



**AMERICAN COLLEGE**  
**of SPORTS MEDICINE**<sup>®</sup>  
**Southeast Chapter**



# 2023 Annual Meeting

## Final Program

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Conference Information

Schedule and Presentation Listing

Abstracts

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February 23-25, 2023

Greenville, SC

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## Welcome to the 2023 Annual Meeting!

We are pleased to welcome you to our 2023 Annual Meeting! We are grateful that we are able to meet in person again this year. Thank you to our members for registering for the meeting, submitting their abstracts, and volunteering to help plan and run the conference.

Last year we celebrated our 50<sup>th</sup> Anniversary Annual Meeting with special sessions and events to recognize the Southeast ACSM members who were instrumental in starting our chapter and establishing the annual meeting. The 2022 meeting featured over 400 presentations and events and was attended by 960 students and professionals.

We are continuing that tradition this year. The 2023 Annual Meeting has a total of 429 presentations including 6 invited speakers, a preconference session with 9 presentations, 18 tutorials, 14 symposiums, 37 oral presentations, 28 thematic posters, 293 poster presentations, 24 posters in the Student Award session, and 9 lectures and 7 case presentations in the Sports Medicine Physician Track program. We are expecting close to 1,000 attendees again this year, the majority of whom are students, many attending their first conference or making their first presentation.

In addition to the tutorials, symposia, and oral and poster presentations highlighting cutting-edge research by our professional members, the program includes several special sessions, programs, and events. These include the Keynote Address, Andrew Kozar ACSM Presidential Address, Clinical Crossover Lecture, Basic Science Lecture, Henry J. Montoye Award Lecture, Luncheon Lecture, and the Sports Medicine Physician Track program. The schedule also includes a Preconference session, the Student Award Poster competition, Emily Haymes Mentoring Breakfast, two special interest group meetings, Student Bowl, and Graduate Program Fair. We are also proud to welcome the students and mentors participating in the Leadership and Diversity Training Program. The Exhibit Hall and Student Help Desk will be open throughout the meeting.

We also have our social on Thursday evening after the Keynote Address to allow everyone to see old colleagues and friends and make new connections. We hope you will enjoy that aspect of the meeting as much as we will.

Wishing you a successful meeting,

*The SEACSM Executive Board*

## Save the date for the 2024 SEACSM Annual Meeting!

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**AMERICAN COLLEGE  
of SPORTS MEDICINE®**  
**Southeast Chapter**



**2024 Annual Meeting**

**Greenville, SC  
February 22–24, 2024**

## About the Annual Meeting

### SEACSM Annual Meeting Objectives

At the conclusion of the meeting, participants should be able to:

- Understand the biological, biomechanical, and psychological bases for the changes that occur during and following exercise in both normal and pathological states.
- Identify new approaches to problems in exercise science and sports medicine through interaction among scientists and clinicians.
- Recognize contemporary controversial issues related to sports medicine and exercise science.
- Examine state-of-the-art and innovative basic science, applied science, and clinical information which will increase their knowledge of exercise, fitness, health, physical performance, and sports medicine.

### Continuing Education Credits

SEACSM is an approved provider for Continuing Education Credits (CECs) through ACSM. The 2023 Annual Meeting is approved for 17 CECs. ACSM members who register for the meeting automatically receive the pre-approved CECs, which are posted online to ACSM accounts 4–6 weeks after the meeting.

### COVID-19 Precautions

SEACSM is committed to holding a safe in-person meeting and we are following all hotel, local, and state COVID-19 recommendations. There is no vaccine, mask use, or social distancing requirement to attend the meeting.

However, we encourage all attendees to be fully vaccinated, as that term is defined by the Centers for Disease Control and Prevention (CDC). Additionally, all attendees should use their own judgement about mask use and social distancing at the conference.

Attendees who feel ill prior to traveling should get tested in accordance with CDC guidelines. If you feel ill while at the event, please do not attend any sessions, get tested, and remain in your room as much as possible.

If you are scheduled to present but cannot attend the meeting, please let us know as soon as possible at [seacsmorg@gmail.com](mailto:seacsmorg@gmail.com).

Per the CDC, if you experience COVID-19 symptoms, you should get tested, stay home, and stay away from others, even if you are fully vaccinated. Please visit the CDC website for the most current guidelines.

Thank you for helping us gather safely at our 2023 Annual Meeting.

### Get the Annual Meeting on your mobile device with the Webex Events App



View the Annual Meeting schedule, connect with other attendees, and learn more about the conference using the Webex Events app. Once you download the free app, search for SEACSM 2023.

## 2023 Annual Meeting Planning Committee

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The Annual Meeting is planned by the SEACSM Executive Board:

**Danielle Wadsworth**, *President*. Auburn University, wadswdd@auburn.edu

**Matt Green**, *Past President*. University of North Alabama, jmgreen@una.edu

**Jonathan Wingo**, *President-Elect*. University of Alabama, jwingo@ua.edu

**Bhibha Das**, *At-Large Member*. East Carolina University, dasb@ecu.edu

**Nicole Rendos**, *At-Large Member*. Emory University, nrendos@emory.edu

**Gordon Fisher**, *At-Large Member*. University of Alabama-Birmingham, grdnfs@uab.edu

**Mallory Marshall**, *At-Large Member*. Samford University, mmarshal@samford.edu

**Katie Spring**, *Student Representative*. Auburn University, kzw0076@auburn.edu

**Alyssa Parten**, *Student Representative*. University of North Alabama, aparten@una.edu

**Ryan Draper**, *Sports Medicine Physician Representative*. Cone Health, timothyd72@yahoo.com

**Carolynn Berry**, *Executive Director*. Winston-Salem State University, berryc@wssu.edu

**Michael Berry**, *Exhibits, Sponsorships and Fund Raising*. Wake Forest University, berry@wfu.edu

**Lynn Panton**, *Representative to ACSM*. Florida State University, lpanton@fsu.edu

**Brian Parr**, *Communication Director*. University of South Carolina Aiken, brianp@usca.edu

## 2023 Annual Meeting Abstract Reviewers

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All abstracts submitted for the 2023 Annual Meeting were reviewed to make sure they meet our high standards for research quality. The abstract review process was coordinated by SEACSM Executive Board members Nicole Rendos and Gordon Fisher. We will issue a call for volunteers next fall if you are interested in helping to review abstracts for the 2024 meeting.

Thank you to the volunteers who helped develop the program by reviewing abstracts:

Kirk Abraham, Liz Ackley, Ashley Artese, Jeff Barfield, Becki Battista, Marissa Bello, Hunter Bennett, Benjamin Boudreaux, Sarah Burkart, Jennifer Caputo, Harish Chander, Ryan Colquhoun, Liz Easley, David Edwards, Liz Edwards, Michael Fedewa, Gordon Fisher, Lee Franco, Colleen Geary, Bruce Gladden, Michael Green, George Grieve, Katie Hirsch, Geoffrey Hudson, Brian Irving, Jason Jagers, Samantha Johnson, Andreas Kavazis, Joshua Keller, Dohoun Kim, Heidi Kluess, Adam Knight, Kurt Kornatz, Stephanie Kurti, Sarah Little-Letsinger, Chad Markert, Erica Marshall, Mary Pat Meaney, Andrew Moore, Cody Morris, Meredith Owen, Traci Parry, Nicole Rendos, Michael Roberts, Austin Robinson, Jonathan Ruiz-Ramie, Greg Ryan, Michael Samaan, Shuichi Sato, Mark Schafer, Michael Schmidt, Neil Schwarz, Jeffrey Simpson, JohnEric Smith, Andreas Stamatis, Lee Stoner, Louisa Summers, Danilo Tulusso, Alana Turner, Hunter Waldman, Kip Webster, Michael Webster, Wendi Weimar, Lee Winchester, Donna Wolf

## SEACSM Executive Board Elections

The Annual Meeting is the time when we elect new members to the SEACSM Executive Board. This year we will be selecting a President-Elect, three At-Large Members, and one Student Representative. You will have a chance to meet the candidates at the meeting and you can learn more about them at the [Elections website](#). Go to [www.seacsm.org](http://www.seacsm.org) —> Annual Meeting —> Elections.

Elections are now electronic! A QR code will be available during the meeting, and you can vote directly from your mobile device.

### Candidates for President-Elect



**Stephen Bailey, PhD, FACS**  
*Elon University*



**Kimberly Reich, PhD**  
*High Point University*

### Candidates for At-Large Member



**Samuel Buckner, PhD**  
*University of South Florida*



**Harish Chander, PhD**  
*Mississippi State University*



**Trent Hargens, PhD, FACS**  
*James Madison University*



**Scott Lyons, PhD, FACS**  
*University of North Alabama*



**Juliana Marino, MA**  
*University of North Carolina Charlotte*



**Chris Mojock, PhD**  
*University of Georgia*

### Candidates for Student Representative



**Adam Ibrahim**  
Doctoral Student  
*University of Tennessee Knoxville*



**Summer Simulcik**  
Doctoral Student  
*Virginia Commonwealth University*

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## Featured Events at the 2023 Annual Meeting

### Preconference Session

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Start your Annual Meeting experience with a Preconference session on Thursday, Feb. 23 at 3:00 pm. This session is the *What's Up Doc?* rapid research presentations, our take on the three-minute thesis. Watch SEACSM professionals and graduate students compete in these short, high-energy presentations.

### Invited Speakers

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The Annual Meeting includes several invited lectures. Be sure to take advantage of these opportunities to hear from experts in our region and beyond.

**Keynote Address**

Thursday, Feb. 23, 7:30 pm  
Sara Wilcox, PhD, FACSM

**Basic Science Lecture**

Friday, Feb. 24, 10:00 am  
Michael Brown, PhD, FACSM

**Andrew Kozar ACSM President Address**

Friday, Feb. 24, 1:15 pm  
Anastasia Fischer, MD, FACSM

**Clinical Crossover Lecture**

Saturday, Feb. 25, 8:00 am  
Jason Zaremski, MD, FACSM

**Henry J. Montoye Award Lecture**

Saturday, Feb. 25, 11:00 am  
Lynn Panton, PhD, FACSM

**Luncheon Lecture**

Saturday, Feb. 25, 12:00 pm  
Michael Berry, PhD, FACSM

### SEACSM Social

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Take advantage of this chance to see old colleagues and friends and make new connections. Join us after the Keynote Address on Thursday, Feb. 23 at 9:00 pm in the Teal room.

### Emily Haymes Mentoring Breakfast

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This annual event is an opportunity for professionals and students to network, provide a support system for career advancement, and promote leadership opportunities in ACSM. Join us on Friday, Feb. 24 at 6:45 am for a chance to connect, learn, and start your day with a delicious meal! You must have preregistered to attend the breakfast.

### Luncheon and Lecture

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End the Annual Meeting on Saturday, Feb. 25 at 12:00 pm with lunch, awards and honors, and a guest speaker. Students who presented in the Student Award Poster session or participated in the Leadership and Diversity Training Program will be recognized. This is also when new board members are announced, and the new President-elect starts the process of planning the 2024 Annual Meeting. You must have preregistered to attend the lunch.

## Special Events for Students at the 2023 Annual Meeting

### Student Award Poster Competition

See some of our region's best and brightest students share their research in this session on Thursday, Feb. 23 at 4:30 pm. Finalists selected from applicants in the undergraduate, masters, and doctoral award categories will present in this poster session. A panel of judges will select the winners in each category. The top graduate poster (masters or doctoral) will compete in the ACSM Presidential Cup at the 2023 ACSM Annual Meeting. The top chapter award winners will also present at the national meeting.

### Leadership and Diversity Training Program

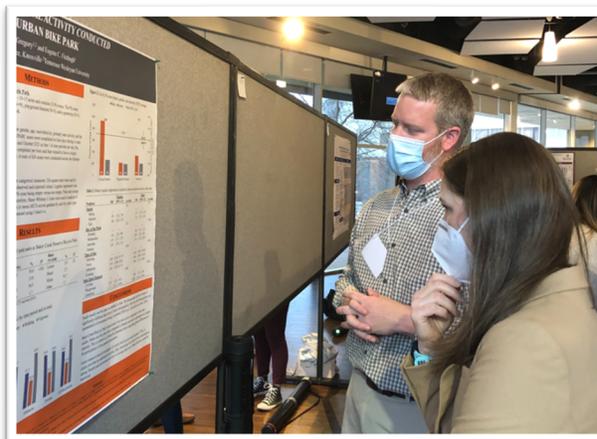
The SEACSM Leadership and Diversity Training Program (LDTP) encourages student members from minority groups underrepresented in the sciences to participate in activities that will lead to successful mentored experiences at the Annual Meeting, enhanced pathways to degree completion and career opportunities, and increased SEACSM and ACSM service. Congratulate the award winners when you see them at the meeting and consider applying for the program yourself next year.

