT FOLLOWING EXERCISE IN SEDENTARY INDIVIDUALS

Sneha Patel, Dr. Gabrielle Dillon, Dr. Brett Crossland

BACKGROUND: Chronic inflammation, marked by elevated C-reactive protein (CRP), is associated with increased risk of cardiovascular and metabolic diseases. While exercise is known to reduce systemic inflammation, the relation between CRP levels and sweat characteristics remains unclear, particularly in sedentary individuals. Sweat rate and composition may offer noninvasive insights into inflammatory status, but evidence is limited. **PURPOSE:** To investigate the relation between CRP and sweat rate, sodium (Na^+) and potassium (K^+) loss following acute exercise in sedentary individuals. **METHODS:** Fourteen sedentary participants (4 males, 10 females; 25.6 ± 4.6 yrs) from Midwestern State University completed a 20-minute treadmill exercise at 80% of age-predicted maximum heart rate. CRP levels were assessed from venous blood samples collected pre- and 24 hours post-exercise. Sweat rate and electrolyte loss were continuously measured using a hDrop Sweat Sensor. Pearson correlations were used to assess relations between CRP and sweat variables; significance was set at $p < 0.05$. **RESULTS:** CRP significantly increased from pre- to post-exercise (0.06 ± 0.09 mg/dL to 0.16 ± 0.29 mg/dL; $p = 0.001$). Sweat rate was 0.62 ± 0.13 L/h, Na^+ loss was 267.96 ± 66.96 mg, Na^+ loss rate was 1186.88 ± 210.23 mg/L, and K^+ loss was 34.95 ± 8.74 mg. Strong correlations were found between sweat rate and Na^+ loss ($r = 0.734$, $p = 0.004$), sweat rate and K^+ loss ($r = 0.734$, $p = 0.004$), and Na^+ and K^+ losses ($r = 1.000$, $p < 0.001$). CRP showed non-significant positive correlations with sweat rate ($r = 0.433$, $p = 0.140$), Na^+ loss ($r = 0.364$, $p = 0.222$), and K^+ loss ($r = 0.363$, $p = 0.222$); Na^+ loss rate was not correlated with CRP ($r = 0.008$, $p = 0.979$). **CONCLUSION:** Moderate treadmill exercise elicited a significant acute inflammatory response in sedentary individuals, as reflected by increased CRP. While sweat rate and electrolyte losses were strongly interrelated, no significant associations were found between sweat parameters and CRP. These findings suggest sweat composition may not be a reliable marker of acute systemic inflammation in this population. Future research should explore larger, more diverse samples and incorporate additional inflammatory biomarkers to further evaluate sweat's potential for noninvasive inflammation monitoring.

IMPACT OF ENDURANCE TRAINING ON MRNA ISOFORM EXPRESSION CHANGES IN SKELETAL MUSCLE.

Alexander Ahn, Eric Y. Zhang, Carson J. V. Lloyd, Carly J. Bauman, Lina A. Jafaar, Luke Stoneback, Brock R. DenUyl, & Andrew T. Ludlow.

BACKGROUND: Alternative RNA splicing (AS) is a key regulatory mechanism, generating mRNA variants to diversify the skeletal muscle proteome. Aerobic exercise perturbs AS in skeletal muscle as demonstrated in single-gene, and more recently transcriptome-wide, studies. However, transcriptome-wide analysis of AS after training remains unclear. **PURPOSE:** This preliminary study aimed to better understand the impact of endurance exercise training on AS and isoform expression changes in skeletal muscle by using transcriptomics data on UM-HET3 male mice (13 weeks old; 6 sedentary, 6 trained). **METHODS:** After the mice performed a 12-week treadmill running protocol, we confirmed physiological training effects by harvesting the gastrocnemius muscles and analyzing for changes in muscle phenotype (maximal running power, glycogen content, mitochondrial DNA content, muscle fiber type, and muscle cross-sectional area). RNA was isolated from the tissues to perform Oxford Nanopore long-read RNA sequencing (LRS) and assembled with StringTie3. Unbiased differentially expressed transcripts were examined with DESeq2. Muscle-specific gene expression was also examined with CIBERSORTx. **RESULTS:** Trained mice had significantly higher maximal running power (mean power: sed=161.7±23.8 mW, trn=208.8±44.8 mW; 29% difference, P=.02). Glycogen content was not significantly different between groups post-training (mean glycogen: sed=5.4±2.7 µmol/g protein, trn=4.6±1.7 µmol/g; 16% difference, P=.52). mtDNA was significantly higher with training (mean mtDNA copy: sed=1.0±0.1 A.U., trn=1.5±0.4 A.U.; 48% difference, P=.02). Cross-sectional area was significantly higher across all fiber types (mean CSA: sedI=1276.7±114.6 µm², trnI=1591.4±56.4 µm², sedIIA=1341.3±91.4 µm², trnIIA=1615.3±307.5 µm², sedIIX=2367.8±104.5 µm², trnIIX=2705.2±308.4 µm², sedIIB=1720.2±218.3 µm², trnIIB=2388.5±751.1 µm²; 14-39% difference, P<.05 for all). Out of 32,825 transcripts, unbiased differential transcript expression revealed 11 and 13 up/downregulated transcript variants post-training ($|\log_2FC| > 1.5$, P-adj<.05), including muscle-specific novel in catalog transcripts of mEif2b3 and mRsph1. **CONCLUSIONS:** This study reaffirms previous studies that exercise training significantly impacts the skeletal muscle transcriptome. Ongoing analysis includes detection of isoform-switching events and validation studies using RT-PCR.

FACTORS INFLUENCING THE SUCCESSFULNESS OF MATCHING CADENCE TO MUSIC IN LONG-DISTANCE RUNNERS

Dason Herrington, Jeffery Taylor-Haas, Jason Long & Micah Garcia

BACKGROUND: Metronomes are used to help runners increase their cadence, but can be perceived to be monotonous. Music can be adjusted to match a desired beat rate, but the factors influencing a runner's successfulness matching their footsteps to music are unknown. **PURPOSE:** To explore the influence of a runner's baseline cadence and change in song tempo with the success rate of cadence matching and to compare perceived challenges among successful and unsuccessful runners. **METHODS:** 27 uninjured recreational runners (female=16; age=37.4±12.4 y; experience=16.4±9.6 y; weekly distance=41±29 km) ran on a treadmill at a self-reported comfortable speed for 5 minutes (2.9±0.4 m/s). Baseline cadence was extracted for 15 seconds after the 5 minutes. Runners performed two 5-minute runs while attempting to match their footsteps to a metronome or tempo-adjusted song set at +5% baseline cadence. The first condition was randomized for the first participant and counterbalanced for remaining participants. Runners completed the NASA-TLX workload survey after each intervention. Between interventions, runners completed a 5-minute washout period with no auditory cueing. A successful run was determined if cadence increased by $\geq 4\%$ from baseline. A Firth's logistic regression analysis investigated if preferred cadence or change in song beat tempo (%) influenced the likelihood of success for runners to match their footsteps to the music. We compared the mean difference [MD] among NASA-TLX components between successful and unsuccessful runners. **RESULTS:** 10/27 (37%) of runners successfully matched their cadence to the music. Baseline cadence and song tempo-adjustment did not influence the likelihood of success (OR=0.988-0.998; $p=0.56-0.84$). We observed no significant differences for the NASA-TLX components (mental MD=1.7 [$p=0.87$], physical MD=-1.4 [$p=0.88$], temporal MD=1.3 [$p=0.91$], performance MD=1.3 [$p=0.90$], effort MD=5.7 [$p=0.54$], frustration MD=2.8 [$p=0.77$]). **CONCLUSION:** Matching cadence to tempo-adjusted music was relatively unsuccessful, but the likelihood of success was not influenced by baseline cadence or change in song tempo. Perceived workload was similar between successful and unsuccessful runners. The chosen song and underlying tempo and runner's typical cadence do not play a role in likelihood of success. Future investigations are warranted to better understand what factors contribute to a runner's acute and longitudinal success with matching cadence to music.

THE EFFECTIVENESS AND PERCEIVED WORKLOAD CHALLENGES OF INCREASING RUNNING CADENCE TO MATCH A METRONOME OR TEMPO-ADJUSTED MUSIC.

Phoebe Roberts, Jason Long, Jeffery Taylor-Haas & Micah Garcia

BACKGROUND: Metronomes are the current standard for adjusting cadence but may be monotonous. Alternatively, runners can synchronize their footsteps to the beat of music, which many runners listen to while running. However, it is unknown whether a metronome or music is more successful, challenging, or preferred for adjusting cadence. **PURPOSE:** To compare the success rate, perceived workload challenges, and preferences of increasing cadence while running to a metronome or tempo-adjusted music. **METHODS:** 27 uninjured runners (female=16, age=37.4±12.4 y) ran on a treadmill at their preferred pace for 5 minutes (2.9±0.4 m/s). We measured baseline cadence at the end of the 5 minutes during a 30-second window. Participants attempted to match their cadence to a tempo-adjusted song of their choice or a metronome, both set 5% higher than their baseline cadence. We randomized the first condition for the first participant and counterbalanced the conditions for the remaining participants. After a 5-minute acclimation period, we recorded a 15 second trial and participants completed the NASA-TLX to report their mental, physical, temporal, performance, effort, and frustration during each condition (0=low, 100=high). Between interventions a 5-minute washout period was performed with no auditory cues. We compared success rates (cadence increased by ≥4%), mean difference [MD] of NASA-TLX components, and preference between the metronome and music conditions. **RESULTS:** We found no significant difference between the metronome and music conditions for success rate (music n=10 [37%], metronome n=14 [52%], p=0.41) or NASA-TLX components (mental demand MD=-4.1 [p=0.48], physical demand MD=-3.1 [p=0.46], temporal demand MD=-7.6 [p=0.23], performance MD=4.0 [p=0.42], effort MD=-5.0 [p=0.33], frustration MD=5.0 [p=0.26]. 14 (52%) participants preferred the music condition, 12 (44%) participants preferred the metronome condition, and 1 (4%) participant had no preference. **CONCLUSION:** Success rate, perceived workload challenges, and preference were similar when attempting to match cadence to a metronome or tempo-adjusted song. Longitudinal research is needed to explore the long-term success rates of matching cadence to tempo-adjusted music. However, runners may choose either the metronome or tempo-adjusted music to acutely increase cadence, depending on their personal preference, since one was not more successful or challenging than the other.

Moderator: Adam Coughlin

INTRASESSION AND INTERSESSION RELIABILITY OF MARKERLESS MOTION CAPTURE DURING TREADMILL RUNNING

Megan Childs, Jason Long & Micah Garcia

BACKGROUND: Markerless motion capture systems offer an affordable, accessible, mobile alternative to marker-based systems that are reliable for measuring kinematics during walking, squatting, and jumping. However, the reliability of OpenCap, a 2-camera markerless system, has not been investigated during treadmill running. **PURPOSE:** To evaluate the reliability of OpenCap for measuring lower extremity peak joint angles during treadmill running. **METHODS:** 8 uninjured participants ($F=6$; $\text{age}=43.5\pm3.1$ y) completed two visits, within 14 days, each involving a 5-minute treadmill running session at the same self-reported comfortable pace (2.8 ± 0.2 m/s). After the 5-minute period, we recorded one 15-second trial during their first visit and two 15-second trials during their second visit. We recorded data with two posteriorly positioned cameras synchronized with OpenCap software. For each trial, we generated mean ensemble waveforms for the pelvis, hip, knee, and ankle/foot from all strides for the right leg and extracted peak joint angles during stance. We assessed intrasession reliability by comparing the two trials during visit 2 and intersession reliability by comparing the trial from visit 1 to the first trial from visit 2. We calculated intraclass correlation coefficients (ICCs), standard error of measurement (SEM), and minimal detectable change (MDC). **RESULTS:** We found excellent intrasession reliability for all peak joint angles ($\text{ICC}=0.90\text{--}1.00$; $\text{SEM}=0.3^\circ\text{--}1.0^\circ$; $\text{MDC}=0.8^\circ\text{--}2.7^\circ$). For intersession reliability, we found excellent reliability for peak knee flexion and extension, and foot pronation ($\text{ICC}=0.90\text{--}0.99$; $\text{SEM}=1.3^\circ\text{--}2.1^\circ$; $\text{MDC}=3.5^\circ\text{--}5.8^\circ$); good reliability for peak pelvis anterior and posterior tilt, hip internal rotation, extension, and external rotation, and foot supination ($\text{ICC}=0.81\text{--}0.89$; $\text{SEM}=1.3^\circ\text{--}2.6^\circ$; $\text{MDC}=3.5^\circ\text{--}7.1^\circ$); moderate reliability for pelvis contralateral drop, hip abduction, and ankle dorsiflexion and plantarflexion ($\text{ICC}=0.54\text{--}0.73$; $\text{SEM}=0.9^\circ\text{--}3.4^\circ$; $\text{MDC}=2.4^\circ\text{--}9.5^\circ$); and poor reliability for peak pelvis ipsilateral drop and hip flexion and adduction ($\text{ICC}=0.36\text{--}0.41$; $\text{SEM}=1.3^\circ\text{--}2.9^\circ$; $\text{MDC}=3.6^\circ\text{--}7.9^\circ$). **CONCLUSION:** OpenCap demonstrated excellent intrasession reliability for peak joint angles with MDC values below 3° but poor to excellent intersession reliability for peak joint angles with MDC values approaching 10° . OpenCap reliability is comparable to marker-based systems, supporting its use for assessing kinematics during treadmill running.

BI-MALLEOLAR WIDTH AND ACHILLES TENDON LENGTH ARE ASSOCIATED WITH JUMP PERFORMANCE IN ADOLESCENT ATHLETES

Shannon Fiddy¹; Adam Lepley²; Fiddy Davis³ 1. Huron High School, Ann Arbor MI, 2. University of Michigan, Ann Arbor MI, 3. Hope College, Holland MI

BACKGROUND: Countermovement Jump (CMJ) is the most commonly used test to measure neuromuscular performance in athletes, with recent smartphone technologies offering easy solutions for implementation. Anthropometric characteristics are considered one of the many factors

that influence CMJ performance. Trials exploring the relationship between lower leg anthropometric characteristics and tests of neuromuscular power are scarce, as existing

studies are weighted toward running economy in endurance athletes. **PURPOSE:** Examine the relationship between Achilles Tendon (AT) length, width, and bi-malleolar (BM) width on CMJ height, power, force, and take-off velocity in adolescent athletes. **METHODS:** Ten male and eight female adolescent high school athletes from volleyball, soccer, basketball, track and lacrosse (age: 16.2 ± 0.8 yrs, height: 175.25 ± 10.53 cm, mass: 67.5 ± 10.10 kg) volunteered. AT length was measured using a measuring tape in prone lying while participants performed a maximal isometric contraction in full plantar flexion. AT width was measured using an anthropometer at a point five centimeters proximal to the point of insertion. BM width was also measured using an anthropometer by placing it at the point corresponding to maximum convexity on the medial and lateral malleoli. Participants performed three trials of the CMJ test. Jump height, power, force, and take-off velocity were calculated using a consumer smartphone application. The average of the three trials was statistically analyzed. Pearson correlations (r) assessed the relationship between AT measurements, BM width, and neuromuscular performance. **RESULTS:** AT length is moderately correlated with jump height ($r=0.41$; $p=0.01$), power ($r=0.41$; $p=0.08$), and velocity ($r=0.58$; $p=0.01$). BM width has a strong correlation with jump height ($r=0.73$; $p<0.01$), power ($r=0.81$; $p<0.01$), force ($r=0.76$; $p<0.01$), and velocity ($r=0.73$; $p<0.01$). AT width does not correlate with jump height ($r=0.02$; $p=0.90$), power ($r=0.006$; $p=0.98$), force ($r=0.02$; $p=0.93$), and velocity ($r=-0.005$; $p=0.98$). **CONCLUSION:** Longer AT length and wider BM width are associated with greater CMJ height, power, velocity, and force. These findings suggest a potential biomechanical advantage offered by these anatomical features which supports athletic screening and talent identification efforts, particularly in sports where explosive power is essential.

THE INFLUENCE OF NEUTRAL AND STABILITY FOOTWEAR ON RUNNING BIOMECHANICS OF ADOLESCENT LONG-DISTANCE RUNNERS

Kai Ellison, Samuel Rosario, Madeline Barnes, Haley Arena, David Bazett-Jones & Micah Garcia

BACKGROUND: Many studies have investigated the influence of footwear on running biomechanics for adults, but results are inconclusive, questioning if footwear meaningfully changes peak joint angles. Adolescent runners may select different types of footwear, but it is unknown if footwear influences running biomechanics for these young runners. **PURPOSE:** To investigate the influence of footwear on running biomechanics for adolescent runners.

METHODS: 20 uninjured adolescent cross-country runners (age=14.5±2.0 y) completed a 3-dimensional overground running trial in three footwear conditions: personal, neutral, and stability. Running trials were performed at a prescribed speed based on the participants' self-reported typical running pace. Participants ran in their personal footwear first followed by the neutral and stability footwear in a counterbalanced order. After a 5-minute acclimation period on a treadmill for each footwear condition, we recorded lower extremity kinematic data and ground reaction forces (GRFs) during overground running. We performed statistical parametric mapping to compare stance phase joint angles and GRFs among the footwear conditions. **RESULTS:** Runners demonstrated 1.6° greater ankle dorsiflexion from 34-82% of stance phase in neutral footwear compared to stability footwear ($p<0.01$), 2.1° greater shoe inversion from 0-85% of stance phase in neutral footwear compared to personal footwear ($p<0.01$), 1.3° greater shoe inversion from 1-25% of stance phase in neutral footwear compared to stability footwear ($p=0.20$), 1.1° greater shoe inversion from 5-15% of stance phase in stability footwear compared to personal footwear ($p=0.04$), 0.10 N/kg and 0.02 N/kg greater vertical force from 0-7% ($p=0.02$) and 88-92% ($p=0.04$) of stance phase in stability footwear compared to neutral footwear, and 0.09 N/kg and 0.04 N/kg greater vertical force from 0-6% ($p=0.03$) and 74-99% of stance phase ($p<0.01$) in stability footwear than personal footwear. We found no significant differences in hip or knee joint motion ($p>0.05$). **CONCLUSION:** While we found significant differences in ankle/shoe motion and vertical GRFs among footwear, the magnitude of differences were small and did not exceed previously reported minimal detectable change values. Our results indicate that footwear does not meaningfully influence lower extremity kinematics or GRFs for adolescent runners.

COMPARING THE CLINICAL UTILITY OF THE SCAT6 SYMPTOM CHECKLIST AND THE CP-SCREEN TO IDENTIFY CONCUSSION IN COLLEGE-AGED ATHLETES

Lilian Klein, Teya Coyle, Lia Baudon, Allie Tracey, Reid Davis, Tracey Covassin

BACKGROUND: Self-reported symptom checklists are commonly used to support concussion diagnosis. The symptom checklist from the Sport Concussion Assessment Tool 6th (SCAT6) edition, is the current standardized symptom assessment for concussion. The Clinical Profiles Screen (CP-Screen) is a newer tool that provides more detailed symptom descriptions and categorization into clinical profiles, which the SCAT6 does not currently offer. However, there is a gap in the literature comparing these tools to determine which provides greater clinical utility. **PURPOSE:** To compare the clinical utility of the SCAT6 symptom checklist and the CP-Screen in identifying college-aged athletes with concussion from healthy controls. **METHODS:** Participants were enrolled within 5 days post-injury. At enrollment, participants completed demographic information, medical history, the SCAT6, and the CP-Screen. SCAT6 symptoms were analyzed by symptom number, symptom severity score, and symptom clusters (affective, cognitive-ocular, migraine-fatigue). The CP-Screen was analyzed by total raw score and symptom profile/modifier scores (anxiety/mood, migraine, cognitive/fatigue, vestibular, ocular, sleep, neck). Logistic regression (LR) and receiver operating characteristic (ROC) analyses assessed clinical utility using area-under-the-curve (AUC) ($P \leq 0.05$). **RESULTS:** Fifty-three participants were included (32 concussions, 21 controls; age = 20.1 ± 1.4 (20.2) years; 56.6% female). The CP-Screen total score demonstrated outstanding clinical utility (AUC = 0.96, 95% CI = 0.90-1.00, $P < 0.001$). SCAT6 symptom number (AUC = 0.87, 95% CI = 0.77-0.97, $P < 0.001$) and symptom severity (AUC = 0.87, 95% CI = 0.78-0.97, $P < 0.001$) demonstrated excellent clinical utility and significantly predicted concussion. A forward stepwise LR model including SCAT6 symptom clusters and CP-Screen profiles retained only the CP-Screen ocular ($P = 0.008$) and neck ($P = 0.047$) profiles in the final model (AUC = 0.97, 95% CI = 0.92-1.00, $P < 0.001$). No SCAT6 clusters were retained in the final model ($P > 0.05$). **CONCLUSION:** Although the SCAT6 is the standardized concussion assessment, the CP-Screen demonstrated superior clinical utility in differentiating individuals with concussion from controls. Ocular and neck symptoms were the strongest predictors of concussion, providing insight for post-concussion symptoms. These results suggest the CP-Screen may be a more effective clinical tool for identifying concussion.

Moderator: Kayla Dingo

**NO STRESS PHYSICAL ACTIVITY: HOW PASSIVE CYCLING MAY IMPROVE
PSYCHOLOGICAL WELL-BEING**

Kassidy A. Thiel & Kathryn M. Rougeau

BACKGROUND: Physical activity (PA), such as active cycling (AC; volitional), has been shown to have many health benefits, including improving physiological well-being. Passive cycling (PC; motor-driven) may be just as beneficial to psychological health as AC. **PURPOSE:** To understand how PC and AC affect heart rate (HR), Rating of Perceived Exertion (RPE), and affect (ADACL/SAI) in healthy individuals. **METHODS:** HR, RPE, and affect [Energy (Enrg), Tension (Tens), Tiredness (Tired), Calmness (Calm), and State Anxiety (SA)] were recorded in N=83 (29 male; 20±3.19 yrs; M ± SD) participants Pre0, Pst0, and Pst30 during 2 cycling bouts, PC and AC. During both conditions, participants cycled for a 2.5-minute warmed up @ 35 r·min⁻¹, 30-minutes @ 65 r·min⁻¹, followed by a 2.5-minute cool-down @ 35 r·min⁻¹. During this time, HR and RPE were recorded every 5 minutes. **RESULTS:** AC and PC elicited significant psychological changes over time concerning perceptions of Enrg, Tens, and SA. During AC, Enrg increased significantly Pre0 (M= 9.51±2.50) to Pst0 (M= 13.14±3.31; P< 0.001) and decreased again Pst30 (M= 9.38±3.30; P< 0.001). During PC, Enrg increased significantly from Pre0 (M= 9.73±3.30) to Pst0 (M= 11.43±3.38; < 0.001) and decreased below baseline Pst30 (M= 9.05±2.98; P< 0.001). During AC, Tens increased significantly Pre0 (M= 6.59±2.15) to Pst0 (M= 7.85±2.53; P< 0.001) then decreased at Pst30 (M= 6.50±2.06; P< 0.001). During PC, Tens remained stable from Pre0 (M= 6.76±2.10) to Pst0 (M= 6.68±1.88; P= 0.329) and decreased Pst30 (M= 5.92±1.37; P< 0.001). During AC, SA increased significantly Pre0 (M= 16.78±3.54) to Pst0 (M= 17.97±3.53; P= 0.019) and decreased Pst30 (M= 16.13±4.50; P< 0.001). During PC, SA remained stable from Pre0 (M= 6.76±2.10) to Pst0 (M= 6.68±1.88; P= 0.225) and decreased Pst30 (M= 15.27±3.61; P= 0.001). HR was significantly higher during the AC (M= 125.9±18.29) (compared to PC (M= 88.84±14.12; P< 0.001). Participants responded with larger RPE scores during AC (M= 12.25±2.015) compared to PC (M= 8.515±2.174; P< 0.001). **CONCLUSION:** Participants' Energy levels increased during PC and AC, with a progressive decrease in Tension and State Anxiety after both conditions. Specifically, PC may be an adequate recommendation to improve Energy for individuals unable or unwilling to participate in AC (e.g., due to poor mental well-being, or disability) while decreasing feelings of Tension or State Anxiety.

**EXERTIONAL DEMANDS IN US RUGBY-7S INCREASES CONCERN IN
HYPERTHERMIA AND EXERCISE INDUCED ASTHMA INCIDENCE**

Philip R. Tesic, Mya C. Gruett, Asha J. Gajraj, Aakansha Kanyal, Lasun O. Oladeji, Richard Ma, Answorth A. Allen & Victor Lopez Jr.

BACKGROUND: US rugby-7s exertional demands including running collisions and seasonal play warrant an understanding of exertional demands illnesses (EDI) influences. Bronchoconstriction (exercise-induced asthma; EIA), and exacerbation and hyperthermia and its variants, due to physiological demands and inspired factors, are injurious. EDI incidence may vary amongst regional playing surfaces. **PURPOSE:** In US rugby-7s, EDI are concerns, whether EIA or hyperthermia variants. An analysis of diagnoses, incidence, sex, and field surface-types was conducted. **METHODS:** The retrospective cohort study analyzed EDI in rugby-7s players (2010 to 2023) in the hospital-based North American Rugby Injury Registry. Medical personnel collected athlete injury data (demographics/injury data/cause/treatment/field type/location) at US rugby-7s tournaments. EDI incidence was calculated per 1000-player hours. **RESULTS:** Exposure was 55,894.70 player-match-hours (ph) for 97,507 players (69,628 male; 27,879 female). Grass: 48,013.51ph, Artificial Turf: 7,880.93ph. Of the 5287 registry injuries, 28 EDI identified cases (hyperthermia n=24; EIA n=4), (Male n=15, Female n=13), (Grass surface n=26, Artificial turf n=2). Overall EDI incidence =0.50/1000ph (n=28; 95% CI:0.33-0.72). Grass EDI incidence =0.54/1000ph (n=28; 95% CI:0.35-0.97), higher than artificial turf incidence =0.25/1000ph (95% CI: 0.03, 0.92). Male EDI incidence =0.39/1000ph (95% CI: 0.22, 0.64), male grass =0.39/1000ph (95% CI: 0.21, 0.67), male artificial turf =0.36/1000ph (95% CI: 0.04, 1.31). Female EDI incidence =0.76/1000ph (95% CI: 0.41, 1.31), female grass =0.89/1000ph (95% CI: 0.47, 1.52), female artificial turf =0.00/1000ph (95% CI: 0.00, 0.00). Athletes on grass surfaces were 2.13 times (IRR= 2.13, 95% CI:0.51-8.99) more likely to experience EDI than those on artificial turf surfaces. Female athletes were 1.98 times (IRR=1.98, 95% CI:0.94-4.16) more likely to experience EDI than male athletes. **CONCLUSION:** Education on sex differences in EDI proportions, EDI regulation, and athlete preparation must be conveyed to US rugby players. Complicating this is the dearth of literature, mainly due to the lack of appropriate data capture. These findings may influence categorization of EDIs in consensus statements, as a sports time-loss injury due to match occurrence and player removal. The suggested association between field type and EDI warrants further study of the regional air quality indexes with EDIs among US rugby.

HIGH PROTEIN INTAKE, WITH PLANT-BASED PREDICTORS, DRIVES MUSCLE GROWTH IN FEMALE TRAINEES, INDEPENDENT OF TIME-RESTRICTED EATING

Mick Smith, Camryn McCoy, Christopher Kotarsky

BACKGROUND: Dietary protein is a cornerstone for muscle growth, yet the optimal amount and source (animal-based protein, ABP, vs. plant-based protein, PBP) for maximizing lean mass gains remains debated. **PURPOSE:** This secondary analysis examined the effects of dietary protein intake and source on muscle growth during an 8-week concurrent exercise training program, independent of dietary strategy (time-restricted eating, TRE, vs. normal eating, NE). **METHODS:** Data from 18 physically inactive, overweight or obese females (age 43.7 ± 7.3 years, body mass 95.5 ± 7.3 kg) from a prior study, originally split into TRE and NE groups, were analyzed. Participants were divided by protein intake: low protein (LP, <0.8 g/kg/day, $n=7$) and high protein (HP, ≥ 0.8 g/kg/day, $n=11$). Changes in lean mass were compared using independent t-tests, and stepwise linear regression assessed ABP (g/d), PBP (g/d), and absolute energy (kcal/d) and macronutrient (g/d) intake as predictors of lean mass changes, with one outlier removed ($n=17$) for these analyses. **RESULTS:** The HP group ($n=10$ after outlier removal) gained significantly more lean mass (1.278 kg) than the LP group ($n=7$, -0.037 kg; $p=0.013$, $d=-1.324$). PBP intake significantly predicted lean mass gains ($F_{1,15}=11.856$, $R^2=0.441$, $p=0.004$), with each 1 g increase in PBP contributing 0.079 kg to lean mass, while ABP showed no effect. **CONCLUSION:** Consuming at least the recommended daily allowance of protein (0.8 g/kg) enhances muscle growth in female trainees, with PBP playing a notable role. Further research should explore PBP's mechanisms and optimize dietary strategies for muscle health in aging populations.

THE SOY ISOFLAVONE GENISTEIN PRESERVES TENDON STRUCTURE AND MECHANICS IN ESTROGEN-DEFICIENT RATS

Gordon Smilanich, Shivam Patel, Reuben Howden, Jennifer Hatch, Joseph Wallace, Chad Carroll

BACKGROUND: The loss of estrogen during menopause leads to soft tissue dysfunction, raising the risk of tendon injury and rupture. Although estradiol (E2) hormone therapy is commonly prescribed, it may adversely affect tendon health. Genistein, an estrogen receptor-activating soy isoflavone, has demonstrated potential to counteract the effects of E2 loss on tendon properties. **PURPOSE:** This study aimed to examine the effects of supplementing E2 and genistein on the structural and functional properties of tendons in estrogen-deficient rats. We hypothesized that E2 supplementation would further decrease tendon properties, while genistein supplementation would mitigate the reduction caused by ovariectomy (OVX). **METHODS:** Thirty rats were purchased as either OVX or intact. After a two-week acclimation period, OVX rats were randomly assigned to receive six weeks of either vehicle (OVX-vehicle), genistein (OVX-Gen), E2 (OVX-E2), or a combination of E2 and genistein (OVX-combo) via subcutaneous injection. Intact rats received a vehicle injection (Intact-Vehicle). After treatment, the animals were euthanized, and their tail tendons were extracted for analysis of fascicle biomechanics and collagen fibril organization using atomic force microscopy (AFM) to measure D-periodic spacing (D-spacing). A one-way ANOVA was used to evaluate differences between the tail tendon mechanical assessments, while AFM data were analyzed with the Anderson-Darling test to compare distributions to Intact-vehicle. All data is presented as mean $\pm$ standard error. **RESULTS:** Young's modulus was lower ($p < 0.05$) in OVX-Vehicle (593 ± 201) and OVX-E2 (528 ± 196 MPa), but not in OVX-combo (763 ± 243 , $p = 0.18$) or OVX-Gen (992 ± 162 , $p = 0.620$) when compared to Intact-vehicle (1425 ± 254 , $p < 0.05$). D-spacing was increased in OVX-vehicle ($68.47 \text{ nm} \pm 0.34$, $p < 0.001$), OVX-E2 ($69.06 \text{ nm} \pm 0.32$, $p < 0.001$), and OVX-combo when compared to Intact-vehicle ($67.79 \text{ nm} \pm 0.34$). D-spacing in the OVX-genistein group ($67.80 \text{ nm} \pm 0.17$) had values that were similar to Intact-Vehicle. **CONCLUSION:** Loss of E2 leads to reductions in tail tendon mechanical properties and increased fibril disorganization in OVX rats. Genistein treatment improved tendon properties. In contrast, treatment with E2 further increased D-spacing and did not improve mechanical outcomes in OVX rats. Future research is necessary to uncover the molecular mechanisms behind how genistein attenuates tendon properties and why E2 causes additional reductions.

Student Poster Presentations

Poster session 1

Th 9:00-10:00 am

Crown Foyer

EXERCISE AND SELF-ESTEEM: RUNNING TOWARD BETTER MENTAL HEALTH

Macy Fleury, Allison Peloso, Rachel Luehrs

BACKGROUND: The correlation between aerobic exercise participation and the self-esteem of children is a widely studied topic. However, most of this research addresses elementary school-aged children and adolescents, which excludes the middle school age group (11-14 years old), where bullying and self-esteem issues typically begin. **PURPOSE:** This study investigated the effectiveness of a four-week running camp on the self-esteem of middle school-aged children (11-14 years old). **METHODS:** To accomplish this, participants in the experimental group participated in the Run with your Heart Youth Running Camp. Three days per week, the campers completed a workout that included mostly aerobic (running) activity, and small bouts of flexibility and strength training to support their running endeavors. A self-esteem questionnaire (The Harter Self-Perception Profile) was given 48 hours prior to the camp starting and 48 hours after its completion to assess whether or not the running camp was able to improve the self-esteem of the children involved. Following the same procedure, an identical questionnaire was given to a control group of students at a local middle school that did not participate in the camp. **RESULTS:** A total of 13 experimental participants and 15 control participants signed up for the study; however, only 12 completed both the pre- and post-surveys for their respective group. There was no change in overall global self-esteem in either group. However, there were statistically significant increases in the subscales of behavioral conduct (mean pre-camp: 5.27 ± 0.49 vs. mean post camp: 5.63 ± 0.42 ; $t = -4.49$; $p = 0.01$) and physical appearance self-esteem (mean pre-camp: 5.13 ± 0.34 vs. mean post camp: 5.54 ± 0.37 ; $t = -5.05$; $p = 0.01$) in the experimental group, but not the control group (all $p > 0.05$). **CONCLUSION:** These findings suggest that the running camp improved aspects of behavior and physical appearance self-esteem of the middle school children involved in the Run with your Heart Camp.

Funding: North Central College Mironda K. Heston Social Impact Grant

GLUCAGON-LIKE PEPTIDE 1 (GLP-1) AGONIST AND LIFESTYLE CHANGES FOR BODY RE-COMPOSITION BENEFITS: A CASE STUDY

David Chen, Margaret Jones, Jennifer Fields, Grant Tinsley, Spencer Nadolsky, Andrew Jagim

BACKGROUND: Obesity remains a growing public health concern, with an increasing number of individuals classified as having obesity. While glucagon-like peptide-1 (GLP-1) receptor agonists or dual GLP-1/GIP agonists, such as tirzepatide, have demonstrated significant efficacy in promoting weight loss, concerns persist regarding the loss of fat-free mass (FFM) during treatment. **PURPOSE:** To examine the impact of tirzepatide treatment combined with lifestyle modifications on body composition in two male patients over a 12-month period. **METHODS:** Two patients, aged 36 (Patient 1) and 37 (Patient 2), initiated tirzepatide treatment (7.5 mg/0.5 mL) while incorporating dietary and exercise interventions. Body composition was assessed using dual-energy X-ray absorptiometry (DXA) at multiple time points over a 12-month period. Changes in total body mass, fat mass, and FFM were used as primary outcome measures.

RESULTS: Patient 1 experienced a decrease in total body mass from 131.4 kg to 111.9 kg over 12 months, with fat mass decreasing from 49.9 kg to 32.9 kg. However, FFM was reduced from 81.5 kg to 79.0 kg. Patient 2 exhibited similar trends, with total body mass decreasing from 106.2 kg to 103.9 kg and fat mass declining from 25.1 kg to 18.3 kg, while FFM increased from 81.1 kg to 85.6 kg. **CONCLUSION:** While both patients achieved significant weight loss, the differential impact on FFM highlights the role of individualized lifestyle interventions. Patient 2, who exhibited an increase in FFM, likely benefited from resistance training and adequate protein intake, underscoring the importance of these strategies in preserving FFM. The findings support the need for comprehensive weight management approaches that integrate pharmacological treatment with structured nutrition and exercise programs. GLP-1 receptor agonist therapy is an effective weight-loss strategy, but its impact on body composition varies among individuals. Implementing lifestyle modifications, particularly resistance training and protein intake, may help mitigate FFM loss and enhance overall body recomposition outcomes. Further research is warranted to refine best practices for preserving FFM during weight.

SEX DIFFERENCES IN ABSOLUTE AND RELATIVE STRENGTH AMONG HIGH SCHOOL POWERLIFTERS: A RETROSPECTIVE ANALYSIS OF WISCONSIN STATE CHAMPIONSHIPS

Molly Pistono, Margaret Jones, Jennifer Fields, Andrew Jagim

BACKGROUND: Powerlifting is a sport that measures maximal strength across the back squat, bench press, and deadlift. Sex-based differences in strength are well-documented in adults; however, limited data exist among high school athletes. Understanding these differences in younger populations is crucial for informing training and talent identification strategies.

PURPOSE: This study examined sex differences in absolute and relative measures of muscular strength in high school powerlifters who competed in the raw (unequipped) division of the Wisconsin High School Powerlifting State Championships. **METHODS:** A retrospective analysis was conducted using publicly available performance data from state championship records. The final dataset included 445 athletes (males: $n = 258$; females: $n = 187$). Absolute strength (kg) was assessed in the back squat, bench press, and deadlift, along with total load (sum of three lifts). Relative strength was calculated as total load divided by body mass (kg/kg). Descriptive statistics were reported as mean $\pm$ SD, and sex differences were analyzed using independent t-tests ($p < 0.05$). **RESULTS:** Males demonstrated significantly higher absolute strength in all lifts and total load ($p < 0.05$). Mean values for males were: back squat = 187 ± 37 kg, bench press = 110 ± 23 kg, deadlift = 208 ± 34 kg, and total average load = 505 ± 86 kg. Females averaged: back squat = 106 ± 25 kg, bench press = 55 ± 12 kg, deadlift = 126 ± 22 kg, and total average load = 287 ± 54 kg. Relative strength was also significantly higher in males (6.13 ± 0.92 kg/kg) compared to females (4.21 ± 0.67 kg/kg; $p < 0.05$), though the disparity was smaller in relative than in absolute terms. **CONCLUSIONS:** High school male powerlifters outperformed females in absolute strength across all lifts, reflecting established physiological sex differences. However, when adjusted for body mass, females achieved approximately 69% of the relative strength of their male counterparts, highlighting competitive strength potential. These findings can inform strength programming and support systems for adolescent athletes. Further studies should consider training age, fat-free mass, and hormonal influences to better understand sex-based strength development during adolescence.

Keywords: Powerlifting, Strength, Adolescents, Sex Differences, Relative Strength, High School Athletes

IN HOME FALLS RISK ASSESMENT AND 8 WEEKS OF MOBILITY ACTIVITY INCREASES BALANCE AND CONFIDENCE AMONG INDEPENDENTLY LIVING OLDER ADULTS

Madison Souders, Nathaniel Bird, Maureen Scheiner, Jaychele Charles, BC. Charles-Liscombe

BACKGROUND: There have been increasing numbers of emergency medical service (EMS) calls related to falls reported in the geriatric population in Southwestern Ohio. Risk of falling increases proportionally with age, as does the potential severity of falls. **PURPOSE:** Due to increases in falls, this pilot study evaluated an 8-week intervention program among older adults living independently. The interventions included in-home evaluations (SST, TUG), functional movement training, and environmental modifications. **METHODS:** 23 residents agreed to participate; 10 (3 males, 7 females) of these subjects were lost to follow-up. 13 subjects (2 males, 11 females) completed the 8-week program and provided post-intervention data. Staff conducted in-home assessments of residents' physical fitness, mobility, and function using the Sit-to-Stand test (SST) and Timed Up and Go (TUG) test. Paired sample t-tests were performed. Participants were also asked to demonstrate the ability to descend to and rise off the ground safely. Staff also assessed the living environment for trip hazards. Following the assessments, participants were provided with personalized 8-week exercise programs and home modification suggestions. **RESULTS:** Significant improvements were found in the SST (pre: 9.31 ± 2.36 , post: $10.62 \pm$

1.76 ; overall change 1.31 ± 0.60 ; $p = 0.01$). No significant difference was found in TUG (pre: 13.65 ± 5.41 , post: 11.11 ± 2.83 ; overall change 2.60 ± 4.29 ; $p=0.34$) over the eight weeks. 100% of participants subjectively reported improved balance. 12/13 reported subjective improvements in confidence rising from the floor after a fall without calling EMS. Cleaning the home of environmental hazards and completing an exercise program resulted in subjects reporting improved confidence and reduced fall risk. **CONCLUSION:** As individuals age, fall risk, disease, and loss of independence increase. Keeping older adults active can reduce age-related declines. This pilot project demonstrated improvements in balance among participants and self-reported confidence. Limitations are due to a small sample size and high drop-out rate. Future studies will examine factors associated with exercise adherence and loss to follow-up. Follow-up studies will include an analysis of falls-related calls to EMS during the study period. The retirement center continues to offer in-home assessments and fitness programming for residents.

FAT-FREE MASS INDEX IN MEN'S COLLEGIATE WRESTLING

Brent Robley, Ward Dobbs, Meghan Magee, Margaret Jones, Jennifer Fields, and Andrew Jagim

BACKGROUND: Fat-free mass index (FFMI) has become a common body composition parameter to identify how much fat free mass (FFM) an athlete has and their potential for future FFM accrual. In addition, it can be used to determine an athlete's risk of having a low FFM.

PURPOSE: The goal of the current study was to examine weight class differences in FFMI

among a cohort of collegiate wrestlers. **METHODS:** NCAA Division I (n=56) and III (n=121)

collegiate wrestlers (n=177, Age: 19.6 ± 1.4 yrs.; Height: 176.6 ± 6.6 cm; Weight: 77.6 ± 12.7

kg; BMI: 25.5 ± 3.6 kg/m²) underwent skinfold measurements to estimate body density and

body fat percentage (BF%) using the Lohman and Brozek skinfold prediction equations,

respectively. FFMI was calculated by dividing FFM by height squared. **RESULTS:** The mean $\pm$

SD FFMI was 21.5 ± 2.1 kg/m². The 5th, 25th, 50th, 75th, and 95th percentile for FFMI were

18.2, 20.1, 21.2, 22.9, and 24.9 kg/m², respectively. FFMI increased notably as wrestling weight

class increased (Table 1). The 7 weight classes from 149 lb through 285 had significantly higher

FFMI values compared to the 125 lb. class. The 8 weight classes from 141 lb. through 285 lb.

had significantly higher FFM values compared to the 125 lb. class. Fat-free mass per weight

class values were significantly higher ($p < 0.05$) in those competing in the 197 lb. and

heavyweight divisions compared to those in the 125 lb. weight class. There were significant

differences ($p < 0.05$) in BF% between weight classes, with those in the 197 lb. and heavyweight

division having higher BF% values compared to the 125 lb. class. **CONCLUSIONS:** A clear and

progressive increase in FFMI was observed across ascending weight classes in male collegiate

wrestlers. Athletes competing in the 149 lb. weight class and above exhibited significantly higher

FFMI values compared to those in the 125 lb. class, suggesting that higher weight categories are

characterized by greater fat-free mass accumulation, relative to body stature. These findings

provide reference FFMI values for collegiate wrestlers and highlight potential benchmarks for

strength and conditioning professionals monitoring athlete development. These normative data

can serve as a useful tool for evaluating physical readiness, body composition goals, and

appropriate weight class placement in competitive wrestling contexts.

CHANGES IN PITCHING PERFORMANCE AFTER ULNAR COLLATERAL LIGAMENT RECONSTRUCTION DIFFER AMONG MAJOR LEAGUE BASEBALL STARTING AND RELIEF PITCHERS

Brandon Merfeld, Zachary Knapp, Charles Dunavan, Jay Krebs, Margaret T. Jones, Jennifer B. Fields, Thomas Almonroeder, and Andrew R. Jagim

BACKGROUND: While it is known that the incidence of arm injuries at the Major League level is increasing, it is less understood how well pitchers are able to return following injury and how their pitching performance is affected. **PURPOSE:** The primary aim of this study was to examine pitching performance metrics before and after ulnar collateral ligament reconstruction (UCLR), among Major League Baseball (MLB) starting and relief pitchers. **METHODS:** Fifty-nine pitchers met the criteria to be included in this study (29 starting pitchers, 30 relief pitchers). The following information was extracted from the “Tommy John Surgery List” database regarding UCLR surgeries among MLB pitchers. Pitching performance metrics were extracted from the Baseball Savant and MLB.com online platforms for the two seasons immediately prior to UCLR (pre) and the two seasons immediately following returning to pitching after UCLR (post). The independent variables included “pitcher type” (starting pitcher, relief pitcher) and “time” (pre, post). The outcome measures of interest were the number of pitches thrown, earned run average (ERA), walks plus hits per inning pitched (WHIP), and fastball velocity. To address the primary aim, a mixed-model analysis of covariance (ANCOVA) was conducted for each pitching metric, with the between-subjects factor of “pitcher type” (starting pitcher, relief pitcher), a within-subjects factor of “time” (pre, post), and age at the time of UCLR as a covariate. **RESULTS:** There was a pitcher type-by-time interaction effect for ERA ($p = 0.01$; $\eta^2 = 0.12$) and WHIP ($p = 0.01$; $\eta^2 = 0.12$), with starting pitcher ERA increasing from mean ($\pm$ standard deviation) 3.68 ± 0.63 to 4.40 ± 1.27 pre to post, while relief pitcher ERA decreased from 4.47 ± 1.61 to 3.90 ± 1.34 . Starting pitcher WHIP increased from 1.22 ± 0.16 to 1.29 ± 0.22 from pre to post, while relief pitcher WHIP decreased from 1.38 ± 0.24 to 1.28 ± 0.16 . There was a main effect of time for pitches thrown ($p = 0.04$; $\eta^2 = 0.07$) as starting pitchers and relief pitchers threw fewer pitches post-UCLR. There was no significant pitcher type-by-time interaction effect for fastball velocity ($p \geq 0.14$). **CONCLUSION:** Starting and relief pitchers responded differently in terms of their changes in ERA and WHIP following UCLR. Both starting and relief pitchers tended to throw fewer pitches after undergoing UCLR, while fastball velocity remained largely unchanged.

DIFFERENCES IN TOTAL DAILY ENERGY EXPENDITURE ACROSS SPORTS

Brenen Skalitzky, Margaret Jones, Jennifer Fields & Andrew Jagim

BACKGROUND: Total daily energy expenditure (TDEE) reflects the energy required to support basal physiological function, physical activity, and thermogenesis. There are variations in TDEE across sports, sex, and skill level which necessitate sport and athlete-specific energy intake recommendations, as energy deficiencies can impair performance and health. **PURPOSE:** This review characterizes TDEE values across a range of men's and women's sports and outlines the utility of physical activity level (PAL), calculated as TDEE divided by resting metabolic rate (RMR), in predicting athlete energy needs. **METHODS:** A literature review identified (n=30) studies reporting energy expenditure data using doubly labeled water (DLW) in athletes, the gold standard for measuring energy expenditure. Each study was reviewed for demographics, performance level, and reported TDEE, relative TDEE (rTDEE), RMR, and PAL. The studies were grouped into 4 sports categories: rugby, soccer, endurance, and other. Weighted means (X_w) and standard deviations (SD_w) were calculated for each variable. A one-way ANOVA with Bonferroni post hoc tests were used to examine between-group differences. **RESULTS:** Pooled TDEE was 4065 ± 1157 kcal/day with significant differences between sports ($p < 0.001$). Endurance athletes had the highest TDEE (5413 ± 1713 kcal/day), exceeding rugby (4417 ± 654), soccer (3157 ± 331), and other athletes (3905 ± 688). Endurance athletes also had the highest rTDEE (95.7 ± 13.8 kcal/kg/day) and PAL (3.0 ± 0.8), both significantly greater ($p < 0.001$) than rugby (49.5 ± 1.3 ; 1.9 ± 0.2), soccer (49.3 ± 11.8 ; 1.7 ± 0.3), and other athletes (61.7 ± 9.9 ; 2.3 ± 0.3). RMR differed by sport ($p = 0.047$), with rugby exhibiting the highest at 2136 ± 322 kcal/day, followed by endurance (1875 ± 450 kcal/day), soccer (1835 ± 208 kcal/day), and other athletes (1749 ± 357 kcal/day). **CONCLUSION:** Endurance athletes exhibited substantially higher TDEE and PAL compared to other athletes, highlighting that sport-specific activity and not basal metabolism drives energy needs. These findings support the need for individualized nutritional programming to avoid under-fueling endurance athletes, or over-feeding others. The results indicate further data collection and comparison between activities, sex, training season, and athlete level could improve and guide future recommendations.

SEX DIFFERENCES IN BODY COMPOSITION AND WEIGHT LOSS BEHAVIORS IN MALE AND FEMALE COLLEGIATE WRESTLERS

Christian Shepler, Ward Dobbs, Margaret Jones, Jennifer Fields & Andrew Jagim

BACKGROUND: Wrestling is widely recognized as a sport that demands strength, endurance, and effective weight management strategies due to its classification as a weight category sport. Therefore, proper weight management is crucial for optimizing performance and maintaining consistency throughout long seasons. Considering the biological differences between male and female wrestlers, weight management may look different between the male and female divisions of the sport. **PURPOSE:** The purpose of the current study was to examine differences in body composition and weight loss across each weight class in both the male and female divisions that may help inform appropriate weight management approaches for collegiate wrestlers.

METHODS: National Collegiate Athletic Association (NCAA) collegiate male ($n=8660$) and female ($n=1435$) wrestlers participated in the current study. Body fat percentage (BF%) was estimated via skinfold measurements. Fat-free mass (FFM), a ratio of FFM to each weight class, and percent weight loss was calculated. Welch's t-tests were used to examine between group differences due to vastly unequal sample sizes. **RESULTS:** Male wrestlers had a lower BF% ($14.9 \pm 4.6\%$ vs. $27.5 \pm 7.5\%$; $p<0.001$; $ES = 2.5$) compared to female wrestlers. Male wrestlers also had a higher FFM compared to female wrestlers (140 ± 18 lbs. vs 102 ± 14 lbs.; $p<0.001$) and a higher ratio of FFM per weight class (0.89 ± 0.04 vs. 0.76 ± 0.07 AU; $p<0.001$). Throughout the season, male wrestlers lost a higher amount of body weight compared to female wrestlers (8.01 ± 6.49 lbs. vs. 5.66 ± 8.23 lbs. $p<0.001$), which represented a relative weight loss of $4.69 \pm 3.57\%$ and $3.87 \pm 5.34\%$ for male and female wrestlers, respectively. **CONCLUSION:** BF% values were lower in male wrestlers than female wrestlers and thus had higher FFM and ratio of FFM per weight class than their female counterparts. In addition, relative weight loss was higher in male wrestlers than female wrestlers. The body composition findings suggest that, on average, male wrestlers carry less body fat than female wrestlers do. In addition, the weight loss findings suggest that male wrestlers lose more weight throughout the season than female wrestlers do. These results suggest significant biological differences between males and females in the context of collegiate wrestling which highlights the need to approach weight management and certification differently between the male and female divisions.

EXAMINING WEIGHT RELATED ATTITUDES AND HEALTH BEHAVIORS AMONG COLLEGE STUDENTS

Alexis Denski, Alina Cioletti & Catherine Gammon

BACKGROUND: College is a pivotal period for the development of lifelong health behaviors. Factors such as greater personal freedom, poor diet, social norms, and insufficient physical activity (PA) contribute to the common weight gain and increase of body image challenges. Although many college students report trying to lose weight, there is limited research examining if their PA and dietary behaviors align with evidence-based health recommendations. **PURPOSE:** Examine the proportion of college students trying to change their weight and their engagement in weight-related behaviors such as PA, strength training (ST), and dietary factors. **METHODS:** In Fall 2019, a random sample of 5,000 students enrolled at a Midwest University was invited to complete the American College Health Association's National College Health Assessment III (ACHA-NCHA). A total of 757 students responded (15.2% response rate). The ACHA-NCHA survey collects self-reported data on demographics, height, weight, PA, ST, and dietary behaviors. Among participants who were trying to lose weight, the frequencies (N and percentages) that were meeting the PA and ST guidelines, and consuming healthier amounts of fruits, vegetables, and sugar-sweetened beverages were calculated. **RESULTS:** Demographic data indicated that most participants identified as white (75.6%), female (71.4%), undergraduate (76.7%), full-time students (76.6%). A majority of participants reported that they were trying to lose weight (54.7%) and 30.9% of these participants were classified as 'underweight' or 'healthy weight' using body mass index groups. Among the participants trying to lose weight, 54.6% didn't meet ST guidelines, 43.0% didn't meet PA guidelines, 50.9% consumed ≥ 2 sugary beverages per day, 74.9% consumed ≤ 2 servings of fruit per day, and 69.7% consumed insufficient vegetables per day. **CONCLUSION:** Many college students are attempting to lose weight, yet their behaviors are inconsistent with achieving weight loss - a little over half meet PA guidelines, less than half meet ST guidelines, and rates of fruit and vegetable intake are low. These findings suggest a need for better education on evidence-based strategies for weight management and health. A strength of this project is the large sample size. A limitation is the use of self-reported PA data, which may be overestimated. Future research and interventions should aim to support college students in adopting sustainable and effective health habits.

EXAMINING THE RELATIONSHIP BETWEEN SLEEP AND PHYSICAL ACTIVITY AMONG UNIVERSITY STUDENTS

Maddie Stock, Catherine Gammon & Alina Cioletti

BACKGROUND: Sleep and physical activity (PA) are important factors for maintaining overall health. Consistently following sleep guidelines can increase PA levels, and vice versa. The relationship between sleep and PA is well-documented for the general adult population, but there is less research on college students. College students are in a formative stage of developing lifelong health behaviors, making the cognitive and health benefits of sufficient sleep and PA particularly relevant. **PURPOSE:** The purpose of this study was to examine the relationship between aerobic PA and sleep in college students. **METHODS:** Of the 5,000 college students at a Midwest University who were invited to participate, 757 (15.2% response rate; 71.4% women, 75.6% white, 76.7% undergraduate) completed the American College Health Association's National College Health Assessment. This survey asks questions about students' health behaviors including aerobic PA and sleep. Participants self-reported sleep quality and quantity over the past 1-2 weeks, and time spent in moderate and vigorous PA over the past 7 days. These values were used to classify participants as "meeting" or "not meeting" PA and sleep guidelines. The relationship between meeting PA guidelines and sleep variables was assessed using Independent Samples t Tests and a Chi square test of independence ($\alpha=.05$). **RESULTS:** Students who met PA guidelines reported sleepiness during the day on significantly less days per week than students not meeting PA guidelines (values are presented as mean $\pm$ standard deviation: 3.9 ± 2.3 vs. 4.3 ± 2.3 , respectively, $p=.022$). Students meeting PA guidelines reported getting enough sleep to feel rested on significantly more days per week (3.0 ± 2.2) than those who did not meet PA guidelines (2.6 ± 2.2 , $p=.022$). The chi square test revealed a non-significant relationship between meeting PA guidelines and meeting sleep recommendations ($\chi^2 [1]=1.246$, $p=.264$). **CONCLUSION:** Students who reported meeting PA guidelines reported significantly better sleep quality, but not sleep quantity. Increasing PA and improving sleep performance could ultimately improve academic success in college students. A strength of this study is the short recall period for sleep data, although the response rate of 15.2% means that the results may not be generalizable. It is recommended that sleep education is prioritized and more student-accessible physical activities are implemented on university campuses.

Poster session 1

Th 9:00-10:00 am

Crown Foyer

ATHLETIC IDENTITY AND DISORDERED EATING IN COLLEGIATE ATHLETES: A COMPARATIVE STUDY

Rhianna Hensler, Emily VanWasshenova

BACKGROUND AND SIGNIFICANCE: Previous research has found that disordered eating (DE) behaviors (such as bingeing and purging) are more common in athletes than non-athletes, and these behaviors harm both health and performance. Athletic identity, or the extent to which an individual identifies as an athlete, has been found to be a significant predictor of DE behaviors. While research has focused heavily on varsity athletes, recreational athletes with a high athletic identity may also be at risk for DE behaviors. However, this population is presently underrepresented in literature. This study aims to address this by examining the relationship between athletic identity and DE behaviors in both varsity and recreational athletes. **RESEARCH QUESTION:** Does athletic identity differ between varsity athletes and recreational athletes? Does disordered eating prevalence differ between varsity athletes and recreational athletes? Does competition level (varsity or recreational) moderate the association between athletic identity and disordered eating when controlling for gender and Body Mass Index (an estimation of body fat percentage based on height and weight)? **PROPOSED METHODS:** This cross-sectional quantitative study will collect data on recreational athletes and compare it with previously collected data on varsity athletes. This will allow a comprehensive examination of athletic identity and DE at differing competition levels. Study participants will access an online survey via Qualtrics through an email link. The survey will take 13 minutes to complete and will consist of questions regarding participant demographics, disordered eating, athletic identity, and general health behaviors. T-tests will be conducted with competition level (varsity or recreational) as the independent categorical variable and athletic identity and disordered eating as the dependent continuous variables. A moderation analysis will be used to examine competition level as a moderator for athletic identity and disordered eating. Control variables will include gender and Body Mass Index. All statistical analyses will be performed using SPSS. **PROJECTED LIMITATIONS AND OBSTACLES:** This study relies on self-reported data, which may impact participant response bias. Additionally, the cross-sectional study design does not allow for examination of changes in the athletic identity and disordered eating behavior relationship over time.

RESTING METABOLIC RATE IN COLLEGIATE WRESTLERS: DEVELOPMENT OF NEW PREDICTION EQUATIONS AND ESTIMATES OF DAILY ENERGY REQUIREMENTS

Emma Tabor, Ward Dobbs, Meghan Magee, Jennifer Fields, Margaret Jones, Andrew Jagim

BACKGROUND: Resting metabolic rate accounts for 60-70% of an athlete's total daily energy expenditure and is a key component of determining an athlete's energy intake requirement. The use of RMR prediction equations may provide an alternative to expensive and time-consuming laboratory measurements. **PURPOSE:** The purpose of the current study was to develop novel equations to predict RMR in collegiate male wrestlers. **METHODS:** NCAA Division III wrestlers participated in the current study ($n = 177$; Age: 19.6 ± 1.5 yrs.; Height: 176.3 ± 6.3 cm; Weight: 76.6 ± 10.9 kg; Body fat: 11.4 ± 3.0 %). RMR was measured using indirect calorimetry and BF% was estimated using Brozek and Lohman skinfold equations. Root-mean squared error (RMSE) was used to determine the error associated with each equation's predictive ability. The %RMSE was then calculated with a value of $\leq 10\%$ to consider a prediction equation to be an acceptable method. Predicted daily energy requirements (DER) were based on physical activity levels of 1.7 (low activity day) and 2.6 (high activity day). **RESULTS:** Mean measured RMR was 2102 ± 341 kcal·d⁻¹. Body weight ($R^2 = 0.377$; $\beta = 0.614$; $p < 0.001$) and fat-free mass (FFM) ($R^2 = 0.422$; $\beta = 0.650$; $p < 0.001$) were found to be a significant predictor of RMR. New prediction equations based on body weight (RMR (kcal/day) = (BW (kg) x 20.32) + 580) and FFM (RMR (kcal/day) = (FFM (kg) x 23.55) + 554) were developed using stepwise linear regression. Overall, the BW-based model had a correlation coefficient of $r = 0.614$, accounting for 38% of the variance in RMR, an RMSE of 277 kcals, and RMSE% of 13.2%. The FFM-based model had a correlation coefficient of $r = 0.650$ and accounted for 42% of the variance in RMR values, with a RMSE of 267 kcals, and RMSE% of 12.7%. Predicted DER values ranged from 2,900 kcal/d to 4495 kcal/d for low activity days and 4500 kcal/d to 6875 kcal/d for high activity level days. **CONCLUSION:** The study developed two moderately predictive equations for estimating resting metabolic rate (RMR) in collegiate male wrestlers, based on body weight (BW) and fat-free mass (FFM). While neither model met the ideal accuracy threshold, they may provide a practical and cost-effective alternative for estimating energy requirements. The high caloric demands observed reinforce the importance of individualized nutrition strategies. Future research should aim to enhance prediction accuracy by incorporating additional physiological and performance- related variables.

THE EFFECTS OF TROLAMINE SALICYLATE ON SKELETAL MUSCLE OXYGENATION: A PROPOSAL

Liliana Mayo-Dominguez, Michael Sauber, Sophia Torne, Danielle Rodriguez, Finley Garza, Diane Fuentes, Viviana Ramirez, Cameron Johnson, Ben Omernik, Jaden Glisson, Julieta Sanchez, Arturo Sosa III, Emily Percino, Jennifer Lin, Mekhii Morris-Heron, Micha

BACKGROUND AND SIGNIFICANCE: Oxygen (O₂) is essential for energy metabolism in multicellular organisms. Due to the body's finite O₂ stores, precise cardiovascular adjustments support metabolic demands, such as during exercise. The largest surface area available for O₂ and substrate exchange is at the microcirculation and skeletal muscle interface. Within the muscle microvascular network, several candidates may contribute to local O₂ delivery-utilization matching. Prostaglandins, which are broken down by cyclooxygenase enzymes, have received considerable attention due to their participation in numerous biological responses, including inflammation and tissue perfusion. Topical analgesics, such as trolamine salicylate (TS), are widely used for temporary relief of musculoskeletal pain. These agents are proposed to exert local anti-inflammatory effects by inhibiting cyclooxygenase enzymes and modulating prostaglandin synthesis. However, the potential effects of TS on vascular responses and skeletal muscle oxygenation remain undefined. Understanding these effects is particularly important given the critical role of microcirculatory function in supporting tissue O₂ delivery and utilization at rest and during exercise. **RESEARCH QUESTION:** Does topical TS application impact skeletal muscle microvascular O₂ delivery-utilization matching from rest to exercise? **PROPOSED METHODS:** In this crossover, double-blind, placebo-controlled study, 20 healthy, active men and women (18-35 years old) will undergo a cuff occlusion protocol and rhythmic handgrip test following TS and placebo (PLA) interventions. Cuff occlusion assessment and moderate handgrip exercise test will be performed with measurements of heart rate, arterial blood pressure, and forearm muscle oxygenation (near-infrared spectroscopy). NIRS data during cuff occlusion protocols will be performed using a paired t-test, while arterial blood pressure, heart rate, and muscle O₂ kinetics will be analyzed using two-way repeated measures ANOVA. **PROJECTED LIMITATIONS AND OBSTACLES:** There are a few key limitations. The depth of action with topical TS is unclear. It may not reach the intramuscular microvasculature, and skin absorption varies across individuals, which could limit any physiological effect. Additionally, prostaglandins can act as vasodilators or vasoconstrictors depending on the pathway. Non-selective prostaglandin inhibition may produce conflicting vascular effects, complicating interpretation.

EFFECTS OF A TARGETED CORE ENDURANCE, BALANCE, PROPRIOCEPTION, AND TORQUE TRAINING REGIMEN ON PERFORMANCE IN CLUB COLLEGIATE MALE SOCCER PLAYERS

Ian Laughlin, Qasim Elshayeb, Stephanie Davis-Dieringer, Ronald Otterstetter FACSM

BACKGROUND: Soccer performance depends on core strength, balance, proprioception, and torque for high-demand movements like sprinting, shooting, and cutting. Compared to NCAA athletes, club players often lack structured training access, elevating injury risk and limiting performance. Neuromuscular training has proven to enhance biomechanics and reduce injury, yet few studies have examined short-term programs tailored to club-level athletes. **PURPOSE:** To evaluate a 6-week training program targeting core endurance, balance, proprioception, and torque, and assess its impact on performance in collegiate men's club soccer players.

METHODS: A prospective, single-group pre/post-test study involved 8 male Akron Men's Club Soccer players (ages 18-24). Club athletes compete at a collegiate level but are not NCAA-sanctioned and are often self-funded. The 6-week study began with baseline testing, followed by 4 weeks of training sessions (2-3 times per week, 30-45 minutes each), and concluded with post-testing in week 5. Training included warm-ups, core endurance exercises, single-leg and BOSU balance drills, and static stretching cooldowns. Performance measures included plank holds, curl-up tests, SEBT, Biodex Balance Assessment (single-leg athlete test), and the agility T-test.

Weekly Qualtrics forms tracked compliance ($\geq 80\%$ participation), symptoms, and injuries.

Participants could withdraw at any time; incomplete data was noted for injury or non-compliance.

RESULTS: Results are presented as mean $\pm$ SD followed by median in parenthesis.

While individual gains were observed, t-test results indicated p-values > 0.05 . Crunch-Up Max averaged 46.33 ± 8.40 (47.00) pre-test and 44.22 ± 18.55 (50.00) post-test. Plank durations were 137.89 ± 31.81 (145.00) seconds pre and 133.89 ± 61.81 (134.00) seconds post. Agility improved from 11.00 ± 0.55 (10.91) seconds to 9.50 ± 3.59 (10.56) seconds. SEBT reach scores increased slightly, but not significantly. Biodex balance results showed mixed medial-lateral and anterior-posterior sway, but no significant group-level effects. Right limb scores were 4.36 ± 2.63 (3.20) compared to the left limb 3.78 ± 2.16 (3.60). **CONCLUSION:** A short-term targeted intervention may enhance core strength, balance, and agility at the individual level, though group-level significance was not achieved. Future research should use larger samples and control groups to evaluate long-term outcomes in club-level athletes.

COMPARATIVE EFFECTS OF PILATES AND A MATTER OF BALANCE INTERVENTION ON FALL RISK, FEAR OF FALLING, AND FUNCTIONAL MOBILITY IN OLDER ADULTS: A NON-RANDOMIZED CONTROLLED TRIAL.

Hannah Beidelman, Kendall Stout, Todd Fenstermacher & Scott Fenstermacher

BACKGROUND: Falls are the leading cause of injury and injury-related deaths among older adults. Estimates of fear of falling in older adults range from 20-39% overall and 40-73% in those who have fallen. Poor physical function is strongly related to fall risk. A Matter of Balance effectively improves fear of falling and physical activity in older adults. Research on Pilates training in older adults has shown varied results, highlighting the need for further research to examine the effects of Pilates and its comparison to other fall prevention interventions.

PURPOSE: The purpose of this study was to compare the effects of a Pilates-based training (PBT) program to the "A Matter of Balance" fall prevention program (MOB) on the fall risk, fear of falling, and functional mobility of older adults in a nonrandomized controlled trial.

METHODS: The study was conducted over 8 weeks. PBT, $n=10$ (70 ± 9 yrs), consisted of 2, 50-minute sessions/week. MOB, $n=11$ (79 ± 7 yrs), consisted of 1, 2-hour session/week. The control group (CG), $n=12$ (74 ± 6 yrs), had no intervention. Participants were assessed pre- and post-intervention on measures of fall risk (4-Square Step test (4SST)), fear of falling (Activities-specific Balance Confidence scale (ABC)), and functional mobility (10-Meter Walk Test (10MWT)). Matched pairs t-tests were used to determine statistically significant improvement for each group. Mixed methods repeated measures ANOVA tests with post-hoc pairwise t-tests were used to determine statistically significant differences between the groups. **RESULTS:** For PBT, there was no significant change in 10MWT (pre: 1.36 ± 0.17 vs. post: 1.44 ± 0.10 , $p=0.09$), 4SST (pre: 7.07 ± 1.13 vs. post: 6.75 ± 0.82 , $p=0.16$), and ABC (pre: 86.97 ± 7.85 vs. post: 89.83 ± 7.43 , $p=0.07$). MOB had significant improvement in 4SST (pre: 16.40 ± 7.90 vs. post: 11.57 ± 4.29 , $p=0.02$) and 10MWT (pre: 0.90 ± 0.19 vs. post: 1.00 ± 0.15 , $p=0.02$) but not ABC (pre: 71.48 ± 17.38 vs. post: 79.30 ± 13.13 , $p=0.17$). The CG had significant improvement in ABC (pre: 91.18 ± 7.51 vs. post: 93.93 ± 5.37 , $p=0.04$) but not 10MWT (pre: 1.27 ± 0.25 vs. post: 1.34 ± 0.24 , $p=0.06$) and 4SST (pre: 8.17 ± 2.12 vs. post: 7.55 ± 1.05 , $p=0.07$). There was no significant difference between the groups for the ABC and 10MWT. For the 4SST, the MOB group showed improvement above the CG ($p=0.034$) and the PBT ($p=0.026$). **CONCLUSION:** PBT had no effect on outcomes. MOB has potential to improve measures of physical capacity and fall risk in comparison to PBT and CG.

ADAPTIVE RESISTANCE FREQUENCY MODULATES MOTOR SYMPTOM IMPROVEMENTS IN PEOPLE WITH PARKINSON'S DISEASE FOLLOWING DYNAMIC CYCLING

Chen Li, Lara Shigo, Brittany Smith, Younguk Kim, Prajakta Joshi, Aasef G. Shaikh, Kenneth A. Loparo, Angela L. Ridgel, FACSM

BACKGROUND: Dynamic cycling with adaptive resistance has shown promise in improving motor symptoms in Parkinson's disease (PD). However, the optimal frequency of resistance adaptation and its impact on different motor symptom domains remain unclear. **PURPOSE:** To compare the effects of high- vs. low-frequency adaptive dynamic cycling on total and symptom-specific Unified Parkinson's Disease Rating Scale (MDS-UPDRS III) score in individuals with PD. **METHODS:** Thirty-four participants with idiopathic PD were block randomized to one of three groups and completed 12 sessions of dynamic cycling exercise. The Low-Frequency Adaptive group (LFA, n=13) had resistance adjustments every three sessions and the High-Frequency Adaptive group (HFA, n=10) had session-by-session resistance adjustments. The Non-Adaptive group (NA, n=11) had no changes in resistance over the 12 sessions. MDS-UPDRS III motor scores were assessed pre- and post-intervention. Subscores were further categorized into dopamine-sensitive (rigidity, tremor, limb agility) and dopamine less-sensitive (gait, posture) domains. One way ANOVA and Tukey post hoc tests were used to analyze the data. **RESULTS:** Total UPDRS scores in the LFA group showed significantly greater improvement ($\Delta = -5.31 \pm 3.71$) compared to the NA group ($\Delta = 4.00 \pm 6.42$; $p = .001$). No significant differences were observed between HFA group ($\Delta = -2.20 \pm 6.84$) and NA ($p = .406$), nor between LFA and HFA ($p = .405$). Dopamine-sensitive symptoms showed significantly greater improvement in the LFA group ($\Delta = -4.62 \pm 3.88$) compared to the NA group ($\Delta = 3.09 \pm 5.74$; $p = .002$). There were no statistically significant differences between HFA ($\Delta = -1.80 \pm 5.69$) and NA ($p = .087$) or between LFA and HFA ($p = .397$). The HFA group exhibited significantly greater improvement ($\Delta = -0.80 \pm 0.63$) in the dopamine less-sensitive symptoms compared to NA ($\Delta = 0.36 \pm 0.50$; $p = .003$). No significant differences were observed between LFA ($\Delta = -0.77 \pm 0.95$) and NA ($p = .329$), or between LFA and HFA ($p = .068$). **CONCLUSION:** Adaptive dynamic cycling is effective in improving motor symptoms in PD, with distinct benefits depending on adaptation frequency. Low-frequency adaptation led to greater improvements in total and dopamine-sensitive motor symptoms, whereas high-frequency adaptation was more effective for improving gait and balance.

FEASIBILITY STUDY ON THE EFFECTS OF PHYSICAL FATIGUE ON RESPONSE TIME AND DECISION-MAKING QUALITY

Kelsey Stamm, Emma Petersen, Sebastian Murillo, Kendall Ellis, Christopher Miller, Candice Burkett, Mindy Hartman Mayol FACSM, Nathaniel R. Eckert, Trent E. Cayot

BACKGROUND: Law enforcement officers face demanding physical and cognitive challenges while on the job and are often called upon to make critical decisions while under fatigued conditions. Better understanding how different types of fatigue might impact response time and decision-making quality is imperative in helping to train individuals for these types of tactical occupations. **PURPOSE:** The purpose of the present feasibility study is to investigate the impacts of physical fatigue on different response times (simple, choice) and decision-making quality in a healthy adult population. The findings from this feasibility study will inform future investigations in the law enforcement population. **METHODS:** 10 healthy participants (age = 23 ± 3 yr, height = 1.70 ± 0.07 m, weight = 69.2 ± 12.2 kg, $VO_{2MAX} = 41.3 \pm 9.3$ ml/kg/min) completed the Deary-Liewald test on a laptop before (PRE), immediately after (POST), and 15 minutes after (15MIN) completing a ramp (20 W/min) graded exercise test (GXT) to volitional fatigue on a stationary cycle ergometer. The Deary-Liewald test assesses simple response time (SRT; time to react to one stimulus from one option), choice response time (CRT; time to react to one stimulus from four options), and decision-making quality (percentage of correct responses from the CRT portion of the test). The ramp GXT was performed to a) physically fatigue the participants and b) quantify the participants' maximal oxygen uptake (VO_{2MAX}) using pulmonary gas exchange methods. One-way repeated measures analysis of variance was used to examine if time (PRE, POST, 15MIN) affected SRT, CRT, and/or decision-making quality. When appropriate, Tukey's post-hoc analysis was used to identify significant pairwise differences and interactions. Statistical significance was established at $p < 0.05$. **RESULTS:** 15MIN (280 ± 32 ms) resulted in faster SRT compared to POST (311 ± 47 ms, $p = 0.03$). 15MIN (371 ± 35 ms) also resulted in faster CRT compared to PRE (409 ± 69 ms, $p = 0.02$). No difference in decision-making quality was detected between PRE ($94 \pm 4\%$), POST ($95 \pm 5\%$), and 15MIN ($95 \pm 6\%$, $p = 0.71$). **CONCLUSION:** While decision-making quality remained unaffected after a physically fatiguing exercise bout, both SRT and CRT improved after physical fatigue and recovery. SRT, CRT, and decision-making quality remained unaffected immediately following the physically fatiguing exercise bout compared to baseline measures.

FEASIBILITY STUDY ON THE EFFECTS OF COGNITIVE FATIGUE ON RESPONSE TIME AND DECISION-MAKING QUALITY

Kendall Ellis, Emma Petersen, Sebastian Murillo, Kelsey Stamm, Christopher Miller, Candice Burkett, Mindy Hartman Mayol FACS, Nathaniel R. Eckert, Trent E. Cayot

BACKGROUND: Law enforcement officers face demanding physical and cognitive challenges while on the job and are often called upon to make critical decisions while under fatigued conditions. Better understanding how different types of fatigue might impact response time and decision-making quality is imperative in helping to train individuals for these types of tactical occupations. **PURPOSE:** The purpose of the present feasibility study is to investigate the impacts of cognitive fatigue on different response times (simple, choice) and decision-making quality in a healthy adult population. The findings from this feasibility study will inform future investigations in the law enforcement population. **METHODS:** 8 healthy participants (age = 23 ± 3 yr, height = 1.71 ± 0.08 m, weight = 72.5 ± 10.9 kg, $VO_{2MAX} = 42.1 \pm 10.3$ ml/kg/min) completed a ramp (20 W/min) graded exercise test (GXT) to volitional fatigue on a cycle ergometer during session 1. During session 2, participants completed the Deary-Liewald test on a laptop before (PRE), immediately after (POST), and 15 minutes after (15MIN) completing the Visual Search Task assessment for the same duration as the ramp GXT from session 1. The Deary-Liewald test assesses simple response time (SRT; time to react to one stimulus from one option), choice response time (CRT; time to react to one stimulus from four options), and decision-making quality (percentage of correct responses from the CRT portion of the test). One-way repeated measures analysis of variance was used to examine if time (PRE, POST, 15MIN) affected SRT, CRT, and/or decision-making quality. Statistical significance was established at $p < 0.05$. **RESULTS:** No significant differences in SRT (281 ± 36 ms, 311 ± 82 ms, 299 ± 83 ms, $p = 0.265$), CRT (397 ± 63 ms, 405 ± 117 ms, 418 ± 171 ms, $p = 0.967$), or decision-making quality ($94 \pm 5\%$, $94 \pm 5\%$, $95 \pm 5\%$, $p = 0.612$) were observed across time (PRE, POST, 15MIN), respectively. **CONCLUSION:** The current findings suggest that the Visual Search Task assessment does not provide sufficient cognitive fatigue to impact response time (SRT, CRT) or decision-making quality in healthy adults.

PATELLAR TENDON PROPERTIES ACROSS THE ADULT FEMALE LIFESPAN

Aidan T Hopwood, Gordon C Smilanich, Lauren E Mitevski, Harrison M Cottingham, Eric J Gutierrez & Chad C Carroll

BACKGROUND: There are over 40 million postmenopausal women in the US, a population at risk for loss of musculoskeletal function, mobility, and increased connective tissue injury. However, the extent of tendon changes across the adult female lifespan is not well described. **PURPOSE:** This study aimed to investigate structural and functional changes in tendons across the adult female lifespan. **METHODS:** Women aged 21-75 were recruited and grouped as pre-menopausal (n=25), perimenopausal (n=6), and postmenopausal (n=34). Women were classified as pre-, peri-, and postmenopausal based on menstrual cycle length. Peri-menopause was defined as two consecutive cycles with more than 7 days difference in duration, while post menopause was characterized by 12 consecutive months without a menstrual cycle. Exclusion criteria included oral contraceptive or hormonal therapy use and a history of hysterectomy. MRI of the patellar tendon assessed mean T2* relaxation time (indicative of collagen fibril disorganization), mean tendon CSA, and body weight-normalized volume. Tendon biomechanics were evaluated via stress-strain relationships during a 10-second ramp contraction. Strain was calculated from ultrasound images using a custom MATLAB sequence, while stress was derived from force transducer data and tendon CSA. Modulus, reflecting tendon material properties, was calculated as the slope of the final 20% of the linear portion of the stress-strain curve. A second-order polynomial regression (chosen for better fit) was used to assess changes in tendon properties across age. The Purdue University IRB approved this study. **RESULTS:** Patellar tendon size increased with age, with a steeper rise from perimenopause to post menopause ($p < 0.05$, $r = 0.241$). In contrast, modulus declined with age, with a more pronounced drop from perimenopause to post menopause ($p = 0.095$, $r = -0.271$). Preliminary T2* data indicated increasing fibril disorganization from pre- to perimenopause, followed by improved organization post menopause ($p < 0.05$, $r = 0.503$). **CONCLUSION:** Older women exhibited lower tendon modulus and increased tendon volume compared to younger women, suggesting age-related molecular disorganization of the patellar tendon. Interestingly, T2* values peaked during perimenopause, indicating maximum fibril disorganization at this stage, followed by structural reorganization post menopause. Further research is necessary to understand the mechanisms driving tendon adaptations over the female lifespan.

CAFFEINE-BASED ENERGY DRINKS DO NOT IMPROVE PERFORMANCE DURING A RUNNING 5K TIME TRIAL IN COLLEGIATE ATHLETES

Andrew Combs, Connor Webster, Amanda Feury, Malachi Noble, Jeanelle Bryan, Karissa Welsh, Craig W. Berry

BACKGROUND: Moderate caffeine consumption (3-6 mg/kg body weight) has been shown to increase exercise performance by 2-4%. Upwards of 62% of college athletes reportedly consume caffeine-based energy drinks (CEDs) to improve performance. A majority of studies examining the impact of CED consumption on exercise performance have utilized a stationary cycle ergometer as their exercise modality, and caffeine capsules as their mode of delivery. Only one previous study has examined the impact of CED consumption on running performance in a 5-kilometer (5K) time trial (TT) though only a low volume of caffeine was consumed in this study (~1-2 mg caffeine/kg body weight). **PURPOSE:** To determine whether consumption of moderate doses of caffeine (2-4 mg/kg body weight) through ingestion of CEDs impacts 5K TT performance. **METHODS:** Four healthy collegiate athletes (3M, 1F; 22±1 yrs; 76.4±8.9 kg), consumed 7mg of fluid per kg of body weight of either placebo (Water+Mio, PLA), Gatorade Fast Twitch (GAT; ~4mg caffeine/kg body weight), or Redbull (RED; ~2.25 mg caffeine/kg body weight) over the course of 15 minutes. Subjects then completed a 5K running TT on a motorized treadmill. Time to complete the 5K was recorded for each trial condition in seconds (s). Heart rate (HR) and rating of perceived exertion (RPE; Borg) were recorded throughout the 5K. A single factor ANOVA was used to determine differences in TT variance. **RESULTS:** There was no statistically significant difference in TT time to completion ($p>0.79$) among the three trial conditions (PLA 1,544±161s; GAT 1,488±146s, RED 1,479±129s). Neither average HR (PLA 176±7, GAT 184±9, RED 179±8 bpm; $p>0.41$) nor peak HR (PLA 194±4, GAT 196±2, RED 194±4 bpm; $p>0.65$) were different among trials. Average RPE was not different among conditions (PLA 12±2, GAT 13±1, RED 12±1; $p>0.37$). However, peak RPE was lower in RED (17±2) compared to GAT (20±1; $p=0.02$), though neither differed from PLA (18±1; both $p>0.05$). **CONCLUSION:** Consumption of two different CEDs did not significantly affect time-to-completion in a running 5K TT compared to consumption of a water placebo. Furthermore, consumption of the CEDs, known to be neurological stimulants, did not significantly affect average or peak HR throughout the 5K. Additionally, CED consumption did not influence perceived exertion compared to water. Despite common use among athletes, energy drinks may not present a performance advantage over water for moderate-endurance events like the 5K.