### Student Bowl

The Undergraduate Student Bowl is back for the 2023 SEACSM Annual Meeting! We are looking forward to coming together for this fun Jeopardy-style team competition testing exercise science knowledge. Join us on Friday, Feb. 24 at 4:45 pm to cheer on your school's team!

### Graduate Program Fair

This annual event is an excellent opportunity for students to learn about graduate programs in our region. This is your chance to make connections with faculty and student representatives to help you in the process of continuing your education. The Graduate Program Fair is on Friday, Feb. 24 at 6:30 pm.



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## Graduate Program Fair

The **Graduate Program Fair** is on **Friday, Feb. 24** at **6:30 pm** in the **Teal** room. This annual event is an excellent opportunity for students to learn about graduate programs in our region. This is your chance to make connections with faculty and student representatives to help you in the process of continuing your education. The Graduate school fair is coordinated by Michael Berry, SEACSM Executive Board member.

The 2023 Graduate Program Fair is sponsored by the **University of Tampa**.

### 2023 Graduate Program Fair Participants

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**Appalachian State University**

**Augusta University**

**Barry University**

**East Tennessee State University**

**Emmanuel College**

**Florida Atlantic University**

**Florida State University**

**Gannon University**

**George Mason University**

**George Washington University**

**Georgia Southern University**

**Georgia State University (Physical Therapy)**

**Jacksonville University**

**James Madison University**

**Kennesaw State University**

**Life University**

**Piedmont University**

**Southeastern Louisiana University**

**The University of Alabama**

**The University of Mississippi**

**The University of South Alabama**

**The University of South Carolina**

**The University of Tampa**

**Troy University**

**University of Alabama Huntsville**

**University of Montevallo**

**University of North Carolina – Greensboro**

**University of North Carolina – Charlotte**

**University of South Carolina Upstate**

**University of Virginia**

**University of West Georgia**

**University of Western Kentucky**

**Wake Forest University**

## Supporters and Exhibitors

Southeast ACSM thanks our supporters and exhibitors for their ongoing support of the chapter.

Companies and institutions interested in sponsorship or exhibiting should contact Michael Berry, SEACSM Executive Board Exhibits, Sponsorships, and Fund-Raising Chair.

### 2023 Program Supporters

The Southeast ACSM chapter gratefully acknowledges program support from:

#### **Trice Medical**

Supporter of the SMPT Reception

#### **Kennesaw State University**

Supporter of the Student Bowl

#### **University of Tampa**

Supporter of the Graduate Fair

#### **Barry University**

Silver Level Supporter

#### **Emmanuel College**

Silver Level Supporter

#### **Delsys**

Bronze Level Supporter

#### **Palmer College of Chiropractic**

Bronze Level Supporter

#### **ParvoMedics**

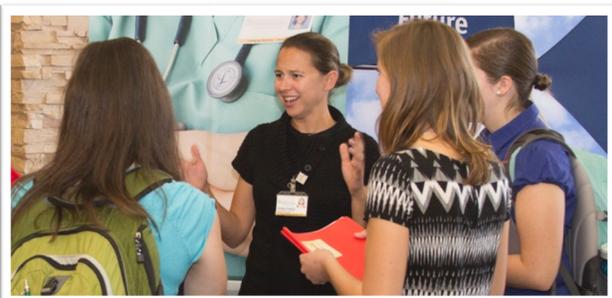
Bronze Level Supporter

#### **American College of Sports Medicine**

Supporter

#### **Gatorade Sports Science Institute**

Supporter



### 2023 Exhibitors

Visit our exhibitors to learn more about their products, services, and academic programs. The exhibit hall is located in the Prefunction area in front of the meeting rooms and is open throughout the conference.

#### **COSMED**

#### **Freed-Hardeman University**

#### **Gannon University**

#### **Hologic**

#### **iWorx**

#### **Liberty University**

#### **Logan University**

#### **Mercer University**

#### **University of Kentucky**

#### **University of West Alabama**

#### **University of West Florida**

#### **XSENSOR**



## Student Award Poster Competition

### Student Research Awards

Southeast ACSM is proud to highlight and reward outstanding research conducted by students at our annual meeting. The **Student Award Poster Competition** is on **Thursday, Feb. 23** from **4:30–6:00 pm** in **Crepe Myrtle**.

Finalists selected from applicants in the undergraduate, masters, and doctoral awards categories will present in this poster session. A team of judges will select the winners in each category—Undergraduate, Masters, and Doctoral. The award winners will be announced at the conference award ceremony and all finalists are expected to attend. SEACSM presents an award to the top three winners in each category.

SEACSM will select the top graduate poster (masters or doctoral) to compete in the ACSM Presidential Cup at the 2023 ACSM Annual Meeting. The top award winners in each category will also present at the national meeting.

### Previous Student Research Award Winners

#### 2022

**Doctoral:** 1<sup>st</sup>–Matthew Martenson, *Florida State University*, 2<sup>nd</sup>–Patricia Pagan Lassalle, *University of North Carolina-Chapel Hill*, 3<sup>rd</sup>–Holly Clarke, *Florida State University*

**Master's:** 1<sup>st</sup>–Louisa Tichy, *University of North Carolina-Greensboro*, 2<sup>nd</sup>–Alex Pomeroy, *University of North Carolina-Chapel Hill*, 3<sup>rd</sup>–Monica Dunn, *East Carolina University*

**Undergraduate:** 1<sup>st</sup>–Miranda Traylor, *University of South Alabama*, 2<sup>nd</sup>–Maria Damewood, *Roanoke College*, 3<sup>rd</sup>–Ashleigh Davis, *Samford University*

#### 2021

**Doctoral:** 1<sup>st</sup>–Emily Grammer, *East Carolina University*, 2<sup>nd</sup>–Brittany Counts-French, *University of Tennessee*, 3<sup>rd</sup>–Kerry Martin, *University of North Carolina-Greensboro*

**Master's:** 1<sup>st</sup>–Jillian Poles, *University of North Carolina-Chapel Hill*, 2<sup>nd</sup>–Rachel Miller, *Samford University*, 3<sup>rd</sup>–Richard Young, *University of Louisiana-Lafayette*

**Undergraduate:** 1<sup>st</sup>–Sophia Osada, *Appalachian State University*, 2<sup>nd</sup>–Madison Gill, *North Carolina Wesleyan University*, 3<sup>rd</sup>–Case Jackson, *University of West Florida*

### Student Award Poster Reviewers and Judges

**Reviewers:** Tom Andre, Ashley Artese, Christopher Ballmann, Jeff Barfield, Becki Battista, Marissa Bello, Andy Bosak, Jennifer Caputo, Harish Chander, Ryan Colquhoun, Elizabeth Easley, David Edwards, Liz Edwards, Ron Evans, Michael Green, Gene Fitzhugh, Lee Franco, Katie Hirsch, Geoffrey Hudson, Samantha Johnson, Lauren Killen, Scott Lyons, Traci Parry, JohnEric Smith, Erica Marshall, Mallory Marshall, Andrew Moore, Cody Morris, Nicole Rendos, Jonathan Ruiz-Ramie, Greg Ryan, Michael Samaan, Mark Schafer, Jeff Simpson, Danilo Toluoso, Alana Turner, Hunter Waldman, Michael Webster, Lee Winchester

**Judges:** Stephen Bailey, Sam Buckner, Harish Chander, Trent Hargens, Scott Lyons, Julie Marino, Chris Mojock, Kimberly Reich

## Leadership and Diversity Training Program

The SEACSM Leadership and Diversity Training Program (LDTP) encourages student members from minority groups underrepresented in the sciences to participate in activities that will lead to successful mentored experiences at the Annual Meeting, enhanced pathways to degree completion and career opportunities, and increased SEACSM and ACSM service.

LDTP recipients will be matched with a professional SEACSM member who will assist the student with setting goals, preparing for attending the Annual Meeting, providing active mentorship at the meeting to connect the student with potential academic, research, and service opportunities, and guide the student through next steps to achieve their educational/professional goals after the meeting. Students in the LDTP program have gone on to be successful graduate students, professionals, and leaders. Some have become LDTP mentors themselves!

LDTP award winners receive a travel stipend to participate in the Annual Meeting. Congratulate the award winners when you see them at the meeting and consider applying for the program yourself next year.

The 2023 LDTP students and mentors are:

### Student

**Mason McIntosh**

*Auburn University*

**Jasmine Parker Brown**

*University of South Carolina*

**Nevaeh Rose Nez**

*University of North Carolina-Chapel Hill*

**Liliana Renteria**

*Florida State University*

**Mervin Jajika**

*Augusta University*

### Mentor

**Marc Cook**

*North Carolina A&T State University*

**Yuri Feito**

*ACSM National Office*

**Leanna Ross**

*Duke University*

**Lauren Reid**

*South College-Atlanta*

**Jonathan Ruiz-Ramie**

*Augusta University*



## Student Bowl

The Undergraduate Student Bowl is back for the 2023 SEACSM Annual Meeting! We are looking forward to coming together for this fun Jeopardy-style team competition testing exercise science knowledge. Join us on **Friday Feb. 24** at **4:45–6:15 pm** in **Regency Ballroom A & B & C** to cheer on your school's team!

The winning team will have the opportunity to represent Southeast ACSM at the National ACSM Student Bowl at the 2023 ACSM Annual Meeting in Denver!

The 2023 Graduate Program Fair is sponsored by **Kennesaw State University**.

### 2023 Student Bowl Participants

**Anderson University**  
**Coastal Carolina University**  
**East Carolina University**  
**East Tennessee State University**  
**Elon University**  
**Florida Southern College**  
**Florida State University**  
**Georgia College & State University**  
**Georgia Southern University**  
**Kennesaw State University**  
**Montreat College**  
**North Carolina Wesleyan University**  
**Roanoke College**  
**Samford University**  
**The Citadel**  
**Troy University**  
**Truett McConnell University**  
**UNC Charlotte**  
**University of Alabama**  
**University of Alabama at Birmingham**  
**University of Mississippi**  
**University of Montevallo**  
**University of North Alabama**  
**University of North Carolina-Chapel Hill**  
**University of North Florida**  
**University of South Alabama**  
**University of South Carolina**  
**Virginia Tech**  
**Wake Forest University**  
**Western Kentucky University**  
**Winston-Salem State University**  
**Winthrop University**

### Student Bowl Committee

The Student Bowl is organized by Executive Board members **Bhibha Das** and **Mallory Marshall**. They are assisted by a committee that develops questions and makes sure the event runs smoothly.

**Liz Edwards (Chair)**, *James Madison University*

**Ashley Artese**, *Duke University*

**Susan Arthur**, *UNC Charlotte*

**Ginny Frederick**, *University of Georgia*

**Robert Herron**, *University of Montevallo*

**Garrett Hester**, *Kennesaw State University*

**Robert Kowalsky**, *Appalachian State University*

**Doris Morris**, *Kennesaw State University*

**Karissa Peyer**, *University of Tennessee Chattanooga*

**Kimberly Reich**, *High Point University*

**Katie Spring**, *Auburn University*

**Robyn York**, *Montreat College*

### Student Bowl Emcee and Judges

The host and emcee for the 2023 Student Bowl is **Judith Flohr**, *James Madison University*.

The Student Bowl is supervised by a panel of SEACSM celebrity judges:

**Bruce Gladden**, *Auburn University*

**Lynn Panton**, *Florida State University*

**Scott Powers**, *Stetson University*

**Sara Wilcox**, *University of South Carolina*

## Opening Remarks and Keynote Address

### Keynote Address

Thursday, February 23 | 7:30–9:00 pm | Regency Ballroom A & B & C

### Designing Physical Activity Interventions for Scalability

Sara Wilcox, PhD, FACSM. *University of South Carolina, Columbia, SC.*

This is the “official” start of the 2023 Annual Meeting. We will begin with announcements from SEACSM President Danielle Wadsworth. She will conduct any SEACSM business that must be brought before the membership. She will also introduce the candidates for Executive Board positions and explain the online voting process.

The Keynote Address is one of six invited lectures at the SEACSM Annual Meeting. Previous speakers represent renowned researchers, practitioners, educators, and leaders. That tradition is continued this year with our Keynote speaker, Sara Wilcox, PhD, FACSM.

### Meet the Speaker: Sara Wilcox, PhD, FACSM



Dr. Sara Wilcox is a clinical psychologist and a professor in the Department of Exercise Science at the University of South Carolina’s Arnold School of Public Health. There she directs a CDC-funded Prevention Research Center. Much of Dr. Wilcox’s research focuses on partnering with communities to promote physical activity and healthy eating to reduce disease risk and eliminate health disparities. Since arriving at the University of South Carolina in 1999, her

research has been continuously funded by agencies including NIH, CDC, and the Robert Wood Johnson Foundation. She has authored or co-authored over 250 peer-reviewed publications.



### Previous Keynote Speakers

<b>2022</b>	Ed Howley
<b>2021</b>	Douglas Casa
<b>2020</b>	Jim Pivarnik
<b>2019</b>	Barry Braun
<b>2018</b>	Tim Lightfoot
<b>2017</b>	Barry Franklin
<b>2016</b>	William Kraemer
<b>2015</b>	Patty Freedson
<b>2013</b>	Molly Bray
<b>2012</b>	Russell Pate
<b>2011</b>	Scott Powers
<b>2010</b>	Frank Booth
<b>2009</b>	Reed Humphrey
<b>2008</b>	Paul Ridker
<b>2007</b>	Timothy Lohman
<b>2006</b>	Frank Hu
<b>2005</b>	James Hagberg
<b>2004</b>	Harold Kohl
<b>2003</b>	Claude Bouchard
<b>2002</b>	William Dietz
<b>2001</b>	Chris Carmichael
<b>2000</b>	Barbara Sternfeld
<b>1999</b>	Maria Fiatarone Singh
<b>1998</b>	Sanders Williams
<b>1997</b>	Carl Casperson
<b>1996</b>	Stan Lindstedt
<b>1995</b>	Paul Thompson
<b>1994</b>	David Lamb
<b>1993</b>	Steven Blair
<b>1992</b>	Claude Bouchard
<b>1991</b>	William Haskell
<b>1990</b>	Eric Newsholme
<b>1989</b>	Barbara Drinkwater
<b>1988</b>	David Costill
<b>1985</b>	Carl Gisolfi
<b>1984</b>	Michael Pollock
<b>1983</b>	Leonard Hayflack
<b>1977</b>	Wendell Stainsby

## Emily Haymes Mentoring Breakfast

### The 2023 Mentoring Breakfast Event

Emily Haymes Mentoring Breakfast will be held on **Friday, February 24** at **6:45–7:45 am** in the **Teal room**. Please note that preregistration was required for this event. This year the event is dedicated to engaging with other students and professionals in table discussions. We will also recognize the winner of the Southeast ACSM Emily M. Haymes Mentoring Award: Judith A. Flohr, PhD, FACSM.

### Meet the 2022 Emily M. Haymes Mentoring Award Winner: Judith A. Flohr, PhD, FACSM



Judith A. Flohr is a Professor Emerita of Kinesiology at James Madison University (JMU) and currently serves as the Founding Director of the Morrison Bruce Center. During her tenure at JMU she was the Director of the Human Performance Laboratory and Coordinator of the Exercise Science Program. As a faculty member at JMU she received the Distinguished Teaching Award in 2000 and the Distinguished Service Award in 2006. In addition, Dr. Flohr served 3 terms as the President of the JMU Faculty Women's Caucus. Dr. Flohr served as President of SEACSM (2009-2010) and in 2013 received the Service Award. From 2013-2017 Dr Flohr served on ACSM Board of Trustees as the Chapter Trustee and on the ACSM Foundation Board of Directors. Dr. Flohr received her Bachelor's degree in Animal Physiology from The University of California-Davis, her Masters in Physical Education (Exercise Physiology) from The University of California-Davis, and her Ph.D. in Exercise Physiology from The University of Tennessee-Knoxville. Prior to her appointment at JMU she was a faculty member at the College of Wooster where she became the first woman in the United States to coach a men's intercollegiate swim team. At Wooster she was Men's and Women's Swimming Coach and taught exercise physiology and kinesiology. Dr. Flohr was also a faculty member in the Physical Education Department at Oberlin College. Dr. Flohr's research interests included women and children's physical activity with an emphasis on the relationship between physical activity and risk for cardiovascular disease in post-menopausal women.

### 2023 Mentoring Breakfast Committee

**Leanna Ross, PhD** (Chair)  
*Duke University*

**Jonathan Ruiz-Ramie, PhD**  
*Augusta University*

**Katie Collins, PhD**  
*Duke University*

**Audrey Collins, PhD**  
*Advent Health*

**Mark Schafer, PhD**  
*Western Kentucky University*

**Liz Edwards, PhD**  
*James Madison University*

**Lee Franco, PhD**  
*Virginia Commonwealth University*

**Becka Kappus, PhD**  
*Appalachian State University*

**Danielle Wadsworth, PhD**  
*Auburn University*

**Becki Battista, PhD**  
*Appalachian State University*

**Katie Spring, MS**  
*Auburn University*

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## Emily Haymes Mentoring Breakfast

Previously known as the SEACSM Women's Breakfast, this annual event was originally conceived by Drs. Emily M. Haymes, Barbara Ainsworth, Mindy Millard Stafford, and Diane Ward. The first Breakfast was held in 1993. The original goals of the Breakfast were to provide a venue/event for women scholars and students that would advance their leadership skills, a support system (network) that would help women become productive scholars and achieve Fellowship status in ACSM, advancement opportunities for members careers, and a forum to honor women of SEACSM and ACSM. The consequences of the Breakfast for SEACSM and ACSM include 28 women on the SEACSM Executive Board and 11 women Presidents of SEACSM, including seven who also served as President or on the Board of Trustees for ACSM.

In 2015, the SEACSM Executive Board and membership recognized that the Chapter should provide an activity/event that would continue to foster the development of women. However, as both men and women at all levels of their careers need or could benefit from mentoring, the annual event evolved to become the Mentoring Breakfast. In 2018, the Breakfast was officially named the Emily M. Haymes Mentoring Breakfast, in recognition of her significant impact as a founder of the Breakfast, her tireless efforts as a mentor, and her service and support of SEACSM and ACSM.

### About Emily M. Haymes, PhD, FACSM

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Dr. Haymes completed her Bachelor of Arts (Mathematics and Physical Education; 1961) from Drury University, her master's degree (Physical Education; 1962) from Florida State University, and her doctoral degree from Penn State University (Exercise Physiology; 1973). Dr. Haymes was an Assistant Professor at the University of Colorado Boulder from 1974-1979, and then served as a faculty member of the Department of Nutrition, Food and Exercise Sciences for 30 years (1979-2009) at Florida State University where she is Professor Emerita. Prior to her retirement, she chaired 26 doctoral dissertation committees, 15 master's thesis committees (Florida State University) and was a member of an additional 28 dissertation committees. During her tenure at University of Colorado Boulder, she chaired 10 master's thesis committees. Her scholarly contributions include over 100 manuscripts and nearly 2500 citations. Dr. Haymes was the first woman to be elected to the SEACSM Executive Board (1984-1986); she served as SEACSM President (1989-1990), a Trustee on the ACSM Board of Trustees (1989-1992, 1993-1995), and Vice President of ACSM 1993-1995. The contributions that Dr. Haymes made to the discipline of Exercise Science, ACSM and especially SEACSM are noteworthy. Perhaps of greater value and significance are the countless hours and "ATP" (energy) she devoted to advancing the careers of her students and colleagues.

## Andrew Kozar ACSM Presidential Address

### Andrew Kozar ACSM Presidential Address

Friday, February 24 | 1:15–2:15 pm | Regency Ballroom A & B

#### **THE LEARNING CONNECTION: HOW NUTRITION, NURTURING, AND ACTIVITY HELP BUILD A HEALTHY KID**

Anastasia N. Fisher, MD, FACSM. *Nationwide Children's Hospital and The Ohio State University College of Medicine, Columbus, OH.*

The Presidential address has been part of our program for over 20 years. In 2011, the SEACSM Executive Board chose to name the annual Presidential lecture in honor of our first President, Dr. Andy Kozar. Dr. Kozar was a long-time faculty member at the University of Tennessee. He was among the group of ACSM members whose strong belief in the importance of founding a regional chapter in the southeast led to the first meeting in Gatlinburg, TN in 1973. Dr. Kozar viewed the annual meeting as a critically important opportunity in the professional development of students, and he was among the loudest voices in making sure that meetings were student-friendly.

In most years the speaker is the current ACSM President, many of whom have ties to the southeast region. The 2023 ACSM president, Anastasia Fischer, MD, FACSM, is no exception.

### Previous Presidential Address Speakers

<b>2022</b>	L. Bruce Gladden
<b>2021</b>	NiCole Keith
<b>2020</b>	William Kraus
<b>2019</b>	Kathryn Schmitz
<b>2018</b>	Walter Thompson
<b>2017</b>	Catrine Tudor-Locke
<b>2016</b>	Manish Gupta
<b>2015</b>	William Dexter
<b>2013</b>	Janet Walberg Rankin
<b>2012</b>	Barbara Ainsworth
<b>2011</b>	Thomas Best
<b>2010</b>	Jim Pivarnik
<b>2009</b>	Mindy Millard-Stafford
<b>2008</b>	Robert Sallis
<b>2007</b>	J. Larry Durstine
<b>2006</b>	Carl Foster
<b>2005</b>	W. Larry Kenney
<b>2004</b>	Linda Pescatello
<b>2003</b>	Edward Howley
<b>2002</b>	Angela Smith
<b>2001</b>	Priscilla Clarkson
<b>2000</b>	Paul Thompson
<b>1999</b>	Barry Franklin

### Meet the Speaker: Anastasia Fisher, MD, FACSM



Anastasia N. Fischer, MD, FAAFP, FACSM Anastasia Fischer, MD, is a member of the Division of Sports Medicine in the Section of Ambulatory Pediatrics at Nationwide Children's Hospital and is a Clinical Associate Professor of Pediatrics at The Ohio State University College of Medicine. Dr. Fischer obtained a master's degree in Exercise Physiology at the University of Georgia before attending medical school at The Ohio State University College of Medicine. She then completed a family practice residency at University of Pittsburgh Medical Center in Pittsburgh, Pennsylvania, and a primary care sports medicine fellowship at Maine Medical Center in Portland, Maine. She is fellowship trained and board certified in sports medicine, and is a member of the American Medical Society for Sports Medicine and the American College of Sports Medicine, where she has

served on the Board of Directors of the Midwest Regional Chapter, the national Board of Trustees, the Strategic Health Initiative for Women's Health, and currently serves as President. She sits on the Board of Directors for Action for Healthy Kids, a non-profit organization that provides grants and instruction for schools to increase physical activity and sound nutrition practices. She has a special interest in research and advocacy regarding the adolescent female athlete, concussions, and spondylolysis. Dr. Fischer is a volunteer physician with the Tour de Grandview bicycle race and serves as team physician at Groveport Madison High School in the central Ohio area.

## Clinical Crossover Lecture

### Clinical Crossover Lecture

Saturday, February 25 | 8:00–8:50 am | Regency Ballroom A & B

#### **SPORTS MEDICINE: THE ROLE OF A MULTI-DISCIPLINARY TEAM. AKA: WHAT DOES IT TAKE TO BE SUCCESSFUL IN SPORTS MEDICINE**

Jason Zaremski, MD, FACS. *University of Florida, Gainesville, FL.*

The Clinical Crossover Lecture is an opportunity to have a speaker with a background in clinical sports medicine address the SEACSM audience. It also serves as part of the Clinical Track, renamed the Sports Medicine Physician Track in 2021. The Sports Medicine Physician Track Program is open to all SEACSM Annual Meeting attendees.

### Previous Clinical Crossover Lecture Speakers

- 2022** William Kraus
- 2021** Dermot Phelan
- 2020** Tom Best
- 2019** Robert Sallis
- 2018** Elizabeth Joy
- 2017** Bert Fields
- 2016** Pierre Rouzier

### Meet the Speaker: Jason Zaremski, MD, FACS



My name is Jason Zaremski, MD, and I am a nonoperative musculoskeletal and sports medicine physician and a clinical associate professor at the University of Florida Department of Physical Medicine and Rehabilitation. I also serve as the chief of the sports medicine division, and I am the associate program director for our department's residency. I earned my medical degree and completed my residency in physical medicine and rehabilitation from Tufts University School of Medicine in Boston, Massachusetts. Following my residency training, I completed my fellowship in sports medicine at the Geisinger Health System in Pennsylvania.

During my faculty appointment with UF, I served as the co-medical director for the High School Outreach Program until 2022. I have also served as a team physician for athletes at the high school, collegiate and professional levels. I currently serve as head team physician for high schools in the Gainesville area and volunteer my time as a team physician for Team USA and the US U-17 women's soccer team. In 2022, I was the chief medical officer for the U-18 Baseball World Cup.

My research interests include areas of sports and musculoskeletal medicine with a focus in throwing injuries in baseball players. I have published more than 100 peer-reviewed publications, posters and abstracts and have presented on the topic of throwing-related injuries in Japan, Norway, Sweden, Denmark and Monaco.

I am an active member of the American Medical Society for Sports Medicine (AMSSM) and the American College of Sports Medicine (ACSM), and I serve as a diplomat in the American Academy of Physical Medicine and Rehabilitation. I am an elected board member for the AMSSM and a fellow in the ACSM.