PEOPLE WITH CHRONIC KIDNEY DISEASE UNDERGOING HEMODIALYSIS EXHIBIT GREATER FATIGABILITY AND SIMILAR RECOVERY AFTER DYNAMIC EXERCISE THAN MATCHED CONTROLS

Chunyu Wang, Ashley M. Morgan, Katherine M. Couture, Gabrielle A. Dillon & Jonathon W. Senefeld FACSM

BACKGROUND: Fatigability is reported by 60 to 97% of people with chronic kidney disease undergoing hemodialysis (HD patients) and represents a key barrier to physical activity and quality of life. Despite its prevalence, skeletal muscle fatigability and recovery have not been systematically characterized using isokinetic dynamometry in this population.

PURPOSE: The purpose of this study was to determine whether HD patients have impairments in fatigability during and recovery after a dynamic fatiguing task with the knee extensor muscles compared to controls matched for age, sex, and body mass index (BMI).

METHODS: Isokinetic dynamometry assessed skeletal muscle performance of 5 HD patients (1 female; age: 58.4 ± 11.7 yr; BMI: 32.3 ± 10.5) and 8 controls (2 females; age: 53.0 ± 11.9 yr; BMI 33.3 ± 4.7). To induce fatigue, participants completed a 4-minute single-limb dynamic knee extension protocol while seated with 90° of both hip and knee flexion. Eighty maximal voluntary concentric contractions (MVCCs) were performed with a load equivalent to 20% maximal voluntary isometric (MVIC) torque through a 60° range of motion at a cadence of 1 MVCC per 3s. MVICs were performed before, immediately after, and during 10-minutes of recovery from the fatiguing protocol. Separate repeated-measures ANOVAs were used to compare performance fatigability and MVIC torque recovery across time and between groups. Pearson correlations assessed potential relations among skeletal muscle performance characteristics.

RESULTS: Reductions in MVCC power were greater for HD patients compared to controls ($59 \pm 20\%$ vs $35 \pm 11\%$, respectively; $p = 0.018$), but there were no differences of reductions in MVIC torque between groups ($44 \pm 21\%$ vs $24 \pm 14\%$, respectively; $p = 0.157$) after the dynamic fatiguing protocol. Reductions in MVCC power were associated with reductions in MVIC torque ($r = 0.611$, $p = 0.040$) and baseline MVIC torque ($r = -0.542$, $p = 0.028$). After 10-minutes of recovery, relative MVIC torque (% baseline) was not different between HD patients and controls ($88 \pm 11\%$ vs $89 \pm 13\%$, respectively; $p = 0.917$).

CONCLUSION: HD patients had impaired baseline skeletal muscle performance and greater fatigability than controls during single-leg knee extensor contractions. Notably, recovery of MVIC torque was not different between groups. Performance fatigability may likely be associated with impaired skeletal muscle contractile properties among HD patients.

PERFORMANCE FATIGABILITY AND CARDIOVASCULAR RESPONSES DURING SINGLE LEG EXERCISE AMONG ADULTS WITH CHRONIC KIDNEY DISEASE UNDERGOING HEMODIALYSIS

Ashley Morgan, Chunyu Wang, Katherine Couture, Gabrielle Dillon & Jonathon Senefeld
FACSM

BACKGROUND: Chronic kidney disease (CKD) is a growing global health concern, and among those with CKD, people undergoing hemodialysis (HD patients) report fatigability as the most common symptom, with a prevalence of up to 97%. However, the physiological mechanisms contributing to performance fatigability during exercise, including cardiovascular responses, are not well understood.

PURPOSE: To quantify performance fatigability and cardiovascular responses during exercise in HD patients compared to controls matched for sex, age, and body mass index (BMI).

METHODS: 5 HD patients (1 female; age: 58 ± 12 yr; BMI: 32.3 ± 10.5) and 8 controls (2 females; age: 53 ± 12 yr; BMI 33.3 ± 4.7) performed a 4-minute single-leg dynamic knee extension exercise protocol through 60° range of motion (beginning at 90° knee flexion) using an isokinetic dynamometer. Eighty maximal voluntary concentric contractions (MVCC) were performed (1 per 3s) with a load equivalent to 20% maximal voluntary isometric contraction torque. Heart rate (HR) and mean arterial pressure (MAP) were measured continuously using photoplethysmography. Repeated-measures ANOVAs were used to compare performance fatigability and cardiovascular responses across time and between groups. Pearson correlations assessed potential associations between performance fatigability and cardiovascular responses.

RESULTS: The reduction in MVCC power (an index of performance fatigability) was greater for HD patients than controls ($59 \pm 20\%$ vs $35 \pm 11\%$, $p = 0.018$). HR and MAP increased during exercise for both HD patients and controls (all $p < 0.001$). However, no between group differences were observed for the increase in HR (22 ± 13 bpm vs 16 ± 12 bpm, respectively; $p = 0.24$) or MAP (19 ± 15 mmHg vs 21 ± 8 mmHg, respectively; $p = 0.089$). Reductions in MVCC power were not associated with increases in HR ($r = -0.414$, $p = 0.16$) or MAP ($r = -0.165$, $p = 0.591$).

CONCLUSION: HD patients had greater performance fatigability during single-leg dynamic exercise compared with matched controls. Cardiovascular responses to exercise were not different between groups and were not associated with performance fatigability. Future studies may investigate skeletal muscle contractile properties to further elucidate potential mechanisms contributing to performance fatigability during exercise among HD patients.

CAFFEINE ENERGY DRINK CONSUMPTION DOES NOT DIFFERENTIALLY AFFECT HYDRATION STATUS BEFORE OR AFTER A 5K RUNNING TIME TRIAL.

Connor Webster, Andrew Combs, Amanda Feury, Malachi Noble, Jeanelle Bryan, Karissa Welsh, Craig W. Berry

BACKGROUND: Caffeine, which has been shown to increase exercise performance by 2-4%, is recognized as having an independent mild diuretic action, thus potentially influencing hydration status. However, caffeine is often consumed in mixed forms, such as ingestion of caffeine-based energy drinks (CEDs). Upwards of 62% of college athletes reportedly consume CEDs to improve performance. To our knowledge, no prior studies have examined the impact of CED consumption on hydration status during and after exercise. **PURPOSE:** To determine the extent to which consumption of CEDs influences hydration status in collegiate athletes during and after a 5-kilometer (5K) running time-trial (TT). **METHODS:** Four healthy collegiate athletes (3M, 1F; 22 ± 1 yrs; 76.4 ± 8.9 kg), consumed 7mg of fluid per kg of body weight of either placebo (Water+Mio, PLA), Gatorade Fast Twitch (GAT; ~ 4 mg caffeine/kg body weight), or Redbull (RED; ~ 2.25 mg caffeine/kg body weight) over 15 minutes. Subjects then completed a 5K running TT on a motorized treadmill. Urine samples were collected before and after the TT to measure urine volume and urine specific gravity (USG) post-drinking. Sweat loss was approximated by changes in body and clothes weights before and after each TT. A single-factor ANOVA was used to determine differences among trials. **RESULTS:** By design, fluid volume was matched across all conditions (PLA 535 ± 66 mL, GAT 537 ± 66 mL, RED 541 ± 70 mL; $p > 0.98$). and caffeine consumption was greater in the two energy drink conditions (PLA 0 ± 0 mg, GAT 302 ± 37 mg, RED 172 ± 22 mg; $p < 0.0001$). There were no statistically significant differences observed in urine volume immediately after drinking (PLA 111 ± 116 mL, GAT 118 ± 145 mL, RED 149 ± 118 mL; $p = 0.90$) or after the TT (PLA 74 ± 79 mL, GAT 101 ± 104 mL, RED 79 ± 105 mL; $p = 0.92$). Sweat volume during the 5K did not differ among conditions (PLA 640 ± 95 mL, GAT 592 ± 274 mL, RED 809 ± 303 mL; $p = 0.44$). Total fluid loss after drinking (urine and sweat) was not statistically different among trials (PLA 825 ± 239 mL, GAT 811 ± 448 mL, RED $1,037 \pm 363$ mL; $p = 0.63$). Furthermore, USG did not differ among conditions at any timepoint (all $p > 0.23$). **CONCLUSION:** Consumption of two CEDs (GAT and RED) did not significantly impact urine volume, USG, or sweat loss before or after a running 5K TT. These findings support recent studies indicating that consumption of other beverages containing moderate doses of caffeine do not significantly affect hydration status during exercise or competition.

EFFECTS OF ACUTE MODERATE INTENSITY EXERCISE ON MEMORY AND REACTION TIME IN YOUNG ADULTS

Haley Boyer, Kyle Timmerman FACSM, Nina Griffiths, Emma DaHinden, Giana Camarata

BACKGROUND: The benefits of physical activity on the human body and cognitive function have been widely studied. Physical activity has been shown to have a positive impact on both short-term and long-term memory, as well as overall cognitive function. Moderate-intensity exercise has been shown to provide significant benefits to the body. Studies in this area often reveal contradictory results, and no specific study has yet incorporated the following: the word list memory technique, the psychomotor vigilance test, and cycling for this age group.

PURPOSE: Examine whether a single session of moderate-intensity exercise improves short-term memory and reaction time in young adults. We hypothesized that a bout of moderate-intensity exercise would improve short-term memory and reaction time compared to seated rest.

METHODS: Utilizing a randomized within-subjects crossover study design, fourteen participants (21.6 ± 1.6 y, 6M/8F) completed two trials where they completed a 5-minute warm-up followed by either a 20-minute rest (control) or 20 minutes of moderate-intensity cycling (intervention), followed by a 10-minute recovery period. Before and after the intervention, cognitive behaviors were assessed using an 8-word recall test (memory) and a psychomotor vigilance test (reaction time). The trials were separated by at least a week. A repeated measures 2 x 2 (Treatment x Time) ANOVA was used to analyze the data. **RESULTS:** The mean percentage of words remembered before exercise was $70.0\% \pm 18.6\%$, and after exercise was $74.0\% \pm 16.8\%$. The mean words remembered before rest were $69.1\% \pm 15.6\%$ and $66.5\% \pm 19.8\%$ after the exercise intervention. There were no significant treatment, time, or treatment $\times$ time effects for word recall ($p = 0.24, 0.71, 0.96$, respectively). The mean reaction time was 345.9 ± 28.5 ms before exercise and 339.0 ± 28.2 ms after exercise. The mean reaction times before rest were 336.07 ± 25.9 ms and 335.4 ± 22.5 ms after exercise. There were no significant treatment, time, or treatment x time effects for word recall ($p = 0.69, 0.77, 0.81$, respectively). **CONCLUSION:** These data do not support our hypothesis that a single bout of moderate-intensity aerobic exercise can improve short-term memory or reaction time in healthy, college-aged men and women.

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ENHANCING INHIBITORY CONTROL THROUGH EXERCISE AND MINDFULNESS

Wojciech Kielbus, Shih-Chun Kao, Salim Onbasi & Chih-Chien Lin

BACKGROUND: Inhibitory control (IC) refers to the cognitive ability to suppress distracting stimuli and regulate responses in support of a goal. While aerobic exercise (AE) and mindfulness (MF) have both been shown to influence IC, their combined effects are not well understood.

PURPOSE: This study compares the effects of mindful-aerobic exercise (MF-AE) and traditional AE on IC by examining Flanker task performance and performance-related N2 and P3 components of event-related potentials.

METHODS: In a within-subject crossover study, thirty young adults (22.1 ± 2.2 yr, 15 males) completed 30-minute sessions of MF-AE (moderate-intensity treadmill-walking [70% max heart rate] with mindful audio for guided attention), AE (moderate-intensity treadmill-walking with a health-related podcast), and RE (seated rest with a health-related podcast) in counterbalanced order on separate days. Following each session, participants completed a five-arrow Flanker task with congruent (low-conflict) and incongruent (high-conflict) trials during an electroencephalogram (EEG) recording. 3 (Session: RE, AE, MF-AE) $\times$ 2 (Congruency: congruent, incongruent) repeated measures ANOVAs were conducted to analyze behavioral (response time [RT], accuracy) and neural (N2 and P3 amplitude and latency) outcomes of IC. **RESULTS:** Although no Session-related difference in response accuracy during the Flanker task was observed, mean response time (RT) showed a main effect of Session ($F = 3.6$, $p = 0.033$, $\eta^2 = 0.11$), with MF-AE leading to shorter RT (395.1 ± 40.8 ms) compared with AE (408.8 ± 40.9 ms; $t = 2.7$, $p = 0.033$, $d = 0.50$). Analysis on N2 did not show any Session-related effects, but a Session $\times$ Congruency ($F = 3.4$, $p = 0.041$, $\eta^2 = 0.10$) interaction was observed for P3 latency. Decomposition of this interaction revealed a longer P3 latency (424.3 ± 72.7 ms) for incongruent than congruent (386.8 ± 77.6 ms) trials only following AE ($t = 4.3$, $p < 0.001$, $d = 0.79$). Additionally, incongruent P3 latency was shorter following MF-AE (405.2 ± 64.7 ms) than AE (424.3 ± 72.7 ms; $t = 2.6$, $p = 0.046$, $d = 0.47$). None of the IC outcomes following the two exercise sessions differed from RE. **CONCLUSION:** Compared to traditional AE, integrating mindfulness may result in superior IC, particularly by improving information processing speed in high-conflict contexts. However, future research using alternative control activities is needed to better clarify the cognition-enhancing effects of MF-AE.

THE IMPACT OF THE PRESENCE OF EFFUSION-SYNOVITIS ON NORMALIZED PEAK EXTENSION TORQUE IN INDIVIDUALS WITH A HAMSTRING TENDON GRAFT AT FOUR TO SIX MONTHS AFTER ACLR

Faith N. Persyn, Natalie L. Blake, Corey D. Grozier, & Matthew S. Harkey

BACKGROUND: Anterior cruciate ligament reconstruction (ACLR) commonly uses hamstring tendon (HT) autografts, which involve less disruption to the extensor mechanism and may preserve quadriceps function. However, postoperative knee inflammation, particularly effusion-synovitis assessed via ultrasound, remains a concern during early rehabilitation, as it can contribute to quadriceps weakness. While HT grafts do not directly impact the quadriceps muscle group, the influence of inflammation on quadriceps strength within the four- to six-month postoperative period remains unexplored.

PURPOSE: To assess the impact of effusion-synovitis on normalized peak extension torque in hamstring tendon graft recipients at four to six months post-ACLR.

METHODS: Nineteen patients (Female=11, Height=171.6±9.1cm, Weight=77.8±18.9 kg, Age=18.6±3.7 yrs, TSS=4.8±0.9mo) were enrolled in our cross-sectional study. Ultrasound images of the suprapatellar recess were acquired bilaterally. Effusion-synovitis in the affected limb was graded using the OMERACT scale, with grades ranging from 0 (none) to 3 (severe). Participants were dichotomized into minimal/mild (grades 0-1) and moderate/severe (grades 2-3) effusion-synovitis groups. Isokinetic quadriceps strength of the affected limb was assessed using isokinetic dynamometry, with knee extension torque measured at an angular velocity of 60 degrees per second and normalized to body mass (Nm/kg) to account for interindividual differences. Effusion-synovitis group differences in normalized peak extension torque were assessed using independent samples t-tests.

RESULTS: This study found no significant difference in quadriceps peak extension torque between individuals with (n=6; Ext Torque=1.89±0.83) and without (n=13; Ext Torque=1.59±0.72) effusion-synovitis (p= 0.433, t= -0.803, Mean Difference = -0.343) at four to six months post-ACLR.

CONCLUSION: This study found no significant difference in quadriceps strength between individuals with and without effusion-synovitis at four to six months post-ACLR. This could be due to decreased quadriceps strength across participants regardless of the presence of effusion-synovitis due to compensation and underuse of the involved limb during this early postoperative timepoint. Future research should consider how longitudinal presence of effusion-synovitis impacts quadriceps strength.

EVALUATING INFRAPATELLAR FAT PAD INFLAMMATION AND ITS IMPACT ON VERTICAL GROUND REACTION FORCE AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

Natalie L. Blake, Faith N. Persyn, Corey D. Grozier, Matthew S. Harkey

BACKGROUND: The infrapatellar fat pad (IPFP) contributes to knee shock absorption and load distribution, but persistent inflammation following ACL reconstruction (ACLR) may impair function, potentially altering movement mechanics and affecting peak loading during early rehabilitation. While ultrasound can detect IPFP inflammation, its impact on functional performance, such as peak vertical ground reaction force (vGRF) during a countermovement jump (CMJ) is unknown. Clarifying this relationship may uncover important links between local knee inflammation and force production early after ACLR. **PURPOSE:** To examine the relationship between ultrasound-assessed IPFP inflammation and limb-specific peak vGRF during a CMJ task in individuals 4-6 months following ACLR. **METHODS:** Twenty-one participants (12 female; age=20.1±7.7yrs; height=173.0±7.2cm; weight=74.6±14.7kg, TSS=4.50±0.62mo) completed bilateral ultrasound assessment of IPFP inflammation 4-6 months post-ACLR. With participants positioned supine and knees flexed to 20°, two longitudinal images per limb were acquired, capturing the IPFP beneath the patellar tendon. A standardized 1 cm rectangular region of interest, deep to the patellar tendon, from the patella to tibial plateau was used to calculate mean echo intensity (grayscale 0-255) with higher values indicating greater inflammation. Participants then performed five CMJ, and mean peak vGRF across trials was extracted bilaterally. Pearson's correlation coefficients assessed the correlation between IPFP inflammation and peak vGRF in the involved and uninvolved limbs. **RESULTS:** For the uninvolved limb, a moderate positive correlation was observed between ultrasound-assessed IPFP inflammation and peak vGRF values (mean peak vGRF=1.90±0.88, mean EI=50.6±8.08, $r=0.51$, $p=0.02$). No correlations were observed for the involved limb (mean peak vGRF=1.45±0.61, mean EI=55.8±8.60, $r=0.12$, $p=0.60$). **CONCLUSION:** No correlation was observed between IPFP inflammation and peak vGRF in the involved limb, whereas a moderate positive correlation in the uninvolved limb suggests that greater early inflammation may increase with peak vGRF during a CMJ. These findings show the importance of examining inflammation bilaterally, as inflammation-related adaptations in the uninvolved limb may contribute to maladaptive mechanics and secondary negative outcomes. Future research should examine interlimb loading rates to better understand compensation during bilateral dynamic tasks.

**EFFECTIVENESS OF A 20-WEEK FIREFIGHTER RECRUIT TRAINING PROGRAM:
PHASE II**

Rachel Greenisen, Christa Brown, Emma Sellmeyer, Alyson Saxton, Jeromy Alt, & Daniel L. Carl FACSM

Background: The demands of being a firefighter (FF) require a high level of physical fitness. Often FF recruits participate in a preparatory physical training program prior to placement for active duty. These training programs are void of national standard requirements and as a result may vary in program design, length, and oversight. Following evaluation of a local fire departments training program (Phase I), we provided suggestions for improvement that were implemented into the following recruit class and subsequently measured for their effectiveness (Phase II). **Purpose:** The purpose of this study was to evaluate the effectiveness of a 20-week physical training program on measurements of cardiovascular endurance, muscular endurance and agility following recommendations from Phase I testing. **Methods:** Forty-Eight FF recruits (38M; 25.5+ 5.6 yr.) consented. Participant measurements were collected at weeks 1, 10 & 21. Measurements included weight, a functional movement screen (FMS), a multistage shuttle test for VO₂max prediction, max repetitions in 60 seconds for body weight squats, push-ups, and pull-ups, and a firefighter obstacle course. Recruit scores were summed across their pre-training measures and recruits placed into top tier 1, middle tier 2, and lower tier 3 for analysis. Differences between tier groups was determined via a two-way ANOVA and a Kruskal-Wallis test when data was not normally distributed. **Results:** Measurements of VO₂max were significantly different between tiers 1 & 2, 1 & 3, and 2 & 3 ($p < 0.0001$, $p < 0.0000$, $p < 0.001$ respectively). Significant differences were seen between weeks 1 & 10 and 1 & 21 ($p < 0.0001$ & $p < 0.0000$). FMS composite scores were significantly different between tier 1 & 2 ($p < 0.0008$) and between tier 2 & 3 ($p < 0.04$). Significant differences occurred between weeks 1 & 10 and 1 & 21 ($p < 0.0008$ & $p < 0.04$). Push-ups were significantly different between tier 1 & 3 ($p < 0.0001$) and tier 2 & 3 ($p < 0.004$). Significance was noted between weeks 1 & 10 and 1 & 21 ($p < 0.0001$ & $p < 0.0001$). Similar muscular endurance results were identified for body weight squats and pull-ups. **Conclusion:** The effectiveness of a local fire departments physical training program prior to active duty was demonstrated in all three areas of cardiovascular, agility, and muscular endurance measurements.

PATELLAR TENDON, BIOMECHANICAL, ORGANIZATIONAL, AND MORPHOLOGICAL ASSOCIATIONS WITH HbA1C AND OTHER SERUM FACTORS IN INDIVIDUALS WITH PREDIABETES AND TYPE II DIABETES

Matthew Fortino, Eric Gutierrez, Lauren Mivteski & Chad C. Carroll

BACKGROUND: Metabolic disorders such as Type 2 Diabetes Mellitus (T2DM) are detrimental to an individual's health, affecting their mobility, quality of life, and long-term health. Within the American population, 10-12% are diagnosed with pre-diabetes or T2DM. Individuals with T2DM have a higher risk of musculoskeletal injury complications.

PURPOSE: The purpose of this pilot study was to investigate the relationship between various serum variables (e.g. HbA1C) and in vivo tendon biomechanical properties and indicators of extracellular matrix (ECM) disorganization in humans.

METHODS: Ultrashort time of echo (UTE) MRI scans of patellar tendon (T2*), patellar tendon biomechanical analysis (elastic modulus), and serum biomarkers were completed in individuals without diabetes (n=15, Age: 50±7y, mean ± standard deviation, BMI: 24±2, HbA1c: 5.44±0.23%), with prediabetes (n=8, Age: 57±11y, BMI: 29.5±5 kg/m², HbA1c: 6.6±2.1%), and T2DM (n=17, Age: 64±8y, BMI: 32±5 kg/m², HbA1c: 7.58±1.6%). MRI derived T2* evaluates fibril organization with higher relaxation time representing increased tendon tissue disorganization. Ultrasound derived elastic modulus provides a measure of patellar tendon material stiffness.

RESULTS: Our preliminary findings indicate mean differences in proximal T2* between individuals with T2DM (4.26±1.98ms) and controls (2.68 ± 0.70 ms) (p=0.0361), with group differences assessed using one-way ANOVA in GraphPad Prism. Associations between variables were evaluated using simple linear regression. HbA1C demonstrated a moderate positive association with T2* measured at the patellar insertion (r=0.5, p=0.0039) and a near-significant association with patellar tendon mean T2* (r=0.33, p=0.0573). Elastic modulus demonstrated a modest negative association with body weight normalized CSA (r=-0.45, p=0.0062).

CONCLUSION: Tendon pathology is often associated with increased patellar tendon CSA, fibrillar disorganization, and reduced function. HbA1C is a key marker that is elevated in those with diabetes and may serve as an early predictor of tendon pathology. With refinement, HbA1c and other serum parameters may be utilized to estimate injury risk and predict post-injury recovery time.

BODY COMPOSITION ASSESSMENT: A COMPARISON OF THE BOD POD, SPREN APPLICATION, AND RENPHO SCALE

Molly Woiteshek, Jeffrey Herrema, and James Sackett MWASCM

BACKGROUND: Various scientifically validated methods exist to measure body composition such as air displacement plethysmography, bioelectrical impedance analysis (BIA), and dual-energy x-ray absorptiometry. Recently, several smart scales and smartphone applications have flooded the market, offering cheap and easy at home measurements of body composition, including the Spren Smartphone Application (Spren) and Renpho Elis 1 Body Fat Smart Scale (Renpho). However, whether these novel technologies are valid remains unknown. **PURPOSE:** This study assessed body composition in young adults to determine the validity of Spren and Renpho compared to the Bod Pod. **METHODS:** 50 adults (age: 20.9 ± 1.9 y, BMI: 24.6 ± 3.6 kg/m²) were tested after a three hour fast whilst wearing spandex shorts, a sports bra, and a swim cap. Participants completed all three tests in one experimental visit, starting with sitting in the Bod Pod, followed by Spren, and finishing with Renpho. The Bod Pod utilizes air displacement plethysmography, while Spren uses photogenic artificial intelligence algorithms and Renpho uses BIA technology. Measurements included body fat percentage (%), body fat mass (kg), fat-free mass (kg), and resting metabolic rate (kcal). Two-way repeated measures ANOVA tests were performed in GraphPad Prism. Data are presented as mean $\pm$ SD. **RESULTS:** Body fat percentage was significantly greater ($p < 0.0001$) for Spren ($24.5 \pm 11.1\%$) but not different ($p = 0.2722$) for Renpho ($21.8 \pm 6.5\%$) compared to the Bod Pod ($20.6 \pm 10.2\%$). Fat mass was significantly greater ($p < 0.0001$) for Spren (18.2 ± 9.5 kg) but not different ($p = 0.1727$) for Renpho (16.6 ± 7.4 kg) compared to the Bod Pod (15.5 ± 8.9 kg). Fat-free mass was significantly underestimated ($p < 0.0001$) for Spren (56.7 ± 13.1 kg) but not different ($p = 0.2298$) for Renpho (58.4 ± 9.9 kg) compared to the Bod Pod (59.5 ± 12.6 kg). Resting metabolic rate was significantly higher ($p < 0.0001$) for Spren (1671 ± 220.2 kcal) but not different ($p = 0.8940$) for Renpho (1632 ± 215.1 kcal) compared to the Bod Pod (1583 ± 317.4 kcal). **CONCLUSION:** Spren overestimated fat percentage, fat mass, and resting metabolic rate, but underestimated fat-free mass, whereas Renpho produced accurate measurements compared to the Bod Pod. Thus, Renpho is a valid, accessible device worth using at home to assess body composition, whereas Spren may require further testing.

**BIDIRECTIONAL ASSOCIATIONS BETWEEN SLEEP AND PHYSICAL ACTIVITY
AMONG HISPANIC ADULTS: RESULTS FROM THE 2022 BRFSS**

Manuel Muñoz II & Susan Aguiñaga

BACKGROUND: One-third of Hispanics obtain less than 7 hours of sleep and engage in lower levels of physical activity (PA) compared to other racial groups. However, the bidirectional association between PA and sleep has not been well understood among different racial and ethnic populations, like Hispanics. **PURPOSE:** Therefore, the purpose of this study is to examine the association between PA and sleep duration among different age groups in Hispanics.

METHODS: The 2022 Behavioral Risk Factor Surveillance System (BRFSS) data were used to assess hours of sleep duration (short = ≤ 6 hours, intermediate = 7-9 hours, long = ≥ 10 hours) and PA engagement outside of work in the past month (yes or no) among Hispanics. Age groups included young (18-39 years), middle-aged (40-59), and older adults (60+). ANCOVA, binary logistic regression, and descriptives were conducted. Covariates included education, sex, and stress. **RESULTS:** 25,263 Hispanic (54% female) adults completed the BRFSS survey questions. Odds ratio calculations showed that participants with intermediate sleep (middle-aged adults (OR=1.576, p-value<.001, CI: 1.296-1.916; older adults (OR= 1.443 , p-value= .001, CI: 1.151-1.809) and long sleep (middle-aged adults (OR= 1.512, p-value= .003, CI: 1.154-1.982) had significantly higher odds of engaging in PA compared to short sleep duration among middle-aged and older adults. ANCOVA revealed that there was a significant difference between PA (adjusted Myes PA= 2.01 vs adjusted Mno PA = 1.98, F(1, 8,728)= 13.161, p< .001) on sleep duration among middle-aged adults such that those who engaged in PA had longer sleep duration, after controlling for education, sex, and stress. However, young (p=.08) and older adults (p=.617) did not have a significant difference in PA on sleep duration. **CONCLUSION:** Findings show that a bidirectional association between sleep duration and PA may exist, specifically in middle-aged adults. Participants reporting intermediate sleep had higher odds of engaging in PA across middle-aged and older groups, but not younger. However, only middle-aged adults who reported PA engagement experienced longer sleep than their physically inactive counterparts. More studies should examine device-assessed PA, domains of PA (i.e., work, leisure), and intensities (i.e., light, moderate) on sleep (i.e., architecture, quality) and vice versa. Additionally, future studies should consider designing interventions that target PA and sleep simultaneously.

IMPACT OF FREE RECREATION CENTER MEMBERSHIPS ON XAVIER UNIVERSITY EMPLOYEE PHYSICAL ACTIVITY

Noah Giganti, Ellie Schulz, Jeremy Steeves FACSM, David Wiley & Ashley Varol

BACKGROUND: Providing subsidized health club memberships for employees is a promising workplace policy intervention that may influence the physical activity (PA) levels of large groups of individuals. On October 28, 2024, Xavier University implemented a policy change granting free access to the campus recreation (rec) center for all university employees, eliminating the previous \$120 annual membership fee. **PURPOSE:** This study examined the impact of this policy on the PA volume of Xavier employees. **METHODS:** Between January-March 2025, an anonymous online Qualtrics survey was distributed to individuals who had accessed the rec center since August 18, 2024, and collected information on rec center PA frequency and duration, and perceptions of the policy. Repeated measures ANOVA compared frequency, duration of rec center PA, and the percentage meeting PA guidelines (>150 min/week) among faculty, staff and administration before and after the free rec center membership policy change. **RESULTS:** A total of 722 participants responded, including faculty (n=30), staff (n=45), administration (n=3), and students (n=644). Prior to the policy change, 77% of employees (faculty: 80%, staff: 76%, and administration: 67%) reported having access to another fitness facility. Following the implementation of free memberships, exercise frequency increased significantly in faculty (1.5 to 2.5), staff (1.2 to 2.2) and administration (1.0 to 2.3 days/week, $p<0.001$), with no differences between groups ($p=0.87$). The average weekly duration of exercise at the recreation center also increased significantly in faculty (100 to 153), staff (66 to 112), and administration (50 to 120 min/week, $p<0.001$), with no differences between groups ($p=0.82$) after free access. A significant interaction showed faculty increased weekly duration significantly more than staff after free access ($p<0.036$). The proportion meeting PA guidelines increased significantly among the faculty, from 30% to 43.3% and staff from 20% to 26.7% ($p<0.001$) and went from 0% to 33.3% in the 3 administrators. Qualitative responses indicated that the policy change positively influenced employee decisions to be physically active on campus, with participants frequently citing cost savings, convenience, and greater opportunity for exercise as key motivators. **CONCLUSION:** These findings suggest that removing financial barriers to accessing on-campus fitness facilities may increase PA participation among university employees.

EFFECT OF A COMMERCIALLY AVAILABLE ENERGY DRINK ON ANAEROBIC POWER AND AEROBIC CYCLING ENDURANCE

Sarah Czupski, Timothy Michael, Carol Weideman

Energy drinks are part of a multimillion-dollar supplement industry. The marketing of these drinks is directed at the public and athletes, and consumers are provided with a multitude of performance claims. Purpose: To investigate the effect of a new commercially available energy drink on the market, designed to improve both aerobic and anaerobic performance. Methods: Healthy college-aged (21-28 yr. old) men ($n = 4$) and women ($n = 4$) volunteered to participate. All participants completed 5 visits. The initial assessment consisted of a maximal cycle ergometer test to volitional fatigue. The remaining 4 conditions were completed in a counterbalanced order: Placebo Aerobic Endurance Trial, Placebo Wingate Anaerobic Trial, Treatment Aerobic Endurance Trial, Treatment Wingate Anaerobic Trial. The Aerobic conditions were performed on an electronically braked ergometer at a power output set at 75% of the maximal power output attained on the initial assessment. Wingate anaerobic trials were completed with 7.5% of body weight as resistance. Before each trial, subjects consumed either 12oz. of an energy drink or a placebo drink. All trials commenced 30 minutes following the consumption of the drink. The placebo drink was created with all the same ingredients as the energy drink, except for the active ingredients. Results: There were no significant differences seen between the treatment and placebo trials for any of the measured variables: (aerobic trials) Time to exhaustion ($p = .091$), Session RPE ($p = 0.175$), (anaerobic trials) Peak Power Output ($p = 0.288$), Mean Power Output ($p = 0.192$), Relative Peak Power Output ($p = 0.301$), and Relative Mean Power Output ($p = 0.138$). Conclusion: It was concluded that the use of this energy drink did not improve exercise performance. This could be due to the habitual use of energy drinks among college students, causing the need to have higher caffeine levels to have any effect.

IMPACT OF A RAGE ANTAGONIST ON TENDON BIOMECHANICAL PROPERTIES IN A MOUSE MODEL OF TYPE 2 DIABETES

Harrison Cottingham, Camila Reyes, Talayah Johnson, Nathan WC Campbell, Nathaniel Dymment, and Chad C Carroll

BACKGROUND: Disruption of tendon extracellular matrix homeostasis and altered biomechanical properties pose significant clinical challenges for millions of people with diabetes. Adding to the problem, controlling blood glucose levels does not restore tendon properties in those with diabetes. Advanced glycation end-products (AGEs) accumulate in the serum of people with diabetes through hyperglycemia, consumption of AGE-rich foods, and decreased kidney clearance of AGEs. We hypothesize that serum AGEs and RAGE activation are mechanisms underlying impaired tendon properties in diabetes. **METHODS:** Thirty-four db/db mice, a mouse model of type 2 diabetes with naturally elevated serum AGEs and impaired tendon function, were treated daily with a RAGE antagonist [Azeliragon (AZ), n=9 male, n=5 female] or vehicle [DMSO (n=15 male, 5 female)] for three weeks. Structural and material properties were calculated from the ramp-to-failure. Stiffness and modulus were calculated from the linear portion of the load-displacement and stress-strain curves, respectively. **RESULTS:** A one-way ANOVA was utilized to compare groups. A multiple comparison assessment was utilized to assess differences between treatments and sex. An alpha value of 0.05 was selected to determine statistical significance, while Sidak's method was utilized to adjust p-values for pairwise comparisons. All data are expressed as mean $\pm$ SE. Patellar tendon stiffness and modulus were greater ($p < 0.05$) in male mice receiving AZ (stiffness: 14.2 ± 1.3 N/mm, modulus: 163.9 ± 23.1 MPa) compared to vehicle (stiffness: 8.7 ± 1.2 N/mm, modulus: 99.6 ± 13.2 MPa). Patellar tendon stiffness and modulus were not different in female mice receiving AZ (stiffness: 11.9 ± 2.2 N/mm, modulus: 124.6 ± 24.5 MPa) compared to vehicle (stiffness: 13.9 ± 1.4 N/mm, modulus: 191.1 ± 13.17). **DISCUSSION:** RAGE antagonism increased tendon stiffness and modulus in males but showed no effect in females. Our results suggest sex-based differences exist that limit the impact of RAGE antagonism. Our findings also suggest that RAGE at least partially mediates the impact of diabetes on tendon functional outcomes in a state of diabetes. RAGE is a multi-ligand receptor; thus, further work is needed to delineate how RAGE is activated in mice with diabetes. Our preliminary results provide a foundation for detailed mechanistic investigations and the development of therapeutic strategies to prevent tendon complications in people with diabetes through RAGE inhibition.

ACUTE EFFECTS OF PASSIVE HEATING ON PERFORMANCE AND ASSOCIATED SEX DIFFERENCES IN NCAA DIVISION III SOCCER PLAYERS

Lauren E. Adamski, Keegan J. DeKuiper, Lauren A. Sysol, Pietro A. Costa, Gabrielle E. Chabala, Nigel C. Jiwan

BACKGROUND: Passive muscle heating may enhance performance by increasing blood flow, improving nerve conduction, and promoting calcium release to boost muscle contractility. While most research focuses on saunas or warm water immersion, studies on heating pads are limited. **PURPOSE:** Examine the impact of heating pads and sex-specific differences on performance in soccer players. **METHODS:** 19 male and female soccer players completed two identical testing sessions in a randomized & counterbalanced design. Heating pads were applied to both thighs and set to 66°C in the passive heating (PH) or maintained at body temperature in the placebo (PL). Skin temperature (ST) was taken before (Pre) and after (Post) heat pad application. Following heating, participants completed three physical performance tests: passing accuracy (PA), vertical jump, and agility T-test. Peak power (PP) was derived from vertical jump height (VJH). Paired t-tests assessed performance and ST differences between PH and PL, while multivariate analysis examined sex-specific effects. LSD post hoc tests were used where appropriate. **RESULTS:** PH significantly increased ST ($36.5 \pm 0.7^\circ\text{C}$ vs. $32.0 \pm 1.1^\circ\text{C}$; $p < 0.001$), improved VJH ($23.1 \pm 3.9\text{in}$ vs. $22.3 \pm 3.2\text{in}$; $p = 0.019$), PP ($4765.6 \pm 914.1\text{W}$ vs. $4639.8 \pm 794.1\text{W}$; $p = 0.019$), and agility times (AT; $10.0 \pm 0.8\text{s}$ vs. $10.2 \pm 0.7\text{s}$; $p = 0.028$), while no differences were observed for PA percentages. Males had greater absolute VJH and faster AT in both PH ($26.1 \pm 2.5\text{in}$ vs. $19.9 \pm 2.3\text{in}$; $p < 0.001$; $9.4 \pm 0.4\text{s}$ vs. $10.7 \pm 0.5\text{s}$; $p < 0.001$) and PL ($24.6 \pm 2.4\text{in}$ vs. $19.8 \pm 1.7\text{in}$; $p < 0.001$; $9.6 \pm 0.5\text{s}$ vs. $10.8 \pm 0.3\text{s}$; $p < 0.001$) compared to females, respectively. Males had higher ST at Pre ($29.2 \pm 2.4^\circ\text{C}$ vs. $27.2 \pm 1.4^\circ\text{C}$; $p = 0.037$) and Post ($32.5 \pm 1.0^\circ\text{C}$ vs. $31.4 \pm 1.1^\circ\text{C}$; $p = 0.014$) in PL than females. Relative to body weight, males had higher PP and faster AT in PH (70.59 ± 4.47 vs. 60.90 ± 5.72 ; 0.12 ± 0.02 vs. 0.16 ± 0.01) and PL (67.58 ± 4.20 vs. 60.83 ± 4.60 ; 0.12 ± 0.01 vs. 0.17 ± 0.01) than females, respectively. Relative to lean body mass, no significant differences were observed for PP between males and females (80.05 ± 4.90 vs. 82.60 ± 5.92) while males had faster AT in PH (0.15 ± 0.02 vs. 0.22 ± 0.03) and PL (0.15 ± 0.01 vs. 0.23 ± 0.02) than females. **CONCLUSIONS:** PH improved VJH, PP, & AT in soccer players, suggesting benefits for pre-activity preparation. Males outperformed females, though PP differences disappeared when adjusted for lean mass. These results support the use of heating pads as a practical tool to boost performance.