### Growth of the Sports Medicine Physician Track

Clinical sports medicine sessions have long been an important part of the SEACSM Annual Meeting program. The Sports Medicine Physician track has grown from a few lectures and case presentations on the schedule to a two-day dedicated program with over 20 talks from experts and case studies from sports medicine residents and fellows.

## Basic Science Lecture

### Basic Science Lecture

Friday, February 24 | 10:00–11:00 am | Regency Ballroom A & B

### EFFECTS OF EXERCISE ON IN VIVO AND IN VITRO ENDOTHELIAL FUNCTION

Michael Brown, PhD, FACSM. *University of Maryland, College Park, MD.*

The Basic Science lecture features renowned scientists who share foundational research in their area of expertise. This is a chance to learn about current research and how it applies to exercise science.

### Meet the Speaker: Michael Brown, PhD, FACSM



Michael D. Brown, PhD, is a Professor and Chair in the Department of Kinesiology, School of Public Health. Dr. Brown received his Ph.D. in Exercise Physiology from the University of Maryland College Park and then completed a Postdoctoral Fellowship at the University of Michigan focused on age-associated hypertension. He has experience at Temple University, University of Illinois, Chicago, and Auburn University before returning to the University of Maryland in 2022. Dr. Brown is a Fellow of the American Heart Association Council for High Blood

Pressure Research, the American College of Sports Medicine, and the National Academy of Kinesiology. Dr. Brown's research program focuses on hypertension, vascular health, and exercise in African Americans. His research uses complementary human and cell models to address his research questions. His recent research includes the association of social determinants and racialized stress with vascular function. His research has been funded primarily by the NIH and AHA. Dr. Brown has received external funding at each stage of his career. He has ~90 publications in peer-reviewed journals.

### Previous Basic Science Lecture Speakers

- 2022** Karyn Esser
- 2021** John Quindry
- 2020** Stella Volpe
- 2019** Andrew Galpin
- 2018** Michael Reid
- 2017** Marcus Bamman
- 2016** Lawrence Weiss
- 2015** Karyn Esser
- 2013** Douglas Seals
- 2012** Scott Trappe
- 2011** Jeff Lichtman
- 2010** Michael Delp
- 2009** Darrell Neuffer
- 2008** Anne McTiernan
- 2007** Scott Powers
- 2006** James Hagberg
- 2005** Steven Kleeberger
- 2004** John Ivy
- 2003** Vincent Caiozzo
- 2002** Michael Hogan
- 2001** Larry Kenney
- 2000** Ronald Terjung
- 1999** John Ivy
- 1998** Charlotte Tate
- 1997** Steven Segal
- 1996** David Wasserman
- 1995** Bruce Gladden
- 1994** Gary Dudley
- 1993** Timothy White

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@SEACSM Chapter



@SEACSM



@southeastern\_acsm

## Henry J. Montoye Scholar Award Lecture

### Henry J. Montoye Scholar Award Lecture

Saturday, February 25 | 11:00 am–12:00 pm | Regency Ballroom C

#### **RIDING THE COATTAILS OF MY STUDENTS: THE IMPORTANCE OF RESISTANCE TRAINING IN CLINICAL POPULATIONS**

Lynn Panton, PhD, FACSM. *Florida State University, Tallahassee, FL*

The Scholar Award was instituted to honor and recognize outstanding contributions to the body of knowledge related to medicine and science in sports and exercise. It was named for Henry J. Montoye in 1997 to recognize his contributions as a scholar and his dedication to founding the Southeast ACSM chapter.

Previous Scholar Award recipients are accomplished researchers, mentors, and leaders in Southeast ACSM. The 2023 Scholar Award recipient, Lynn Panton, PhD, FACSM, shares these same qualities.

### Meet the Speaker: Lynn Panton, PhD, FACSM



Lynn Panton graduated from Emory University in Atlanta, Georgia with a BS in Psychology. She received her master's degree and Ph.D. from the University of Florida in Exercise Science. She is currently a Professor in the Department of Nutrition and Integrative Physiology at Florida State University. Dr. Panton's research interests are in the area of resistance training and the effects on the physiological measurements of strength, body composition, and functional outcomes of

healthy older adults and chronically diseased populations. She is currently studying the effects of resistance training on body composition and functionality in breast cancer survivors.

### Previous Scholar Award Speakers

<b>2022</b>	Laurie Wideman
<b>2021</b>	Peter Brubaker
<b>2020</b>	Ed Acevedo
<b>2019</b>	Allan Goldfarb
<b>2018</b>	Janet Walberg Rankin
<b>2017</b>	Dixie Thompson
<b>2016</b>	Michael Berry
<b>2015</b>	Arthur Weltman
<b>2013</b>	Dianne Ward
<b>2012</b>	Gordon Warren
<b>2011</b>	Steven Blair
<b>2010</b>	Timothy Lightfoot
<b>2009</b>	Kevin McCully
<b>2008</b>	J. Larry Durstine
<b>2007</b>	David Bassett, Jr.
<b>2006</b>	David Nieman
<b>2005</b>	Emily Haymes
<b>2004</b>	Rod Dishman
<b>2003</b>	Robert McMurray
<b>2002</b>	J. Mark Davis
<b>2001</b>	Barbara Ainsworth
<b>2000</b>	Bruce Gladden
<b>1999</b>	Steve Messier
<b>1998</b>	Ed Howley
<b>1997</b>	Henry Montoye
<b>1996</b>	Mel Williams
<b>1995</b>	Scott Powers
<b>1994</b>	Kirk Cureton
<b>1993</b>	Michael Pollock
<b>1992</b>	Robert Armstrong
<b>1991</b>	Wendell Stainsby
<b>1990</b>	Russ Pate
<b>1989</b>	Hugh Welch

## Luncheon and Lecture

End the Annual Meeting at the **Luncheon and Lecture** on **Saturday Feb. 25 at 12:00 pm** in **Regency Ballroom A & B** with lunch, awards and honors, and a guest speaker. Please note that preregistration was required for this event.

Awards will be given for the top three undergraduate, masters, and doctoral presentations in the Student Award Poster session. Students who participated in the Leadership and Diversity Training Program will be recognized. The SEACSM Service Award will also be presented in this session.

This is also when newly elected board members are announced, and the new President-elect starts the process of planning the 2024 Annual Meeting.

Speakers at the Luncheon Lecture are accomplished scholars and leaders in southeast and national ACSM.

### **STATS SONGS: THE MUSIC THAT MADE STATISTICS JUST A LITTLE BIT LESS PAINFUL**

Michael Berry, PhD, FACSM. *Wake Forest University, Winston-Salem, NC.*

### **Meet the Speaker: Michael Berry, PhD, FACSM**



Dr. Michael Berry is a Professor of Health and Exercise Science at Wake Forest University and the Wake Forest University Bitove Faculty Fellow. Dr. Berry completed his undergraduate degree at Jacksonville State University in Alabama, his master's degree at Southeast Louisiana University, and his Ph.D. at Texas A&M University. Prior to joining the faculty at Wake Forest in 1985, Dr. Berry completed post-doctoral training at the University of North Carolina. He teaches a variety of classes including: statistics at the undergraduate and graduate level, human physiology at the undergraduate level and an advanced exercise physiology class. Dr. Berry's early research interest was in the control of respiration during exercise which eventually led to his interest in the role exercise plays in the rehabilitation of those with lung disease. Dr. Berry has been the principal and/or co-investigator on several large randomized clinical trials that have investigated how exercise can be used to improve physical function in individuals with chronic obstructive pulmonary disease (COPD) and acute respiratory failure. More recently, Dr. Berry's research has centered around identifying variables that best predict physical function recovery trajectories in intensive care unit patients. In his free time, Michael likes writing stats songs. During his work time, he accomplishes even less.

### **Previous Luncheon Speakers**

<b>2022</b>	Scott Powers
<b>2020</b>	Karin Pfeiffer
<b>2019</b>	Micheal Delp
<b>2018</b>	Sofiya Alhassan
<b>2017</b>	Peter Wagner
<b>2016</b>	Mark Nash
<b>2015</b>	Jeffery Woods
<b>2013</b>	Michael Joyner
<b>2012</b>	Kevin Guskiewicz
<b>2011</b>	Brent Ruby
<b>2010</b>	Nicolaas Pronk
<b>2009</b>	Stella Volpe
<b>2008</b>	Lawrence Armstrong
<b>2007</b>	Jim Palwelczyk
<b>2006</b>	Mark Fenton
<b>2005</b>	Laurie Goodyear
<b>2004</b>	Paul Ribisl
<b>2003</b>	Al Ernst
<b>2002</b>	Wayne Sotile
<b>2001</b>	Craig Horswill
<b>2000</b>	David Costill
<b>1999</b>	David Costill
<b>1998</b>	Priscilla Clarkson
<b>1997</b>	Martin Collis
<b>1996</b>	Mel Williams
<b>1995</b>	Wayne Sotile
<b>1994</b>	Liz Applegate
<b>1993</b>	Laverne Woods
<b>1992</b>	Martin Collis
<b>1991</b>	Jack Wilmore
<b>1990</b>	Ethan Nadel
<b>1989</b>	Charles Dillman
<b>1988</b>	William Castelli
<b>1985</b>	George Pfeiffer
<b>1984</b>	Peter Van Handle
<b>1983</b>	Jimmy Carnes
<b>1977</b>	Wendell Stainsby

## Sports Medicine Physician Track Program

### Program Description

The Sports Medicine Physician Track Program this year features nationally recognized speakers and fellowship Program Directors in the field of Sports Medicine. Sports Medicine cases will also be presented by residents and sports medicine fellows with the best case presentation receiving recognition and a monetary award. The Sports Medicine Physician Track Program is open to all SEACSM Annual Meeting attendees.

The **Sports Medicine Physician Track Program** begins on **Friday, Feb. 24** from **12:30–6:00 pm** in **Regency Ballroom H** and continues on **Saturday, Feb. 25** from **7:45 am–12:45 pm** in **Regency Ballroom D&E**.

### Accreditation/Continuing Medical Education

This activity has been planned and implemented in accordance with the accreditation requirements and policies of the Medical Association of Georgia through the joint providership of The Hawkins Foundation and the Southeast Chapter of the American College of Sports Medicine.

The Hawkins Foundation designates this live activity for a maximum of 9.5 AMA PRA Category 1 Credits.<sup>™</sup> Physicians should claim only the credit commensurate with the extent of their participation in the activity. The Hawkins Foundation is accredited by the Medical Association of Georgia to provide continuing medical education for physicians.

At the conclusion of this educational activity, participants should be able to:

1. Understand the unique features and rules of some common extreme sports.
2. Quickly recognize different injury patterns as they pertain to each sport.
3. Confidently manage associated injuries and return to sport.
4. Better understand how physical activity contributes to a healthy lifestyle.

### Sports Medicine Physician Track Officers

**Ryan Draper, DO**  
SEACSM Executive Board Physician Representative

**Leonardo Oliveira, MD**  
Chair, Physician Track Meeting

**Kim Kaiser, MD**  
Vice Chair, Physician Track Meeting

### Clinical Case Reviewers

**Ryan Draper, DO**, *Cone Health*

**William Hollabaugh, MD**, *Vanderbilt University*

**Shane Hudnall, MD**, *Cone Health*

**Kim Kaiser, MD**, *University of Kentucky*

**John Kiel, DO**, *University of Florida Jacksonville*

**Kathleen Roberts, MD**, *University of Kentucky*

## Sports Medicine Physician Track Program

### Friday, February 24

- 12:30 Welcome and Announcements**  
Leonardo Oliveira, MD *Cleveland Clinic Florida, Weston, FL*
- 12:45 High Risk Sports in Pregnancy – When or not to say NO?**  
Kim Kaiser, MD *University of Kentucky, Lexington, KY*
- 1:15 Achilles Tendon Tear - Non-operative vs. Operative Management? What Does the Data Say?**  
Kathleen Roberts, MD *University of Kentucky, Lexington, KY*
- 1:45 Home Exercise Program vs. Formal Rehabilitation Programs - What is the Best Approach?**  
David Berkoff, MD *UNC-Chapel Hill, Charlotte, NC*
- 2:15 Discussion**
- 2:25 Break**
- Fellow Case Presentations- Session 1**
- 2:40** Matthew Waldrop, MD *Atrium Health Wake Forest*
- 2:55** Jeff Nadwodny, DO *Mayo Clinic*
- 3:10** Kiran Mullur, MD *Atrium Health Wake Forest*
- 3:30 Tendinopathies - Understanding the role of all interventions.**  
Shane Hudnall, MD *Cone Health, Greensboro, NC*
- 4:00 Discussion**
- 4:05 Is there a new way to classify muscle injuries?**  
William Hollabaugh, MD *Vanderbilt University, Nashville, TN*
- 4:35 Discussion**
- 4:40 Break**
- 4:55 FAST Ultrasound - Applying it to Sports Medicine + Demonstration**  
John Kiel, MD *University of Florida, Jacksonville, FL*
- 5:55 Discussion**
- 6:30 Reception**

### Saturday, February 25

- 7:45 Welcome and Announcements**  
Leonardo Oliveira, MD *Cleveland Clinic Florida, Weston, FL*
- 8:00 Clinical Crossover Lecture - Sports Medicine and Its Multi-Disciplinary Aspects!**  
Jason Zaremski, MD *University of Florida, Gainesville, FL*
- Fellow Case Presentations- Session 2**
- 9:15** Michael Mauhar, MD *Prisma Health*
- 9:30** Alexander Sin, MD *Vanderbilt University*
- 9:45** Joseph Blessman, MD *University of Kentucky*
- 10:00 Stem Cells: What is the evidence?**  
Leonardo Oliveira, MD *Cleveland Clinic Florida, Weston, FL*
- 10:30 Discussion**
- Fellow Case Presentations- Session 3**
- 10:35** Bishop Carmichael, DO *University of Kentucky*
- 10:50 Break**
- 11:05 Weighted ball velocity training - Should you do it?**  
Jason Zaremski, MD *University of Florida, Gainesville, FL*
- 11:35 Discussion**
- Fellow Case Presentations- Session 4**
- 11:40** Nicole Prendergast, MD *Vanderbilt University*
- 12:05** Catie Stacks, MD, *University of Kentucky*
- 12:30 Voting for Best Case Presentation**
- 12:40 Closing Remarks**
- 12:45 Adjourn**

# Schedule

## Thursday, February 23

11:00 am–1:00 pm	<b>Executive Board Meeting</b>	<i>Boardroom</i>
12:00–6:00 pm	<b>Registration</b>	<i>Lobby</i>
1:00–6:00 pm	<b>Student Help Desk</b>	<i>Lobby</i>
1:00–2:00 pm	<b>Leadership and Diversity Training Program Meeting</b>	<i>Redbud</i>
1:00–2:00 pm	<b>AV Team Meeting</b>	<i>Regency Ballroom D &amp; E</i>
2:00–6:00 pm	<b>Exhibits</b>	<i>Prefunction Area</i>
3:00–3:50 pm	<b>Preconference Session (PC)</b>	<i>Redbud</i>
4:00–4:50 pm	<b>Symposium (S1)</b>	<i>Regency Ballroom D &amp; E</i>
4:00–4:50 pm	<b>Symposium (S2)</b>	<i>Regency Ballroom H</i>
4:00–4:50 pm	<b>Tutorial (T1)</b>	<i>Regency Ballroom C</i>
4:00–4:50 pm	<b>Tutorial (T2)</b>	<i>Regency Ballroom G</i>
4:00–6:00 pm	<b>Oral Presentation Session 1 (O1–O8)</b>	<i>Regency Ballroom F</i>
4:30–6:00 pm	<b>Thematic Poster Session 1 (TP1–TP7)</b>	<i>Think Tank</i>
4:30–6:00 pm	<b>Poster Presentation Session 1 (P1–P40)</b>	<i>Studio 220</i>
4:30–6:00 pm	<b>Student Award Poster Competition</b>	<i>Crepe Myrtle</i>
5:00–5:50 pm	<b>Symposium (S3)</b>	<i>Regency Ballroom D &amp; E</i>
5:00–5:50 pm	<b>Symposium (S4)</b>	<i>Regency Ballroom H</i>
5:00–5:50 pm	<b>Tutorial (T3)</b>	<i>Redbud</i>
5:00–5:50 pm	<b>Tutorial (T4)</b>	<i>Regency Ballroom C</i>
5:00–5:50 pm	<b>Tutorial (T5)</b>	<i>Regency Ballroom G</i>
7:30–9:00 pm	<b>Opening Remarks and Keynote Address</b>	<i>Regency Ballroom A &amp; B &amp; C</i>
9:00–10:30 pm	<b>SEACSM Social</b>	<i>Teal</i>

## Schedule

### Friday, February 24 Morning

6:45–7:45 am	<b>Emily Haymes Mentoring Breakfast</b>	<i>Teal</i>
8:00 am–5:00 pm	<b>Registration</b>	<i>Lobby</i>
8:00 am–4:00 pm	<b>Student Help Desk</b>	<i>Lobby</i>
8:00 am–6:00 pm	<b>Exhibits</b>	<i>Prefunction Area</i>
8:00–8:50 am	<b>Symposium (S5)</b>	<i>Regency Ballroom C</i>
8:00–8:50 am	<b>Symposium (S6)</b>	<i>Regency Ballroom H</i>
8:00–8:50 am	<b>Tutorial (T6)</b>	<i>Regency Ballroom G</i>
8:00–8:50 am	<b>Tutorial (T7)</b>	<i>Redbud</i>
8:00–10:00 am	<b>Oral Presentation Session 2 (O9–O16)</b>	<i>Regency Ballroom F</i>
8:00–9:30 am	<b>Thematic Poster Session 2 (TP8–TP16)</b>	<i>Crepe Myrtle</i>
8:00–9:30 am	<b>Poster Presentation Session 2 (P41–P105)</b>	<i>Studio 220</i>
9:00–9:50 am	<b>Symposium (S7)</b>	<i>Regency Ballroom D &amp; E</i>
9:00–9:50 am	<b>Symposium (S8)</b>	<i>Regency Ballroom G</i>
9:00–9:50 am	<b>Tutorial (T8)</b>	<i>Redbud</i>
9:00–9:50 am	<b>Tutorial (T9)</b>	<i>Regency Ballroom C</i>
9:00–9:50 am	<b>Tutorial (T10)</b>	<i>Regency Ballroom H</i>
10:00–11:00 am	<b>Basic Science Lecture</b>	<i>Regency Ballroom A &amp; B</i>

## Schedule

### Friday, February 24 Afternoon

12:00–1:00 pm	<b>Past Presidents Lunch</b>	<i>Teal</i>
12:30–1:15 pm	<b>Minority Health Research Interest Group Meeting</b>	<i>Redbud</i>
12:30–1:15 pm	<b>Biomechanics Interest Group Meeting</b>	<i>Regency Ballroom D &amp; E</i>
12:30–6:00 pm	<b>Sports Medicine Physician Track Sessions</b>	<i>Regency Ballroom H</i>
1:15–2:15 pm	<b>Andrew Kozar ACSM Presidential Address</b>	<i>Regency Ballroom A &amp; B</i>
2:30–3:20 pm	<b>Symposium (S9)</b>	<i>Redbud</i>
2:30–3:20 pm	<b>Symposium (S10)</b>	<i>Regency Ballroom D &amp; E</i>
2:30–3:20 pm	<b>Tutorial (T11)</b>	<i>Regency Ballroom G</i>
2:30–4:30 pm	<b>Oral Presentation Session 3 (O17–O24)</b>	<i>Regency Ballroom F</i>
2:30–4:00 pm	<b>Thematic Poster Session 3 (TP17–TP24)</b>	<i>Crepe Myrtle</i>
2:30–4:00 pm	<b>Poster Presentation Session 3 (P106–P170)</b>	<i>Studio 220</i>
3:30–4:20 pm	<b>Symposium (S11)</b>	<i>Redbud</i>
3:30–4:20 pm	<b>Symposium (S12)</b>	<i>Regency Ballroom D &amp; E</i>
3:30–4:20 pm	<b>Tutorial (T12)</b>	<i>Regency Ballroom G</i>
4:45–6:15 pm	<b>Student Bowl</b>	<i>Regency Ballroom A &amp; B &amp; C</i>
6:30–7:30 pm	<b>Graduate Program Fair</b>	<i>Teal</i>
6:30–7:15 pm	<b>Sports Medicine Physician Track Reception</b>	<i>Regency Ballroom F</i>

## Schedule

### Saturday, February 25

6:30–7:30 am	<b>SEACSM Run</b>	Lobby
7:45 am–12:45 pm	<b>Sports Medicine Physician Track Sessions</b>	Regency Ballroom D & E
8:00 am–12:00 pm	<b>Registration</b>	Lobby
8:00–11:00 am	<b>Student Help Desk</b>	Lobby
8:00 am–1:00 pm	<b>Exhibits</b>	Prefunction Area
8:00–8:50 am	<b>Clinical Crossover Lecture</b>	Regency Ballroom A & B
8:00–8:50 am	<b>Tutorial (T14)</b>	Regency Ballroom G
8:00–8:50 am	<b>Tutorial (T15)</b>	Regency Ballroom H
8:00–10:00 am	<b>Oral Presentation Session 4 (O25–O32)</b>	Redbud
8:00–10:00 am	<b>Oral Presentation Session 5 (O33–O39)</b>	Regency Ballroom F
8:00–9:30 am	<b>Thematic Poster Session 4 (TP25–TP30)</b>	Think Tank
8:00–9:30 am	<b>Poster Presentation Session 4 (P171–P235)</b>	Studio 220
9:00–9:50 am	<b>Symposium (S13)</b>	Regency Ballroom G
9:00–9:50 am	<b>Tutorial (T13)</b>	Crepe Myrtle
9:00–9:50 am	<b>Tutorial (T16)</b>	Regency Ballroom H
9:00–9:50 am	<b>Tutorial (T18)</b>	Regency Ballroom C
9:30–11:00 am	<b>Poster Presentation Session 5 (P236–P300)</b>	Studio 220
10:00–10:50 am	<b>Symposium (S14)</b>	Regency Ballroom G
10:00–10:50 am	<b>Tutorial (T17)</b>	Regency Ballroom H
11:00 am–12:00 pm	<b>Henry J. Montoye Award Lecture</b>	Regency Ballroom C
12:00–2:00 pm	<b>SEACSM Luncheon and Lecture</b>	Regency Ballroom A & B
2:00–4:00 pm	<b>Executive Board Meeting</b>	Boardroom

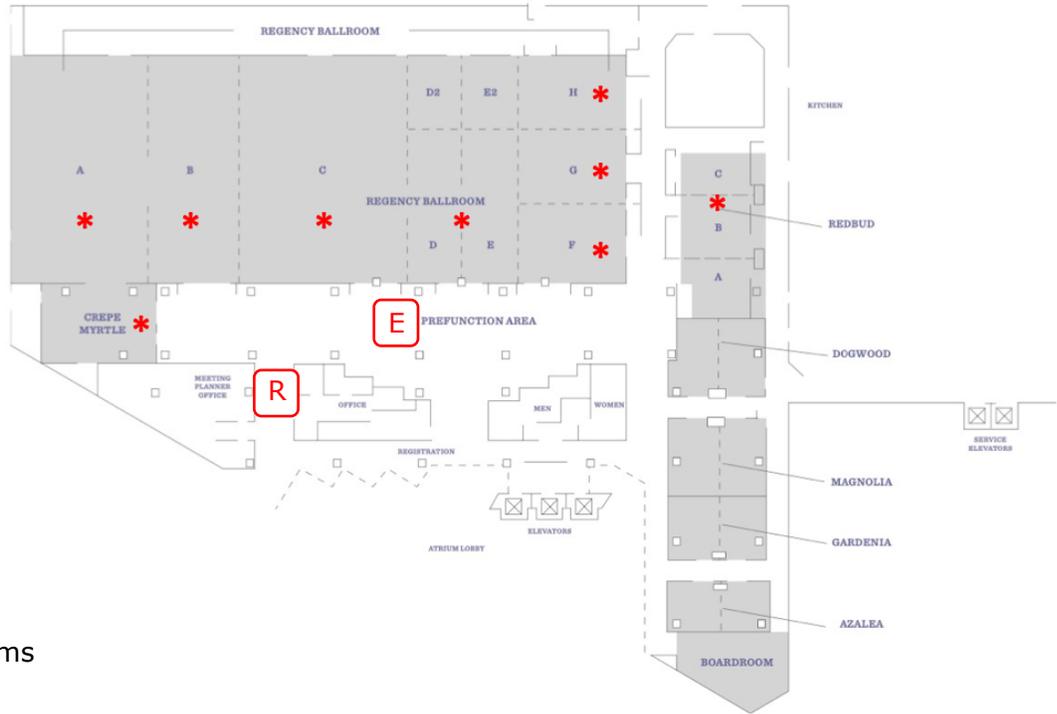
2023 SEACSM Annual Meeting  
Visual Schedule