XAVIER UNIVERSITY RECREATION CENTER USE AND PHYSICAL ACTIVITY PARTICIPATION

Ellie Schulz, Noah Giganti, David Wiley, Ashley Varol, & Jeremy A. Steeves FACSM

BACKGROUND: University recreation (rec) centers are important spaces that support student and employee wellness. However, little is known about how these centers are used throughout the academic year. Understanding patterns of use and associated motivations can help optimize programming and access. **PURPOSE:** To describe usage patterns of Xavier University's rec center across time and population groups (students vs. employees), including duration, timing, location, and primary motivations for physical activity. **METHODS:** An anonymous Qualtrics survey was distributed to all rec center members (January-March 2025) via email and QR-code flyers posted within the facility. Rec center member entry swipe data were collected from August 2024 to March 2025. Descriptive data (means, SDs, percentages) were analyzed for usage trends, preferred activities, and reasons/barriers for exercise participation. **RESULTS:** A total of 722 members completed the survey (students: $n=644$; employees: $n=78$), and 123,017 swipe entries were recorded (98% students) across 8 months. Average visit duration was 69.5 ± 18.7 minutes, with students having significantly longer visit durations than employees (71.5 ± 27.7 vs. 53.7 ± 19.3 minutes, $p < 0.001$). Peak usage occurred in the afternoon (12-5 p.m.; 40.8%), with the lowest usage in the morning (9 a.m.-12 p.m.; 15.8%). Among students, the weight floor (75.6%) and cardio floor (67.5%) were most utilized; for employees, 60.2% used the weight floor and 55.9% used the cardio floor. The most common activity for female users was walking (students: 43.3%; employees: 56.3%), while core/bodyweight exercises were most common among males (students: 45.1%; employees: 45.7%). The top reasons for exercising were fitness (students: 93.5%; employees: 91.0%) and mental health (students: 73.6%; employees: 77.9%). The main reported barrier to being active was lack of time (students: 61.0%; employees: 66.7%). Average rec center daily swipe counts/users peaked in August (901 ± 45) and dropped in November (613 ± 39). **CONCLUSION:** The Xavier University rec center is a heavily utilized resource supporting physical and mental health for both students and employees. Afternoon use dominates, and most members report engaging for fitness and mental well-being. Programming should consider strategies to address time-related barriers and seasonal declines in use.

LIMB DIFFERENCE IN ULTRASOUND ASSESSED PERIPHERAL KNEE FAT FOLLOWING ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

Jessica Tolzman, Matthew Harkey

BACKGROUND: Following anterior cruciate ligament reconstruction (ACLR) individuals experience a decreased physical activity, that can lead to excessive adiposity. Greater subcutaneous fat at the knee joint line, defined as peripheral knee fat, has been found to be a risk factor for development of radiographic osteoarthritis (OA). Magnetic resonance imaging (MRI) has previously been used to assess the relationship between peripheral knee fat has on OA. However, due to the cost and time ultrasound could offer a clinically accessible tool in its place.

PURPOSE: Therefore, the purpose of this abstract was to assess differences in peripheral knee adiposity between the ACLR limb and the contralateral limb. Evaluating between-limb differences may help determine whether both limbs are at risk for adiposity-related negative health outcomes following ACLR.

METHODS: A convenience sample of 10 individuals from an ongoing longitudinal study at Michigan State University was utilized. Two images were acquired on the medial joint line to visualize the medial meniscus on each limb, ensuring the medial collateral ligament was visible overlaying the meniscus, similar images were acquired on the lateral joint. Peripheral fat thickness was measured from the deep border of the skin to the superficial aspect of the medial collateral ligament. Thickness was assessed at the distal end of the femur and the proximal end of the tibia. Averages of the measurements of both the femur and tibia set were taken, and significance was set at ≤ 0.05 . A paired sample t-test was used to assess the difference between medial and lateral peripheral knee fat between participants ACLR and contralateral limb.

RESULTS: 10 participants were included (60% females, age: 19.3 ± 3.5 , height: 172.3 ± 8.8 cm, weight: 79.3 ± 21.1 kg, months post-surgery: 4.7 ± 0.8). No statistically significant differences were seen between participants ACLR and contralateral limb for medial (ACLR: 0.60 ± 0.26 cm, Contra: 0.56 ± 0.23 cm, mean difference = 0.042 , $p = .195$, $d = 0.44$) or lateral regions (ACLR: 0.57 ± 0.26 cm, Contra: 0.55 ± 0.22 cm, mean difference = 0.018 , $p = 0.66$, $d = 0.14$).

CONCLUSION: Peripheral fat did not differ between ACLR and contralateral limbs, suggesting possible adiposity gain in both knees. Future research should include a matched healthy control group. Increased peripheral knee fat is a known risk factor for OA, making it important to monitor changes in this region following ACLR.

INTERACTIVE CONSEQUENCES OF HYPOXIA AND HEAT EXPOSURE ON COGNITIVE PERFORMANCE: CEREBRAL HYPERPERFUSION AS A COUNTERMEASURE

Eloisa Herrera-Ospina, Ernesto Ramirez, Rachel Bailey, Samuel Stiles, Igor Fernandes, Bruno T Roseguini, Shih-Chun Kao

BACKGROUND AND SIGNIFICANCE: Military personnel often operate in extreme environments that include heat and hypoxia, each of which can reduce cerebral blood flow (CBF) and impair cognitive performance. When combined, these stressors may have synergistic effects that further compromise executive function and decision-making. Acetazolamide, a carbonic anhydrase inhibitor, increases CBF by inducing mild metabolic acidosis and raising arterial CO₂, promoting vasodilation; still, its potential to preserve cognition under simultaneous heat and hypoxia remains unclear. **RESEARCH QUESTION:** Can acetazolamide-mediated increases in CBF preserve cognitive performance during simultaneous exposure to heat and hypoxia. **PROPOSED METHODS:** This randomized, double-blind, placebo-controlled, crossover study will enroll 12-16 participants. Visit 1: Consent, screening, and familiarization with instrumentation and cognitive task (Go/No-Go Flanker test). Visits 2 & 3: Participants ingest either 1000 mg acetazolamide or placebo 4 hours prior to testing, followed by exposure to combined heat and hypoxia in a semi-recumbent position. Environmental stressors: Heat: Raised core temperature (+ ~ 1.5-2.0°C) using a water-perfused suit (48°C). Hypoxia: FiO₂ ≈ 10% delivered via RespirAct™ gas system. Measurements: Skin and core temperature (via ingestible thermistor pill), SpO₂, heart rate, blood pressure, and ventilation. Primary outcomes: CBF (internal carotid and vertebral arteries) via ultrasonography; cognitive performance (reaction time and accuracy) via Go/No-Go Flanker task. Secondary outcomes: Stroke volume, cardiac output, beat-by-beat blood pressure, and temperature responses. Proposed Statistical Analysis: Data will be analyzed using a three-way repeated-measures ANOVA (2 × 2 × 6) to assess main effects and interactions for drug (acetazolamide vs. placebo), temperature (normothermia vs. hyperthermia), and time (six experimental phases) on CBF and cognitive performance. Significant interactions will be further examined using Bonferroni-adjusted post-hoc tests. An alpha level of 0.05 will be used, and all analyses will be conducted in Jamovi for Mac. **PROJECTED LIMITATIONS AND OBSTACLES:** Potential confounding from acetazolamide side effects, technical difficulty in imaging both internal carotid and vertebral arteries under thermal and positional constraints, and challenges in precisely regulating core temperature, we maintain it within a narrow target range of +1.5 to 2.0°C.

THE ROLE OF FITNESS AND MOTOR SKILLS IN CHILDREN'S INHIBITORY CONTROL: EVIDENCE FROM BEHAVIORAL AND ERP MEASURES

Manuela Cortes-Ospina, Nicholas Baumgartner, Kyoungmin Noh, Shih-Chun Kao

BACKGROUND: Cardiorespiratory fitness (CRF) and motor competence (MC) have been associated with cognitive development but their unique and combined contributions to childhood cognition remains less clear. While CRF may enhance cognitive functioning through improved neurovascular function, MC may support more efficient neural communication and resource allocation. **PURPOSE:** This study examined the relative and unique associations of CRF and MC with behavioral and neuroelectric measures of inhibitory control (IC) in children.

METHODS: 120 children between 8-10 years old (55 males) completed the Movement Assessment Battery for Children (MABC) to assess MC and a graded treadmill test to measure CRF via $\dot{V}O_{2\max}$. IC was measured by response time (RT) and accuracy (ACC) during a computerized Flanker Task. Electroencephalogram was recorded during task performance to extract the N2 and P3 components of event-related potentials (ERPs). CRF and MC were used as predictors in separate hierarchical regression models to predict behavioral and neuroelectric cognitive outcomes while controlling for age, sex, BMI, and IQ.

RESULTS: $\dot{V}O_{2\max}$ only positively predicted ACC for both congruent ($\Delta R^2 = 0.056$, $\beta = .304$, $p = .009$) and incongruent trials ($\Delta R^2 = 0.087$, $\beta = .378$, $p = .001$). None of these effects remained significant after including MABC percentile as an additional covariate. Higher MABC percentile predicted greater accuracy across congruent ($\Delta R^2 = 0.155$, $\beta = .419$, $p < .001$) and incongruent trials ($\Delta R^2 = 0.150$, $\beta = .412$, $p < .001$) as well as larger N2 amplitude ($\Delta R^2 = 0.067$, $\beta = -0.276$, $p = .004$) and smaller P3 amplitude ($\Delta R^2 = 0.089$, $\beta = -0.317$, $p = .001$) for congruent trials. The associations of MABC percentile with congruent ACC ($\Delta R^2 = 0.109$, $\beta = 0.377$, $p < 0.001$), incongruent ACC ($\Delta R^2 = 0.090$, $\beta = 0.343$, $p = 0.001$), and congruent P3 amplitude ($\Delta R^2 = 0.073$, $\beta = -0.309$, $p = 0.003$) remained significant after controlling for $\dot{V}O_{2\max}$ as an additional covariate.

CONCLUSION: CRF and MC were positively associated with children's IC performance, highlighting their complementary contributions to cognitive development. Independent of CRF, MC was further linked to not only better IC performance but also smaller P3 amplitude, suggesting a unique beneficial association of MC with IC and underlying neural efficiency. These findings underscore the importance of considering both CRF and MC when examining and promoting childhood cognitive development.

FROM KNEES TO NEIGHBORHOODS INVESTIGATING PERCEIVED STRESS AND DEPRIVATION IN ADULTS FOLLOWING ACL RECONSTRUCTION

Ian Frederick, Corey Grozier, Jessica Tolzman, Arjun Parmar & Matthew Harkey

BACKGROUND: Social and environmental conditions influence health, including psychological well-being such as perceived stress. The Area Deprivation Index (ADI) is a validated, census-based measure of neighborhood-level disadvantage based on an individual zip code. While higher ADI is linked with various adverse outcomes, its relationship to perceived stress in physically active adults recovering from anterior cruciate ligament reconstruction (ACLR) remains unclear. Investigating this association may improve contextual understanding of perceived stress during recovery.

PURPOSE: To examine differences in perceived stress across levels of neighborhood deprivation, as measured by state-level ADI quartiles, in recreationally active individuals recovering from ACLR four to six months post-surgery.

METHODS: A total of 112 participants (72 female, 40 male; mean age = 21.6 ± 9.1 years; height = 170.2 ± 7.8 cm; weight = 73.8 ± 15.8 kg) who had undergone ACLR within the last four to six months and had a corresponding Tegner score of ≥ 4 , indicating at least recreational activity. All participants completed the 10-item Perceived Stress Scale (PSS-10). ZIP codes were used to assign state-level ADI decile scores (1 = least deprived; 10 = most deprived), and participants were grouped into ADI quartiles: Q1 (ADI deciles 1-2), Q2 (deciles 3-4), Q3 (deciles 5-6), and Q4 (deciles 7-10). A one-way ANOVA was used to assess whether the mean perceived stress score differed between ADI quartile groups.

RESULTS: The average PSS score was 12.3 ± 7.2 (range: 0-30), and the average ADI decile was 4.4 ± 2.3 . Mean PSS scores by ADI quartile were as follows: Q1 (deciles 1-2) = 11.0 ± 7.1 , Q2 (deciles 3-4) = 13.0 ± 6.5 , Q3 (deciles 5-6) = 11.4 ± 7.1 , and Q4 (deciles 7-10) = 14.0 ± 7.5 . The one-way ANOVA revealed no statistically significant difference in perceived stress scores between ADI quartiles ($F = 1.59$, $p = 0.195$).

CONCLUSION: Neighborhood-level deprivation was not significantly associated with differences in perceived stress among individuals recovering from ACLR. These findings suggest that categorical ADI groupings may not adequately capture subtle environmental effects on perceived stress in this population. Future research may benefit from finer-grained analyses or inclusion of additional contextual variables, such as individual-level SES or social support, when evaluating perceived stress after ACL surgery.

THE EFFECT OF BIOBANDING ON WITHIN GROUP VARIANCE OF YOUTH USA HOCKEY PLAYERS

Katherine C. Curtis, Ken Martel, Kristen Dieffenbach, Karin A. Pfeiffer

BACKGROUND: Traditionally, youth athletes are grouped by their chronological age, with birth year serving as the primary criterion. However, due to the significant variability in physical development during puberty, this method often advantages early maturers (Chimera et al., 2024). In response, researchers introduced biobanding, an alternative grouping strategy based on biological maturation rather than chronological age. Studies have shown that biobanding can reduce variability in body size and physical performance (MacMaster et al., 2021). Most research on biobanding has focused on male soccer populations, but it is important to examine other team sports where body size has a strong influence on performance and talent identification.

PURPOSE: The study's purpose was to examine the maturation status of U15 male hockey players. A second purpose was to assess whether grouping athletes by maturity status through biobanding reduces within-group variance in anthropometric measures and physical fitness performance. **METHODS:** A total of 111 fifteen-year-old male hockey players participating in a regional USA Hockey camp participated in the study. Anthropometric data, including height and weight, were collected, followed by physical fitness assessments: countermovement jump (CMJ), single leg jump (SLJ), 10-meter sprint, and grip strength tests. The Khamis-Roche method was used to estimate predicted adult height as a measure of biological maturity. The athletes were grouped into late, on time, and early maturers (<90 %PAH, 90-95 %PAH and >95 %PAH). **RESULTS:** The sample lacked late matures, resulting in 36 on-time and 73 early maturers. Within-group variation was assessed using coefficient of variation (CV). Results showed that CVs were reduced across all variables measured (Height CV % = 3.78 - 3.58, Weight CV % = 13.25-12.78, CMJ CV% = 11.63-11.26, SLJ CV% = 7.48-6.87, 10m Sprint CV% = 4.6-4.38, Avg Grip CV% = 18.49-17.28) when athletes were grouped by maturation status. Statistically significant differences were observed between early and on-time maturers in anthropometric and physical fitness measures, with medium effect sizes (ES = -0.737- -0.582), except for the 10-meter sprint (p = 0.137, ES = 0.305). **CONCLUSION:** Biobanding effectively reduces group variance in anthropometrics and physical fitness testing. Meaningful differences were identified between maturity groups, supporting the relevance of biobanding for grouping male youth hockey players.

**EFFECTS OF CHRONIC WHOLE BODY VIBRATION TRAINING ON
NEUROMUSCULAR CONTROL**

Jarrold Gable, Angela Ridgel FACSM

BACKGROUND AND SIGNIFICANCE: When performing a motor task, proprioceptors provided valuable feedback regarding limb positions, speed and direction of movement, and muscle tension. The brain can pair this information with sensory input (i.e. vision) and previous experiences to predict physical requirements of the task being planned. This complex analysis is used to develop intricate movement plans for coordinated motor unit recruitment and sequencing to produce accurate and efficient movement patterns. When the proprioceptive feedback loop is damaged or inhibited, the brain defaults to reliance on visual input, past experience, or simple intuitive guessing to inform the motor planning process. Visual feedback can fill some of the void left by altered proprioceptive feedback, but the processing is slower and often unreliable. When applied, whole body vibration (WBV) has lowered recruitment thresholds of Type II motor units, but this effect has largely been measured as an acute effect. **RESEARCH QUESTION:** Can motor unit recruitment and reciprocal inhibition be sustainably improved as a plastic effect via chronic WBV intervention paired with resistance exercise? **PROPOSED METHODS:** A sample of 16-20 healthy young adults will be recruited to complete body weight resisted, lower extremity exercise twice per week for four weeks. Participants will be randomized into one of two groups. The experimental group will perform exercises on a VibeX WBV platform set at a frequency of 30 Hz. The control group will perform the same exercise Rx without turning on the WBV platform. Testing will be performed at baseline, two weeks, and at the completion of the four-week trial. Peak amplitudes of rectus femoris and gastrocnemius will be measured by EMG during a body squat. Peak amplitudes EMG of the rectus femoris and biceps femoris will be measured during knee extensions at 60, 120, and 240° per second on a HUMAC NORM isokinetic machine. EMG amplitudes will be used to represent motor unit recruitment and reciprocal inhibition between flexors and extensors. **PROJECTED LIMITATIONS AND OBSTACLES:** Data collection methods should provide accurate data to represent our experimental foci. However, ensuring consistent, maximum effort from subjects could prove difficult and there are questions about what responses healthy nervous systems will present in response to the WBV stimulus.

POSITIVE ASSOCIATION BETWEEN PSPCSA AND CARDIOVASCULAR ENDURANCE IN ELEMENTARY CHILDREN

Megan Blake, Karin A. Pfeiffer, FACSM, Aaron Wood, Stephanie Palmer, Christian Burke, Luis Torres Villela, Leah E. Robinson, FACSM

BACKGROUND: Perceived competence in elementary children is associated with increased physical activity, motor skill development, and overall fitness. Understanding the relationship between perceived competence and cardiovascular endurance may help identify predictors of fitness that can inform targeted interventions. Research has shown a link between perceived competence and cardiovascular endurance, but more studies are needed to understand how specific aspects of perceived competence, like physical and motor competence, relate to endurance in young children. **PURPOSE:** This study examined the relationship between elementary-aged children's perceived competence and cardiovascular endurance. **METHODS:** Participants (grades K-2, 5-8 yrs old) in the Children's Health Activity Motor Program in After School Programs (CHAMP-ASP) completed assessments of perceived competence (n=189, 53% female). Physical/motor competence was measured using the Pictorial Scale of Perceived Competence and Social Acceptance (PSPCSA) and the Digital Scale of Perceived Motor Competence (DSPMC). Cardiovascular endurance was evaluated using the 6-minute walk test. **RESULTS:** T-tests showed similar PSPCSA scores between boys (M = 3.13, SD = 0.49) and girls (M = 3.15, SD = 0.47). DSPMC scores were higher for boys (M = 3.24, SD = 0.41) than girls (M = 3.05, SD = 0.40) (p=0.001). No significant sex differences were observed in the 6-minute walk test performance. Multiple regression analyses indicated that models including PSPCSA scores, age, sex, and BMI significantly predicted 6-minute walk scores ($R^2 = 0.107$, $p < 0.001$), with PSPCSA and age emerging as significant predictors. DSPMC scores were not significantly associated with 6-minute walk test performance. **CONCLUSION:** Perceived competence (PSPCSA) was significantly associated with cardiovascular endurance, while perceived motor competence (DSPMC) was not. Although PSPCSA may serve as a better predictor of endurance, the overall variance explained was low, suggesting that additional factors beyond perceived competence, age, and sex contribute more substantially to cardiovascular fitness in children.

EXAMINING FEAR OF MOVEMENT AND FUNCTIONAL LIMB SYMMETRY THROUGH SINGLE-LEG HOP TESTING POST-ACLR

Kate Mumford, Jessica Tolzman, Matthew Harkey

BACKGROUND: Kinesiophobia, or fear of movement, is commonly experienced during recovery from anterior cruciate ligament reconstruction (ACLR). Single-leg hop (SLH) testing assesses limb symmetry, with asymmetries potentially reflecting movement-related fear. This may be especially relevant in adolescents, who are undergoing simultaneous physical growth and psychological development that can influence confidence in movement. **PURPOSE:** Therefore, this study aims to evaluate the relationship between SLH limb symmetry and kinesiophobia in adolescents 5 to 6 months post-ACLR. **METHODS:** A convenience sample of 27 ACLR individuals were used. The Tampa Scale for Kinesiophobia (TSK) is a self-reported questionnaire used to assess fear of movement. It includes 11 items rated on a 4-point Likert scale. Participants completed three maximum effort SLH for distance on each limb. The average distance was recorded, and limb symmetry index (LSI) was calculated as (ACLR limb/non-surgical limb) x 100. Values greater than 100 indicated the ACLR limb was stronger than the non-surgical limb. Pearson correlation analysis assessed the relationship between limb symmetry and TSK scores. Significance was placed at 0.05. **RESULTS:** Participants included 27 adolescents, approximately six months post-ACLR (age: 16.41 ± 1.17 years, height: 170.31 ± 6.87 cm, weight: 71.47 ± 15.05 kg, time since surgery: 6.08 ± 0.24 months). The mean TSK-11 score was 22.93 ± 5.32 . SLH distances averaged 119.94 ± 27.75 cm for the surgical limb and 132.76 ± 29.51 cm for the non-surgical limb. The mean LSI for SLH was $90.30 \pm 10.84\%$. A significant negative correlation was observed between TSK-11 scores and SLH symmetry ($r = -0.509$, $p = 0.008$). **CONCLUSION:** These results show that greater kinesiophobia is associated with poorer limb SLH symmetry. Future research should explore targeted interventions to address kinesiophobia and reduce psychological limitations to optimize functional recovery from ACLR.

PHYSICAL ACTIVITY IN DOG OWNERS IN THE MIDWEST

Dan Hamze, Emily Van Wasshenova, Jezerca Hodaj, Dorin Drignei

Background: Dog walking is a common form of physical activity that can benefit both humans and dogs and can help people meet the recommended 150 minutes of moderate intensity physical activity per week. Understanding the reasons behind why people walk their dogs can help promote more widespread participation in dog walking. This study examined demographic, environmental, and psychosocial predictors of dog walking behavior in adults in the Midwest. **Methods:** Dog owners (n=400) living in Michigan, Indiana, Ohio, Wisconsin, and Illinois completed an internet-based survey. The survey collected information on gender, age, education, marital status, income, dog size, dog attachment, dog behavior, environmental factors, dog walking obligation, and identity. Dog walking behavior, measured in minutes per week, was the primary outcome variable and categorized into two groups: individuals who walked their dogs for 150 minutes or more per week and those who walked for less than 150 minutes per week. Two binary logistic regression analyses were conducted: one examined weekly time spent dog walking at mild, moderate, and vigorous intensities (total dog walking time), and the other focused only on weekly time spent at moderate and vigorous intensities (total dog walking time that contributes to meeting physical activity guidelines). **Results:** For total time spent walking dogs at mild, moderate, and vigorous intensities, walking obligation ($p<0.001$), identity as a dog walker ($p<0.001$) were significant predictors. When only moderate and vigorous intensity walking, walking obligation ($p<0.05$), identity ($p<0.05$), and being of non-Hispanic ethnicity ($p<0.05$) were significant predictors. **Conclusion:** Psychosocial factors, specifically, the obligation to walk one's dog and the identity as a dog walker, were predictors of meeting physical activity guidelines through dog walking and also of overall dog walking, including mild-intensity activity. These findings suggest that promoting these factors could increase physical activity in dog walkers in the Midwest.

ASSESSING THE RELATIONSHIP BETWEEN STATIC AND DYNAMIC QUADRICEP ANGLE AND KINETIC ASYMMETRY INDEX % IN FEMALES DURING THE FOLLICULAR PHASE OF MENSTRUATION

Madeline Poirier, Lukus Klawitter

BACKGROUND AND SIGNIFICANCE: The quadriceps angle (Q-angle) is a biomechanical measurement quantifying the lateral pull exerted on the knee, formed by lines from the anterior superior iliac spine (ASIS) to the patella and from the patella to the tibial tuberosity. Females generally have higher static and dynamic Q-angles due to anatomical differences including wider pelvises and a more lateral tibial tuberosity, which increases their risk for knee injuries such as, ACL tears and patellofemoral pain syndrome (PFPS). Dynamic Q-angles, measured during movement, tend to be even greater, further elevating injury risks. The Kinetic Asymmetry Index percentage (KAI %) measures limb-to-limb differences in ground reaction force (GRF) impulses during dynamic tasks such as countermovement jumps (CMJ); values above 10% are linked to higher ACL injury risk. The follicular phase of the menstrual cycle, characterized by rising estradiol and low progesterone, is associated with increased joint laxity and increased ACL injury risk, which may further compound biomechanical vulnerability in females with elevated Q-angles. **RESEARCH QUESTION:** The purpose of this study is to evaluate differences in static and dynamic Q-angle measurements during the follicular phase of the menstrual cycle and examine their association with KAI %, an indicator of ACL injury risk. **PROPOSED METHODS:** An observational study will require (n=32) eumenorrheic females aged 18-40, who are moderately active with no musculoskeletal injury within 30 days prior to testing. Anthropometric data will be collected prior to testing and menstrual phase will be confirmed using both calendar tracking and salivary hormone assays for estradiol and progesterone. Static Q-angle will be measured in the standing position using Noraxon 2D marker less video analysis, with participants standing still on force plates. Dynamic Q-angle will be assessed during five countermovement jump (CMJ) trials, with angular changes captured through the unweighing, braking, and propulsive phases, with KAI % measured simultaneously during the CMJs using AMTI force plate data to calculate impulse asymmetries. Pearson correlation analyses will assess relationships between hormone levels, static and dynamic Q-angle(s), and KAI %. **PROJECTED LIMITATIONS AND OBSTACLES:** The observational design limits causal inference and within-subject comparisons across menstrual phases and findings may not expand beyond the follicular phase.

THE EFFECT OF REFLEXIVE PERFORMANCE RESET (RPR) ON MOBILITY AND PERFORMANCE

Preston Sykes, Melissa Cook, Elisha Strawser, Quinn Willard & Brock Thomason

BACKGROUND: Reflexive Performance Reset (RPR) is self-applied acupressure points and breathing exercises that is used to create a better connection between the nervous and muscular system to improve performance and mobility. The website states that it has been designed as a treatment that can increase flexibility and sport performance, reduce pain and potentially aid in injury prevention (Reflexive Performance Reset®, n.d.). The body can create compensation patterns and poor breathing habits which may alter biomechanics of joints and contribute to injuries in sport and musculoskeletal pain with exercise. There are 3 body zones of wake-up drills™ which only take a few minutes to complete with a strength coach's leading or by the athlete themselves so they can "control their own health and performance" (Reflexive Performance Reset®, n.d.). Although it is a technique that has been increasing in popularity over the past several years in the strength and conditioning world and used at this university and local high schools, there is very limited presence in the literature. **PURPOSE:** The purpose of this study is to research the effectiveness of RPR on short term athletic performance and mobility. **METHODS:** A sample of 30 athletes (age 19.7 ± 1.21 years) consisting of 25 males and 5 females who are not currently using RPR. The teams included were Men's Soccer, Football, Track, and Cross Country. Testing occurred on two nonconsecutive days to complete a pre-test and post-test. The pre-test included a dynamic warmup with no RPR. The subjects were then tested on countermovement vertical jump (VJ), 10-yard sprint (SPR), upper body medicine ball throw (MBT), and mobility of the shoulder (SHD), glute (GLT), and hamstring (HAM). The post-test including 5 belly breaths and RPR before the same dynamic warmup and mobility and performance tests to follow. **RESULTS:** Using a paired t-test to determine significance ($p < 0.05$ level), statistically significant differences were found among the pre and post-test as the group improved in all six tests while using RPR. There were statistically significant changes in SPR (1.73 ± 0.12 to 1.67 ± 0.077 sec) $p = 0.002$, SHD (173.5 ± 4.77 to 177.33 ± 2.99 deg) $p = 0.008$, GLT (14.97 ± 5.16 to 17.93 ± 4.31 deg) $p = 0.013$, and HAM (78.5 ± 11.94 to 86.66 ± 8.28 deg), $p = 0.011$. VJ (28.24 ± 4.41 to 28.78 ± 4.37 in) and MBT (213.83 ± 41.51 to 220.97 ± 45.53 in) are trending toward significance VJ ($p = 0.056$) and MBT ($p = 0.051$). **CONCLUSION:** It appears that RPR improves performance and mobility measurements by creating a better connection between the nervous and muscular systems. The 13 wake-up drills™ across all three zones of the body and breathing exercises indicate there would be immediate improvement in mobility and performance on some anaerobic activities. Further testing is warranted in the general population and other athletics groups to support these results.

SHORT TERM HOT WATER IMMERSION ON MARKERS OF HEAT ACCLIMATION

Peyton Thibodeau, Christiana Donkor, Isaac Tiguridaane, Michael Platt, Jordyn Elders, Marian Avila, & Micah Zuhl

BACKGROUND: Athletes who live in temperate areas are advised to heat acclimate before competing in hot environments. Traditional recommendations suggest that 60-100 minutes of daily heat exposure over 1-2 weeks is adequate to elicit physiological adaptations such as an enhanced sweat response, lower heart rate, and core temperature during exercise in heat. The time requirement and physical demands of traditional heat acclimation protocols have historically made it challenging to implement into training schedules. There has been a surge of recent evidence to suggest that short-term (3-5 days) heat exposure via hot water immersion (HWI) supports heat acclimation. Submersion in hot water limits the body's thermoregulatory response due to uncompensable heat stress (e.g., lack of heat removal). One approach yet to be explored is combining exercise with HWI across a short-term acclimation protocol. Exercise would enact thermoregulatory mechanisms such as sweating and evaporation while HWI would provide added thermal stress. **PURPOSE:** This study aimed to determine if a short-term heat acclimation protocol consisting of exercise and HWI will promote heat acclimation adaptations. **METHODS:** Using a randomized controlled study, 10 (23 ± 2 years, 7 male, 3 female) non-heat acclimated participants were randomized into 2 groups, including 40 minutes of HWI (40 degrees C water); or 20 minutes of exercise (65% $\text{VO}_{2\text{max}}$) in a heated environmental chamber (36 degrees C, 40% RH) followed by 20 minutes HWI (E+HWI). Both HWI and E+HWI were completed on five consecutive days. A heat tolerance test (HTT) consisting of 45 minutes treadmill exercise at 50% $\text{VO}_{2\text{max}}$ (36 degrees C, 40% RH) was performed before (HTT1) and after (HTT2) heat acclimation. The primary outcome measure was core temperature measured during the HTTs. **RESULTS:** Findings are preliminary with data collection ongoing. Core temperature was similar at the end of HTT1 for both HWI and E+HWI (38.30 ± 0.18 vs. 38.42 ± 0.10 degrees C respectively). A decrease in core temperature was observed in HTT2 versus HTT1 in the HWI trial only (38.00 ± 0.18 vs. 38.30 ± 0.18 degrees C, respectively, $p=0.03$). Core temperature did not change in HTT2 versus HTT1 in the E+HWI trial (38.48 ± 0.49 vs. 38.42 ± 0.10 degrees C respectively). **CONCLUSIONS:** Preliminary results suggest that the addition of exercise to HWI does not lead to thermoregulatory adaptation to heat. Hot water immersion alone may be a viable option to induce acclimation.

ASSOCIATIONS AMONG SELF-REPORTED HEALTH-RELATED QUALITY OF LIFE AND INDICES OF FITNESS AND BODY COMPOSITION IN OLDER ADULTS

Elizabeth Hudak , Charlie Vallone, Owen Taylor, Reghan Doyle, Kyle Timmerman

BACKGROUND AND SIGNIFICANCE:Cardiorespiratory fitness (CRF) is a powerful predictor of all-cause morbidity and mortality and has recently been emphasized by the American Heart Association as a vital sign. Despite this, CRF is rarely assessed in routine clinical practice, and limited research has examined how CRF and related clinical health measures, such as muscular strength, body composition, and blood pressure, relate to self-perceived health, particularly in older adults. Understanding these associations could support more personalized healthcare interventions and improve quality of life. This research is significant because it may inform clinicians about the value of incorporating non-traditional measures of fitness and function into preventive care for aging populations. **RESEARCH QUESTION:** How are health-related quality of life (HRQoL) scores associated with commonly assessed clinical indicators such as CRF, body composition, muscular strength, blood pressure, and physical activity in older adults? **PROPOSED METHODS:** Adults aged 65 years and older will be recruited from the Oxford, Ohio community, including residents at a local retirement community. After providing informed consent, participants will complete the short form-36 (SF-36) HRQoL questionnaire, CHAMPS physical activity questionnaire, and a health history form. Clinical assessments will include resting blood pressure, body composition (via bioelectrical impedance analysis), grip strength, the Short Physical Performance Battery (SPPB), and the six-minute walk test (to estimate CRF). Correlation and regression analyses will be used to evaluate associations between HRQoL scores and the fitness/body composition measures. Longitudinal data will be collected from participants who return for follow-up assessments at yearly intervals. **PROJECTED LIMITATIONS AND OBSTACLES:** As an observational study, causal relationships between fitness indicators and HRQoL cannot be established. Participant retention over multiple years may also limit the longitudinal component of the analysis. Additionally, self-reported data from questionnaires may introduce recall bias.

THE IMPACT OF EXERTIONAL HEAT STRESS ON VERBAL MEMORY

Jayden Bonsall, Magdelyn Gipe, Erin Roush, Molly Behen, Shane Fitzpatrick, Cambrya Ankoviak, Hajime Otani, and Micah Zuhl

BACKGROUND: Evidence suggests that verbal memory is influenced by exercise. Specifically, verbal memory was higher after aerobic exercise compared to muscle stretching. The proposed mechanism was enhanced cardiovascular response (i.e., heart rate) induced by aerobic exercise, which may support brain blood flow and thus cognitive function post exercise. Aerobic exercise performed in a hot environment can exaggerate heart rate as the body enacts thermoregulatory mechanisms such as redistribution of blood flow and sweating. The heightened cardiovascular response during exercise in the heat may influence verbal memory compared to exercise in a temperate environment. **PURPOSE:** The purpose of this study was to investigate the effects of aerobic exercise in the heat on verbal memory. **METHODS:** 40 (23 female, 17 male), physically active individuals, aged 19-23 were randomized to either 45 minutes of low intensity aerobic exercise in a heated environment (HE: 36C, 40% RH) or room temperature (RT: 20C, 19% RH). Heart rate, estimated core temperature, and thermal tolerance were recorded during both trials. Following exercise, the Rey's Auditory Verbal Learning Test RAVLT) was administered, which calculates immediate learning, forgetting, and percent forgetting. The Samn-Perelli fatigue questionnaire was also used to measure subject's fatigue pre and post exercise. **RESULTS:** Heart rate was higher across the HE session compared to RT (significant difference between slopes, $F(1,366)=5.87$, $p=0.015$). There was a significant effect of temperature (all data combined) for thermal sensation ($F(1,39)=11.44$, $p=0.001$) with greater thermal stress reported in HE. RAVLT forgetting and percent forgetting were greater in HE vs. RT (forgetting: 2.75 (1.64) vs. 1.50 (1.68) words, $p=0.034$; percent forgetting: 25.06 (16.92) vs. 13.89 (16.01)%, $p=0.044$ respectively). There was a significant interaction (time x temperature) for fatigue ($F(1,39)=4.46$, $p=0.04$) with fatigue worsening from pre to post in the HE trial only (14.05 (2.75) vs. 11.42 (2.89), $p=0.0006$). **CONCLUSION:** These findings suggest that exertional heat stress may impact memory as the number and percentage of forgotten words was greater. The mechanisms are unclear but may be linked to worsened fatigue after 45 minutes of exercise in the heat.

THE EFFECT OF PASSIVE HEATING VIA HEAT PADS ON SQUAT PERFORMANCE

Sydney I. Kane, Caleb L. Hoekema, Lauren E. Adamski, Brian C. Rider, FACSM & Nigel C. Jiwan

BACKGROUND AND SIGNIFICANCE: Passive heating is commonly used in exercise and rehabilitation to reduce soreness and enhance recovery. Local heating raises intramuscular and skin temperature without altering core body temperature and has been shown to enhance neuromuscular function by improving blood flow, oxygen delivery, and calcium release from the sarcoplasmic reticulum, thereby supporting efficient muscle contractions. While heating methods such as hot water immersion (HWI) and environmental chambers (EC) have been studied, the effects of heat pads on performance remain limited. Unlike HWI or EC, heat pads provide a practical, affordable, and accessible way to deliver localized heat directly to target muscles, making them a novel intervention for resistance exercise (RE) performance. **RESEARCH QUESTION:** What is the effect of acute heat pad application on back squat performance? **PROPOSED METHODS:** Fifteen recreationally resistance-trained males (18-35years old; ≥ 2 sessions/week for ≥ 6 months) will complete a randomized, counterbalanced crossover study consisting of three visits. Visit 1 will include informed consent, anthropometrics, body composition, one-repetition max (1RM) back squat testing, and a dietary log for consistency between Visits 2 and 3. One week later, visit 2 will begin with hydration assessment via urine specific gravity (< 1.020) and heart rate variability (HRV) monitoring via Polar chest-strap at baseline, 5 minutes (mins) during the end of the heating session, during exercise, and 5 mins post-exercise. Skin temperature sensors will record temperature throughout the heating and RE. Participants will undergo 45 mins of thigh heating at either 66°C or applied without heating (sham condition), followed by a dynamic warm-up, and four sets of back squats at 70% of 1RM to failure, with 2 mins rest. Repetitions, bar velocity (via linear transducer), and ratings of perceived exertion will be recorded. Visit 3 will follow the same procedures as visit 2, but will employ the alternate condition and will be separated by one week. Performance and physiological outcomes will be compared between heating and sham conditions using a paired t-test and repeated-measure ANOVA. **PROJECTED LIMITATIONS AND OBSTACLES:** This study includes only recreationally trained males and focuses on the back squat, limiting the generalizability of the findings to other populations and exercises. Potential obstacles include participant comfort and tolerance during heating.

EFFECTS OF A SCHOOL BASED NUTRITION AND EXERCISE INTERVENTION ON INHIBITORY CONTROL IN CHILDREN: A PILOT STUDY

Paige K. Witte, Timber Terrell, Revati N. Malani, Naiman A. Khan, Eduardo E. Bustamante
FACSM, Shelby A. Keye

BACKGROUND: Previous studies strongly support the claim that there is a clear link between the independent effects of exercise and a protein-rich breakfast on inhibitory control in school-aged children. However, few have examined the cognitive effects of providing these two behaviors convergently. **PURPOSE:** To determine the convergent effects of a protein-rich breakfast (~40%) and morning exercise bout (30 minutes) on children's inhibitory control. **METHODS:** Forty-two children (ages 7-14) were randomly distributed to one of four groups: protein-rich breakfast only (N=12), exercise only (N=11), protein-rich breakfast + exercise (N=10), or a control (N=11) receiving neither. Each condition lasted five consecutive days, as a pilot protocol. To track high protein compliance, children were scored a 1-did not eat, 2- partial, or 3- completed. Participants completed a computerized task measuring attentional inhibition (Modified Eriksen Flanker) before and after the intervention. Reaction time and accuracy were recorded as variables of interest. A mixed analysis of variance was used to determine significant differences within (time) and between (intervention) subjects. **RESULTS:** The high protein meal compliance was a mean of 2.24 ± 0.55 . Baseline mean accuracy scores were $82.19\% \pm 12.21$ for congruent trials and $75.59\% \pm 17.38$ for incongruent trials, increasing to $90.17\% \pm 8.63$ and $83.41\% \pm 14.60$ at post-test, respectively. A significant main effect of time was found for Flanker accuracy in both congruent ($F(1,25) = 14.503, p < .001$) and incongruent ($F(1,25) = 7.939, p = 0.009$) conditions. No significant interaction effects were observed between groups for either congruent ($F(3,25) = 0.471, p = 0.705$) or incongruent accuracy ($F(3,25) = 1.131, p = 0.355$). Reaction time analyses revealed no significant main or interaction effects for the task: Flanker congruent (main: $F(1,25) = 0.659, p = 0.425$; interaction: $F(3,25) = 1.231, p = 0.319$), Flanker incongruent (main: $F(1,25) = 2.515, p = 0.125$; interaction: $F(3,25) = 0.026, p = 0.994$). **CONCLUSIONS:** The high-protein and exercise protocol was well-tolerated by the participants. There was a significant time effect but no interaction effects in accuracy or reaction time on the task. While the intervention was successfully implemented, further research is needed to gain a greater understanding of how a protein-rich breakfast and morning exercise can influence a child's cognitive abilities among larger samples.

MENTAL HEALTH SYMPTOMS ARE ASSOCIATED WITH LOWER RESILIENCE
AMONG RECRUIT FIREFIGHTERS

Madelyn R. Szamocki, Jonathon W. Senefeld FACSM & Steven J. Petruzzello FACSM.

BACKGROUND: Firefighters face elevated rates of stress, depression, and suicide, increasing risk for adverse mental health outcomes. Psychological resilience may offer protection, yet its role during the early stages of firefighter training remains unclear.

PURPOSE: To examine associations between perceived stress, post-traumatic stress symptoms (PTSD), anxiety, and depressive symptoms and psychological resilience among recruit firefighters before and after academy training.