THURSDAY, FEB. 23												
Room	Lobby & Prefunction Area	Redbud	Crepe Myrtle	Teal	Studio 220	Think Tank	Regency Ballroom A & B	Regency Ballroom C	Regency Ballroom D & E	Regency Ballroom F	Regency Ballroom G	Regency Ballroom H
11:00 AM												
11:30 AM												
12:00 PM	Registration											
12:30 PM	12:00-6:00											
1:00 PM												
1:30 PM	Student	LDTP Meeting 1:00-2:00							AV Team Mtg 1:00-2:00			
2:00 PM	Help Desk											
2:30 PM	1:00-6:00											
3:00 PM		PC 3:00-3:50										
3:30 PM	Exhibits											
4:00 PM	2:00-6:00											
4:30 PM			Student Award		P1-P40 4:30-6:00	TP1-TP7 4:30-6:00		T1 4:00-4:50	S1 4:00-4:50	O1-O8 4:00-6:00	T2 4:00-4:50	S2 4:00-4:50
5:00 PM		T3 5:00-5:50	Posters 4:30-6:00					T4 5:00-5:50	S3 5:00-5:50		T5 5:00-5:50	S4 5:00-5:50
5:30 PM												
6:00 PM												
6:30 PM												
7:00 PM												
7:30 PM							Keynote Address 7:30-9:00					
8:00 PM												
8:30 PM												
9:00 PM				SEACSM Social 9:00-10:30								
9:30 PM												
10:00 PM												
10:30 PM												
FRIDAY, FEB. 24												
Room	Lobby & Prefunction Area	Redbud	Crepe Myrtle	Teal	Studio 220	Think Tank	Regency Ballroom A & B	Regency Ballroom C	Regency Ballroom D & E	Regency Ballroom F	Regency Ballroom G	Regency Ballroom H
6:30 AM				Mentoring Breakfast 6:45-7:45								
7:00 AM												
7:30 AM												
8:00 AM	Registration	T7 8:00-8:50	TP8-TP16 8:00-9:30		P41-P105 8:00-9:30			S5 8:00-8:50		O9-O16 8:00-10:00	T6 8:00-8:50	S6 8:00-8:50
8:30 AM	8:00-5:00							T9 9:00-9:50	S7 9:00-9:50		S8 9:00-9:50	T10 9:00-9:50
9:00 AM	Student	T8 9:00-9:50										
9:30 AM	Help Desk						Basic Science 10:00-11:00					
10:00 AM	8:00-4:00											
10:30 AM	Exhibits											
11:00 AM												
11:30 AM	8:00-6:00			Past Pres Lunch 12:00-1:00								
12:00 PM		Min Hlth Res IG 12:30-1:15					ACS President 1:15-2:15		Biomechanics IG 12:30-1:15			
12:30 PM												
1:00 PM												
1:30 PM												
2:00 PM												
2:30 PM		S9 2:30-3:20	TP17-TP24 2:30-4:00		P106-P170 2:30-4:00			S10 2:30-3:20	O17-O24 2:30-4:30		T11 2:30-3:20	
3:00 PM												
3:30 PM		S11 3:30-4:20						S12 3:30-4:20			T12 3:30-4:20	
4:00 PM												
4:30 PM							Student Bowl 4:45-6:15					
5:00 PM												
5:30 PM												
6:00 PM												
6:30 PM				Grad Prog Fair 6:30-7:30						SMPT Reception 6:30-7:15		
7:00 PM												
7:30 PM												
8:00 PM												
SATURDAY, FEB. 25												
Room	Lobby & Prefunction Area	Redbud	Crepe Myrtle	Teal	Studio 220	Think Tank	Regency Ballroom A & B	Regency Ballroom C	Regency Ballroom D & E	Regency Ballroom F	Regency Ballroom G	Regency Ballroom H
6:30 AM	SEACSM Run 6:30-7:30											
7:00 AM												
7:30 AM												
8:00 AM	Registration	O25-O32 8:00-10:00			P171-P235 8:00-9:30	TP25-TP30 8:00-9:30	Clinical Crossover 8:00-8:50					
8:30 AM	8:00-12:00											
9:00 AM	Student		T13 9:00-9:50					T18 9:00-9:50				
9:30 AM	Help Desk				P236-P300 9:30-11:00							
10:00 AM	8:00-11:00											
10:30 AM	Exhibits											
11:00 AM								Montoye Lecture 11:00-12:00				
11:30 AM	8:00-1:00											
12:00 PM												
12:30 PM							Luncheon and Lecture 12:00-2:00					
1:00 PM												
1:30 PM												
2:00 PM												
2:30 PM												
3:00 PM												

Presentation types: O = oral free communication | P = poster free communication | PC = preconference session | S = symposium | T = tutorial | TP = thematic poster

# HYATT REGENCY GREENVILLE

## FLOOR PLANS First Floor



- R Registration
- E Exhibits
- \* Meeting rooms

## FLOOR PLANS Second Floor



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**Thursday, February 23, 2023**

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**3:00 – 3:50      PRE-CONFERENCE SESSION – *What's Up Doc?*****Redbud**Chair: Sue Graves, *Florida Atlantic University*

- PC1:      LONGITUDINAL ASSOCIATIONS BETWEEN SLEEP AND PHYSICAL ACTIVITY IN INFANTS AND TODDLERS**  
Agnes Bucko. *University of North Carolina at Charlotte, Charlotte, NC.*
- PC2:      PHASE-SPECIFIC COUNTERMOVEMENT VERTICAL JUMP PREDICTORS OF DRIVER CLUB HEAD SPEED IN COLLEGIATE GOLFERS**  
Jeffrey Simpson<sup>1</sup>, Kyle Rank<sup>1</sup>, John Garner<sup>2</sup>. <sup>1</sup>*University of West Florida, Pensacola, FL.* <sup>2</sup>*Troy University, Troy, AL.*
- PC3:      READY-SET-GO: VIRTUAL REALITY GAMING VERSUS TRADITIONAL CARDIO TO IMPROVE PSYCHOLOGICAL STATES FOLLOWING ACUTE EXERCISE**  
Daniel R. Greene, Mervin Jijika, Kenneth S. Anderson, Jonathan J. Ruiz-Ramie. *Augusta University, Augusta, GA.*
- PC4:      COMBINATION OF AEROBIC EXERCISE TRAINING AND BERBERINE ATTENUATE KIDNEY CACHEXIA IN DIABETIC RATS BY INCREASING THE BCL-2/BAX RATIO**  
Fereshteh Ahmadabadi, FACSM<sup>1</sup>, Somayeh Azizi<sup>2</sup>, Marziyeh Saghebjoos<sup>2</sup>, Javad Mohiti-Ardakani<sup>3</sup>, B. Sue Graves, FACSM<sup>4</sup>. <sup>1</sup>*Keiser University, West Palm Beach, FL.* <sup>2</sup>*University of Birjand, Birjand, FL.* <sup>3</sup>*Shahid Sadoughi University of Medical Science, Yazd, FL.* <sup>4</sup>*Florida Atlantic University, Boca Raton, FL.*
- PC5:      ASSOCIATIONS BETWEEN SLEEP, ADIPOSITY AND METABOLIC HORMONES IN EMERGING ADULTS: RIGHT TRACK HEALTH STUDY**  
Jessica McNeil<sup>1</sup>, Nathaniel T. Berry<sup>1</sup>, Lenka H. Shriver<sup>1</sup>, Jessica M. Dollar<sup>1</sup>, Susan P. Keane<sup>1</sup>, Lilly Shanahan<sup>2</sup>, Laurie Wideman, FACSM<sup>1</sup>. <sup>1</sup>*University of North Carolina at Greensboro, Greensboro, NC.* <sup>2</sup>*University of Zurich, Zurich.*
- PC6:      THE EFFECTS OF ALMOND CONSUMPTION ON CARDIOVASCULAR HEALTH IN ACTIVE, OVERWEIGHT/OBESE ADULTS: PRELIMINARY RESULTS**  
Taylor A. Behl<sup>1</sup>, Holly E. Clarke<sup>2</sup>, Neda S. Akhavan<sup>2</sup>, Saiful Singar<sup>2</sup>, Bahram H. Arjmandi<sup>2</sup>, Robert C. Hickner, FACSM<sup>2</sup>, David W. Eccles<sup>2</sup>, Jeong-Su Kim, FACSM<sup>2</sup>, Lynn B. Panton, FACSM<sup>2</sup>. <sup>1</sup>*Flagler College, St. Augustine, FL.* <sup>2</sup>*Florida State University, Tallahassee, FL.*
- PC7:      SELF-REPORTED SORENESS INDICATES PREVIOUS DAY WORKLOAD IN MALE INTERCOLLEGIATE SOCCER PLAYERS**  
Troy Coppus, Katie Delinsky, J. Grant Mouser. *Troy University, Troy, AL.*
- PC8:      NO EFFECT OF MODE FAMILIARITY ON TIME PERCEPTION DURING EXERCISE**  
Andrew Moore. *Augusta University, Augusta, GA.*
- PC9:      EFFECT OF BLOOD FLOW RESTRICTION TRAINING AT VARIABLE LOADS AND REPETITION SPEEDS ON MUSCULAR FATIGUE**  
John C. Sieverdes, Korey C. Little, Wesley D. Dudgeon. *College of Charleston, Charleston, SC.*

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**Thursday, February 23, 2023**

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**4:00 – 4:50 SYMPOSIUM 1****Regency Ballroom D & E**Chair: Katherine Collins, *Duke University*

- S1: MOVING AWAY FROM BMI MEASURES: THE NEED FOR A CENTRALIZED REPOSITORY**  
Madison M. Kindred<sup>1</sup>, Jason R. Jagers, FACSM<sup>2</sup>, Ryan R. Porter<sup>3</sup>, Xuemei Sui, FACSM<sup>4</sup>. <sup>1</sup>*Augusta University, Augusta, GA.* <sup>2</sup>*University of Louisville, Louisville, KY.* <sup>3</sup>*Texas Christian University, Fort Worth, TX.* <sup>4</sup>*University of South Carolina, Columbia, SC.*

**4:00 - 4:50 SYMPOSIUM 2****Regency Ballroom H**Chair: Whitley Stone, *Western Kentucky University*

- S2: MUSCLE WASTING IN CANCER: OPPORTUNITIES AND CHALLENGES FOR EXERCISE IN CLINICAL CANCER TRIALS**  
Ciaran M. Fairman. *University of South Carolina, Columbia, SC.*

**4:00 - 4:50 TUTORIAL 1****Regency Ballroom C**Chair: Michael Samaan, *University of Kentucky*

- T1: DIP YOUR TOES IN OUR ACADEMIC WATER**  
Christopher Wilburn<sup>1</sup>, Brandi Decoux<sup>2</sup>, Wendi Weimar<sup>3</sup>. <sup>1</sup>*Auburn University, Auburn, AL.* <sup>2</sup>*Southeast Louisiana State University, Hammond, LA.* <sup>3</sup>*Auburn University, Auburn, AL.*

**4:00 - 4:50 TUTORIAL 2****Regency Ballroom G**Chair: Greg Grosicki, *Georgia Southern*

- T2: DO CARDIOMETABOLIC RISK FACTORS PROVIDE SIMILAR EFFECTIVENESS PREDICTING CARDIOVASCULAR DISEASE IN AFRICAN AND EUROPEAN AMERICANS**  
Trudy Moore-Harrison<sup>1</sup>, L. Jerome Brandon, FACSM<sup>2</sup>. <sup>1</sup>*University of North Carolina at Charlotte, Charlotte, NC.* <sup>2</sup>*Georgia State University, Atlanta, GA.*

**4:00 - 6:00 ORAL PRESENTATION SESSION 1 (O1-O8)****Regency Ballroom F**Chair: Greg A Ryan, *Piedmont University*

- O1: EFFECTS OF CAFFEINE ON PITCHING ACCURACY AND VELOCITY IN D-1 SOFTBALL PLAYERS: A PILOT STUDY**  
Lauren G. Killen, Scott Lyons, FACSM, Matt Green, FACSM, Gaven Barker, Noah Bishop, Alyssa Parten, Takeo Higgins. *University of North Alabama, Florence, AL.*
- O2: EFFECTS OF GUARANA COMPARED TO MATCHED DOSE CAFFEINE: EXERCISE PERFORMANCE BENEFITS?**  
Alec Harp<sup>1</sup>, Eduardo Marcedo Penna<sup>2</sup>, Brian Hack<sup>1</sup>, Tyler Talik<sup>1</sup>, Mindy Millard-Stafford, FACSM<sup>1</sup>. <sup>1</sup>*Georgia Institute of Technology, Atlanta, GA.* <sup>2</sup>*Federal University of Pará, Belem.*
- O3: EFFECTS OF CAFFEINE ON BAT SPEED AND SPRINT SPEED IN D-1 SOFTBALL PLAYERS: A PILOT STUDY**  
Thomas Scott Lyons, FACSM, Lauren Killen, Matt Green, FACSM, Gaven Barker, Noah Bishop, Takeo Higgins. *University of North Alabama, Florence, AL.*

**Thursday, February 23, 2023****4:00 - 6:00 ORAL PRESENTATION SESSION 1 (O1-O8)***Regency Ballroom F*

- O4: THE EFFECTS OF TOPICAL MENTHOL CREAM ON ANAEROBIC EXERCISE PERFORMANCE**  
Callie Ledford, Kayla Dendy, FACSM, Rebecca R. Rogers, Christopher G. Ballmann, FACSM, Tyler D. Williams. *Samford, Birmingham, AL.*
- O5: THE EFFECTS OF YOHIMBINE INGESTION ON PSYCHOPHYSIOLOGICAL RESPONSES TO MAXIMAL EXERCISE AT VARYING TIMES OF DAY**  
Carson Elwell, Kailey Luiken, Rebecca Rogers, Tyler Williams, Christopher Ballmann, FACSM. *Samford University, Birmingham, AL.*
- O6: YOGA AS THE SOLUTION TO MOVEMENT LIMITATIONS IN BASEBALL PITCHERS**  
Tynniesia M. Wilson, Kathleen S. Thomas, Matthew Rein, Donna Wolf. *Norfolk State University, Norfolk, VA.*
- O7: ACUTE EFFECTS OF GUARANA INGESTION COMPARED TO MATCHED DOSE CAFFEINE: MENTAL PERFORMANCE BENEFITS?**  
Tyler N. Talik<sup>1</sup>, Mindy Millard-Stafford, FACSM<sup>1</sup>, Brian Hack<sup>1</sup>, Alec Harp<sup>1</sup>, Eduardo Macedo Penna<sup>2</sup>. <sup>1</sup>*Georgia Institute of Technology, Atlanta, GA.* <sup>2</sup>*Federal University of Pará, Belem.*
- O8: EFFECTS OF SPIDER TACK ON PITCHING PERFORMANCE**  
Dakota W. Garcia. *Montreat College, Lakeland, FL.*

**4:30 - 6:00 THEMATIC POSTER SESSION 1 (TP1-TP7)***Think Tank*Chair: Jeremiah Lukers, *Truett McConnell University*

- TP1: THE EFFECT OF PHYSICAL ACTIVITY AFTER CONCUSSION ON CONCUSSION-RELATED SLEEP PROBLEMS**  
Tristan Vansteene, Ryan Cyusa, Timothy Donovan, Meir Magal, FACSM, Shannon K. Crowley. *North Carolina Wesleyan University, Rocky Mount, NC.*
- TP2: SHORT TERM COMPARISON OF HAMSTRING FLEXIBILITY AFTER STATIC STRETCHING COMPARED TO A MASSAGE GUN TREATMENT**  
Mackenzie R. Anderson, Morgan Davidson, Annabell Bailliez, Zahra Asif, John Fox, Sarah Hayden. *Methodist University, Fayetteville, NC.*
- TP3: THE ROLE OF SOCIAL SUPPORT IN IDENTITY RECONSTRUCTION OF STROKE SURVIVORS**  
Abigail Kroll, Eric E. Hall, FACSM. *Elon University, Elon, NC.*
- TP4: THE EFFECTS OF INTERMITTENT NEUROMUSCULAR ELECTRICAL STIMULATION (NMES) OF THE PERONEAL NERVE ON MUSCLE SORENESS AND EXPLOSIVE EXERCISE PERFORMANCE**  
McKenzie Parker, Kylie Nixon, Rebecca Rogers, Tyler Williams, Christopher Ballmann, FACSM. *Samford University, Birmingham, AL.*
- TP5: PILOT STUDY TO EVALUATE THE FEASIBILITY OF KETONE SUPPLEMENTATION TO IMPROVE FUNCTIONAL OUTCOMES IN ADOLESCENTS POST SPORTS-RELATED CONCUSSION**  
Kelsey A. Rushing, Payton E. Butler, Grace Graves, Alex B. Rich, Maggie C. Steen, Ervin Watson, Kaitlyn G. Willis, Allyn Abadie, Eric P. Plaisance, FACSM, Cody E. Morris. *University of Alabama at Birmingham, Birmingham, AL.*

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**Thursday, February 23, 2023**

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**4:30 - 6:00 THEMATIC POSTER SESSION 1 (TP1-TP7)***Think Tank***TP6: PERCEIVED EXERTION AND COMFORT WHEN INTRODUCING PROPHYLACTIC ANKLE BRACING BEFORE A TREADMILL RUN**

Benjamin Paquette<sup>1</sup>, Samuel J. Wilson<sup>1</sup>, Cameron Powden<sup>2</sup>, Robert Reyburn<sup>3</sup>, Diego Castro-Diaz<sup>1</sup>, Barry A. Munkasy<sup>1</sup>, Jessica A. Mutchler<sup>1</sup>. <sup>1</sup>*Georgia Southern University, Statesboro, GA.* <sup>2</sup>*University of Indianapolis, Indianapolis, IN.* <sup>3</sup>*Western Carolina University, Cullowhee, NC.*

**TP7: LONG-TERM PERCEIVED DISABILITY FOLLOWING A HAMSTRING INJURY**

Jessica Mutchler, Savannah L. McLain, Samuel J. Wilson, Megan Byrd, Benjamin Paquette, Diego Castro-Diaz, Barry A. Munkasy. *Georgia Southern University, Statesboro, GA.*

**4:30 - 6:00 POSTER PRESENTATION SESSION 1 (P1-P40)***Studio 220*

Chair: Katherine Spring, *Auburn University*

**P1: EFFECTIVENESS OF NINTENDO RING FIT IN IMPROVING BALANCE DEFICITS AFTER RECOVERY FROM ACL RECONSTRUCTION**

Emma Lord, Sarah Scali, Whitley Stone, Melissa Tolbert. *Western Kentucky University, Bowling Green, KY.*

**P2: HOW ATHLETIC TRAINERS BUILD RELATIONSHIPS AND TRUST WITH COLLEGIATE ATHLETES**

Grace E. Johnston, Eric E. Hall, FACSM, Caroline J. Ketcham. *Elon University, Elon, NC.*

**P3: TREATMENT OF INTERPHALANGEAL JOINT AND METACARPOPHALANGEAL JOINT INJURIES**

Deneb Gabriel Delos Trinos<sup>1</sup>, Adil Kabbeer<sup>2</sup>. <sup>1</sup>*University of Florida, Gainesville, FL.* <sup>2</sup>*The Orthopaedic Institute, Gainesville, FL.*

**P4: DIFFERENT CROSS TRAINING MODALITIES ON PERFORMANCE AND INJURY PREVENTION IN COMPETITIVE DISTANCE RUNNERS**

Hannah Oliver, Jarrett Walbolt. *Montreat College, Montreat, NC.*

**P5: NEUROMUSCULAR PERFORMANCE IN CHILDREN AT HIGH VERSUS LOW RISK FOR OBESITY**

Bethany A. Moore, Harshvardhan Singh, Paula Chandler-Laney. *University of Alabama at Birmingham, Birmingham, AL.*

**P6: EFFECT OF ON-DUTY RESISTANCE TRAINING ON NEUROMUSCULAR FUNCTION IN STRUCTURAL FIREFIGHTERS**

Jamal L. Thruston<sup>1</sup>, Sarah N. Lanham<sup>1</sup>, Lance Bollinger<sup>1</sup>, Stuart Best<sup>1</sup>, Joseph Pastina<sup>1</sup>, Nick Heebner<sup>1</sup>, Jackson Miller<sup>1</sup>, Emily L. Langford<sup>2</sup>, Lauren T. Higginbotham<sup>1</sup>, Luis Monteiro<sup>3</sup>, Vanessa Santos<sup>4</sup>, Mark G. Abel<sup>1</sup>. <sup>1</sup>*University of Kentucky, Lexington, KY.* <sup>2</sup>*University of Montevallo, Montevallo, AL.* <sup>3</sup>*Lusofona University, Lisbon, Portugal.* <sup>4</sup>*ICPOL Research Center, Higher Institute of Police Sciences and Internal Security, Lisbon, Portugal.*

**P7: THE IMPACT OF LIFESTYLE FACTORS ON HEART RATE VARIABILITY DURING THE TRANSITION FROM HIGH SCHOOL TO COLLEGE**

Anna Lipsman<sup>1</sup>, Simon Higgins<sup>2</sup>, Svetlana Nepocatych<sup>1</sup>, Mark Weaver<sup>1</sup>. <sup>1</sup>*Elon University, Elon, NC.* <sup>2</sup>*University of North Carolina, Chapel Hill, NC.*

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**Thursday, February 23, 2023**

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**4:30 - 6:00****POSTER PRESENTATION SESSION 1 (P1-P40)****Studio 220**

- P8: PHYSIOLOGICAL EFFECTS OF INTERVALS DURATION DURING AEROBIC EXERCISE WITH BLOOD FLOW RESTRICTION**  
Grayson Sossamon, Timothy R. Rotarius, Jakob D. Lauver, Justin P. Guilkey. *Coastal Carolina University, Conway, SC.*
- P9: THE AGREEMENT OF SPHYGMOCOR XCEL AND VICORDER MEASURES OF CENTRAL HEMODYNAMICS**  
Nghia V. Phan, Madeline Musacchio, Alex Pomeroy, Patricia P. Lassalle, Lee Stoner, FACSM. *University of North Carolina at Chapel Hill, Chapel Hill, NC.*
- P10: PHYSICAL ACTIVITY PATTERNS AND SEDENTARY BEHAVIOR DISPARITIES WITHIN THE LGBTQ+ COMMUNITY**  
Jake C. Diana, Zachary Y. Kerr, Lee Stoner, FACSM. *University of North Carolina at Chapel Hill, Chapel Hill, NC.*
- P11: IMPACT OF PHYSICAL ACTIVITY INTERVENTIONS ON PULSE WAVE VELOCITY IN CANCER SURVIVORS: A META-ANALYSIS**  
Juliette Levet-Bourtayre, Lauren C. Bates-Fraser, Lee Stoner, FACSM, Erik D. Hanson, FACSM. *University of North Carolina at Chapel Hill, Chapel Hill, NC.*
- P12: A META-ANALYSIS OF THE RELATIONSHIP BETWEEN SLEEP QUALITY AND ARTERIAL STIFFNESS**  
Melanie S. Semcesen, Alex Pomeroy, Patrick Harrison, Lee Stoner, FACSM. *University of North Carolina at Chapel Hill, Chapel Hill, NC.*
- P13: IMPACT OF SHORT-TERM CREATINE SUPPLEMENTATION ON MUSCULAR PERFORMANCE AND COGNITIVE FUNCTION IN BREAST CANCER SURVIVORS**  
Emily Parsowith<sup>1</sup>, Alex Brooks<sup>1</sup>, Alec Schump<sup>1</sup>, Matt Stock<sup>2</sup>, Kyla Jackson<sup>1</sup>, Emily Andriello<sup>1</sup>, Alena Larson<sup>1</sup>, Madison Dixon<sup>1</sup>, Ciaran Fairman<sup>1</sup>. <sup>1</sup>*University of South Carolina, Columbia, SC.* <sup>2</sup>*University of Central Florida, Orlando, FL.*
- P14: BLOOD FLOW RESTRICTED EXERCISE DOSAGE FOR CHRONIC KIDNEY DISEASE UNDERGOING HEMODIALYSIS: A META-ANALYSIS PROPOSAL**  
Alexander G. Kasari, Lauren C. Bates-Fraser, Erik D. Hanson, FACSM, Lee Stoner, FACSM. *University of North Carolina at Chapel Hill, Chapel Hill, NC.*
- P15: EXAMINING SPRINT DEMANDS DURING THE COMPETITIVE SEASON IN COLLEGIATE MENS SOCCER PLAYERS**  
Evan D. Kilby<sup>1</sup>, Dylan Wright<sup>1</sup>, Jacob Gdovin<sup>2</sup>, Charles C. Williams<sup>1</sup>. <sup>1</sup>*University of North Florida, Jacksonville, FL.* <sup>2</sup>*Winthrop University, Rock Hill, SC.*
- P16: THE INFLUENCE OF SURFACES ON ACCELERATION AND DECELERATION CAPACITY AND RATING OF PERCEIVED EXERTION**  
Megan A. Gordon, Brandi E. Decoux, FACSM, Bovorn Sirikul, FACSM. *Southeastern Louisiana University, Hammond, LA.*
- P17: EFFECTS OF MENSTRUAL CYCLE ON MAXIMAL POWER OUTPUT IN BASKETBALL**  
Mackenzie Yoder, Madisyn Williams, Hannah Young, Heath Burton. *Anderson University, Anderson, SC.*
- P18: SQUAT DEPTH IMPACTS ON JOINT SPECIFIC VERTICAL JUMP**  
Wyatt Baggett, Jarrett Walbolt. *Montreat College, Montreat, NC.*