METHODS: Recruit firefighters (N=48; 44 males; 26 ± 4 yr; $BMI=28.5 \pm 3.6$ kg·m⁻²) completed assessments before and after a 7-week training academy. Psychological resilience was measured using the Dispositional Resilience Scale (DRS-15). Perceived stress was assessed with the Perceived Stress Scale (PSS), anxiety and depressive symptoms with the Hospital Anxiety and Depression Scale (HADS), and PTSD symptoms with the Post-Traumatic Stress Disorder Checklist (PCL-5). Paired t-tests evaluated changes in resilience and mental health symptoms over time. Hierarchical multiple regression analyses examined associations between stress, PTSD, anxiety, and depression with psychological resilience. Effect sizes were calculated using Cohen's d.

RESULTS: Stress (13.27 ± 5.20 vs. 13.23 ± 4.60 , $p = 0.941$), depressive symptoms (5.40 ± 2.27 vs. 5.19 ± 1.93 , $p = 0.449$), and PTSD symptoms (11.54 ± 14.11 vs. 10.15 ± 13.59 , $p = 0.280$) did not change during academy training. In contrast, psychological resilience (35.19 ± 4.11 vs. 33.69 ± 4.53 , $p = 0.002$, $d = 0.48$) and anxiety symptoms (7.02 ± 4.35 vs. 5.83 ± 3.60 , $p = 0.016$, $d = 0.36$) both declined after training. Before training, higher stress was associated with lower resilience ($R^2 = 0.361$, $p < 0.001$). After training, stress ($p = 0.021$), PTSD symptoms ($p = 0.013$), and depressive symptoms ($p = 0.008$) were associated with lower psychological resilience, with the model accounting for 52% of the variance in psychological resilience ($R^2 = 0.522$).

CONCLUSION: Resilience and anxiety declined during firefighter academy training. Stress was associated with lower psychological resilience before training, whereas stress, PTSD, and depressive symptoms were associated with lower resilience after training. These findings highlight the need for early, targeted mental health support for firefighters.

CORRELATION BETWEEN MUSCLE PERFORMANCE PARAMETERS WITH FUNCTIONAL PERFORMANCE AND BODY COMPOSITION IN ACTIVE OLDER ADULTS

Jessica Frey, Vitor Siqueira, Mingyi Ye, Emerson Sebastiao

BACKGROUND: Aging is associated with declines in all physiological systems, including the neuromuscular and cardiovascular systems. Physical activity, particularly exercise training has been highly recommended for older adults. This is because regular participation in exercise programs has been shown to slow down the physiological declines associated with aging.

PURPOSE: This study examined the correlation between muscle performance parameters with performance in functional tests and body composition in older adults who regularly engage in community-based physical activity programs.

METHODS: This correlational study assessed 23 older adults (75.2 ± 6.1 years) from both sexes, who underwent assessments of muscle strength (PeakTorque), power (PeakPower) and fatigue index (FI) using an isokinetic dynamometer, walking speed (10-meter Walking Test, 10MWT), and body composition for lean mass (LM) and fat percentage (Fat%) (Dual X-Ray Absorptiometry, DXA). This represents baseline data from an intervention study examining the effects of additional leg-based resistance training intervention for older adults engaged in community-based physical activity programs. Person r correlation was used to examine the association among the described variables.

RESULTS: There was a significant moderate-to-large correlation between PeakTorque and LM ($r = 0.68$ [95%CI: 0.37; 0.85], $p < 0.01$), and a moderate negative correlation between PeakTorque and Fat% ($r = -0.52$ [95%CI: -0.77; -0.14], $p = 0.010$). No significant correlation was observed between PeakTorque and performance in the 10MWT. PeakPower presented a moderate negative correlation with 10MWT ($r = -0.56$ [95%CI: -0.79; -0.19], $p < 0.01$), a strong positive correlation with LM ($r = .82$, $p < 0.01$) and a strong negative correlation with Fat% ($r = -0.71$ [95%CI: -0.87; -0.42], $p < 0.01$). FI was not correlated with the walking speed test (i.e., 10MWT) or body composition parameters. **CONCLUSIONS:** Our findings suggest that different muscle performance parameters (i.e., strength, power, fatigue) present with distinct associations with both performance in walking speed measured using the widely adopted 10MWT and body composition parameters (i.e., LM and Fat%).

The Effects of Kinesio Tape on Delayed Onset Muscle Soreness

John Isaac Maibauer, Dakota Deiwert, Dakota Tiede, Keith Naugle, Monica Hubal, Kelly Naugle

BACKGROUND: Kinesio Tape (KT) is a commonly used therapy to relieve the symptoms of pain and delayed onset muscle soreness (DOMS) following strenuous exercise by improving tissue circulation in the taped area. **AIM:** Our study determines the effect of KT on pain and DOMS over 3 days following eccentric exercise. **METHOD:** Untrained participants (N=34; 69% female) performed 30 maximal eccentric actions of the nondominant elbow flexors to induce moderate muscle damage. Participants were randomized to control group (n=11), KT group (n=12; with tension) and a sham KT group (n=11; no tension). Maximal voluntary contraction (strength), pressure pain thresholds (PPT), QuickDash (QD) surveys and Brief Pain Inventories (BPI) were obtained before, 48h and 72h post-exercise. Mixed model ANOVAs assessed main effects (group and time) and interaction ($p < 0.05$). **RESULTS:** Significant time effects were present for all outcome measures following exercise (MVC $F_{((2,31))} = 33.5, p < 0.001, \eta_p^2 = 0.52$; PPT $F_{((2,32))} = 23.1, p < 0.001, \eta_p^2 = 0.42$; QD $F_{((2,32))} = 17.1, \eta_p^2 = 0.36$; BPI: Severity $F_{((2,31))} = 43.7, p < 0.001, \eta_p^2 = 0.59$; Interference $F_{((2,29))} = 12.3, p < 0.001, \eta_p^2 = 0.30$). A 35% loss of strength from pre to post exercise (-12.5 Nm) and a 33.8% decrease in pain threshold at 48 hrs (-71.9 kPa) are consistent with moderate muscle damage with subsequent DOMS. These measures remained significantly elevated 72 hours post-exercise. However, no significant group*time interactions were found (MVC $p = 0.765$; PPT $p = 0.697$; QD $p = 0.533$; BPI: $p = 0.688, p = 0.820$). **CONCLUSION:** The exercise protocol induced symptoms of damage at 48 and 72 hours post-exercise. KT did not improve the recovery of muscle soreness back to baseline following eccentric exercise. These results do not validate KT as an effective treatment for DOMS.

EFFECTS OF A 4-WEEK FINNISH SAUNA INTERVENTION ON BLOOD PRESSURE: A PILOT STUDY

Mason T. Lentz, Corey Washington, Gregory D. Fink, Nigel Paneth, George S. Abela, Supratik Rayamajhi, Katharine D. Currie FACSM

BACKGROUND: Passive heat therapy such as Finnish sauna bathing has been associated with improved cardiovascular outcomes, including decreases in blood pressure (BP), arterial stiffness, and cardiovascular morbidity. Acute sauna use is known to induce vasodilation and reduce peripheral vascular resistance, which may lead to chronic cardiovascular adaptations with repeated use. However, prospective evidence on the short-term effects (4-weeks) of regular Finnish sauna use on vascular function remain limited, especially in a North American sample.

PURPOSE: To examine the effect of 4-weeks of Finnish sauna bathing on resting BP using a pre-post design. **METHODS:** Adults 30-80 years without contraindications for sauna use and stable drug therapy and physical activity levels were recruited. At pre- and post-intervention, mass was assessed with a digital scale and seated resting bilateral systolic and diastolic BP were measured using an automated oscillometric device; values from the higher arm are reported. Participants also recorded at-home BPs throughout the intervention period. The intervention consisted of 4 sessions per week of traditional Finnish sauna bathing between 80-110°C for an accumulated 30 minutes per session, over 4-weeks. Given the small sample size, statistical tests were not performed, however data are presented as mean±SD for pre- and post-intervention.

RESULTS: To date, five participants have completed the intervention (56±14 years, 3 males). Mass decreased 1.3±2.2 kg (range -1.0 to 4.2 kg). Seated systolic BP decreased from 142±19 to 138±20 mmHg; the range of reduction was -4 to 20 mmHg. Diastolic BP decreased from 85±10 to 83±10 mmHg; the range of reduction was -5 to 14 mmHg. At home measurement of systolic BP showed no change (141±14 to 141±15 mmHg). **CONCLUSIONS:** Preliminary findings demonstrate that while all participants were able to successfully complete the 4-week Finnish sauna intervention, assessments of mass and BP in the lab and at-home did not show meaningful reductions. Given the large range of BP reductions within our small sample, it is possible that this intervention may be beneficial to some. Therefore, collection of data in additional participants will enable statistical comparisons and allow us to draw more definitive conclusions about the utility of passive heat therapy for improving cardiovascular health.

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IN-KNEE-SCAPABLE: A RARE KNEE INJURY PATTERN IN A HIGH SCHOOL FOOTBALL PLAYER

Sean McDade & Robert Baker FACSM

HISTORY: A 15-year-old male with right knee pain/stiffness following an injury sustained while playing JV football. The patient was on the field with feet planted when an opponent tackled him at the level of the knees, with a valgus force to the right knee. He had immediate pain and quickly developed a knee effusion. He was taken out of the game and evaluated in the ED immediately, where he was placed in a hinged brace and discharged with crutches to follow up with sports medicine. At the time of his initial appointment, the patient and family noted knee swelling and range of motion seemed to be improving with routine cycling of ice and NSAIDs, although still significantly limited. **PHYSICAL EXAMINATION:** Moderate effusion of the right knee without ecchymosis, erythema, or increased warmth. Tender primarily along medial knee, including joint line and distal insertion of MCL. Range of motion limited between 10 and 45° of flexion and unable to perform adequate posterior drawer test or McMurray. Anterior translation on Lachman's test. Patient gaps wide with valgus stress without definite endpoint, Varus stress unremarkable. No patellar tenderness/discomfort with patellar apprehension testing. 2+ DP/PT pulses. **DIFFERENTIAL DIAGNOSIS:** Differential diagnosis includes MCL sprain, meniscus injury, ACL sprain, PCL sprain, femoral contusion, patellar subluxation. **TESTS AND RESULTS:** Right knee X-Ray 4 view showed trace suprapatellar joint effusion without any other significant abnormalities. Right knee MRI remarkable for complete tear/grade 3 sprain of distal MCL, complete radial tear involving the root attachment of the posterior horn of the medial meniscus with mild extrusion of the body, bone marrow contusion of lateral femoral condyle, large joint effusion, and suspected tear of proximal PCL. **FINAL WORKING DIAGNOSIS:** Grade 3 MCL Sprain, tear of posterior horn of medial meniscus, PCL sprain. **TREATMENT AND OUTCOMES:** The patient was taken to surgery, where it was confirmed that his PCL had ruptured; ACL was found to be intact. He underwent arthroscopic repair of medial meniscus, MCL, and PCL. Following surgery, he was placed in a hinged knee brace and made to be strictly non-weightbearing for 6 weeks. He started physical therapy 1-2 weeks following surgery and is continuing with this at time of submission.

PHYSICAL ACTIVITY AND POST-COVID SYMPTOMS: FINDINGS FROM THE EPICOVID 2.0 SURVEY IN BRAZIL

Deanivea Mendes Felix, Vishnu Jaisree Mohandas, Otavio Amaral de Andrade Leao, Fernando Vinholes Siqueira, Pedro Curi Hallal

BACKGROUND: Physical inactivity contributes to over 5 million non-communicable deaths annually. Active individuals have a lower risk of severe COVID-19 outcomes compared to inactive peers. **PURPOSE:** This study aims to analyze physical activity (PA) changes during the COVID-19 pandemic in Brazil and their association with post-COVID symptoms. **METHODS:** Using data from the 2024 Brazilian national survey EPICOVID 2.0, we analyzed 33,250 participants to assess self-reported PA during the pandemic and the presence of 22 post-COVID symptoms: tiredness, anxiety, headache, body pain, loss of smell/taste, joint pain, sleeping disturbances, difficulty concentrating, memory loss, hair loss, shortness of breath, difficulty standing, cough, dizziness, tachycardia, difficulty in mobility, loss of appetite, numbness, chest pain, diarrhea, menstrual irregularities, and skin spots. Reported PA habits during the pandemic were categorized into four groups: Never Practiced PA (29.45%), Decreased Levels of PA (30.01%), Maintained Levels of PA (32.02%), or Increased Levels of PA (8.53%). We estimated the weighted proportion of PA, post-COVID symptoms, and covariates. Also, we calculated Prevalence Ratios (PR) from Poisson regression models (adjusted for age, sex, education, income, and region) to test the association between PA changes and post-COVID symptoms. **RESULTS:** Adjusted Poisson regression showed that Decreased Levels of PA were associated with memory loss (PR = 1.41, 95% Confidence Interval (CI): 1.05-1.89) and anxiety (PR = 1.28, 95% CI: 1.05-1.55). Increasing Levels of PA showed a lower proportion of numbness (PR = 0.53, 95% CI: 0.29-0.96). Maintaining Levels of PA was associated with lower proportion of several symptoms, among them, tiredness (PR = 0.69, 95% CI: 0.54-0.89), sleeping disturbances (PR = 0.70, 95% CI: 0.51-0.96), dizziness (PR = 0.67, 95% CI: 0.47-0.96), and tachycardia (PR = 0.61, 95% CI: 0.39-0.95). **CONCLUSION:** Participants who maintained or increased their physical activity levels presented a lower prevalence of some post-COVID symptoms, suggesting a protective effect of regular PA. Results stress the importance of targeted interventions that promote equitable access to PA.

**ASSOCIATION BETWEEN KNEE INJURY HISTORY AND ACUTE RECOVERY IN
DIVISION I FEMALE ATHLETES**

Jagger Wraalstad, Arjun Parmar, Matthew Harkey

INTRODUCTION: Following knee injuries, a fraction of athletes will return to their pre-injury performance level. Monitoring both physical and mental recovery may provide insight into long-term effects limiting performance in high level athletes. The Acute Recovery and Stress Scale (ARSS) is a validated tool to assess athletes' recovery-stress states during training.

PURPOSE: Explore the difference in Acute Recovery scores between Division I female athletes with and without knee injury history.

METHODS: Fifty-four female athletes (age 20.04 ± 1.39 years; height 169.38 ± 9.26 cm; mass 67.73 ± 11.24 kg) completed a demographics survey, including injury history information, and the ARSS during a pre-season testing session. Athlete Acute Recovery was quantified using the ARSS subscales representing physical performance, mental performance, emotional balance, and overall recovery. An independent samples Welch's t-test was used to compare ARSS Recovery scores between those with history of knee injury ($n=23$) and those without ($n=31$). A multiple linear regression model was also conducted to adjust for any current injuries impacting ARSS scores.

RESULTS: Athletes with a previous knee injury reported significantly lower Acute Recovery scores (58.9 ± 14.9) than those without (66.9 ± 10.0) ($p=0.033$, $t=2.21$, Cohen's $d=0.64$), which remained significant after adjusting for current injuries ($p=0.046$).

DISCUSSION: Division I female athletes with a history of knee injury have worse Acute Recovery scores compared to those without a history of knee injury. This suggests physical and/or mental effects that may be due to the prior knee injury. Being that the testing session was held during the pre-season, this is especially concerning as results may be worse post-season. Future studies should determine if results are consistent pre- and post-season to further explore this relationship. Overall, this highlights the need for additional monitoring and targeted interventions, even after athletes return to sport, to support recovery and enhance physical and mental performance.

INTERLIMB TRANSFER OF VISUOMOTOR ADAPTATION IN LEFT-HANDED INDIVIDUALS: TESTING THE DYNAMIC DOMINANCE MODEL UNDER DUAL PERTUBATION CONDITIONS

Ayden Battin and Reuben N. Addison

Abstract:

Background: Visuomotor adaptation involves adjusting motor output in response to altered visual feedback, and such phenomenon can transfer across limbs (i.e., Bilateral transfer). The Dynamic Dominance Model posits limb-specific specializations i.e., the dominant arm emphasizes trajectory planning and dynamics, while the non-dominant arm prioritizes endpoint accuracy. Although this model has been widely validated in right-handed individuals, its relevance to left-handed individuals remains underexplored.

Purpose: This study tested whether the Dynamic Dominance Model remains consistent for interlimb transfer patterns in left-handers under combined perturbations of cursor rotation (45°) and gain reduction (0.5).

Methods: 18 Left-handed participants performed goal-directed reaching on a digitizing tablet with a stylus across baseline, adaptation, and transfer phases involving contralateral hand use. Participants were placed into two main groups, the LRL and the RLR groups. Indicating the sequence of hands used for baseline, adaptation and readaptation phases respectively. Initial direction error was our primary measure, analyzed with mixed-model ANOVAs.

Results: Results showed significant group differences during adaptation ($F(1,15.77)=9.78$, $p=0.0066$) and in readaptation after-effects ($F(1,279)=7.80$, $p=0.0056$). No group-by-block interactions were observed, indicating stable asymmetry patterns across practice. Transfer of directional information was stronger from the dominant to the non-dominant limb, in contrast to the reverse pattern commonly observed in right handed individuals.

Conclusions: These findings demonstrate that left-handed individuals exhibit interlimb transfer not consistent with the Dynamic Dominance Model. The results highlight the importance of accounting for handedness in designing bilateral motor training and neurorehabilitation protocols.

BUILDING CADET POWER: UPPER AND LOWER BODY DEVELOPMENT IN CORRECTIONS ACADEMY TRAINING

Adrian Jourdan, James Oñate, Jaclyn Caccese FACSM, Nathan Edwards

BACKGROUND: Corrections officers require rapid force production, making power a critical fitness component for unpredictable occupational tasks and injury mitigation. However, traditional academy training often prioritizes endurance and calisthenics, leaving explosive power underexplored. **PURPOSE:** This study investigated how a standard 10-week corrections academy program influences upper and lower body power development in cadets. Power changes were tracked to assess program effectiveness in preparing cadets for dynamic physical demands. We hypothesized no significant changes in upper or lower body power would be observed. **METHODS:** A longitudinal observational design recruited 72 cadets (59 male, 13 female; age 30.0 ± 8.1 yrs, height 176 ± 9.1 cm, BMI 30.6 ± 5.4 kg/m²) from three local Sheriff's Training Academy classes. Pre- and post-training assessments included countermovement jumps (CMJs) for lower-body power (n=72) and plyometric push-ups (PPUs) for upper-body power (n=68) using force plates. Cadets performed three single reps of each movement with sufficient rest. Four metrics were analyzed: jump height (JH), average braking power (ABP), average propulsive power (APP), and modified reactive strength index (mRSI). Data were non-normally distributed (Shapiro-Wilk $p < 0.05$). Wilcoxon signed-rank tests compared pre- and post-training values ($p < 0.05$), and effect sizes (r) were calculated. **RESULTS:** No statistically significant improvements were found in any power variables. For CMJ, mean $\pm$ SD JH was 24.7 ± 7.4 cm pre- and 24.3 ± 7.4 cm post-training ($p = 0.724$, $r = 0.042$). ABP was -737.5 ± 296.5 W pre- and -790.4 ± 301.8 W post- ($p = 0.216$, $r = 0.146$). APP was 2013.3 ± 609.3 W pre- and 2053.6 ± 613.5 W post- ($p = 0.668$, $r = -0.051$). mRSI was 0.48 ± 0.13 pre- and 0.50 ± 0.14 post- ($p = 0.372$, $r = -0.105$). For PPU, JH was 14.9 ± 12.2 cm pre- and 14.0 ± 8.9 cm post- ($p = 0.919$, $r = -0.012$). ABP was -285.2 ± 186.6 W pre- and -329.4 ± 222.2 W post- ($p = 0.307$, $r = 0.124$). APP was 872.6 ± 367.1 W pre- and 909.5 ± 346.5 W post- ($p = 0.652$, $r = -0.055$). mRSI was 0.18 ± 0.08 pre- and 0.19 ± 0.07 post- ($p = 0.477$, $r = -0.086$). Effect sizes were generally small ($r < 0.15$). **CONCLUSION:** The current corrections academy training program did not significantly improve upper or lower body power in cadets. These findings suggest the curriculum likely lacks the necessary volume or intensity for meaningful power adaptations. A more power-focused approach is recommended to better prepare cadets for explosive demands of corrections tasks.

IMPACT OF ATTENDING A GOAT YOGA EVENT ON XAVIER UNIVERSITY STUDENT HEALTH

Nora Clary, Hannah Beiting, & Jeremy A. Steeves

BACKGROUND: College students commonly experience elevated stress levels due to increased academic, social, financial, and personal pressures that may limit opportunities for physical activity. Campus-wide wellness events, such as goat yoga, may offer outlets for stress relief and social interaction and promote the engagement of physical activity. **PURPOSE:** To describe participation in and evaluate the impact of attending an end-of-semester goat yoga event offered by the Xavier University Exercise Science Club. **METHODS:** A post-event survey was distributed via e-mail to all sixty-two Xavier University students who attended one of two 60-minute goat yoga sessions on Monday, April 28, 2025. Descriptive data (means, SDs, and percentages) were analyzed to summarize participants' demographics, knowledge of physical activity guidelines, and physical activity levels, motivations for, perceived benefits of, and satisfaction with the goat yoga event. **RESULTS:** Eleven participants (91% women; mean age = 20.1 ± 1.4 years; mean BMI = 22.5 ± 1.8 kg/m²) completed the survey, and all students (100%) loved the overall experience, scoring it as 10/10, and would attend a similar event in the future. All participants reported that the event decreased their stress (55% reported a significant reduction and 45% reported a slight decrease in their stress level). The most reported motivation (72%) for attending the event was "to have fun or enjoy the activity." On average, participants reported obtaining 193 ± 118 minutes of moderate to vigorous physical activity per week. While 73% of participants met the weekly exercise recommendation of 150 minutes per week, only 18% knew the correct aerobic guideline (e.g., 150 minutes of moderate-intensity activity per week). While 91% strongly agreed that "exercise is important for my physical and mental health," 73% reported "lack of time" and 18% reported too much academic stress as the top reasons for not being more physically active. **CONCLUSION:** Goat yoga events were well-received by students and decreased stress while offering a structured opportunity to overcome barriers to participating in physical activity.

Funding: The Goat Yoga event was supported by the Midwest ACSM EIM-OC Mentoring Program Grant

ORAL CONTRACEPTIVE USE AND RESPONSE TO EXERCISE-INDUCED MUSCLE DAMAGE.

Mai Wageh, Rebecca Ladouceur, Hannah Luong, Andrea Vilorio Medina, Changhyun Lim, James McKendry, Stuart M. Phillips FACSM & Gianni Parise.

BACKGROUND: Eccentrically-biased exercise induces skeletal muscle damage and a subsequent repair and regeneration response involving skeletal muscle stem cells - satellite cells (SC). The response to damaging exercise may be affected by endogenous or exogenous synthetic, such as those on oral contraceptives (OC), sex steroid hormones; however, the effect of menstrual cycle phase and OC use on the response to damaging exercise remains unknown.

PURPOSE: We sought to characterize the effect of oral OC use on skeletal muscle damage and SC response to eccentric exercise-induced damage versus normally cycling (NC) women.

METHODS: Thirty-two healthy young females (21 ± 3 years [mean $\pm$ SD]) underwent 300 maximal eccentric leg extension contractions on an isokinetic dynamometer, and measures were collected prior to and at 0h, 24h, 48h, and 72h after the muscle damage. Skeletal muscle biopsies were collected from the vastus lateralis to be assessed via immunohistochemistry. Serum samples were collected to determine concentrations of creatine kinase (CK). Measures of strength (maximal voluntary contraction) and soreness (visual analog scale) were collected.

RESULTS: There were no significant differences between NC and OC groups in the SC response, with no changes in SC abundance or activation detected across time (NC: 6.6 ± 3.4 Pax7+ cells/100 fibers, OC: 7.1 ± 2.6 Pax7+ cells/100 fibers; $p > 0.05$). CK increased in both groups up to 72h post-exercise (NC: 278 ± 172 U/L; OC: 357 ± 221 U/L; $p < 0.05$), and a loss in strength was observed immediately post-exercise in both groups and remained as such until 72h.

CONCLUSION: NC and OC users experienced similar strength loss and demonstrated no difference in systemic or satellite cell responses to damaging exercise.

ASSOCIATIONS OF PHYSICAL ACTIVITY DOMAIN WITH SLEEP QUALITY, EFFICIENCY, AND DURATION IN EARLY PREGNANCY

Hunter Nawrocki, Kara Whitaker FACSM, Bethany Barone Gibbs, Melissa A. Jones

BACKGROUND: Quality sleep is critical for pregnancy health yet sleep disturbances are common. The role of different types of activity on sleep health during pregnancy is not well understood.

PURPOSE: To examine associations of household, occupational, and sport-related domains of physical activity (PA) with sleep quality, efficiency, and duration in early pregnancy.

METHODS: The present study is a secondary analysis of the Pregnancy 24/7 cohort study first trimester data. Participants reported frequency of various types of activities in the past month using the Pregnancy Physical Activity Questionnaire (PPAQ). Volumes of PA in each domain were summed for total MET hr/week of household, occupational, and sport-related PA. Sleep was measured using the Pittsburgh Sleep Quality Index (PSQI). Responses are scored as global sleep quality (GSQ), ranging from 0-21 where higher scores indicate poorer sleep quality. Sleep duration was calculated using average reported sleep and wake times where 7-9 hours per night was considered meeting duration guidelines. Sleep efficiency was calculated as total time sleeping divided by total time in bed and $\geq 85\%$ was considered meeting efficiency guidelines. Associations of each domain of activity with GSQ were tested using linear regression. Odds of meeting sleep duration or sleep efficiency guidelines by each domain of physical activity were calculated using logistic regression. All models adjusted for total physical activity, study site, race, age, and education.

RESULTS: Analyses included $n=495$ individuals (86% white, mean $\pm$ SD age: 30 ± 4.6).

Participants reported an average GSQ score of 6.2 ± 2.8 and 75% met sleep duration and 52% met sleep efficiency guidelines. Participants were also highly active, reporting 105 ± 84 ,

108 ± 68 , and 14 ± 12 MET hr/week for household, occupational, and sport-related PA, respectively. Greater sport PA was associated with better GSQ scores (Std β : -0.31 ; $p=0.02$) and greater odds of meeting sleep efficiency guidelines (Std OR: 1.26 ; $p=0.02$) but not odds of meeting sleep duration guidelines. Occupational or household activity were not associated with any sleep outcomes (all $p>0.10$)

CONCLUSION: These findings suggest that greater sport-related but not household or occupational PA may be important for sleep health in early pregnancy. Future studies should include objective sleep and activity assessment and include mid- and late-pregnancy to fully elucidate this relationship.

EFFECTS OF ELECTRICAL STIMULATION DURING A 3-RM ON MOTOR UNIT RECRUITMENT AND VERTICAL JUMP PERFORMANCE

Nathan Sigg, Brittany Followay

BACKGROUND: Electrical stimulation (E-STIM) utilizes electrical currents through electrodes to stimulate involuntary muscle contractions and is often employed for muscle strengthening, rehabilitation, and enhancement of athletic performance, despite the potential onset of fatigue due to involuntary muscle contraction. **PURPOSE:** This study investigated the effects of E-STIM during a 3-RM on motor unit recruitment and vertical jump performance. **METHODS:** Twenty-one resistance-trained adults (20.6 ± 3.5 years) reported to the laboratory on two separate occasions, completing a 10-minute cycling warm-up at a self-selected intensity, followed by a 3-repetition maximum (3-RM) leg extension protocol on the dominant limb. Each participant completed the 3-RM with 85hz of electrical stimulation (E-STIM) to the vastus lateralis (VL) and without E-STIM (control) in a counterbalanced fashion. Following the 3-RM during both sessions, participants then completed a 2-repetition vertical jump attached to a tendo unit. Electromyography (EMG) was recorded from the VL during the 3-RM at both sessions, averaged across the three repetitions, and analyzed for root mean square (RMS). During the vertical jump, jump height, average power output (APO), peak power output (PPO), and rating of perceived exertion (RPE) were recorded. Participants also reported post-session soreness (PSS) using a visual analog scale (VAS). Paired samples t-tests were used to compare RMS, APO, PPO, RPE, and PSS between the E-STIM and control groups. **RESULTS:** RMS of the VL was significantly greater ($p = 0.031$) during the 3-RM with E-STIM (0.562 ± 0.024) compared to the control (0.421 ± 0.032). PPO was significantly lower ($p = 0.022$) following E-STIM (2140 ± 123) compared to the control (2767 ± 211). RPE during the vertical jumps was significantly higher ($p = 0.041$) following E-STIM (13 ± 1.0) compared to the control (10 ± 1.5). No significant differences were observed in vertical jump height ($p = 0.062$), APO ($p = 0.083$), or post-session pain ($p = 0.072$). **CONCLUSION:** The involuntary muscle contraction induced by E-STIM resulted in a higher RMS value, indicating increased motor unit recruitment. Greater motor unit recruitment is often associated with increased muscle fatigue, which may have contributed to the decreased peak power output. Results suggest that E-STIM may cause motor unit recruitment patterns that lead to greater fatigue and impaired performance in power output.

ACUTE EFFECTS OF AMBIENT TEMPERATURE ON POSTURAL CONTROL

Mackenzie Korff, Trevor Lopatin, Nathan Conner, Joshua Haworth

BACKGROUND: Thermal modalities such as ice baths or heated muscle wraps are frequently applied in clinical and recreational settings to aid in injury recovery and alleviate pain. However, it is not clear whether acute changes in tissue temperature would modify postural control. Modified control strategies could include changes in the range of an individual's stable movement or the patterns of sway observed during a dynamic balance task. These constructs of dynamic balance may be evaluated through an undirected BTrackS Limits of Stability (BLOS) test. This test assesses dynamic postural control by measuring the ability to maximally displace the body's center of mass within a fixed base of support, without explicit instruction of where or how to move. **PURPOSE:** This study aims to assess how changes in ambient temperature, known to impact tendon stiffness/laxity, leads to modifications in sway strategies during a dynamic balance task. **METHOD:** 12 participants completed BLOS testing under three conditions: baseline (BL), hot-water immersion (HW), and cold-water immersion (CW). Each immersion lasted 15 minutes, with a one minute BLOS trial being performed immediately following. Ankle skin temperature was continuously monitored. Before the next condition, time was allotted for ankle skin temperature to return to baseline. Raw center of pressure data was exported from the BTrackS software and analyzed with a custom MATLAB script to calculate the perimeter, area, circularity, and pathlength of each trial. One-way Repeated measures ANOVA compared BLOS outcomes across conditions. **RESULTS:** No significant differences were observed between conditions for: Area (cm²; BL 498±78, HW 480.8±60.6, CW 498.2±81.1; $F(2,2)=1.249$, $p=.304$), Pathlength (cm; BL 657.1±388.5, HW 624.2±334.5, CW 595.6±313.8; $F(2,2)=2.122$, $p=.144$), Perimeter (cm; BL 86.8±6.9, HW 85.5±4.7, CW 87.2±6.3; $F(2,2)=.944$, $p=.404$), Circularity (unitless; BL .828±.045, HW .823±.037, CW .819±.039; $F(2,2)=.667$, $p=.524$). **CONCLUSION:** Contrary to the research hypothesis, the BLOS parameters were not significantly affected by cold or hot water immersions. Findings indicate that cold and heat therapies may not acutely alter postural control strategies; rather, their effectiveness may depend on chronic application across extended durations. These values may reflect the limited sample size, as at the time of analysis only 12 participants were recruited.

ACUTE CAFFEINE INGESTION FOLLOWING CREATINE SUPPLEMENTATION: PRELIMINARY EFFECTS ON COGNITION, MOOD, AND RESISTANCE EXERCISE PERFORMANCE

Nate Keenan, David Russell, Cali Prochaska, Owen Dickinson, Carson Allen, CJ Accola, Connor Thorpe & Terence Moriarty

BACKGROUND: Creatine supplementation is associated with improvements in exercise performance and possible links to benefits in cognitive function, while caffeine is a well-established ergogenic aid. However, the combined influence of creatine supplementation followed by acute caffeine ingestion on mood, cognition, and resistance performance in adults remains unclear. **PURPOSE:** This pilot study investigated the effects of varying acute caffeine doses on resistance exercise performance and psychological outcomes following 18 days of creatine supplementation. **METHODS:** Participants (N=14; Groups: 1. decaf n=6 (M=3, F=3)), 2. 100 mg n=3 (M=3, F=0), 3. 200 mg n=4 (M=2, F=2), 4. 300 mg n=1 (M=1, F=0)) consumed creatine monohydrate (5 g/day) for 18 days. On Day 18, subjects ingested coffee containing 0, 100, 200, or 300 mg caffeine 1 hour prior to post-testing. Pre- and post-measures included mood (mood, stress, energy, focus), cognition (NIH Toolbox: attention, processing speed, memory), and resistance performance (estimated 1RM squat/bench, repetitions at 50% 1RM). Within-group pre-post changes were analyzed with paired t-tests, and between-group comparisons (Groups 1-3) used one-way ANOVA on change scores. **RESULTS:** In Group 1 (decaf), squat repetitions at 50% 1RM increased significantly (+6.5 reps, $p=0.008$), with a trend towards improved memory (+8.3 points, $p=0.074$). Group 2 (100 mg) demonstrated no significant changes, though small improvements were observed in processing speed and memory. In Group 3 (200 mg), processing speed (+11.5 points, $p=0.039$) and memory (+17.5 points, $p=0.040$) increased significantly. No significant between-group differences were detected for any outcome (all $p>0.05$). Mood variables were stable across conditions. Group 4 (300 mg) included one participant and was analyzed descriptively. **CONCLUSION:** Following 18 days of creatine supplementation, acute caffeine ingestion yielded domain-specific effects. Decaf improved muscular endurance (squat repetitions), while 200 mg caffeine was associated with significant gains in processing speed and memory. No clear dose-response effects emerged across groups. These findings highlight feasibility and suggest potential benefits of moderate caffeine dosing for cognition and baseline improvements in muscular endurance independent of caffeine. Larger trials are warranted to confirm and extend these preliminary results.

EXERCISE MODULATION OF FIBROTIC SIGNALING IN SKELETAL MUSCLE OF ADULTS WITH TYPE 2 DIABETES: RNA-SEQ EVIDENCE FROM ACUTE AND TRAINED STATES

Cory A. Lutz, Adam T. Ludlow, Jacob M. Haus

BACKGROUND: SKM fibrosis contributes to reduced strength, impaired regeneration, and metabolic dysfunction in Type 2 Diabetes Mellitus (T2DM). Fibrosis reflects excessive extracellular matrix (ECM) deposition leading to dysfunction, with TGF- β 1 as a central regulator. While animal studies support exercise as anti-fibrotic, human skeletal muscle responses, particularly in T2DM, remain unclear. Understanding acute, chronic, and trained responses may clarify mechanisms and inform therapeutic strategies. **PURPOSE:** To examine how aerobic exercise influences transcriptional regulation of fibrosis-related pathways in skeletal muscle of adults with T2DM. **METHODS:** Vastus lateralis biopsies were collected from 10 adults with T2DM before and 30 min after an aerobic bout in the untrained (AU) and trained (AT) states. AT was conducted after a 12-week exercise intervention. RNA was extracted, sequenced (>100M paired-end reads, Illumina), aligned (STAR), quantified (FeatureCounts), and analyzed (limma). Analyses focused on 197 curated genes from literature and the Reactome "Signaling by TGF- β receptor complex" pathway. Pathway analyses included PROGENy, SPIA, GSEA, and GSVA. **RESULTS:** DGE identified 27 significant genes ($p_{adj} < 0.05$, $|\log_2FC| > 0.5$): AU (11 up), INT (6 up, 1 down), and AT (8 up, 1 down). AU and AT shared 6 DEGs with 8 unique to AU and 5 unique to AT. In AU, CDKN1A, CEBPD, FOSB, MYOD1, and MYC increased; in AT, SMAD7 and TXNIP increased. PROGENy revealed 7 enriched pathways: 2 shared and 5 distinct between AU and AT, including JAK-STAT $\downarrow$ in AU and NF- κ B, MAPK, hypoxia, androgen $\uparrow$ in AT. SPIA demonstrated significant modulation of TGF- β signaling in AT, with a bias toward inhibitory regulation. GSEA and GSVA confirmed increased downstream TGFB1 activity across all contrasts. INT upregulated collagen(1A1,1A2,3A1,4A1), FAP, SERPINE1 and downregulated PDK4, showing an ECM synthesis bias supported by SPIA. **CONCLUSION:** Aerobic exercise modulates TGFB1-mediated fibrotic signaling in a state-dependent manner. Acute untrained exercise activates stress-responsive transcription, whereas training reprograms responses toward a regulated, antifibrotic profile. Chronic training promotes coordinated regulation of collagen, fibroblast activity, and ECM remodeling, supporting adaptive ECM maintenance. These findings provide novel human RNA-seq evidence linking aerobic exercise to favorable fibrotic signaling remodeling and establish a foundation for future validation studies.

EFFECTS OF WEARING A WEIGHTED PACK DURING A BALANCE TRAINING PROGRAM ON STATIC BALANCE IN FEMALE SOCCER PLAYERS. A PILOT STUDY

Sophia Raymond, Alexander Daniels, Fiddy Davis, Brian C. Rider FACSM & Kirk Brumels

BACKGROUND: Balance training often employs body weight activities and little is known if an added external load will influence adaptations. **PURPOSE:** To examine the effect of wearing a weighted Ruck Plate during a balance training program on closed kinetic chain balance measurements. **METHODS:** Participants ($n=16$, age: 19.6 ± 0.89 yrs, height: 167 ± 6.24 cm, weight: 65.3 ± 4.2 kg) were recruited from a Division III Women's Soccer team. Based on pretest balance scores participants were split into high ($N=8$) and low performer groups ($N=8$) and then equally randomized to weighted (10% of body weight) and non-weighted groups. Participants engaged in bi-weekly training sessions for 9-weeks consisting of standard eyes open (EO) and eyes closed (EC) single-leg balance activities. Ten-minute training sessions progressed bi-weekly through steady state, proactive, and reactive balance activities; at the conclusion of every three-week period, the ground surface was changed (solid, foam, disc) and the progression repeated. Balance was assessed via Center of Pressure (COP) measures using a balance plate at pre, 3 week, 6 week, and post intervention. A repeated measures analysis of variance (RMANOVA) was used to identify significant differences ($p<0.05$) across time points and training conditions using SPSS version 29.01.1. **RESULTS:** 12 participants completed the study (7 non-weighted, 5 weighted). The RMANOVA revealed a significant between-subjects effect of group for EO with right leg balance, $F(1,10) = 5.11$, $p = .047$, $\eta^2 = .34$, with the non-weighted group performing better overall ($M = 92.7\pm44.6$ cm) than the weighted group ($M = 106.6\pm51.2$ cm). Significant within-subjects effects of time were also found for EC right leg, $F(1.83, 18.32) = 5.33$, $p = .017$, $\eta^2 = .35$ (non-weighted: Pre = 144.8 ± 38.3 , Post = 108.6 ± 34.4 cm; weighted: Pre = 183.3 ± 76.9 , Post = 131.8 ± 20.6 cm), EC left leg, $F(2.27, 22.73) = 8.57$, $p = .001$, $\eta^2 = .46$ (non-weighted: Pre = 144.3 ± 24.5 , Post = 117.6 ± 40.2 cm; weighted: Pre = 180.0 ± 58.4 , Post = 115.8 ± 17.1 cm), and EO left leg, $F(2.20, 22.02) = 5.51$, $p = .010$, $\eta^2 = .36$ (non-weighted: Pre = 58.6 ± 8.6 , Post = 55.1 ± 7.7 cm; weighted: Pre = 73.7 ± 17.6 , Post = 54.8 ± 12.5 cm). No significant Time $\times$ Group interactions were observed across conditions. **CONCLUSION:** Balance improved over time across several conditions, but a weighted pack did not enhance training effects. Follow-up studies with different amounts of weights are needed to determine the role of load in balance training.

ACUTE EFFECTS OF LONG RUN COFFEE ON COGNITIVE FUNCTION, EXERCISE PERFORMANCE, AND HYDRATION: A PILOT STUDY

Ben Boezinger, Chris Reichert, Molly Stamp, Jordan Beasley & Terence Moriarty.

BACKGROUND: Caffeine and hydration strategies are commonly used to optimize endurance performance and cognition, yet the combined effects of coffee with added electrolytes during exercise remain understudied. **PURPOSE:** This pilot study examined the acute effects of Long Run Coffee (LRC; 200 mg caffeine with electrolytes) compared to decaffeinated coffee on exercise performance, cognition, and hydration in trained adults. **METHODS:** Four trained runners (2 males, 2 females; mean age 22.4 ± 5.9 yrs; body weight 71.3 ± 5.0 kg; body fat 11.7 ± 2.8 %; VO_2max 60.0 ± 10.8 ml/kg/min) completed three laboratory visits: (1) VO_2max testing and (2-3) two counterbalanced 10km treadmill time trials following ingestion of LRC or decaf coffee 60 min prior. Cognitive outcomes were assessed via the Stroop test (response time (RT) and accuracy) at baseline, pre-exercise, and post-exercise. Hydration status was determined via urine specific gravity (USG) at the same timepoints. Exercise measures included VO_2 , respiratory exchange ratio (RER), heart rate (HR), and running speed collected every 2.5km. Data were analyzed using repeated-measures ANOVA with paired post hoc comparisons. **RESULTS:** A significant effect of time was observed for Stroop RT ($p=0.026$), with post-exercise RT faster overall. Post-run RT was faster with LRC than decaf (0.540 vs. 0.606 s), with a large within-subject effect size (Cohen's $d = -1.14$). Accuracy remained high ($>28/30$ trials), with a trend toward condition $\times$ time interaction ($p=0.067$) and moderate-to-large post-run effect size favoring LRC ($d=0.78$). HR increased significantly with distance ($p=0.0016$), confirming physiological progression across the run, but no condition differences were found in VO_2 , RER, or speed with this sample size. Descriptively, LRC produced faster completion times (2738.5 ± 439 s vs. 2809.8 ± 396 s) and higher average VO_2 (51.1 vs. 45.8 ml/kg/min). USG decreased significantly over time ($p=0.033$), reflecting expected fluid shifts during exercise, but there were no differences between conditions at any timepoint. **CONCLUSION:** This pilot study suggests that LRC may enhance cognitive performance post-exercise and modestly improve endurance running performance without impairing hydration status compared to decaf coffee. Although underpowered, these preliminary findings warrant further investigation in larger cohorts to clarify the ergogenic and neurocognitive benefits of caffeine-electrolyte coffee blends in endurance settings.

Assessing First-Year Female Athletes' Readiness for Collegiate Strength and Conditioning

Caitlyn Mitchell, Rachel Luehrs

BACKGROUND AND SIGNIFICANCE: Strength and Conditioning (S&C) programs are vitally important for athletes because of the beneficial adaptations they elicit in the domains of strength, power, speed, agility, among others. Proper S&C programs can also help to reduce the risk of injury among athletes. Previous studies have shown that college freshman athletes are unprepared for the rigor of collegiate S&C. However, these studies have primarily focused on male athletes, with the vast majority concentrating on football. There is limited research examining whether incoming first-year, female athlete are adequately prepared for the demands of collegiate S&C. **RESEARCH QUESTION:** To what extent are incoming first year female student-athletes equipped with the S&C skills and knowledge needed to meet the physical demands of collegiate S&C and to minimize injury risk? **PROPOSED METHODS:** A survey will be sent to approximately 300 S&C coaches and 300 Certified Athletic Trainers (ATs) working alongside National Collegiate Athletic Association (NCAA) women's basketball, soccer, and volleyball (across all divisions). The goal is to achieve a 25% response rate from both groups of respondents. A survey will be developed for S&C coaches and will focus on two components: athletes' mental and physical preparedness and injury prevention. The survey component for ATs will focus on frequency of injuries, causes and contributing factors, and athlete preparedness. Both surveys will also include a few optional open-ended questions to gather recommendations for improving first-year athletes' preparedness for collegiate S&C. **PROJECTED LIMITATIONS AND OBSTACLES:** Since the survey will be distributed to many individuals identified through the athletic website, there is a risk of insufficient responses, and the absence of some programs' S&C coach information from the website may further limit the study's representation of all programs within the targeted domain.

Poster session 4

Th 3:30-4:30 pm

Crown Foyer

THE EFFECTS OF GLUTAMINE SUPPLEMENTATION ON COGNITION, MOOD, AND PERCEIVED FATIGUE DURING HEATED EXERCISE

Taylor Vanderah, Abby Rentsch, Maggy Weymiller, Ainsley Schlicher, Caitlyn Conlee, and Kelsey Bourbeau

BACKGROUND AND SIGNIFICANCE:

Exertional heat stress (EHS) can negatively impact both physical and mental performance, which is

especially concerning for people working in hot environments, such as firefighters, construction workers, agricultural workers, and military personnel. When body temperature rises, gut permeability also increases, which can set off an inflammatory response that affects fatigue, mood, and cognitive performance. L-Glutamine (GLN) is a non-essential amino acid that plays a role in gut health and has been shown to help maintain gut integrity and reduce inflammation. While GLN has been studied in relation to EHS, no human research has tested whether acute supplementation can protect cognition during heated exercise. This project addresses that gap, with potential applications for exercise science, occupational health, and nutrition.

RESEARCH QUESTION:

Does acute L-Glutamine supplementation preserve or improve cognition, mood, and fatigue during heated aerobic exercise compared to placebo?

PROPOSED METHODS:

This study uses a double-blind, randomized, counterbalanced crossover design with 14 healthy, active adults (ages 18-45) who meet "good" aerobic fitness standards per ACSM criteria. Each participant will complete a baseline visit and two exercise trials (GLN and placebo), separated by a 7-day washout. After hydration screening, participants will ingest either GLN (.30 g/kg mixed in 500 mL of lemon-flavored water) or placebo 1 hour before performing 55 minutes of cycling at ~65% HRmax in a heat chamber set to 100°F (37.8°C). Cognition will be measured with the Color Word Stroop Test (CWST), mood with the Profile of Mood States (POMS), and fatigue with the Visual Analogue Scale for Fatigue (VAS-F). Heart rate, core temperature, and perceived exertion will be monitored throughout exercise to ensure safety.

PROJECTED LIMITATIONS AND OBSTACLES:

This is a small pilot study (n=14), so the findings may be limited by sample size and may not generalize to less fit or clinical populations. The crossover design reduces variability, but environmental chamber testing still may not fully capture real-world occupational heat stress. Participant compliance with pre-visit guidelines (hydration, diet, caffeine avoidance) could also introduce variability. Despite these challenges, this project will provide valuable first steps toward understanding whether GLN supplementation can protect cognitive performance during heated exercise.

UNDERSTANDING PHYSICAL ACTIVITY BEHAVIORS AND BARRIERS IN YOUNG ADULTS IN COLLEGE

Isabella LaRocco, Logan Selsky, Rachel Luehrs

BACKGROUND AND SIGNIFICANCE: Fewer than 50% of young adult college students meet the recommended physical activity guidelines for American adults. These guidelines state that adults should aim to achieve at least 150 minutes of moderate intensity aerobic exercise (or 75 minutes of vigorous aerobic activity) per week and complete at least two days per week of muscle strengthening exercises. This is concerning because inactivity during early adulthood can increase the risk for cardiovascular disease, mental health challenges, and other chronic conditions. More research needs to be conducted to gain a better understanding of the physical activity behaviors of college students across areas such as year in school, major, athlete vs. non-athlete, etc. There also needs to be a greater understanding of the barriers students experience that prevent them from exercising and possible solutions to these barriers. **RESEARCH QUESTIONS:** This study aims to examine 1) the extent to which college students meet the physical activity guidelines while also exploring differences across key subgroups such as athletes vs. non-athletes, students from different majors, and year in school and (2) the barriers to exercise that students experience and potential solutions to overcome these barriers. **PROPOSED METHODS:** An anonymous Qualtrics survey will be distributed to students from 2-year and 4-year colleges across the Chicagoland area. The survey will include questions pertaining to demographics, physical activity levels, sedentary behavior, barriers to being active, and open-ended items asking students to propose solutions to their own barriers. Responses will be analyzed using descriptive statistics, chi-square tests, t-tests, and ANOVAs to compare physical activity and barriers across the various subgroups. Qualitative responses will undergo thematic analysis to identify common solution themes. The target sample size is 250 responses. **PROJECTED LIMITATIONS AND OBSTACLES:** The study may face challenges in recruitment given reliance on department chairs and program directors to distribute the survey. Additionally, the self-report nature of the survey may introduce response bias. Finally, focusing on Chicagoland schools improves consistency but limits generalizability.

THE EFFECTS OF SODIUM BICARBONATE MINI-TABLETS INGESTED IN A CARBOHYDRATE HYDROGEL SYSTEM ON SKELETAL MUSCLE OXYGENATION: A PROPOSAL

Arturo Sosa III, Matteo F. de Leon, Rachel Kowal, Clayton L. Camic, Daniel M. Hirai, Michael D. Belbis

BACKGROUND AND SIGNIFICANCE: Severe-intensity exercise performance is often limited by skeletal muscle fatigue, largely due to hydrogen ion (H^+) accumulation and metabolic acidosis in the muscle. Sodium bicarbonate ($NaHCO_3$) supplementation is a well-established ergogenic aid that enhances severe-intensity exercise performance by increasing blood buffering capacity, facilitating H^+ efflux from muscle, delaying fatigue, and improving contractile function and glycolytic rate. While traditional $NaHCO_3$ ingestion improves buffering, a hydrogel delivery system provides a practical advantage by eliciting significant blood bicarbonate (HCO_3^-) responses with fewer gastrointestinal side effects. Beyond buffering, $NaHCO_3$ may also affect whole-body metabolism through phosphocreatine kinetics, glycolytic intermediates, and strong ion balance, all critical for muscle function. However, its influence on vascular responses and skeletal muscle oxygenation remains undefined. Investigating these effects is important given the key role of microcirculation in supporting O_2 delivery and utilization at rest and during exercise.

RESEARCH QUESTION: What are the effects of hydrogel $NaHCO_3$ supplementation skeletal muscle microvascular O_2 delivery-utilization matching in humans and severe-intensity exercise tolerance?

PROPOSED METHODS: In a crossover, double-blind, placebo-controlled trial, 15 healthy men and women (18-35 years) will complete an arterial cuff occlusion protocol, and constant work rate cycling at severe intensity following $NaHCO_3$ or placebo ingestion (45 min post-ingestion). Measurements will include heart rate, arterial blood pressure, pulmonary oxygen consumption and vastus lateralis oxygenation via near-infrared spectroscopy (NIRS). Additionally, capillary blood pH and HCO_3^- will be measured at baseline, 45-minute post-ingestion, and post-exercise. NIRS data during cuff occlusion protocols, pulmonary oxygen uptake kinetics, leg muscle oxygen kinetics, and exercise tolerance will be analyzed with paired t-tests. Arterial blood pressure, heart rate, blood pH, and blood HCO_3^- will be measured with two-way repeated-measures ANOVAs.

PROJECTED LIMITATIONS AND OBSTACLES: Peak alkalosis may vary among individuals. We will not determine individualized timing in this trial. However, studies have shown that peak alkalosis is usually between 30-60 minutes post-ingestion. Therefore, we will begin testing at 45 min post-ingestion to capture peak alkalosis in the subjects.

ACUTE EFFECTS OF ALPHA-GLYCERYLPHOSPHOCHOLINE ON UPPER AND LOWER BODY MUSCULAR PERFORMANCE IN RESISTANCE-TRAINED MALES

Matteo F. de Leon, Arturo Sosa III, Michael D. Belbis, Clayton L. Camic.

BACKGROUND AND SIGNIFICANCE: Alpha-glycerolphosphocholine (A-GPC) is a choline-containing compound that functions as a precursor to acetylcholine, thereby supporting and potentially augmenting cholinergic transmission at the neuromuscular junction. Thus, A-GPC supplementation may provide beneficial effects on muscular performance related to strength, endurance, power, and activation. In addition, A-GPC is commonly included in pre-workout formulations despite limited data on its isolated ergogenic effects. Findings from this study will help provide a better understanding of the correct dosage, benefits in performance, and augmentation of muscle activity with A-GPC supplementation. **RESEARCH QUESTION:** Does acute A-GPC supplementation benefit upper and lower body muscular strength, endurance, power, and activation in resistance-trained males? **PROPOSED METHODS:** This will be a randomized, double-blind, placebo-controlled, crossover study. Fifteen college-aged, resistance-trained males will visit the laboratory on three occasions separated by seven days each. The first visit will be used to familiarize the subjects with the testing procedures and for assessment of their one-repetition maximum (1-RM) for bench press and back squat. For the second and third visits, subjects will complete isometric maximal voluntary contractions for bench press and back squat with electromyographic (EMG) signals recorded from the pectoralis major and vastus lateralis. Subjects will then be randomly assigned to ingest 900 mg of A-GPC or placebo 90-minutes prior to being assessed for their 1-RM and repetitions to failure at 70% of first visit 1-RM for both bench press and back squat with EMG recordings, followed by completion of a Wingate Anaerobic Test. Food logs will be recorded for two days prior to each visit. Separate paired-samples t-tests will be used to assess mean differences between the conditions for 1-RM and repetitions to failure for bench press and back squat as well as peak power, mean power, and fatigue index from the Wingate Anaerobic Test. All daily energy intake and macronutrient data will be analyzed with paired-samples t-tests. An alpha of 0.05 will be considered statistically significant. **PROJECTED LIMITATIONS AND OBSTACLES:** Potential limitations include assessing muscle activation in only one upper body (pectoralis major) and one lower body (vastus lateralis) muscle, using only male subjects, and not measuring free choline levels in the blood.

JUMP VOLUME DURING MATCH PLAY ACROSS A PROFESSIONAL VOLLEYBALL SEASON

Kennedy Maynard, Jacob Boyd, Mitch Nienhuis & Chris Dondzila

BACKGROUND: Jumping is a vital component in volleyball, contributing to actions such as serving, blocking, and attacking. While previous studies have examined overall jump demands and positional differences, there is a lack of research on how jump volume varies across a competition season in a professional league. This information is valuable to further examine the relationship in jump volume in practice as it relates to the physical demands presented in a match. It is essential to understand these patterns to optimize load management, performance, and injury prevention. **PURPOSE:** To examine the association of jump volume engaged in practice versus that observed during match play (for all positions) across a season in professional female volleyball players. **METHODS:** Jump volume was monitored using video recordings (Volleymetrics, Agile Sports Technologies Inc., Lincoln, NE) of matches. Jumps for each player/position were manually tallied during practices and matches during week 1 (baseline), week 8 (mid-season), and week 16 (end of season). Pearson correlations were performed to examine the association between jump volume in practice and matches at the beginning, middle, and end of the competitive season. **RESULTS:** Data on 17 players (26.67 ± 3.20 years of age) was observed. The jump volume during practice at week 1, 8, and 16 was 85.4 ± 54.1 , 70.2 ± 52.1 , and 94.6 ± 66.5 , respectively. The jump volume during match play at week 1, 8, and 16 was 60.3 ± 61.7 , 68.1 ± 41.4 , and 65.0 ± 54.8 , respectively. At week 1, practice jump volume was significantly related to match jump volume ($r = .661$, $p < .05$). Although not statistically significant, this trend was diminished at mid-season ($r = .543$, $p = .131$) and at season's end ($r = .427$, $p = .191$). **CONCLUSION:** Jump volume during practices adequately reflected the jump volume demands of match play at the beginning of the season. Jump volume during practice increased at the end of the season, whereas jump volume during matches was relatively constant. Future efforts should examine physiological responses during practice and matches.

REMOTE LATIN DANCE CLASSES WITH HEALTH EDUCATION OR DIETARY INTERVENTION IMPROVE EXECUTIVE FUNCTION IN MIDDLE-AGED AND OLDER LATINOS

Christian Corral, Diana Morales, Manuel Munoz II, Susan Aguinaga

BACKGROUND: Latinos are the fastest growing demographic group in the United States. However, health inequities and chronic disease co-occurrence place them at a higher risk for dementia. Testing culturally tailored multidomain interventions that embed physical activity and dietary patterns may synergistically protect cognitive function. **PURPOSE:** To test the effects of a Latin dance intervention combined with either health education (D+HE) or the Mediterranean-DASH Intervention for Neurodegenerative Delay (D+MIND) on executive function among middle-aged and older Latinos. **METHODS:** Thirty community-dwelling Latinos (93% female) participated in a 6-month pilot randomized controlled trial comparing D+HE (age = 59 ± 6.46) or D+MIND (age = 58 ± 6.13). Dance classes were remote-delivered twice weekly for 60 minutes. Once a week, participants received another hour of instruction regarding general health education or a culturally tailored MIND diet education including benefits of food items, recipes, and self-tracking strategies. Executive function was assessed pre/post with the Stroop Test and Verbal Fluency Test. Mixed effects models were used to analyze time, group, and interaction effects adjusting for age, sex, BMI, and educational attainment. **RESULTS:** There was a significant time effect for verbal fluency (Baseline B = -8.18, $p = 0.02$) and inhibitory control assessed by the Stroop color-word condition (Baseline B = -3.53, $p = 0.03$). There were no significant group or interaction effects. **CONCLUSION:** A remote-delivered dance intervention coupled with either health education or MIND diet education is associated with improved executive function. More research is needed to analyze additive effects of a remote dietary intervention.

INFLUENCE OF RALLY DURATION ON PERFORMANCE ACROSS A PROFESSIONAL VOLLEYBALL SEASON

Arabella Dorado, Lindsey Dip, Mitch Nienhuis, Chris Dondzila

BACKGROUND: In professional volleyball, there is a large variance in jump frequency per position per set. Related to this, it is critically important to be able to sustain jumping ability through an entire match. As the rally, set, and match duration is prolonged, muscular fatigue is more likely to manifest, and thus compromise performance. The relationship between rally duration and performance has not been examined, which is valuable for assessing a team's training and preparation. This study aims to explore this relationship cross the entire 2025 season from a Professional Volleyball Federation team. **PURPOSE:** To examine the association between rally duration and winning the volley/possession. **METHODS:** Rally duration and point possession were visually monitored from video recordings (Volleymetrics, Agile Sports Technologies Inc., Lincoln, NE) over 11 weeks, including 28 matches from a professional women's volleyball team. Rally duration was manually timed via stopwatch from first contact (serve) to the end of the play (where the ball hits the ground). Rally duration was stratified into tertiles: <5 seconds, 5-9.9 seconds, and ≥ 10 seconds. Point biserial correlations were performed to examine the association between rally duration (across sets/matches) and winning the possession (yes/no). **RESULTS:** 18 athletes (26.67 ± 3.20 years of age) participated in the 28 match season from January to May that included a total of 4,920 possessions across 121 sets (4.09 ± 0.76 sets per match). Across all possessions, the average duration was 7.7 ± 6.6 seconds. There were 1,931 possessions lasting <5.0 seconds, 1,688 possessions lasting 5.0-9.9 seconds, and 1,301 possessions lasting ≥ 10.0 seconds. There were no significant relationships between rally duration and winning the volley/possession for any of the tertiles. Although not statistically significant, there were slight inverse relationships between rally durations lasting <5.0 seconds ($r = -.026$, $p = .256$) and 5.0-9.0 seconds ($r = -.022$, $p = .356$) with winning the volley/possession. **CONCLUSION:** Rally duration was not a significant influencing variable on performance. There was a slight trend suggesting the team had a tendency to lose more possessions that were lower in duration. Future efforts should examine how practices and training relate to performance during match play.

THERMAL INSULATION PROPERTIES OF SOCCER JACKETS: IMPLICATIONS FOR FEMALE COLLEGE PLAYER PERFORMANCE AND COMFORT

Kaylie Andres, Lauren Agnew & Paul O'Connor

BACKGROUND: Given that muscle power output can decrease as temperature drops, maintaining thermal balance and therefore sustaining thermoregulation systems, is critical for performance, particularly in outdoor sports. **PURPOSE:** This study investigates the impact of base layer uniforms and uniforms with the addition of a thermal jackets on thermal comfort and potential athletic performance following sideline rest periods in collegiate female soccer players. **METHODS:** This study used a female form, thermal manikin to examine the effects of different sideline clothing ensembles on heat retention in collegiate female soccer players' uniforms. The manikin was dressed in either a standard uniform alone or with an insulated jacket and placed in a climate-controlled chamber. Conditions were typical of an outdoor soccer game, in season. Data collected as means were thermal insulation and temperature ratings during a MET 2 and MET 4 activity level that reflected sideline rest periods. To assess differences in performance and subjective measures across ensemble conditions, a one-way repeated measures ANOVA was conducted for each dependent variable. **RESULTS:** Average thermal resistance (RCT) of the base layer was $0.043 \text{ m}^2 \cdot \text{K/W}$, while the addition of the jacket increased this value to $0.149 \text{ m}^2 \cdot \text{K/W}$ ($p < 0.05$). The base layer ensemble alone was associated with a MET 4 temperature rating of 51.21°F , whereas the addition of the jacket lowered this rating to 18.16°F . **DISCUSSION:** These findings suggest that wearing insulated apparel during rest helps maintain muscle warmth, improve thermal comfort by increasing RCT and improving temperature rating (the lowest temperature at which the garment will keep you warm) to support overall athletic readiness. The results emphasize the importance of selecting appropriate thermal gear to improve post-rest performance player outcomes and justify sports program investments in high-performance apparel. Further research involving human subject testing-specifically among female college soccer players-is needed to better understand the impact of thermal insulation and comfort on athletic performance among this underrepresented population.

BLOOD PRESSURE RESPONSES DURING EXERCISE TESTING IN FEMALES USING ORAL CONTRACEPTION

Dalton Goodwin, Amy Boettcher & Katharine Currie FACSM

BACKGROUND: A systolic blood pressure (BP) ≥ 190 mmHg during exercise testing is an exaggerated BP response in females. This observation provides insight into cardiovascular health, including future risk of hypertension. BP fluctuations throughout a female's menstrual cycle may complicate hypertension diagnosis. Further, 25% of menstruating females use oral contraceptive pills (OCP), which warrants examination of how OCP may affect BP responses during exercise. **PURPOSE:** To examine BP responses during exercise testing throughout a monophasic OCP cycle in females. We hypothesize that there would be no effect of cycle time point on exercise BP values. **METHODS:** Fifteen females (23 ± 2 years, body mass index 23.5 ± 3.2 kg/m²) completed a modified Bruce treadmill test during the placebo, early pill, and late pill phase of their OCP cycle. Brachial BP was measured pre-exercise (standing on treadmill) and at submaximal (Stage 4) and peak efforts. Data were checked for normality and compared using repeated-measures ANOVA or Friedman tests depending on normality.

RESULTS: Data are presented as mean $\pm$ SD for placebo, early pill and late pill time points. Visits took place on days 3 ± 1 (placebo), 10 ± 1 (early pill) and 24 ± 3 (late pill) of their cycle. There was no difference in pre-exercise (121 ± 11 , 122 ± 16 , 125 ± 14 mmHg; $P=0.683$), submaximal (169 ± 23 , 174 ± 30 , 162 ± 22 mmHg, $P=0.106$), or peak (186 ± 21 , 191 ± 29 , 185 ± 20 , mmHg; $P=0.434$) systolic BP between time points. Within the sample, 13% had an exaggerated BP response on two visits, while 40% had an exaggerated BP response on all three visits.

CONCLUSION: Similar BP values throughout an OCP cycle suggest exercise testing can be performed at any time point; however, the observation that 53% had exaggerated BP responses on at least two visits warrants further research.

SEX BASED PERFORMANCE DIFFERENCES IN MIDDLE-DISTANCE EVENTS IN YOUTH TRACK AND FIELD ATHLETES.

Ava Kloehn, Taylor Molling, Margaret T. Jones, Jennifer B. Fields, and Andrew R. Jagim

BACKGROUND: Controversy exists whether youth sports should be segregated by sex.

PURPOSE: The purpose of the current study was to examine sex-based performance differences in middle-distance sprint events among U.S. youth track and field athletes aged 8-12 years.

METHODS: Data were extracted from the USA Track & Field (USATF) Regional and National Championships for the 2025 season. Performance times from all 16 USATF regions and the national championship meets were analyzed. Race times (from finals heat only) for male and female athletes in the 8-and-under, 9/10-year-old, and 11/12-year-old age groups were compared for the 400m (males, $n = 397$; females, $n = 386$) and the 800m (males, $n = 377$; females, $n = 358$) events using paired-sample t-tests ($P < 0.05$). Cohen's d was calculated to determine effect sizes (ES). Data are presented as mean $\pm$ standard deviation (SD). **RESULTS:** Within the 8U and 11/12 age division, male athletes (8U: $1:18 \pm 00:06$; 9/10: $1:10 \pm 00:06$; 11/12: $1:03 \pm 00:04$ minutes:seconds (mm:ss)) ran significantly ($p < 0.001$) faster times than the female athletes for the 400m (8U: $1:20 \pm 00:06$; 9/10: $1:11 \pm 00:05$; 11/12: $1:05 \pm 00:05$ mm:ss). At the 8U, and 11/12 level, male athletes ran 1.88 ± 0.74 sec. (ES = 0.33) and 2.79 ± 0.71 sec. (ES = 0.44) faster than the female athletes for the 400m, respectively. Within each age division, male athletes (8U: $3:08 \pm 00:23$; 9/10: $2:46 \pm 00:14$; 11/12: $2:33 \pm 00:13$ mm:ss) ran significantly faster times than the female athletes for the 800m (8U: $3:19 \pm 00:23$; 9/10: $2:55 \pm 00:18$; 11/12: $2:39 \pm 00:24$ mm:ss; $p < 0.001$). At the 8U, 9/10, and 11/12 level, male athletes ran 10.9 ± 2.5 (ES = 0.48), 8.9 ± 2.2 (ES = 0.56), and 5.6 ± 2.2 sec. (ES = 0.31) faster than the female athletes for the 800m, respectively. **CONCLUSIONS:** Male athletes demonstrated significantly faster 400m and 800m performances compared to female athletes across most age divisions in youth track and field. While sex-based differences were evident as early as the 8U group, the magnitude of differences was small-to-moderate, with effect sizes ranging from 0.31-0.56. These findings suggest that sex-based performance gaps in middle-distance events are present in youth sport but are less pronounced than those typically observed in older adolescent and adult populations. Such results provide relevant context for ongoing discussions surrounding sex-based competition structures and may inform athlete development and participation policies in youth athletics.

SEX BASED PERFORMANCE DIFFERENCES IN SPRINT EVENTS IN YOUTH TRACK AND FIELD ATHLETES.

Taylor Molling, Ava Kloehn, Margaret T. Jones, Jennifer B. Fields and Andrew R. Jagim

BACKGROUND: Controversy exists whether youth sports should be segregated by sex.

PURPOSE: The purpose of the current study was to examine sex-based performance differences in sprint events among U.S. youth track and field athletes aged 8-12 years. **METHODS:** Data were extracted from the USA Track & Field (USATF) Regional and National Junior Olympic Championships during the 2025 season, and performance times from all 16 USATF regions and the national championship meets were analyzed. Race times (from finals heat only) for male and female athletes in the 8-and-under, 9-10-year-old, and 11-12-year-old age groups were compared for the 100m (males, $n = 409$; females, $n = 413$) and the 200m (males, $n = 404$; females, $n = 403$) events using paired-sample t-tests ($P < 0.05$). Cohen's d was calculated to determine effect sizes (ES). Data are presented as mean $\pm$ standard deviation (SD). **RESULTS:** Within each age division, male athletes (8U: 15.73 ± 1.03 ; 9/10: 14.27 ± 0.75 ; 11/12: 13.31 ± 0.68 seconds (sec.)) ran significantly faster times than the female athletes for the 100m (8U: 16.42 ± 1.2 ; 9/10: 14.77 ± 0.95 ; 11/12: 13.70 ± 0.97 sec.; $p < 0.001$) sprint event. At the 8U, 9/10, and 11/12 level, male athletes ran 0.69 ± 0.12 sec. (ES = 0.59), 0.50 ± 0.11 (ES = 0.58), and 0.39 ± 0.11 (ES = 0.47) faster than the female athletes for the 100m event, respectively. Within each age division, male athletes (8U: 33.04 ± 2.57 ; 9/10: 29.72 ± 1.90 ; 11/12: 27.43 ± 1.39 secs.) ran significantly faster times than the female athletes for the 200m (8U: 34.63 ± 3.90 ; 9/10: 30.70 ± 2.13 ; 11/12: 28.30 ± 1.70 sec.; $p < 0.001$) sprint event. At the 8U, 9/10, and 11/12 level, male athletes ran 1.60 ± 0.30 (ES = 0.48), 0.99 ± 0.29 (ES = 0.49), and 0.87 ± 0.29 sec. (ES = 0.56) faster than the female athletes for the 200m events, respectively. **CONCLUSIONS:** Male youth track and field athletes demonstrated significantly faster 100m and 200m sprint times compared to female athletes across all age divisions (8U, 9-10, and 11-12 years). Although performance differences were statistically significant, the magnitude of differences was moderate, with effect sizes generally ranging from 0.47-0.59. These findings suggest that sex-based differences in sprint performance emerge early in youth sport, though the gaps are relatively modest compared to those reported in older adolescent and adult populations. Such results provide important context for ongoing discussions about sex-based grouping in youth athletics.

JOINT KINEMATIC ASYMMETRY AND ITS IMPACT ON RUNNING EFFICIENCY: A WEARABLE SENSOR STUDY

Mahgol Zahra Kamari, Paul M. Wright, Michael D. Belbis

BACKGROUND AND SIGNIFICANCE: Running is one of the most widely practiced physical activities. Running efficiency is a central determinant of endurance performance and injury prevention. Efficient mechanics allow athletes to sustain performance with reduced energy expenditure, while inefficiencies often contribute to common overuse injuries. One of the major biomechanical contributors to running inefficiency is lower-limb kinematic asymmetry, defined as differences in movement patterns between the left and right sides. Even subtle asymmetries in hip, knee, or ankle function can reduce running economy and elevate injury risk. Wearable technologies, particularly inertial measurement units (IMUs), now allow portable and cost-effective tracking of gait kinematics. These devices enable continuous monitoring in both training and real-world environments, offering valuable insights into efficiency and injury mechanisms. **RESEARCH QUESTION:** How does joint kinematic asymmetry, measured using wearable sensors, affect running efficiency and movement coordination in distance runners at various exercise intensities? **PROPOSED METHODS:** A total of 15 competitive and recreational runners (ages 18-25) who run at least 4 times per week, will be recruited. The study will involve four visits. Visit 1 will include informed consent, medical screening, demographics, measurement of resting heart rate, and determination of estimated maximum heart rate ($MHR = 220 - \text{age} \times 0.7$). Visits 2-4 will involve treadmill-based running trials (~60-90 min each). Each visit will include runs at low (~60-65% MHR), moderate (~70-75% MHR), and high (~80-85% MHR) intensities. Each run will last ~10 min. IMUs placed on the shank, thigh, and lower back will capture 3D acceleration, angular velocity, and orientation. Participants will maintain consistent running form, and running efficiency, symmetry, and intra-limb coordination will be continuously monitored. Repeated measures ANOVA and correlation analyses will be used to assess intra-subject variability and associations between asymmetry and running efficiency. **PROJECTED LIMITATIONS AND OBSTACLES:** The limitations for this study might involve difficulty in isolating asymmetry effects from factors like fatigue and footwear, in addition to managing IMU signal noise. Despite these challenges, wearable-based analysis offers a practical approach to studying biomechanics outside of laboratory settings.

BALANCE PERFORMANCE ON A NOVEL SNOWBOARD SIMULATOR: FREE VS FIXED ANKLE CONDITIONS

Gracielle Wilhelm, Joshua Haworth, Mackenzie Korff, Matt Colletti, Sam Aylward, Amber Spencer

BACKGROUND AND SIGNIFICANCE: Balance is essential for independence, fall prevention, and athletic performance. Unstable surface training has been shown to enhance neuromuscular control and proprioceptive function. Gamified approaches may improve motivation and adherence. We propose, and the use of a snowboard simulator, which represents an innovative, accessible method for balance training with potential applications in both clinical and athletic populations. The simulator itself combines an unstable platform with biofeedback-driven software, via IMU, requiring continuous postural adjustments to interact with the gametask environment. Because real-world snowboarding involves bindings that restrict ankle movement, incorporating both free and fixed ankle conditions within the simulator provides a controlled and testable parameter for examining how ankle mechanics influence postural strategies. **RESEARCH QUESTION:** How do free versus fixed ankle conditions during gamified snowboard simulation influence performance, and what role do baseline balance confidence, snowboarding history, leg dominance, grip strength, plantar flexion strength, and pre-test balance performance play in shaping these outcomes? **PROPOSED METHODS:** Participants will complete a series of forms including a baseline balance confidence questionnaire and a snowboarding history survey to categorize experience level. Pre-test assessments will include the Modified Clinical Test of Sensory Interaction on Balance (MCTSIB) and Limits of Stability (LOS) tests using the BTrackS system, as well as grip and plantar flexion strength. Two randomized testing conditions follow: free ankle, allowing independent sagittal plane foot movement from 0 to 15 degrees, and fixed ankle which allows 0 degrees. In both conditions, participants will ride an air cushion compliant surface snowboard simulator while interacting with a video game requiring dynamic postural adjustments. IMU metrics will be collected during both conditions. Analyses will explore correlations with baseline measures, compare performance between free and fixed conditions, and examine differences between snowboarding experience level. **PROJECTED LIMITATIONS AND OBSTACLES:** The short testing duration may constrain the ability to detect long-term adaptations. Additionally, the snowboard simulator is a novel, custom-built device; while innovative, its lack of prior validation may limit the comparability of results to existing balance interventions.

SUBLIME TUBERCLE FRACTURE: A RARE FRACTURE IN A BASEBALL PITCHER

Lauren Etzkorn, Robert Baker & David Waterson

HISTORY: 16-year-old right-handed male baseball pitcher presented three days post-injury with acute right elbow pain. He describes a distinct "pop" while pitching. He reported associated tingling in the 4th and 5th digits of the right hand. He denied preceding pain, weakness, or instability. Past medical history of right 4th and 5th metacarpal shaft fractures status post ORIF and remote history of right medial epicondylitis.

PHYSICAL EXAMINATION: On exam, the right elbow demonstrated medial swelling without ecchymosis, erythema, or skin compromise. He lacked a few degrees of full active flexion and extension compared to the contralateral side. His supination and pronation were symmetric. There was focal tenderness over the sublime tubercle. No significant tenderness was appreciated over the distal biceps tendon, medial or lateral epicondyles, or olecranon. Radial pulse was palpable. Sensory testing revealed decreased light touch sensation over the 4th and 5th digits of the right hand.

DIFFERENTIAL DIAGNOSIS: The differential diagnosis included UCL tear with or without avulsion fracture, traction apophysitis of the medial epicondyle, medial epicondyle avulsion fracture, flexor-pronator strain, and ulnar neuropathy.

TESTS AND RESULTS: Right elbow X-Ray revealed good alignment with irregularity and lucency at the sublime tubercle and subtle medial soft tissue swelling, raising concern for acute fracture versus chronic change.

MRI of the right elbow demonstrated nondisplaced osseous avulsion fracture at the sublime tubercle insertion of the anterior bundle of the ulnar collateral ligament (UCL) with surrounding marrow and soft tissue edema, thickened and remodeled anterior bundle, intact posterior bundle, and a mild joint effusion.

FINAL WORKING DIAGNOSIS: Nondisplaced avulsion fracture of the right elbow sublime tubercle.

TREATMENT: Patient was placed in I-ROM brace to limit range of motion from 30 to 60 degrees with acetaminophen for pain management, and serial x-rays were obtained to track fracture healing. The case was discussed with orthopedic surgery, and fracture is non-operative.

OUTCOME: Patient will remain in brace for three months with possible return to throwing in 3-6 months.

EFFECTS OF AEROBIC BLOOD FLOW RESTRICTION TRAINING ON MUSCULAR STRENGTH, VO₂MAX, AND FUNCTIONAL ABILITY IN OLDER ADULTS

Kelly Kline, Aidan Berndt, Brittany Followay

BACKGROUND: Blood flow restriction (BFR) training has been demonstrated to improve physical fitness parameters, and may mimic the effects of high-intensity exercise, even while exercising at lighter loads. Limited research has been done to determine whether aerobic BFR training elicits greater improvements in muscular strength and maximal oxygen consumption (VO₂max) than non-BFR training in older adults. **PURPOSE:** This study investigated the effects of BFR walking on muscular strength, VO₂max, and functional performance in older adults compared to non-BFR walking. **METHODS:** Ten physically active males (67 ± 5.3) were randomly assigned to a BFR-walking (BFRW, $n = 5$) or control (CON, $n = 5$) group. All participants completed two 15-minute walking sessions per week for a total of four weeks. BFR cuffs were placed on the upper thighs during each walking session in the BFRW group, beginning with a resistance of 160mmHg in the first week, and increasing by 10mmHg each week. Muscular strength was assessed via a 1-RM of the leg extensors (LE), VO₂max was estimated via the Queen's College Step Test, and functional performance was evaluated via a 30-second sit-to-stand (STS) and timed-up-and-go (TUG). Ratings of perceived exertion (RPE) were averaged across the eight walking sessions. Repeated measures ANOVA were used to examine changes over time and between groups. **RESULTS:** A time x group interaction was observed for LE-1RM, with a main effect of time for the BFRW group, demonstrating greater LE-1RM at POST (218.33 ± 75.1) compared to PRE (211.67 ± 72.1). No main effect of time was observed for the CON group ($p = 0.072$). A time x group interaction was also observed for VO₂max, with a main effect of time for the BFRW group ($p = 0.046$), demonstrating greater VO₂max at POST (43.47 ± 0.84) compared to PRE (40.87 ± 1.6). No main effect of time was observed for the CON group. No significant differences were observed in RPE between groups ($p = 0.067$). No significant differences were observed between groups for STS or TUG ($p > 0.05$). **CONCLUSION:** Results suggest that BFR-walking may be more effective at improving muscular strength and VO₂max than walking alone. Walking with BFR was no more exerting than walking alone, suggesting that BFR may be effective at improving health-related fitness components in older adults who cannot exercise at higher intensities. Further research is needed to investigate the effectiveness of BFR in improving functional ability.

NOVEL COMPUTER BASED TOOL TO MEASURE BASE OF SUPPORT

Amber Spencer, Mackenzie Korff, Joshua Haworth

BACKGROUND: Balance and stability are essential components to overall quality of life. To interpret static and dynamic balance performance, it is critical to accurately estimate the base of support (BoS). Currently, BoS can be estimated in several ways, including geometric approximations based on stance width or by using points of contact with an instrumented mat. However, there is a lack of consensus on which BoS measurement method is best.

PURPOSE: The purpose of this project was two-fold: to develop a novel BoS measurement method and determine it provides a more accurate representation of functional BoS and improve interpretations of stability metrics compared to rectangular estimations of BoS.

METHODS: First, we developed a MATLAB-based algorithm that uses computer vision applied to foot tracings to generate a convex hull around digitized foot tracings. Then, we recruited twenty-five healthy adults (13 female, 12 male; age = 22.4 ± 2.7 years) to participate in this study evaluating our novel BoS measurement by comparing its reliability to rectangular estimations of BoS. Each participant stood in their natural stance on a fixed-size sheet of paper while their foot placement was traced using a marker. Rectangular BoS (RBoS) was calculated using length multiplied by the width of the outermost bounds of the physical trace. The same foot trace was digitized and processed using a computer vision algorithm. A convex Hull function was applied to estimate BoS (HBoS). A repeated measures ANOVA and subsequent intraclass correlation coefficient (ICC) were calculated to determine mean difference as well as agreeability between the two measures.

RESULTS: We successfully developed a novel computer based tool to measure base of support. The (RBoS = 1001.8 ± 108.0 cm²) was significantly larger than the HBoS (HBoS = 918.2 ± 101.2 cm²). A repeated measures ANOVA indicated a significant difference between the two approaches, $F(1,24) = 105.93$, $p < 0.001$. ICC results indicated a strong agreement between the two methods. ($ICC(3,1) = 0.92$; 95% CI: 0.837-0.970). All data presented as mean $\pm$ SD.

CONCLUSION: Although both methods trend similarly, convex hull estimations using computer vision algorithms on digitized images provide a more anatomical representation for evaluating BoS. Standard RBoS measures may overestimate the base of support by failure to account for foot contour. Further research could investigate the validation of this method against pressure mat contours.

THE EFFECT OF WHITE NOISE ON MUSCULAR ENDURANCE PERFORMANCE IN HEALTHY COLLEGE-AGED MALE ATHLETES

Keegan Honig & James Sackett

BACKGROUND: Listening to music during exercise has been shown to improve performance. Listening to white noise has shown benefits in other areas, such as cognitive performance and stress relief. However, the effect of listening to white noise on exercise performance remains unknown. **PURPOSE:** We tested the hypothesis that listening to white noise would improve muscular endurance performance and lower rate of perceived exertion (RPE) when compared to listening to music. **METHODS:** Thirteen college-aged male athletes (age: 20 ± 1 y; BMI: 22 ± 2 kg/m²) participated in three randomized sessions. Participants wore earbuds and listened to no noise in one session as a control (CT), white noise in one session (WN), and self-selected music in one session (MU). Each session included a pushup test (PU), a sit-up test (SU), and a plank test (PL), all completed until failure. Performance was recorded as repetitions (a.u.) completed in PU and SU and time elapsed (s) in PL. Directly after the participant reached failure, they were asked their RPE (a.u.) using the Borg 6-20 Scale. Data were analyzed via one-way repeated measure ANOVAs. Significance level was set to $p < 0.05$. Data are presented as mean $\pm$ standard deviation. **RESULTS:** There was not a significant difference ($p = 0.37$) for PU performance between CT (38.5 ± 10.5 a.u.), WN (40.8 ± 12.1 a.u.), or MU (41.1 ± 10.7 a.u.). There was not a significant difference ($p = 0.08$) for SU performance between CT (30.9 ± 8.3 a.u.), WN (35.5 ± 9.0 a.u.), or MU (33.6 ± 6.6 a.u.). There was not a significant difference ($p = 0.24$) for PL performance between CT (125.0 ± 36.4 s), WN (117.6 ± 35.4 s), or MU (136.5 ± 39.2 s). Notably, RPE was significantly lower ($p = 0.02$) during PU in WN (13.5 ± 2.3 a.u.) vs. MU (15.2 ± 1.7 a.u.), but was not different between CT (14.1 ± 2.5 a.u.) vs. MU ($p = 0.06$) or CT vs. WN ($p = 0.72$). There was not a significant difference ($p = 0.89$) in RPE during SU between CT (13.2 ± 3.7 a.u.), WN (13.5 ± 2.8 a.u.), or MU (13.2 ± 3.1 a.u.). There was not a significant difference ($p = 0.71$) in RPE during PL between CT (15.9 ± 1.9 a.u.), WN (15.6 ± 3.2 a.u.), or MU (16.1 ± 2.8 a.u.). **CONCLUSION:** These results indicate that listening to white noise during muscular endurance exercise does not improve performance, but it may provide positive effects on RPE. Further research is needed to better understand the effects of white noise on exercise.

RELATIONSHIP BETWEEN BODY WEIGHT AND FUNCTIONAL FITNESS

Madeline Dungan, Diane Dungan, Scott Fenstermacher, Bradley Kendall

Purpose: Obesity has become one of the most prevalent noncommunicable diseases in the United States. Currently, approximately 30% of adults are classified as overweight 4 in 10 adults meet the criteria for obesity. While excess body weight is a significant health concern on its own, it is also associated with numerous comorbidities and complications. Emerging evidence suggests that declines in physical performance may begin even before individuals reach the threshold for obesity. Therefore, the purpose of this study was to examine the relationship between body weight and functional fitness in adults. **Methods:** Participants were adults ($N = 30$; Mean age = 57 ± 12 years) who volunteered for an employee wellness program. Upon enrollment, participants completed assessments of aerobic capacity (6-minute walk test), mobility (4-square step test and 8-foot up-and-go test), and static balance (Modified Clinical Test of Sensory Interaction in Balance, MCTSIB). Body weight and Hemoglobin A1c levels were also measured. **Results:** Of the 30 participants, 18 were classified as overweight ($BMI > 25.0$), and 2 were classified as obese ($BMI > 40.0$). As hypothesized, body weight was significantly related to the 6-minute walk test ($r = -.727$, $p < 0.01$), the 4-square step test ($r = .370$, $p < 0.05$), the 8-foot up-and-go test ($r = .500$, $p < 0.01$), and the MCTSIB ($r = .395$, $p < 0.05$). Additionally, body weight was also related to A1c ($r = .388$, $p < 0.05$). **Conclusion:** These findings underscore the relationship between body weight and functional fitness. Adults who are overweight or obese may exhibit reduced aerobic capacity, impaired mobility, diminished balance, and elevated blood sugar levels. Consistent with prior research, increased body weight may serve as an early indicator of physical decline. Future studies should explore the predictive value of body weight for long-term physical limitations and risk of related health conditions.

INFLUENCE OF TEMPERATURE ON CARDIOVASCULAR DYNAMICS IN A MICROGRAVITY MODEL

Mitchell Hamilton, Nyah Beavers, Brody Woods, Katherine Schmidt, Micah Zuhl, Rachael Nelson.

INFLUENCE OF TEMPERATURE ON CARDIOVASCULAR DYNAMICS IN A MICROGRAVITY MODEL

Authors: Hamilton, M.G. B.S., Beavers, N.S. B.S., Woods, B.K. B.S., Schmidt, K.B. B.S., Zuhl, M.N. Ph.D., and Nelson, R.K., Ph.D.

BACKGROUND: Prolonged microgravity exposure during space missions adversely affects astronauts' cardiovascular health. Variations in ambient temperature are known to cause changes in vascular resistance, altering hemodynamics and impacting cardiovascular health. The combined effect of micro-gravity and temperature on hemodynamics and cardiovascular function remains unclear. **PURPOSE:** To evaluate hemodynamic responses to warm and cool environments in simulated weightlessness. **METHODS:** Twelve highly fit, healthy male (n=7) and female (n=5) adults (23.7 ± 3.8 years) participated in this investigation. Using a randomized crossover study design, participants completed two identical trials in a cool (18°C) vs. warm (27°C) environment. Trials were separated by 7 ± 3 days and were completed at the same time of day ± 2 hours. Weightlessness was simulated using a tilt table starting at a 45° head-up tilt and going to a -45° head-down tilt in 15° increments. Participants remained at each tilt angle for 6 minutes, where heart rate via ECG telemetry, manual blood pressure, skin temperature, and perceived thermal sensation (ASHRAE Thermal Scale) were recorded in the final minute of each tilt angle. **RESULTS:** There was a significant main effect of environment on higher skin temperature (35.5 ± 0.8 vs. $33.7 \pm 1.5^{\circ}\text{C}$, $p < 0.01$) and thermal sensation (1.2 ± 1.1 vs. -1.2 ± 1.2 , $p < 0.01$) during the warm vs. cool trial. There was also a significant main effect of environment on higher heart rate during the warm vs. cool trial (67.6 ± 13.8 vs. 61.9 ± 11.4 bpm, $p < 0.01$). No significant differences were observed between environments or tilt angles in SBP. The incidence of ectopic beats was similar between the warm vs. cool trials (20 vs. 19, $p = 0.89$). **CONCLUSION:** Warm ambient temperature appears to help mitigate reductions in heart rate observed during simulated weightlessness. Understanding how temperature influences hemodynamics in a weightless environment may help improve space shuttle design to enhance astronauts' health while in space as well as upon returning to gravity on Earth.

"HOT ONES" ORAL SPICE DELIVERY PROVOKES CHANGES IN MOVEMENT STRATEGIES

Samuel Aylward, Makenzie Korf, Matt Colleti, Joshua Haworth

BACKGROUND: Oral spice intake, particularly capsaicin, activates TRPV1 receptors that initiate sensory responses such as burning and heat, which may lead to physiological and behavioral changes. While capsaicin has been explored for its effects on metabolism and performance, less is known about its acute impact on balance and movement strategies. Disruption or enhancement of focus due to oral spice could influence neuromuscular control during postural tasks, presenting both a potential risk and a novel intervention avenue.

PURPOSE: To examine how oral spice delivery at two distinct Scoville heat unit (SHU) levels impacts balance and postural control using the BTrackS Balance Test (BBT) and Limits of Stability (LoS) protocol.

METHODS: Seven healthy participants (4 male, 3 female, ages 18-25) completed BBT and LoS trials at baseline, after a low spice dose (30,000 SHUs), and after a high spice dose (55,000-60,000 SHUs). A within-subjects design was used. ANOVA and pairwise t-tests were applied to assess postural sway (BBT, cm) and total excursion area (LoS, cm²) across conditions. Heart rate and subjective responses were monitored throughout.

RESULTS: One-way ANOVA revealed no significant differences across spice conditions for both BBT and LoS protocols ($p > 0.05$) (BBT baseline 19.57 ± 4.47 cm, BBT Low spice 17.29 ± 4.57 cm, BBT Hi spice 16.71 ± 4.72 cm. LoS Baseline 452.29 ± 54.86 cm², LoS Low spice 456.99 ± 48.67 cm², and Low Hi spice 452.29 ± 62.51 cm²). However, pairwise t-tests for BBT showed significant differences between baseline and both low ($p = 0.043$) and high spice conditions ($p = 0.035$), suggesting an acute influence of spice on static balance. No significant changes were found in LoS outcomes.

CONCLUSION: While overall ANOVA results did not demonstrate statistical significance, pairwise comparisons suggest oral spice delivery may influence static balance outcomes as measured by BBT. These findings raise questions about the role of spice-induced sensory activation in enhancing focus or altering postural control. Further research with larger samples and controlled dosing is warranted to investigate the potential "dialing-in" effect and its implications for performance, rehabilitation, and neuromodulation strategies.

COMPARISON OF PULMONARY OXYGEN UPTAKE AND SKELETAL MUSCLE OXYGENATION KINETICS IN ENDURANCE RUNNERS AND SPRINTERS

Danielle Rodriguez, Chase Pruett, Liliana Mayo-Dominguez, Mekhii Morris-Heron, Julieta Sanchez, Michael Sauber, Viviana Ramirez, Finley Garza, Cameron Johnson, Jaden Glisson, Emily Percino, Arturo Sosa III, Carlos Estrada, Craig Broeder, Michael Belbis

BACKGROUND AND SIGNIFICANCE: Efficient oxygen (O₂) delivery and utilization are crucial for energy production and key factors of exercise performance. Exercise training, such as long-distance running or sprinting, can enhance the efficiency of O₂ transport to tissues through cardiovascular and musculoskeletal adaptations. At the microvascular level, training increases capillary density, improving O₂ delivery to working muscles and delaying fatigue. The efficiency of this process can vary depending on training background. Pulmonary O₂ uptake and muscle O₂ kinetics reflect how rapidly O₂ delivery and utilization adjust to changing exercise demands, which is a critical determinant of performance. While endurance runners often exhibit faster pulmonary O₂ uptake kinetics than sprinters, the extent of these differences under controlled exercise conditions is unclear. Addressing this gap can provide valuable insight into how different training specializations influence O₂ dynamics during exercise. **RESEARCH QUESTION:** To what extent do endurance runners and sprinters differ in the speed and efficiency of pulmonary O₂ uptake and skeletal muscle O₂ kinetics when transitioning to moderate- and severe-intensity exercise? **PROPOSED METHODS:** Thirty healthy men and women (18-35 years old) will undergo two laboratory visits. Visit 1 will involve an incremental treadmill cardiopulmonary exercise test to determine maximal O₂ uptake ($\dot{V}O_{2\max}$) and maximal running speed. Visit 2 will consist of a moderate-intensity treadmill run (6 min at 90% ventilatory threshold) followed by a severe-intensity run (80% maximal speed to volitional exhaustion), separated by ≥ 30 min of recovery. Physiological measures include heart rate (chest strap), arterial blood pressure (auscultatory method), pulmonary O₂ uptake kinetics (metabolic cart), and skeletal muscle O₂ kinetics of the vastus lateralis (near-infrared spectroscopy, NIRS). Fatigue resistance will be assessed as time-to-exhaustion during severe-intensity running. **PROJECTED LIMITATIONS AND OBSTACLES:** Sex-related physiological differences may contribute to variability in responses. Although participants will be asked to avoid strenuous exercise, food intake, and alcohol prior to testing, daily variability in diet and sleep cannot be fully controlled and may influence cardiovascular and metabolic outcomes. NIRS probe placement may also introduce variability, even with standardized preparation and securing procedures.

JUMP VOLUME DIFFERENCES ACROSS POSITIONS THROUGHOUT A PROFESSIONAL VOLLEYBALL SEASON

Vincent Couch, Annika Van Loton, Mitch Nienhuis, Chris Dondzila

BACKGROUND: Jumping is the most critically important aspect of volleyball performance and imperative for actions such as serving, blocking, and attacking. Previous research has examined jump volume during competitive match play showing that different positions have variance in jump volume due to their required actions within a match. Practices should be designed to meet the jump volume demands of matches, yet it remains unknown the jump volume loads experienced during practice across an entire competitive season for the individual positions, particularly for professional level volleyball players. **PURPOSE:** To examine jump volume engaged in practice in all positions across a season in professional female volleyball players. **METHODS:** Jump volume during practice was monitored using video recordings (Volleymetrics, Agile Sports Technologies Inc., Lincoln, NE) in volleyball players. Jumps for each player/position were manually tallied during practice throughout the season (weeks 1, 5, 10, 15, and 20), and then average jumps/week were calculated. Repeated measures ANOVAs were performed to examine potential differences in jump volume (average jumps/week) for middle blockers, opposite hitters, outside hitters, setters, and liberos across the season.

RESULTS: Data was available for 14 professional volleyball players. The average jump volume/week for the entire season for liberos, middle blockers, opposite hitters, outside hitters, and setters were 10.57 ± 13.54 , 97.57 ± 31.41 , 70.79 ± 25.65 , 62.11 ± 21.07 , and 153.23 ± 42.15 , respectively. There was a statistically significant difference in average jump volume/week between the position groups across the season ($F(16, 18.96) = 3.79$, Wilk's Lambda = 0.012, $p < 0.05$). Although each position had minor fluctuations in jump/volume throughout the season at the stated time points (peaking around midseason), liberos had the lowest jump volume, followed by outside and opposite hitters, and setters and middle blockers had the highest jump volumes. **CONCLUSION:** Jump volume demands during practice were intentionally varied during practice for each position due to their demands in a possession. Jump volume peaked between the 50% and 75% point of the season, and then slowly tapered. Future research should explore the associated physiological responses during training throughout the season.

PHYSICAL FUNCTION IN 6-MONTH-OLD MICE FOLLOWING VARYING LEVELS OF EARLY LIFE ACTIVITY

Jackson P. Yeager, Amritesh Bali, Anthony A. Kachulkin, Julia Beltran, Ava Ward, Arina Prikhodko, Grace Scott, Paul T. Reidy

BACKGROUND: Physical activity and inactivity are known to have opposing impacts on an individual's health throughout their lifespan. Less is known about how different levels of physical activity during early life stages can impact physical function later in life. **PURPOSE:** This study investigates the impact of varying levels of physical activity in early life on physical function in early adulthood. **METHODS:** 56 mice were separated into 2 cohorts: all completed 14 days of treatment from 3 to 5 weeks postnatal, involving voluntary wheel-running (VWR), early-life activity (ELA), standard cage sedentary (SED), small mouse cage (SMC), or hindlimb unloading (HU). The level of activity was as follows (VWR>ELA>SED>SMC>HU). After this 14-day period, ELA, SED, SMC and HU mice were placed in standard-size cages and allowed to ambulate freely while VWR maintained access to running wheels. Around 6 months of age, the mice underwent a battery of assessments, including functional tests of grip strength (GS), inverted cling (IC), Rotorod (RR), and treadmill (TM) running, as well as body composition analysis via MRI. One-Way ANOVA with Tukey's multiple comparisons test was performed. Data are presented as Mean $\pm$ SD. **RESULTS:** Body weight, Lean Mass, Grip Strength and IC did not differ between groups. Fat mass was greater in SED (5.53 ± 2.21) than in HU (3.44 ± 1.258) only. Body Fat % (BF%) was lower in HU (12.04 ± 3.05) than in SMC (18.17 ± 3.92) and SED (18.97 ± 6.71). TM time to exhaustion was higher in VWR (624.0 ± 117.1) than in SED (411.4 ± 134.5) and SMC (480.4 ± 120.1) s. RR latency to fall trended towards a group difference ($p=0.064$). **CONCLUSION:** At 6 months of age, 5 months after the early-life period, Endurance was higher in VWR mice compared to a sedentary control group. SED exhibited higher fat mass and BF% than HU, likely due to the stressful nature of HU. This is consistent with the Higher BF% in SMC when compared to HU. Motor coordination and balance showed a trend toward differences between groups which may become more distinct with continued aging of the cohorts. Physical function and body composition seem to be affected by early-life inactivity. The function of these mice will be followed to moribundity to see if any other functional differences arise during the lifespan.

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COMPARING CARDIORESPIRATORY FITNESS LEVELS BETWEEN FIRST-GENERATION AND CONTINUING-GENERATION COLLEGE STUDENTS

Francesca Whalen, Krystina Sarff, Rachel Luehrs

BACKGROUND: Individuals of low socioeconomic status (SES) experience decreased resources and safety when it comes to physical activity. First-Generation (F-G) college students are more likely to be of low socioeconomic status, and experience increased barriers to physical activity as compared to continuing-generation (C-G) students. **PURPOSE:** To investigate differences in F-G student cardiorespiratory fitness compared to C-G students. **METHODS:** Fifty-one students (22 male/28 female) participated in this study. Height and weight were recorded at baseline. Cardiorespiratory fitness was measured via a one mile walk test (Rockport Walking Test). Estimated maximal oxygen consumption (VO₂ max) was determined using the validated Rockport walking test equation. Following the walking test, participants completed a questionnaire that asked background and demographic information. An Analysis of Covariance (ANCOVA) test was used to compare VO₂ max values between F-G and C-G students while adjusting for gender. An ANCOVA with post-hoc analysis was used to compare VO₂ max values between F-G athletes, F-G non-athletes, C-G athletes, and C-G non-athletes while adjusting for gender. Chi-square tests were used to compare categorical descriptive data between F-G and C-G students. **RESULTS:** This study found that a higher percentage of F-G students are of Hispanic descent compared to C-G students (13 F-G Hispanic vs. 2 C-G Hispanic students; $\chi^2=14.71$; $p<0.01$). Additionally, F-G students are more likely to be of lower SES than C-G students (16 F-G lower middle-class background vs. 4 C-G students; $\chi^2=9.77$; $p<0.01$). F-G students have lower estimated VO₂ max values compared to C-G students (F-G = 42.8 ± 8 vs. C-G = 47.6 ± 6 ml/kg/min; $t=-2.30$, $p=0.03$) and this remained significant after adjusting for gender ($p=0.02$). Further subgroup analysis demonstrated that compared to C-G athletes, F-G non-athletes had lower estimated VO₂ max (F-G non-athletes = 41.5 ± 9 vs. F-G athletes = 46.1 ± 7.1 vs. C-G non-athletes = 45.3 ± 7.4 vs. C-G athletes = 49.2 ± 4.6 ml/kg/min; $F= 3.05$; $p= 0.04$) and this remained after adjusting for gender ($p=0.01$). **CONCLUSION:** F-G students demonstrated lower cardiorespiratory fitness compared to C-G students, particularly among non-athletes. Future research should further investigate how factors such as family income, cultural identity, and family exercise habits contribute to fitness disparities among F-G students.

IMPACT OF THANKSGIVING BREAK ON PHYSICAL ACTIVITY, BODY COMPOSITION AND INTERSTITIAL GLUCOSE CONTROL IN COLLEGE-AGE ADULTS

Arina Prikhodko, Asya Walsh, Paula Concha Fernandez Soto, Eric Slattery, Kevin D. Ballard FACSM, Kyle L. Timmerman FACSM & Paul T. Reidy

BACKGROUND: Holiday periods are anecdotally thought to be characterized by less physical activity (PA), more sitting, and higher caloric intake, which would theoretically lead to changes in metabolism and body composition (BC). The impact of Thanksgiving (TG) on glucose control, BC, and PA in healthy college-age adults is unexplored. **PURPOSE:** We hypothesized that TG would adversely affect PA, glucose control and BC. **METHODS:** Healthy college-age adults ($n=28$; 22F/6M; age 21.5 ± 0.99 y; body fat $25.2\% \pm 8.3\%$; body mass 69.3 ± 14.6 kg) completed two monitored weeks: Week 1 (pre-TG) and Week 2 (TG). At the start of the pre-TG, BC was assessed via bioelectrical impedance, and participants were fitted with accelerometers and continuous glucose monitors (CGM) across both weeks. Dietary intake was captured with Automated Self-Administered 24-hour Dietary Assessment Tool (ASA24). After TG, devices were removed and BC testing was repeated. Primary outcomes were steps/day, BC and CGM metrics (mean glucose (MG), SD, coefficient of variation (CV), time-in-range (TIR) 70-140 mg/dL). Within-subject (paired) t-tests compared TG vs pre-TG; data are Mean (Lower, Upper 95% CI) and significance was set at $p < 0.05$. **RESULTS:** Dietary intake, body mass and 24-hour MG were unchanged. Decreases in steps/day [$1,504$ ($-2,473$, -535)] and skeletal muscle mass [0.33 (-0.62 , -0.04) kg] were seen. Visceral fat area [3.84 (1.15 , 6.54) cm^2], body fat percentage [0.90 (0.33 , 1.48) %], and fat mass [0.69 (0.20 , 1.18) kg] increased. 24-hour CGM metrics showed small changes: Decreases were seen in Glucose SD [0.06 (-0.14 , 0.02) mmol/L], and Glucose CV [1.37 (-2.72 , -0.02) %], while TIR [2.04 (-0.37 , 4.46) %] increased. **CONCLUSION:** In healthy college students, TG week resulted in a reduction in daily steps and an unfavorable shift in body composition, despite stable reported dietary intake. Surprisingly, glucose control improved modestly (lower CV; higher TIR trend), possibly reflecting more structured meal timing. Short holiday periods can hide meaningful compositional changes even when weight is stable - emphasizing the value of maintaining activity and monitoring beyond body mass.

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CORRELATION BETWEEN HANDGRIP AND PLANTARFLEXION STRENGTH IN YOUNG ADULTS

Matthew Colletti, Mackenzie Korff, Amber Spencer, Joshua Haworth

BACKGROUND: Dynamic balance is defined as the ability to control the body's center of gravity

within a given base of support through voluntary movements or in response to perturbation. Maintaining this ability is a crucial aspect of one's ability to perform activities of daily living (ADLs). The loss of plantarflexion force coincides with decline in balance control which affects basic ADLs and heightens fall risk. As there is no objective standardized method for measuring plantarflexion strength, we developed a plantarflexion strength test that accurately measures the combined force of the triceps surae. Using this method, we were able to assess the correlation between maximum handgrip strength and maximum plantarflexion strength. Previous literature has proposed maximum handgrip assessments, through the use of a handgrip dynamometer, to be an accurate depiction of total body strength. To expand on these findings, we sought to compare maximum handgrip strength, as used in many clinical settings, with maximum plantarflexion strength. **PURPOSE:** This study aims to understand the correlation between maximum grip strength and plantarflexion strength. This correlation may provide a basis on which to encourage or discourage the use of handgrip strength as a proxy for plantarflexion strength within the clinical setting. **METHODS:** 22 participants (ages 22 ± 4 yrs) were tested for both maximum plantarflexion strength, using a custom force transducer system, and handgrip strength, using a handgrip dynamometer. Plantarflexion force was analyzed at a standard seated position to isolate the triceps surae. A two-tailed Pearson correlation was used to explore linear associations among variables. **RESULTS:** A strong, positive correlation was found between maximum plantarflexion (MPF) and maximum handgrip strength (MGS) (MPF 586.1 ± 226.3 , MGS 421.5 ± 119.3 ; $R^2=0.47$, $p < .001$). **CONCLUSION:** Handgrip strength and maximum plantarflexion strength were shown to be strongly correlated, confirming our hypothesis. This suggests that maximum handgrip strength may be assessed in place of a relatively complex plantarflexion strength test. With further research, this test of handgrip strength may have implications for the dynamic balance capabilities of an individual through their ability to control dynamic stability at the ankle.

BULLDOGS IN THE KITCHEN: DEVELOPMENT OF A COOKING BASED NUTRITION EDUCATION PROGRAM FOR FEMALE ADOLESCENT ATHLETES

Irene Romero, MS, RD, LD; Abigail Peairs PhD

BACKGROUND AND SIGNIFICANCE: Nutrition in adolescent athletes is vital for growth, development and performance. Female adolescent athletes are at an increased risk for several micronutrient deficiencies, Relative Energy Deficiency in Sports (RED-S) and disordered eating and/or eating disorders. Increasing nutrition knowledge can lead to better food choices, performance and diet quality. Practical application of nutrition education such as culinary interventions can be beneficial for adolescents. These classes can increase nutrition knowledge and self-efficacy in meal preparation. Additionally, these programs can also help prepare adolescents for adulthood by increasing cooking skills and may improve diet quality.

RESEARCH QUESTION: Will a 7 session culinary intervention improve sports nutrition knowledge among female high school athletes? **PROPOSED METHODS:** Female adolescent athletes from a high school program will be recruited to participate in a cooking-based nutrition education program. This program consists of 7 sessions emphasizing different sports nutrition topics. Additionally, participants will learn a variety of cooking methods and will learn how to use different cooking equipment. Each session consists of an education, demonstration, recipe preparation and discussion component. Sports nutrition knowledge and cooking self-efficacy will be measured by using questionnaires. Sports nutrition knowledge will be assessed pre and post intervention using the validated Nutrition Knowledge Questionnaire for Young and Adult Athletes (NUKYA). Cooking self-efficacy will be assessed by using a self-efficacy questionnaire developed by our team. Sports nutrition knowledge and self-efficacy will be analyzed by using paired sample t-test to assess pre and post intervention changes. **PROJECTED LIMITATIONS AND OBSTACLES:** Obstacles include working with participants with a demanding schedule, the high cost of supplies and equipment for the program and acquiring the necessary permissions to include minors in research. Limitations include using a self-efficacy questionnaire that has not yet been validated.

ACCURACY OF NON-WEAR ESTIMATES FROM THE EMBRACEPLUS SMARTWATCH

Justin J. Jackson, In-Whi Hwang, Paul R. Hibbing

BACKGROUND: Health researchers often use smartwatches to assess free-living physical activity. When cleaning the data, non-wear is typically identified using an algorithm that examines acceleration data. One alternative algorithm (for the Empatica EmbracePlus device; EEP) uses both acceleration and photoplethysmographic data. This may result in greater accuracy, but has not been tested. **PURPOSE:** To assess how accurately the EEP algorithm detects non-wear. **METHODS:** As part of a larger study, healthy adults ($n = 20$; 50% F; mean $\pm$ SD age = 29 $\pm$ 10 yr) performed a 2.5-h activity protocol wearing an EEP on the left wrist. At 1-2 points in the protocol, the EEP was removed for an arbitrary amount of time. Non-wear estimates were then compared against the actual removal times to determine accuracy, requiring multiple analyses: Total non-wear time was examined using equivalence testing and Bland-Altman analysis; classification accuracy (based on second-by-second cross-classification of wear/non-wear from each method) was examined by calculating precision and recall for each participant, then averaging across participants; transition detection was assessed using the transition pairing method with 2-min tolerance (i.e., allowing up to 2 min of lag time when identifying true positive pairs of predicted and actual transitions). **RESULTS:** Devices were removed for 9.7 $\pm$ 2.3 min at a time, resulting in total non-wear of 18.0 $\pm$ 5.0 min per participant (range: 8.5-26.3 min). Predicted non-wear for EEP averaged 14.3 $\pm$ 6.2 min (mean bias -3.8 min), reaching equivalence to ground truth at a tolerance of $\pm$ 6.2 min ($p < 0.05$). Limits of agreement were -15.9 min to 8.4 min. When predicting epoch-level classification of wear/non-wear across participants, mean $\pm$ SD precision and recall were 75.8% $\pm$ 23.0% and 66.1% $\pm$ 29.3%, respectively (medians: 84.2% and 71.4%). Across participants, transitions were predicted with median precision of 83.3% (transitions into non-wear) and 100.0% (transitions out of non-wear). Median recall values were 100.0% for both types of transition. **CONCLUSION:** EEP's non-wear algorithm performs well overall, but may perform better for some individuals than others. More research is needed to understand if variations correlate with participant characteristics (e.g., skin pigmentation). Additional comparisons are warranted against standard accelerometer algorithms and in free-living contexts. Supported by a Digital Endpoint Accelerator Research Grant from Ametris LLC.

IMPACT OF H₂O₂ TREATMENT ON PRIMARY HUMAN SKELETAL MUSCLE MYOTUBE EXTRACELLULAR VESICLE RELEASE AND SIZE DISTRIBUTION

Ivan A. Alonso, Linda Adeyemo, Haley I. Arrowood, Allison G. Walawender, Timothy P. Gavin, FACSM

Background: Skeletal muscle (SKM) accounts for ~40% of total body mass. Beyond its role in locomotion, SKM acts as an active secretory organ that exerts physiological effects on numerous cell types. This intercellular communication is mediated, in part, by the release of extracellular vesicles (EV), specifically of small EV (sEV) with a size between 30 to 150 nm. EVs are a heterogeneous population of nanosized (30-1000 nm), membrane-bound particles that encapsulate proteins, lipids, and microRNAs, reflecting the physiological state of their cell of origin. The quantity of EVs and their composition depend upon the cell type and environmental conditions. Aging is associated with increased oxidative stress (OS) and disrupted redox balance, which can alter EV release and content. In cultured C2C12 myotubes, hydrogen peroxide (H₂O₂) exposure did not change EV release. However, the impact of OS on human myotube (HSkM-T) EV release and size distribution is unknown. We hypothesize that H₂O₂ exposure will not affect HSkM-T-EV release and EV size distribution.

Methods: Primary HSkM-T were exposed to 200 μ M H₂O₂ for 48 h. Conditioned media from treated and control were collected, and EVs were recovered by size-exclusion chromatography. EVs were then visualized and quantified by nanoparticle tracking analysis. HSkM-T and EVs were lysed in RIPA buffer, and total protein content (TPC) was determined using BCA and microBCA assays, respectively. Paired Student's t-tests were used to identify differences between conditions. Mean + SD. $P \leq 0.05$.

Results: H₂O₂ exposure did not alter EV release after normalizing by HSkM-T total protein content (CON= 90677+68156; H₂O₂= 74815+32572 particles* μ g HSkM-T TPC-1, $P=0.37$). Moreover, sEV release was not different between groups (CON= 491554+522243; H₂O₂= 381556+182029 particles* μ g HSkM-T TPC-1, $P=0.38$). EV size was unaltered by H₂O₂ treatment (CON= 149.6+52.03; H₂O₂= 146.6+45.99 nm, $P=0.62$).

Conclusions: Exposure of primary HSkM-T to H₂O₂ does not induce changes in EV release or EV size. However, these findings do not exclude the possibility that OS modifies EV signaling capacity. Future studies should investigate changes in EV cargo to better understand how OS influences the communicative role of HSkM-T-derived EV in aging.

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EFFECTS OF INTERMITTENT ISOMETRIC FATIGUE ON PEAK TORQUE PRODUCTION OF THE LEG EXTENSORS IN RESISTANCE-TRAINED FEMALES

Noah Shugart, Matteo F. de Leon, Arturo Sosa III, Rachel A. Kowal, Michael D. Belbis, & Clayton L. Camic

BACKGROUND: Contractile mechanics, force-generating capabilities, neural activation strategies, and fatigue processes are unique among isometric (ISO), concentric (CON), and eccentric (ECC) muscle actions. Previous studies have utilized various fatigue protocols to explore these differences and their performance implications. **PURPOSE:** To examine the effects of intermittent ISO fatigue on muscle action specific peak torque of the leg extensors in resistance-trained females. **METHODS:** Ten resistance-trained female subjects (mean age $\pm$ SD = 21.1 ± 1.4 years; body mass = 61.2 ± 5.6 kg) volunteered to visit the laboratory on two occasions. The first visit served as an orientation to familiarize the subjects with completing ISO, CON, and ECC muscle actions of the leg extensors on a calibrated isokinetic dynamometer. For the second visit, subjects were assessed for ISO, CON, and ECC peak torque before (PRE) and immediately after (POST) completing an ISO fatigue protocol that consisted of 30 repeated, maximal muscle actions. All ISO muscle actions were sustained for 3 seconds with 120° between the thigh and leg, whereas the isokinetic CON and ECC muscle actions were assessed at 30° /s-1. Three seconds of rest was provided between all muscle actions. A two-way (time: PRE and POST; muscle action: ISO, CON, ECC) repeated-measures analysis of variance (ANOVA) was used to analyze peak torque values. Follow-up analyses included one-way repeated measures ANOVAs and paired-samples t-tests. **RESULTS:** The two-way repeated measures ANOVA indicated there was no significant interaction ($p = 0.409$) for muscle action across time, but there were significant main effects for muscle action ($p = 0.032$) and time ($p < 0.001$). Estimated marginal means for muscle action (collapsed across time) demonstrated CON peak torque (149.0 ± 22.6 Nm) was significantly ($p = 0.016$) less than ISO peak torque (166.2 ± 29.3 Nm). There were no differences, however, between CON and ECC (177.3 ± 47.8 Nm) or ISO and ECC peak torque. In addition, the estimated marginal means for time (collapsed across muscle action) indicated significant ($p < 0.001$) decreases in peak torque from PRE (180.1 ± 33.1 Nm) to POST (148.3 ± 27.3 Nm) fatigue. **CONCLUSIONS:** The present findings demonstrated that fatigue elicited by intermittent ISO exercise, likely due to substantial metabolic stress and metabolite accumulation, uniformly reduced the maximal force-generating capacity of the quadriceps across all contraction types.

EFFECTS OF SINGLE VERSUS MULTIPLANAR HIGH INTENSITY RESISTANCE TRAINING ON BONE MINERAL DENSITY AND STRENGTH IN MIDDLE-AGED FEMALES

Amy Yi, Rachel A. Kowal, Peter J. Chomentowski, Brandon Male, Michael D. Belbis, & Clayton L. Camic

BACKGROUND: Decreases in estrogen during perimenopause elicit negative implications for the musculoskeletal system involving rapid reductions in strength and bone mineral density (BMD). Specifically, dynapenia increases the risk of falling and coupled with low bone mineral density, there is a subsequent greater probability of fracture and disability. Previous research has been limited to investigating strength training in the sagittal plane alone. **PURPOSE:** To observe the effects of multi-planar resistance training on BMD and strength. **METHODS:** Fifteen female subjects (mean age $\pm$ SD=53 $\pm$ 5.3 years; body mass =86.3 $\pm$ 17.6 kg) were assessed at baseline (T0), four months (T4), and eight months (T8) for BMD [femoral neck (FN) and lumbar spine (LS) (L1-L4)] using a DEXA scan. Isometric peak torque of the right leg extensors at 90° was recorded. Participants were randomly assigned to two groups: LIFTMOR (LM) (deadlift and back squat at five sets of five repetitions at 85% of 1RM) and STOP (ST) (three sets of five repetitions at 85% of 1RM of deadlift and back squat, and heavy dumbbell curtsy and side lunge). Both groups completed two supervised sessions per week for eight months. Two-way repeated measure ANOVAs were used to determine differences in strength, body composition, and BMD variables across time and between groups. **RESULTS:** For FN BMD, there was no significant ($p=0.161$) interaction or main effects for group ($p=0.355$) or time ($p=0.284$). For LS BMD, there were significant improvements in the LM group from T0 (1.06 $\pm$ 0.11 g/cm²) to T4 (1.12 $\pm$ 0.16 g/cm²) ($p=0.012$) and from T0 to T8 (1.11 $\pm$ 0.10 g/cm²) ($p=0.004$), with no changes ($p>0.05$) in the ST group at T0, T4, or T8 (1.02 $\pm$ 0.14, 1.02 $\pm$ 0.15, 1.03 $\pm$ 0.14 g/cm², respectively). For peak torque, there were significant increases from T0 (115 $\pm$ 29 Nm) to T8 (170 $\pm$ 39 Nm) in the ST group ($p=0.007$), while the LM group exhibited no change (128 $\pm$ 31 and 162 $\pm$ 58 Nm, respectively) ($p=0.091$). **CONCLUSIONS:** Eight months of strength training resulted in significant improvement for LS BMD for the group that performed more sets of 85% 1RM in the sagittal plane only, while neither group had significant increases in the FN BMD. The multiplanar group showed significant improvement in strength over the sagittal plane group.

HEART RATE VARIABILITY AS A MODERATOR OF EXECUTIVE FUNCTION FOLLOWING MODERATE-INTENSITY EXERCISE

Kate Stone, Hannah Baldwin, Veronica Wolny, Mackenzie Korff, Joshua Haworth

BACKGROUND: Heart rate variability (HRV), a measure of autonomic nervous system balance, is recognized as a physiological indicator of cognitive adaptability and self-regulation. Executive function (EF; working memory, cognitive flexibility, and inhibitory control) is known to benefit from acute moderate-intensity exercise. While higher baseline HRV is generally associated with improved EF, it is less clear if HRV moderates acute cognitive responses to exercise. **PURPOSE:** This study aimed to determine whether baseline HRV classification (High vs. Low) moderates changes in executive function performance following a single bout of moderate-intensity treadmill exercise. **METHODS:** Seven healthy participants (18-25 years) completed the 2-Back working memory task and Trail Making Test (TMT) before and after 20 minutes of treadmill walking at 60-70% of age-predicted max HR. HRV was recorded using a Polar chest strap monitor, and participants were categorized into High or Low HRV groups. Separate two-way repeated measures ANOVA were used to analyze group (HRV) $\times$ time (pre/post) effects. **RESULTS:** For TMT, no significant main effects or interaction were found ($M=15.9\pm6.9$ time: $F(1,5)=1.86$, $p=.231$; group: $F(1,5)=0.51$, $p=.507$). Similarly, for NBack2, results were non-significant ($M=3.1\pm2.4$ time: $F(1,5)=1.27$, $p=.311$; group: $F(1,5)=0.02$, $p=.907$). However, the Low HRV group showed decreased variability in EF performance post-exercise (TMT Pre $M=27.9\pm10.4$, Post $M=20.1\pm7.2$ NBack2 Pre $M=3.1\pm2.4$, Post $M=1.1\pm0.9$). No statistically significant effects were observed for either EF task. **CONCLUSION:** Statistical significance was not reached in the original dataset. However, individuals with lower HRV may experience greater consistency and benefit post-exercise. These preliminary findings support the need for larger, controlled trials to clarify HRV's role in cognitive outcomes and optimize exercise prescriptions for enhancing executive function.

RELATIONSHIP BETWEEN SIGA AND CORTISOL FOLLOWING ACUTE EXERCISE

Jared Stayte, Ethan Brown, Tom Rideout, Joshua Haworth, Brad Kendall & Brandon Dykstra

BACKGROUND: Secretory immunoglobulin A (SIgA) is a protein secreted into saliva and is considered the first line of defense against airway pathogens. Acute exercise has been shown to impact SIgA. It has been suggested that cortisol is a mediator in the relationship between acute exercise and SIgA, but research on the relationship between SIgA and cortisol is limited.

PURPOSE: To explore the relationship between cortisol and SIgA metrics following acute exercise. **METHODS:** Participants (n=15) visited the laboratory 4 times. The first visit consisted of a graded VO₂max test on a cycle ergometer. Participants then were randomly assigned to a counterbalanced order of exercise conditions, which were completed on the other visits: 45% VO₂Peak for 60 minutes; 65% VO₂Peak for 30 minutes; 85% VO₂Peak for 10 minutes.

Unstimulated saliva was collected for 5 minutes immediately before exercise and 5 and 30 minutes after exercise. Saliva volume was measured to calculate SFR (μg/min) and SIgA and cortisol concentrations (μg/ml) were determined using enzyme-linked immunosorbent assays. SR (μg/min) was computed from SFR and absolute SIgA concentrations. Change scores from pre-exercise to each post-exercise timepoint for each exercise intensity were calculated for cortisol and each SIgA metric. These data are presented as mean±SD. Relationships between cortisol and SIgA were assessed using correlations. Significance was set at p≤0.05. **RESULTS:** Following the 45% bout, there were significant correlations between SFR (-0.0442±0.1062 μg/min) and cortisol (1.1503±6.2407 μg/ml; r = -0.591, p = 0.020) and between SR (8.8818±73.9599 μg/min) and cortisol (r = -0.517, p = 0.049) 5 minutes post-exercise. Following the 65% bout, there were significant correlations between SFR (0.0055±0.2003 μg/min) and cortisol (2.1331±11.2128 μg/ml; r = 0.752, p = 0.001) and SR (41.2113±137.5168 μg/min) and cortisol (r = 0.551, p = 0.033) 30 minutes post-exercise. There were no significant correlations for cortisol and any SIgA metric at either timepoint following the 85% bout. **CONCLUSION:** While there were some significant correlations between SIgA and cortisol, it appears that relationships between cortisol and SIgA are limited to SFR and SR following light- and moderate-intensity exercise. It appears that there is not a significant relationship between cortisol and SIgA concentration following any intensity of exercise, and no relationship for any SIgA metric following high-intensity exercise.

NUTRITION EDUCATION FOR FEMALE HIGH SCHOOL ATHLETES TO INCREASE SPORTS NUTRITION KNOWLEDGE

Emily Miller, Abigail Peairs

BACKGROUND: Adolescent female athletes are faced by unique nutritional challenges during a critical period of growth and development. Nutrition patterns of concern among adolescent female athletes include inadequate energy intake, inadequate carbohydrate intake, and inadequate intake of key micronutrients. Nutrition education may be an effective intervention to increase nutrition knowledge and prevent some of these issues. **PURPOSE:** The purpose of this study was to assess the effectiveness of a six-week nutrition education intervention on increasing nutrition knowledge and self-efficacy related to nutrition behaviors in female high school athletes.

METHODS: A preliminary assessment of needs was distributed to a group of athletes at a local high school. Female high school athletes were recruited to participate by the school's athletic director. The intervention included six-weekly nutrition education sessions, each of which being one half hour in duration. The topic of the classes included energy needs, macronutrients, micronutrients, periodization, hydration, and supplement usage. Nutrition knowledge and self-efficacy related to nutrition behaviors were assessed before and after the intervention. Paired T-tests were used to examine the differences pre- to post-intervention for nutrition knowledge and self-efficacy. **RESULTS:** 17 participants completed both the pre- and post-test. The average knowledge post-test score was 34.35. The average change in score from pre to post was +3.7 points. The post-test score was significantly higher than the pre-test score at $p < .05$. The average Likert scale score on the pre-evaluation was 4.67 points (with the highest possible score being 7 and lowest possible score being 1), and the average Likert scale score and the post-evaluation was 5.94 points. The average change in this score was +1.24 points. The Likert scale score from the post-evaluation was significantly higher than that of the pre-evaluation at $p < .001$.

CONCLUSION: This intervention was shown to be effective in increasing sports nutrition knowledge and self-efficacy in this population. The short duration and flexibility of this program indicate that it would be feasible to repeat the intervention with future participants. Future interventions should explore the effect of this nutrition intervention with dietary and anthropometric data collection.

EFFECTS OF ACUTE LOCAL HEATING ON SKELETAL MUSCLE INTERSTITIAL OXYGENATION IN RATS

Jacob M. Pontorno, Morgan F. Killam, Edward T.N. Calvo, Taylor A. Schultz, Matthew J. Etchison, Michael D. Belbis, Bruno T. Roseguini, Daniel M. Hirai

BACKGROUND: Accumulating evidence indicates that acute local heating elevates skeletal muscle oxygen delivery via peripheral hemodynamic mechanisms. Whether acute local heating increases skeletal muscle interstitial oxygen pressures (PO_{2i}; the sole driving force for O₂ flux into the myocyte) remains unknown. **PURPOSE:** To determine the effects of acute local heating on skeletal muscle PO_{2i} in healthy rats. We hypothesized that, while maintaining core temperature (T_c) using external cooling systems, graded heating would progressively elevate resting muscle PO_{2i} without altering central hemodynamics. **METHODS:** Muscle PO_{2i} was determined via phosphorescence quenching in 10 male Sprague-Dawley rats. Progressive muscle heating was achieved with infrared light in 20-min increments (40, 41 and 42°C; 60 min total), while T_c was maintained with a water-perfused cooling pad. Following the heating protocol, sodium nitroprusside (SNP; 300 µM) was used locally to assess the viability of the preparation. Data comparison was performed using paired Student's t-test or one-way repeated measures ANOVA where appropriate. Statistical significance was set at p<0.05. Data are presented as mean±SD. **RESULTS:** In the setting of unchanged T_c (36.9±0.4 vs. 37.1±0.4°C; p>0.05), direct heating increased muscle PO_{2i} from baseline (15.6±0.4) to 40°C (35.5±1.2), 41°C (40.4±1.2) and 42°C (42.7±1.6 mmHg; p<0.05 for all) without affecting mean arterial pressure or heart rate (p>0.05 for both). SNP increased muscle PO_{2i} from 18.5±3.9 to 35.9±10.2 mmHg (p<0.05). **CONCLUSION:** Acute local heating elevates skeletal muscle PO_{2i} and, therefore, blood-myocyte O₂ diffusion via peripheral mechanisms.

FORCE-TIME METRICS OF UPPER EXTREMITY PUSH-UP TESTS DIFFER BY SEX IN COLLEGIATE ATHLETES

Fiddy Davis, Kate Olsowy, Sophia Raymond, & Nile Devers

Background: Force time metrics provide objective measures of neuromuscular performance and injury risk. Lower extremity jump tests are widely studied, while upper extremity tasks remain unexplored, particularly with respect to sex differences.

Purpose: To explore the sex differences in the rate of force development and other force-time characteristics of a countermovement push-up and drop push-up tests of various athletes.

Methods: Five D3 athletes (1 Male, 4 Female) performed three countermovement push-ups (CMPU) and three drop push-ups (DPU) on Bertec Force plates at a sampling rate of 1000 Hz. Upon arrival athletes were guided through a five-minute warm-up. CMPU was performed from toes (males) and knees (females). DPU was performed from the knees for both sexes. They were instructed to be as explosive as possible during their movements and to carry out the push ups with a shoulder distance that felt comfortable. Metrics calculated from the tests include rate of force development (RFD) peak loading force (PL), take off velocity (TOV), peak power (PP) and reactive strength index (RSI). Oneway ANOVA was used to compare the metrics across sexes and the level of significance was set at $p < 0.05$.

Results: Males demonstrated substantially higher CMPU RFD ($20,874$ vs $1,496 \pm 567 \text{ N} \cdot \text{s}^{-1}$; $F=934.1$, $p<.0$) and CMPU PL (45.2 vs $13.1 \pm 5.1 \text{ N} \cdot \text{s}^{-1}$; $F=153.3$, $p<.01$). In the DPU, males also exhibited greater PL (41.1 vs $13.6 \pm 2.5 \text{ N} \cdot \text{s}^{-1}$; $F=22.8$, $p=.01$). Other metrics, including take-off velocity (TOV), peak power (PP), and reactive strength index (RSI), showed no significant differences (all $p>0.05$). These findings are preliminary and reflect data from the first five athletes tested; additional participants are being recruited and analyzed, and updated results with effect sizes and confidence intervals will be presented at the conference.

Conclusion: Preliminary data suggest that males demonstrate higher RFD and peak loading during countermovement and drop push-ups, whereas other performance metrics appear similar across sexes. These findings highlight the potential of push-up-based force-time testing to detect sex differences in upper-extremity neuromuscular performance. Our ongoing recruitment will provide greater power to confirm these preliminary findings.

CLIMBING TOWARDS HEALTH: DESCRIBING DIETARY BEHAVIORS THROUGHOUT A ROCK CLIMBING INTERVENTION

Camryn Nugent, Ryan Voltz, Eva Shinabery, Riley Buckmaster, Laila Heiss, Jordan Fleury, Vanessa Steigauf, Declan Stratford, Lanae Joubert, Megan C Nelson, ACSM EP-C

BACKGROUND: Lifestyle interventions examining the effects of physical activity (PA) can be influenced by concurrent changes in other health behaviors. For example, researchers have shown that increasing PA may lead to a healthier diet and regulating eating behaviors.

PURPOSE: We aimed to describe the dietary behaviors of physically inactive young adults who underwent a 12-week indoor climbing pilot intervention aimed at improving health outcomes.

METHODS: We measured PA behaviors, quality of life, components of health-related fitness, cardiometabolic disease risk factors, and dietary intake before and after a 12-week progressive, indoor rock climbing intervention. Participants ($n=3$; age: 21 ± 2.6 y; gender: 66.7% female; height: 167.9 ± 4.0 cm; weight: 63.5 ± 17 kg) climbed for 60 min, 2 days per week for the first 4 weeks, progressing to 3 days per week for the remaining 8 weeks. Dietary intake was assessed using the Automated Self-Administered 24-hour Dietary Assessment Tool (ASA24). Participants were asked to complete three dietary recalls (2 weekdays and 1 weekend day) both pre- and post-intervention. Dietary data was reported as an average of the three days at each time point.

RESULTS: The average energy intake pre-intervention was 2046 ± 523 kcalories and 1708 ± 213 kcalories post-intervention. The average protein intake pre-intervention was 73 ± 32 grams, while the post-intervention protein intake was 61 ± 10 grams. The average fat intake pre-intervention was 87 ± 21 grams, while the average fat intake post-intervention was 85 ± 12 grams. The average carbohydrate intake pre-intervention was 237 ± 82 grams, while the average intake post-intervention was 231 ± 19 grams. **CONCLUSION:** Preliminary data suggests that the intervention did not appear to affect dietary energy intake significantly over the 12 week timeframe. Future research should examine dietary habits alongside novel exercise interventions in larger samples to understand interactions between health behaviors.

THE INFLUENCE OF AGE AND PHYSICAL ACTIVITY ON LOWER LIMB BALANCE AND UPPER LIMB STABILITY

Asia Jones, Kendra Grayson, Cory Gatlin & Mary Jacobs

BACKGROUND: Balance and stability are essential for daily activities and athletic performance, playing key roles in reducing injury risk and optimizing function. The Y-Balance Test (YBT) is a reliable and valid tool for assessing dynamic balance and stability. While prior research has examined YBT outcomes in athletic populations, limited work has explored how age and physical activity influence balance and stability in the general population. **PURPOSE:** To determine how lower limb balance and upper limb stability are influenced by age and physical activity in the general population using the YBT. **METHODS:** This study examined 29 participants (19-66 years; 34.79 ± 13.43) from a university community. As part of the initial paperwork, participants were given the American College of Sports Medicine (ACSM) physical activity guidelines and self-reported whether they met them. After a warm-up, bilateral lower limb balance and upper limb stability were tested using the YBT protocol. A composite score was calculated using these measurements and limb length. Data was analyzed using Pearson correlations to examine the effects of age on balance and stability, and independent t-tests to compare physical activity/inactivity to upper and lower composite scores. **RESULTS:** There was a significant negative correlation ($r = -.427$, $P = .005$) between age and lower limb balance (101.60 ± 9.47). A weak negative correlation ($r = -.156$, $P > .05$), with no significance, was found between age and upper limb stability (84.26 ± 20.44). A significant positive correlation was observed between average upper and lower limb composite scores ($r = .550$, $P < .001$). There was no significant difference ($t = 1.212$, $P > .05$) in lower limb balance between the physically active (102.81 ± 7.07) and the inactive (97.78 ± 5.02). However, physically active participants (88.65 ± 14.19) had significantly higher ($t = 2.142$, $P = .02$) upper limb stability compared to those who were inactive (70.45 ± 31.96). **CONCLUSION:** Findings suggest that aging negatively impacts lower limb balance, while upper limb stability may be less age sensitive. However, those with better upper limb stability tend to also have better lower limb stability. In addition, those who are active will also generally have better upper limb stability. These results highlight the importance of maintaining activity as individuals age. Future research should investigate larger, more diverse populations and explore interventions to enhance both upper and lower limb performance.

IN PERSON IMPLEMENTATION OF THE BUILT FAMILY LIFESTYLE PROGRAM IMPROVES FUNDAMENTAL MOVEMENT SKILLS IN CHILDREN WITH ADHD AND TYPICALLY DEVELOPING PEERS

Amanda J. Vukits, Timber Terrell, Yuliana Soto, Jared D. Ramer, Jake M. Leese, Amber Guintu, Steffany Medrano, Eduardo E. Bustamante, FASCM

Introduction: Children with ADHD evidence poorer fundamental movement skills than typically developing peers. Children with ADHD are well represented in after-school programs, making this a promising setting for improving movement skills in this population. The Be Unstoppable in Life Together (BUILT) family lifestyle program engages families of children enrolled in public after-school programs in health focused home challenges. **Purpose:** This study tested the effect of BUILT on fundamental movement skills in children with ADHD and typically developing peers enrolled in Chicago Park District after-school programming. **Methods:** A total of 45 children ($M=8.57$ yrs., $SD=1.66$; 46% female) and 26 parents ($M=39.56$ yrs., $SD=7.65$, 86% female) participated in the program from 08/2022 to 05/2024. Families participated in either an 8-week online version consisting of 21 challenges ($N=19$) or a 6-week in-person on-site version with 13 challenges ($N=25$). A subset of children ($N=32$) completed the PLAYfun movement competence assessment at baseline and posttest. PLAYfun asks participants to complete 18 movement tasks that yield scores on running, locomotion, balance, upper body object control, lower body object control, and overall movement competence. Analyses included paired samples t-tests and Cohen's d effect sizes and linear regression for group-time effects. **Results:** Completion of physical activity challenges was higher in the in-person (79%) vs. on-line (53%). A moderate decrease was observed in motor competence following the on-line implementation of BUILT ($M_{change}=-7.53$, $SD_{change}=11.86$, $t=2.01$, $p<.05$, Cohen's $d=.635$) but improved significantly during the in-person implementation ($M_{change}=5.52$, $SD_{change}=4.36$, $t=5.93$, $p<.001$, Cohen's $d=1.27$). Regression analyses demonstrated a significant group by time interaction ($F_{1,31}=23.21$, $p<.001$, $\eta^2p=.45$). **Conclusion:** Preliminary results suggest that BUILT has promise for improving fundamental movement skills in children as part of in-person after-school programming. Future studies that include random group assignment will be necessary to demonstrate efficacy.

ASSESSING THE FEASIBILITY AND DOSAGE OF RESPIRA+: A CULTURALLY TAILORED YOGA PROGRAM FOR LATINA ADOLESCENTS

Yuliana Soto, Diana Morales, Timber Terrell, Mandy Vukits, Susan Aguiñaga, Eduardo Bustamante FASCM

BACKGROUND: Most yoga programs fail to report physical intensity, limiting comparisons with traditional physical activity (PA). Furthermore, culturally tailored programs for diverse youth are scarce. **PURPOSE:** This study examined the feasibility and dosage of RESPIRA+, an 8-week yoga and mindfulness program designed for low-active Latina adolescents.

METHODS: This convergent mixed-method study assessed (1) acceptability and (2) dosage of yoga postures and mindfulness techniques (breathing and meditation). Tailored components included a Latina instructor, bilingual classes, a workbook, and discussions of marianismo (women's self-sacrifice) and familismo (family-centered). Acceptability was assessed via twelve items on satisfaction (5 point-Likert scale; adapted from Vahabi & Damba, 2015), and semi-structured interviews. Dosage included intensity and duration domains. Intensity was measured at the beginning, middle, and end of each class, via heart rate (HR; using Fitbit) and rate of perceived exertion (RPE; using the OMNI scale). Minutes of time spent in yoga postures and mindfulness were recorded. **RESULTS:** Six Latina adolescents (Mage = 17.3 years) participated. Acceptability was high (97.5% satisfaction), though time of day, location, and workbook received relatively the lowest scores (4/5). Interviews highlighted preferences for flexible scheduling (including virtual and make-up options), as well as a digital RESPIRA+ workbook. Across the 16 sessions, yoga remained within the light-intensity range: baseline (MHR = 87.3 ± 8.5 bpm; MRPE = 1.45 ± 1.5), midpoint (MHR = 91.2 ± 3.8 bpm; MRPE = 1.7 ± 1.3), and post (MHR = 79.8 ± 4.7 bpm; MRPE = 1.7 ± 1.3). Sessions averaged 40 minutes of yoga postures and 15 minutes of mindfulness per session. Participants described the sessions as relaxing and enjoyable, with yoga postures perceived as easy to follow. **CONCLUSION:** Findings support the feasibility and acceptability of RESPIRA+ among Latina youth. The program successfully integrated tailored elements while maintaining light-intensity activity. Convergent data highlight the importance of virtual delivery, flexible scheduling, and digital tools. These results provide preliminary evidence that yoga and mindfulness can be implemented as feasible, culturally relevant PA alternatives for adolescent Latinas. Future research with larger samples and control groups is warranted to test efficacy and explore psychosocial and health outcomes.

TIME OF DAY EFFECTS ON SEATED BLOOD PRESSURE AND POST-EXERCISE HYPOTENSION IN POSTMENOPAUSAL FEMALES WITH HYPERTENSION

Gregory J Mitchell FACSM, Katharine D. Currie FACSM, Wesley T. Blumenburg, Vy Nguyen, Jill M. Slade FACSM

BACKGROUND: Exercise is widely known to cause hypotension during the recovery period, which is known as post-exercise hypotension (PEH). Blood pressure (BP) is widely accepted to have a circadian rhythm, fluctuating throughout the day and night. **PURPOSE:** This research examined whether the time of day affects BP and PEH in post-menopausal females with hypertension. **METHODS:** Post-menopausal females (aged 55-80 yrs) with Stage I/II hypertension completed an exercise session of moderate aerobic exercise (30 minutes of walking at 50-60% heart rate reserve) with submaximal handgrip exercise (4, 2-min sets at 30% maximal voluntary contraction with the dominant hand) in the morning (ME) and on a separate day in the evening (EE). Seated systolic BP (SBP) and diastolic BP (DBP) were measured in the non-dominant arm before (pre) and after (post) exercise. BP-pre was taken after 5-min of seated rest. BP-post was taken 10-, 20- and 30-min following exercise with the minimum BP value reported. PEH for both SBP and DBP was calculated as pre - post for SBP and DBP. Paired t-tests and Wilcoxon tests were used to examine differences (significance at $p < 0.05$); mean $\pm$ SD or median with interquartile range (IQR) are reported, respectively. **RESULTS:** Forty-two females (67 ± 7 yrs old, body mass index = 31 ± 5 kg/m²) participated. The majority (37/42) of participants used medication to manage BP. SBP-pre was significantly lower in ME (134 mmHg [IQR: 125-145 mmHg]) vs. EE (138 mmHg, [IQR: 133-148 mmHg]), $P = 0.039$, but there were no time-of-day differences in SBP-post (ME = 124 ± 15 mmHg vs. EE = 126 ± 15 mmHg, $P = 0.415$). There were no time-of-day differences in DBP-pre (ME = 77 ± 10 mmHg vs. EE = 77 ± 10 mmHg; $P = 0.887$) or DBP-post (ME = 74 ± 11 mmHg vs. EE = 74 ± 11 mmHg, $P = 0.652$). In both ME and EE, BP-post was lower than BP-pre; ME: SBP-pre = 136 ± 15 mmHg vs. SBP-post = 124 ± 15 mmHg $P < 0.001$, DBP-pre = 77 ± 10 mmHg vs. DBP-post = 74 ± 11 mmHg, $P = 0.003$; EE: SBP-pre = 138 mmHg [IQR: 133-148 mmHg] vs. SBP-post = 123 mmHg [IQR: 117.4-133.6 mmHg], $P < 0.001$; DBP-pre = 77 ± 10 mmHg vs. 74 ± 11 mmHg, $P = 0.001$. Systolic PEH had no time-of-day difference (ME = 11 mmHg [IQR: 4.4-18.1 mmHg] vs. EE = 14.4 mmHg [IQR: 7.5-19.4 mmHg], $P = 0.132$). Diastolic PEH also had no time-of-day difference (ME = 3 ± 6 mmHg vs EE = 4 ± 6 mmHg, $P = 0.515$). **CONCLUSION:** Seated resting SBP was higher in the evening in post-menopausal females with hypertension. Exercise reduced SBP and DBP in the morning and evening, but the time-of-day of exercise did not affect the magnitude of PEH.

PROJECT EMBRACE: THE COMBINED EFFECTS OF PROTEIN-RICH BREAKFAST AND MORNING EXERCISE ON REDUCING OFF-TASK CLASSROOM BEHAVIOR IN SCHOOL-AGED CHILDREN.

Timber Terrell, Paige K. Witte, Amanda J. Vukits, Dante McCoy, Steffany Medrano, Yuliana Soto, Shelby A. Keye, Naiman Khan, Lindsey Strieter, Alfredo Villegas, John Heybach, Eduardo E. Bustamante FACSM

BACKGROUND: Evidence regarding the combined influence of exercise and diet on off-task behavior is lacking. Project EMBRACE (Embracing Morning Breakfast and Activity on Classroom Engagement) examined the combined effects of a breakfast and morning exercise on off-task behaviors during instruction. **PURPOSE:** Test the independent and combined effects of breakfast and morning exercise on off-task behavior in children. **METHODS:** 44 students (M=10.39 yrs, SD=2.4 yrs, 52.2% female, 43.5% African American, 56.5% Latino) were randomized into 1 of 4 groups: high-protein breakfast + sedentary (N=11), low-protein breakfast + exercise (N=12), high-protein breakfast + exercise (N=10), or low-protein breakfast + sedentary (N=11). The Behavioral Observation of Students in Schools (BOSS) was used to systematically observe off-task behaviors (i.e., off-task motor, off-task verbal, and off-task passive). At baseline, no breakfast or structured activity was offered. A 2x2 factorial ANCOVA with 2 factors (exercise and breakfast) and 2 levels (yes/no) was run on post-test off-task behavior, controlling for baseline off-task behavior. **RESULTS:** Mean attendance across groups was 69%±6%, average and max heart rates were 151±12.2 bpm and 186±9.7 bpm. The percentage of assigned meals consumed at least somewhat was 63%, hence, 37% of assigned meals were not eaten at all. Groups assigned to high protein breakfast reduced off-task behavior by 16% (Mbaseline=61%±30%, Mpost-test=45%±27%, d=-.56), while low protein groups reduced off-task behavior by 12% (Mbaseline= 61%±20%, Mpost-test=49%±22%, d=-.57; F=.39, p=.53, dgroup-time=-.16). Exercise groups reduced off task behavior by 18% (Mbaseline=63%±24%, Mpost-test=45%±23%, d=-.76) while sedentary groups (Mbaseline= 59%±26%, Mpost-test=50%±25%, d=-.35; F=1.19; p=.28; dgroup-time=-.36) reduced off-task behaviors by 9%. The combination of high protein breakfast + morning exercise yielded a 16% reduction in off-task behavior (Mbaseline=67%±28%, Mpost-test= 51%±26%, d=-.59). This was not significantly different from the other three groups (F=2.65, p=.11). **CONCLUSION:** All groups that received breakfast and structured morning activity reduced off-task behavior relative to baseline, regardless of nutritional composition or active vs. sedentary format Exercise groups demonstrated promising moderate-to-large reductions in off-task behavior, but high-protein groups had limited results potentially due to limited consumption of assigned breakfast.

VIRTUAL REALITY AND PASSIVE CYCLING: EXAMINING ENJOYMENT COMPARED TO TRADITIONAL PHYSICAL ACTIVITY

Gevon Hannawa & Kathryn M. Rougeau

BACKGROUND: Reported lack of enjoyment continues to be one of the most consistent barriers to physical activity (PA) participation. The addition of virtual reality (VR) may improve enjoyment during traditional PA, potentially due to immersive and interactive environments that VR offers its users. However, the exploration of VR during passive, motor-driven cycling (PC; PCVR) remains unexplored. Given the lower reported enjoyment of PC compared to AC, integrating VR may increase enjoyment for individuals whose active movement is limited or for those who find traditional PA less enjoyable. **PURPOSE:** The purpose of the study was to determine if PCVR could enhance participant enjoyment and achieve enjoyment levels equal to or greater than traditional AC. **METHODS:** Data were obtained from two independent studies that assessed levels of physical activity enjoyment (PACES) under comparable conditions. Group comparisons were performed between cycling protocols involving either traditional AC or PCVR; a 2.5-minute warm-up at 35 r·min⁻¹, 30 minutes at 65 r·min⁻¹, followed by a 2.5-minute cool-down at 35 r·min⁻¹. To examine differences between the two groups, AC and PCVR, an independent samples t-test was conducted using SPSS 30.0. Group means and standard deviations were calculated for each study sample. **RESULTS:** An independent samples t-test indicated a nonsignificant difference in enjoyment between the two study groups via the PACES. Levene's test indicated that the assumption of homogeneity of variance was met, $F = 3.215$, $p = 0.077$. Participant enjoyment did not differ significantly between AC ($M = 90.47$, $SD = 16.15$, $n = 51$) and PCVR ($M = 87.65$, $SD = 20.76$, $n = 20$), $t(28.48) = 0.546$, $p = 0.295$. The effect size, Hedge's $g = 0.159$, indicates a small effect size. **CONCLUSION:** There was no significant difference in PA enjoyment following PCVR and traditional AC without VR. There may be implications for prescribing PCVR as an enjoyable therapeutic measure for those unable or unwilling to participate in traditional active cycling as an alternative method of exercise. In future studies, adjustments to the current protocol, such as increasing game interactivity and or allowing participants to tailor their VR environment to their preferences, may allow for further enjoyment of PCVR and better capture the potential benefits users may experience.

EFFECTS OF SHORT- AND LONG-DISTANCE TRAVEL ON ACUTE NEUROMUSCULAR FATIGUE IN COLLEGIATE FEMALE BASKETBALL ATHLETES

Kyle Pulvermacher, Ward Dobbs, Emaly Vatne, Joshua Hagen, James Onate

BACKGROUND: In the new landscape of Division I (DI) college athletics, teams travel across the country for competitions more than ever. Jetlag from this travel, with quick turnarounds, can negatively impact athletic performance. In sport, a countermovement jump (CMJ) is often utilized to measure performance and monitor fatigue and help guide load management decisions. **PURPOSE:** To evaluate how the pre-to-post changes in CMJ differ between short-distance and long-distance travel in DI women's basketball players while controlling for acute on-court workload. **METHODS:** Data from 13 DI women's basketball athletes (age: 20.6 ± 1.3 yrs, height: 1.8 ± 0.1 m, mass: 78.4 ± 15.0 kg) was examined for this study. Athletes performed two CMJs prior to and after two separate 10-day series that included 3 games and 5 practices. The CMJ with the max jump height (JH) was selected utilized as the marker of NP. One 10-day series included a long trip for two of the three games (LT) that went across 3 time zones that involved a duration of 6 nights. The other 10-day series included a short trip for one of the three games (ST). Athletes wore a load monitoring device for all practices and competitions using player load (PL) to quantify workload. A linear mixed-effect model was used to examine whether changes in JH differed as a function of travel. A paired-samples t-test was performed to evaluate PL from LT and ST. **RESULTS:** Mixed-effects modeling revealed a significant main effect of time, with athletes demonstrating higher CMJ height at Pre (34.8 ± 4.5 cm) compared to Post (32.6 ± 4.5 cm; mean difference of 2.2 cm, ~7% higher at Pre; $p < .001$). Travel distance was not associated with overall differences in CMJ ($p = .97$). The time $\times$ travel interaction was not significant ($p = .063$). When looking at changes in JH, pre- to post-decline in the LT condition was 2.2 cm (~6% decrease) and the ST condition was 0.7 cm (~2% decrease). Random effects indicated substantial between-athlete variability (ICC = 0.91), underlining that individual differences accounted for most of the variance in JH. The paired-samples t-test a non-significant different in PL $t = -1.57$, $p = .14$, 95% CI [-105.09, 652.38]. **CONCLUSION:** These findings suggest that overall JH declined from pre to post and the usage of CMJ height may be a useful metric to measure performance. The limitation of low sample size warrants further investigation into the potential effect of travel on neuromuscular fatigue.

PHYSICAL ACTIVITY ENJOYMENT IN ADULTS DURING SHADOWBOXING AND BOXING-MOVEMENT-BASED VIRTUAL REALITY GAMES

Hailey Porter, Carter Gillaspie, Patrick M. Filanowski, Luke Haile, Joshua Godfrey, Zan Gao FACSM, & Jeremy A. Steeves FACSM

BACKGROUND: When designing behavioral interventions to promote physical activity (PA), it is essential to prioritize PA enjoyment, enhance PA self-efficacy, and reduce participation barriers. Integrating PA with engaging immersive virtual reality (VR) games may enhance both PA enjoyment and self-efficacy. Among exergames, boxing-based games consistently elicit the highest intensity PA and are often rated as more enjoyable than sedentary video games. However, no studies to date have compared PA enjoyment across different types of boxing-based VR exergames or to conventional shadowboxing. **PURPOSE:** The aim of this study was to compare the enjoyment of three boxing-based VR exergames (Thrill of the Fight [TOF], Supernatural, and FitXR) against traditional shadowboxing. **METHODS:** Following a familiarization day, fourteen healthy adults (8 male, ages 19-53), completed a 10-minute rest period, then performed four randomized 12-minute conditions: three box-based VR exergames (TOF, Supernatural, FitXR) using a Meta Quest 3 headset, and shadowboxing led by a video instructor. After each condition, participants completed the 18-item PA Enjoyment Scale (PACES) to assess enjoyment (1, least enjoyment; 7, most enjoyment). After completing all four conditions participants ranked conditions from most to least enjoyable and provided explanations for their rankings. PACES sum scores were compared between conditions using repeated measures ANOVA. Significant main effects were followed by pairwise post hoc comparisons. Qualitative responses were analyzed to identify common themes, with positive and negative comments were tallied for each condition. **RESULTS:** For PACES, Supernatural (108.9 ± 13.6), FitXR (105.3 ± 17.1) and TOF (96.4 ± 20.7) as significantly more enjoyable than shadowboxing (82.5 ± 19.0 , $p < 0.001$). When comparing within each condition between sex, males (110.1 ± 10.4) enjoyed TOF significantly more than females (78.2 ± 16.2 , $p < 0.001$), and females (116.3 ± 8.6) enjoyed FitXR significantly more than males (97.0 ± 17.5 , $p = 0.03$). Out of 132 total comments 85.3% of comments for Supernatural were positive, followed by FitXR (65.6%), TOF (55.2%), and shadowboxing (14.7%). Common themes to explain the enjoyment of Supernatural and FitXR were upbeat, fun, and interactive. Females strongly disliked TOF because they did not enjoy fighting a male opponent. **CONCLUSION:** Boxing-based VR exergames were more enjoyable than shadowboxing. Sex may impact enjoyment of some boxing-based VR exergames.

PHYSIOLOGICAL RESPONSES OF VIRTUAL REALITY BOXING GAMEPLAY AND SHADOWBOXING IN ADULTS

Carter Gillaspie, Hailey Porter, Patrick M. Filanowski, Luke Haile, Joshua Godfrey, Zan Gao FACSM, Jeremy A. Steeves FACSM

BACKGROUND: Physical activity (PA) benefits nearly all body systems. While 46% of adults met the PA guidelines, 40-50% do not engage in any PA. Popular screen-based hobbies contribute to decreased PA levels. Exergames can provide enjoyable moderate-to-vigorous intensity PA, with boxing-based exergames consistently eliciting the highest activity intensity. Shadowboxing, a traditional boxing exercise performed without equipment, provides a useful comparison. However, no studies have compared the activity intensity of boxing-based virtual reality (VR) exergames to shadowboxing. **PURPOSE:** The primary aim of the study was to compare the oxygen consumption (VO₂), heart rate (HR), and rate of perceived exertion (RPE) during boxing-based VR exergames- Thrill of the Fight (TOF), Supernatural and Fit-XR and shadowboxing. **METHODS:** Fourteen (8 male) healthy adults ages 19-53, completed a familiarization day where they learned and practiced the 6 basic punches by following a boxing instructional video then completed four, five-minute conditions in the following order: shadowboxing video, TOF, FitXR, and Supernatural. On day 2, participants were equipped with a COSMED K5 metabolic analyzer and Polar H10 heart rate monitor before completing 10-min of rest and then performed 12 minutes each of three boxing-based VR exergames (TOF, Supernatural, FitXR) on a Meta Quest 3 headset, as well as shadowboxing led by a video instructor in randomized order. Exercise intensity of each condition was assessed via average VO₂, HR, and RPE (Borg 6-20 scale). Repeated measures ANOVA was used to compare these variables between conditions, and significant main effects were followed by pairwise post hoc comparisons. **RESULTS:** Participants average age was 30.4±12.4 years. For VO₂, TOF (31.4±5.9 mL/kg/min) was significantly higher ($p<0.01$) than Supernatural (26.5±4.6 mL/kg/min), FitXR (26.4±6.0 mL/kg/min), and shadowboxing (26.0±5.1 mL/kg/min). For HR, TOF (160.0±20.1 bpm) was significantly higher ($p<0.01$) than Supernatural (147.5±19.8 bpm), and shadowboxing (141.0±21.5 bpm), but not FitXR (146.9±19.7 bpm). For RPE, TOF (15.9±2.0) was significantly greater than FitXR (13.8±1.9) and shadowboxing (13.0±1.6). Supernatural (14.9±1.4) was also significantly greater than shadowboxing. **CONCLUSION:** Several boxing-based VR exergames elicited intensities comparable to or greater than shadowboxing. Future research may explore the use of VR gaming as a source of PA for adults who enjoy video games.

ACCURACY OF RESTING METABOLIC RATE PREDICTION EQUATIONS COMPARED TO INDIRECT CALORIMETRY

Kylie Moskal, Kaylee Scharrer, Veronique Chapman, Madison Travis, Rachael K. Nelson, Paul L. O'Connor

BACKGROUND: Obesity is a global health crisis linked to metabolic dysfunction. Weight loss can improve metabolic health but is difficult to achieve without accurate assessment of energy needs. Precise methods for determining resting metabolic rate (RMR) are available through body composition analysis via Dual-Energy X-ray Absorptiometry (DXA) or indirect calorimetry (IC) but are often limited by cost and accessibility. While several predictive equations can provide an estimate of RMR, their accuracy varies. Therefore, identifying the most reliable predictive method is a vital step in weight loss efforts and metabolic health. **PURPOSE:** To examine the relationship between two commonly used predictive equations for RMR vs. the gold standard for determining RMR, indirect calorimetry. **METHODS:** 51 male (n=14) and female (n=37) young, healthy adults (age: 18-24) participated in this study. Participants arrived after an overnight fast for assessment of height, weight, and RMR by IC using a ventilated hood system. A DXA scan was performed to determine lean body mass (LBM). Age, sex, height, and weight were used to predict RMR using the Harris-Benedict equation. LBM was used to predict RMR using the Cunningham equation. A Pearson correlation was used to determine the relationship between RMR determined via IC vs. predictive values. The effects of age and sex were assessed using a multilinear regression. **RESULTS:** We observed a significant relationship between RMR determined by IC vs. RMR determined via the Cunningham ($R^2 = 0.562$, $p < 0.001$) and Harris-Benedict ($R^2 = 0.523$, $p < 0.001$) equations. In a multilinear regression model, age had no significant effect on RMR values. However, sex was a significant predictor of RMR and resulted in an improved R^2 value with the Cunningham equation ($R^2 = 0.777$, $p < 0.001$). Similarly, for the Harris-Benedict equation, sex was also a significant predictor of RMR and improved the R^2 value in this model ($R^2 = 0.719$, $p < 0.001$). **CONCLUSION:** Both models showed positive correlations, indicating similar predictive strength. Both equations can be accurately utilized to determine weight-loss prescriptions. The Cunningham equation, which incorporates LBM, showed a stronger correlation with measured RMR in males, suggesting it may better account for sex-specific differences in metabolically active tissue. Further investigation is required to understand whether this applies to other age groups, racial and ethnic populations, and clinical settings.

SPORT NUTRITION KNOWLEDGE OF NAIA STUDENT-ATHLETES

Ana Jackson and Paul Hafen

BACKGROUND: Athletic performance has been closely tied to nutrition for decades. To help gauge athlete's nutrition knowledge related to athletic performance, Trakman et al. (2018) developed the abridged sport nutrition knowledge questionnaire (ANSKQ). This questionnaire has been validated and used to gauge the sport nutrition knowledge of amateur and NCAA athletes. However, sport nutrition knowledge has not yet been reported for athletes participating in the National Association of Intercollegiate Athletics (NAIA) division of sports.

PURPOSE: To assess sports nutrition knowledge of male and female athletes participating across various sports within the NAIA. These athletes are underrepresented in the literature and do not generally have the same resources available to them as their NCAA counterparts.

METHODS: An online survey (ANSKQ) was filled out by 117 NAIA (58 male; 59 female) athletes across 11 sports to assess their sports nutrition knowledge. The results were divided into content areas to explore potential gaps in sport nutrition knowledge. The specific content areas included: macronutrients, micronutrients, hydration, alcohol use, and nutritional supplements.

RESULTS: Data from the qualitative ANSKQ survey are reported as percentage correct scores (mean $\pm$ SD) based on the original ANSKQ scoring protocol. The average total score of the ANSKQ in our NAIA athlete population was $42.0 \pm 14.8\%$. The athletes knowledge of the role of macronutrients ($46.0 \pm 16.4\%$), micronutrients ($21.0 \pm 20.9\%$), hydration ($24.0 \pm 25.8\%$), and nutritional supplements ($44.0 \pm 28.3\%$) in sport performance were considered poor ($<50\%$), while their knowledge of the impact of alcohol use ($69.0 \pm 27.3\%$) on athletic performance fell within the 'good' categorization (66-75%). **CONCLUSION:** These generally low scores amongst NAIA collegiate athletes are similar to those observed at other competitive levels and demonstrate a lack of knowledge about the role of nutrition in sports. Our division into 5 content areas suggests that gaps in NAIA collegiate athlete sport nutrition knowledge include the roles of macronutrients, micronutrients, hydration, and nutritional supplement use in sport. These areas of knowledge may be explored in more depth in future research and might serve as focal points for practitioners attempting to develop resources aimed at improving student-athlete knowledge of sports nutrition.

UNSTEADY GROUND? CHRONIC CONDITIONS AND BALANCE PERFORMANCE IN U.S. ADULTS: A COMPLEX SAMPLE ANALYSIS OF NHANES 2021-2022

Revati N. Malani, Paige K. Witte, Shelby A. Keye

BACKGROUND: Balance impairment is a significant public health concern affecting millions of US adults and is associated with increased fall risk, functional decline, and mortality. While research has shown that balance function declines with age, limited research has examined how specific chronic conditions may predict balance impairment independent of age. **PURPOSE:** To examine the association between diabetes and hypertension and balance performance as measured by the Modified Romberg Test among US adults.

METHODS: This cross-sectional analysis used data from the 2021-2022 National Health and Nutrition Examination Survey (NHANES). Participants were aged 30-69 years (who completed the final two conditions of the Modified Romberg Test: standing on foam with eyes closed (Condition 4, N = 1879) and standing on foam with eyes closed while moving head (Condition 5, N = 1209). Outcomes included binary pass/fail indicators and time-to-failure (0-30 seconds). The primary predictor was a four-category diabetes-hypertension comorbidity variable (DM_HTN): neither condition, diabetes only, hypertension only, or both conditions. Covariates included age (centered), sex, race/ethnicity, and education. Complex Samples Logistic Regression and General Linear Models were used to account for NHANES sampling design, with interaction terms between DM_HTN and age included in all models.

RESULTS: In adjusted logistic regression models, DM_HTN was significantly associated with increased odds of failure only in Condition 5 ($F = 8.088$, $p = 0.003$), with significant DM_HTN $\times$ age interactions in both conditions (Condition 4: $F = 6.250$, $p = 0.007$; Condition 5: $F = 4.006$, $p = 0.032$). In linear models, DM_HTN was a significant predictor for both conditions (Condition 4: $F = 7.369$, $p = 0.004$; Condition 5: $F = 4.011$, $p = 0.032$) and DM_HTN $\times$ age interaction only significant at condition 4 ($F = 22.466$, $p < .001$).

CONCLUSION: This nationally representative study demonstrates that cardiometabolic comorbidity-particularly the combination of diabetes and hypertension-exerts independent effects on balance performance in US adults, with these chronic conditions serving as significant predictors of time-to-failure regardless of age in the most challenging balance condition (Condition 5). These findings support the clinical importance of chronic disease management, as the deleterious effects of such conditions may be intrinsic to the diseases themselves rather than merely an age-dependent phenomena.