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**Thursday, February 23, 2023**

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**4:30 - 6:00****POSTER PRESENTATION SESSION 1 (P1-P40)****Studio 220**

- P19: ARE CLUSTERED 24-HR ACTIVITY BEHAVIORS ASSOCIATED WITH DEPRESSION?**  
Madeline Musacchio, Tara Samtmann, Bella Smith, Michelle L. Meyer, Lee Stoner, FACSM, Jimikaye B. Courtney, Patricia Pagan Lassalle. *The University of North Carolina at Chapel Hill, Chapel Hill, NC.*
- P20: SEDENTARY BEHAVIOR INTERRUPTION PRESCRIPTION IN MIDDLE- & OLDER-AGED ADULTS: IDENTIFYING THE OPTIMAL DOSE**  
Margaret I. Damare, Lauren C. Bates-Fraser, Emma S. Cowley, Erik Hanson, FACSM, Lee Stoner, FACSM. *University of North Carolina at Chapel Hill, Chapel Hill, NC.*
- P21: SEDENTARY BEHAVIOR AND CARDIOVASCULAR DISEASE RISK IN ENDOMETRIAL CANCER SURVIVORS: MODERATION BY PERCEIVED DISCRIMINATION**  
Grayson C. Carey, Lauren C. Bates-Fraser, Erik Hanson, FACSM, Lee Stoner, FACSM. *University of North Carolina Chapel Hill, Chapel Hill, NC.*
- P22: THE EFFECT OF ACUTE SEDENTARY BEHAVIOR ON REACTIVE OXYGEN SPECIES**  
Nishad Sai Kosaraju. *UNC Chapel Hill, Chapel Hill, NC.*
- P23: EFFECTS OF A VIRTUAL TRAINER ON INTENSITY SELECTION AND EXERCISE ENJOYMENT**  
Alyssum Reno, Lauren Killen, Kensey Hannon, Takeo Higgins. *University of North Alabama, Florence, AL.*
- P24: DETERMINING THE EFFECT OF CUFF DEFLATION ON POST EXERCISE ARTERIAL OCCLUSION PRESSURE**  
J Barnes Benton, Daphney M. Stanford, Matthew A. Chatlaong, Matthew B. Jessee. *University of Mississippi, University, MS.*
- P25: THE EFFECTS OF THE MENSTRUAL CYCLE AND ORAL CONTRACEPTIVES ON ATHLETIC PERFORMANCE IN COLLEGIATE FEMALE ATHLETES**  
Emma Jillian Pilcher, Trinity Hambrick, Riya Patel, Catherine Winstanley, Paul Whitehead, Ryan Connors, FACSM. *The University of Alabama in Huntsville, Huntsville, AL.*
- P26: INVESTIGATING THE FEASIBILITY, RELIABILITY, AND VALIDITY OF A HOME-BASED PROTOCOL TO ASSESS PHYSICAL FUNCTION**  
Samuel C. Norton<sup>1</sup>, Bennett Ann McIver<sup>1</sup>, Bri Wolle<sup>1</sup>, Peter Brubaker, FACSM<sup>1</sup>, Shannon Mihalko<sup>1</sup>, Jason Fanning<sup>1</sup>, Alexander R. Lucas<sup>2</sup>. <sup>1</sup>Wake Forest University, Winston-Salem, NC. <sup>2</sup>Virginia Commonwealth University, Richmond, VA.
- P27: INFLUENCE OF A LIVE VS. VIRTUAL TRAINER ON INTENSITY SELECTION AND EXERCISE ENJOYMENT**  
Kensey E. Hannon, Lauren G. Killen, Takeo Higgins. *University of North Alabama, Florence, AL.*
- P28: PATTERN OF STEP ACCUMULATION (CADENCE BANDS) AND RELATIVE HEART RATE INTENSITY DURING FREE-LIVING OBSERVATION**  
Austin L. Cooper, FACSM. *University of Alabama, Tuscaloosa, AL.*
- P29: EFFECTS OF LIFESTYLE FACTORS ON TRABECULAR BONE SCORE DURING TRANSITION FROM HIGH SCHOOL TO COLLEGE**  
Julia Lois Burpeau<sup>1</sup>, Simon Higgins<sup>2</sup>, Svetlana Nepocaty<sup>1</sup>. <sup>1</sup>Elon University, Elon, NC. <sup>2</sup>University of North Carolina, Chapel Hill, NC.

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**Thursday, February 23, 2023**

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**4:30 - 6:00****POSTER PRESENTATION SESSION 1 (P1-P40)****Studio 220**

- P30: ENERGY AVAILABILITY IN FEMALE COLLEGIATE BEACH VOLLEYBALL ATHLETES**  
Meghan Thomas<sup>1</sup>, Marcos Daou<sup>1</sup>, Patrick Saracino<sup>2</sup>, Brandon Willingham<sup>1</sup>. <sup>1</sup>*Coastal Carolina University, Conway, SC.* <sup>2</sup>*College of Charleston, Charleston, SC.*
- P31: DOES LION'S MANE ENHANCE COGNITIVE FUNCTION IN YOUNG ATHLETIC POPULATIONS?**  
James Connaghan, Branson Bennet, Mathew Ellison, Robyn York. *Montreat College, Montreat, NC.*
- P32: THE EFFECT OF ASTAXANTHIN SUPPLEMENTATION ON THE SUBJECTIVE SENSATION OF MUSCLE SORENESS IN RESISTANCE-TRAINED MALES**  
Chloe Bagdonas, Gaven A. Barker, Alyssa L. Parten, Hunter S. Waldman. *University of North Alabama, Florence, AL.*
- P33: INVESTIGATING THE IMPACT OF GLUCOSE LEVELS AND BRIEF EXERCISE BOUT ON ESPORTS PERFORMANCE AND FATIGUE**  
Hannah Nelson, Thomas Andre. *University of Mississippi, Oxford, MS.*
- P34: THE RELATIONSHIP BETWEEN SLEEP BEHAVIORS AND MENTAL HEALTH IN HIGH SCHOOL SENIORS**  
Christina Westbrooks<sup>1</sup>, Simon Higgins<sup>2</sup>, Eric Hall, FACSM<sup>1</sup>, Svetlana Nepocatykh<sup>1</sup>. <sup>1</sup>*Elon University, Burlington, NC.* <sup>2</sup>*University of North Carolina, Chapel Hill, NC.*
- P35: THE EFFECTS OF ELECTRONIC DANCE MUSIC ON RUNNING**  
Cassidy Jordan Reeves, Timothy M. Dornemann, Lauren M. Biscardi. *Barton College, Wilson, NC.*
- P36: EFFECT OF ON-DUTY RESISTANCE TRAINING ON COGNITIVE FUNCTION IN STRUCTURAL FIREFIGHTERS**  
Jackson B. Miller<sup>1</sup>, Sarah N. Lanham<sup>1</sup>, Jamal L. Thruston<sup>1</sup>, Stuart Best<sup>1</sup>, Lance Bollinger<sup>1</sup>, Nick Heebner<sup>1</sup>, Emily L. Langford<sup>2</sup>, Lauren T. Higginbotham<sup>2</sup>, Vanessa Santos<sup>3</sup>, Luis Monteiro<sup>4</sup>, Mark G. Abel<sup>1</sup>. <sup>1</sup>*University of Kentucky, Lexington, KY.* <sup>2</sup>*University of Montevallo, Montevallo, AL.* <sup>3</sup>*Higher Institute of Police Sciences and Internal Security, Lisbon, Portugal.* <sup>4</sup>*Lusofona University, Lisbon, Portugal.*
- P37: LIFESTYLE INTERVENTIONS FOR VITALITY AND EMPOWERMENT OF SENIORS (LIVES) STUDY**  
Olivia C. Biehl, Jeffrey Katula, Jason Fanning, Anthony Sali, Andrew Wells. *Wake Forest University, WINSTON SALEM, NC.*
- P38: THE IMPACT OF A 12-WEEK EDUCATION-BASED PROGRAM ON METABOLIC RISK FACTORS AND MENTAL HEALTH MEASURES**  
Gabrielle Witherell. *Elon University, Elon, NC.*
- P39: ASSOCIATION BETWEEN COACH BEHAVIORS AND ATHLETES' SELF-, OTHER-, AND COLLECTIVE EFFICACY BELIEFS**  
Tyler F. Hewitt, Colby Sullivan, Christine Habeeb, Thomas Raedeke, Katrina DuBose, FACSM. *East Carolina University, Greenville, NC.*
- P40: THE EFFECT OF A CYCLING PARTNER ON INTENSITY SELECTION AND PERCEIVED ENJOYMENT IN SEDENTARY ADULTS**  
Ashley A. Cook, Kyle W. Reason, Scott T. Lyons, FACSM, Jean Ann Helm Allen, Matt J. Green, FACSM, Lauren G. Killen. *University of North Alabama, Florence, AL.*

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**Thursday, February 23, 2023**

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**4:30 - 6:00      STUDENT AWARD POSTER COMPETITION (D1–D8, M1–M8, U1–U8) *Crepe Myrtle***Chair: Matt Green, *University of North Alabama*

- D1:      COMPARISON OF RAW ACCELERATION FROM CONSUMER WEARABLES AND ACTIGRAPH ACCELEROMETERS USING A MECHANICAL SHAKER TABLE**  
James W. White III, Nick Tindall, Olivia Finnegan, Kasey Hansen, Meghan Bastyr, Hannah Parker, Rodrick Dugger, Elizabeth L. Adams, Sarah Burkart, Bridget Armstrong, Michael W. Beets, R. Glenn Weaver. *University of South Carolina, Columbia, SC.*
- D2:      EVALUATION OF THE RELATIONSHIP BETWEEN BODY COMPOSITION AND MENOPAUSE SYMPTOMS ACROSS THE MENOPAUSE TRANSITION**  
Sam R. Moore. *University of North Carolina at Chapel Hill, Chapel Hill, NC.*
- D3:      EFFECTS OF RESISTANCE TRAINING ON MITOCHONDRIAL ADAPTATIONS TO SUBSEQUENT ENDURANCE TRAINING**  
Paulo H.C. Mesquita, Joshua S. Godwin, Bradley A. Ruple, Casey L. Sexton, Mason C. McIntosh, Shelby C. Osburn, Breanna J. Mueller, Nicholas Kontos, Cleiton A. Libardi, Kaelin C. Young, Michael D. Roberts, Andreas N. Kavazis, FACSM. *Auburn University, Auburn, AL.*
- D4:      HIGH SALT-INDUCED ELEVATIONS IN MCP-1 AND BLOOD PRESSURE REACTIVITY ARE NOT CORRELATED IN YOUNG ADULTS**  
Braxton A. Linder<sup>1</sup>, Matthew C. Babcock<sup>2</sup>, Joseph C. Watso<sup>3</sup>, Austin T. Robinson<sup>1</sup>. <sup>1</sup>*Auburn University, Auburn, AL.* <sup>2</sup>*University of Colorado Anschutz Medical Campus, Aurora, CO.* <sup>3</sup>*Florida State University, Tallahassee, FL.*
- D5:      TRANSIENT RESPONSES OF MYOSTATIN SIGNALING MARKERS TO ACUTE BOUTS OF RESISTANCE TRAINING**  
Mason C. McIntosh, Casey L. Sexton, Joshua L. Godwin, Bradley A. Ruple, Shelby C. Osburn, John M. Michel, Daniel L. Plotkin, Christopher B. Mobley, Michael D. Roberts. *Auburn University, Auburn, AL.*
- D6:      INTERACTION BETWEEN ENVIRONMENTAL SLEEPING CONDITIONS AND NEXT DAY CORTISOL AND COPEPTIN ON COGNITION**  
Jesse N.L. Sims<sup>1</sup>, Hannah R. Koch<sup>1</sup>, Mitchell E. Zaplatosch<sup>1</sup>, Travis Anderson<sup>2</sup>, Laurie Wideman, FACSM<sup>1</sup>, William M. Adams, FACSM<sup>2</sup>, Jessica McNeil<sup>1</sup>. <sup>1</sup>*University of North Carolina Greensboro, Greensboro, NC.* <sup>2</sup>*United States Olympic and Paralympic Committee, Colorado Springs, CO.*
- D7:      EXERCISE PRIOR TO TUMOR-BEARING PROTECTS CARDIAC FUNCTION AND INHIBITS TUMOR GROWTH IN FEMALE TUMOR-BEARING MICE**  
Louisa Tichy, Traci L. Parry. *University of North Carolina at Greensboro, Greensboro, NC.*
- D8:      OBESITY ACCELERATED TUMORIGENESIS AND DID NOT PROTECT AGAINST MURINE CANCER CACHEXIA**  
Thomas D. Cardaci, Brandon N. VanderVeen, Sierra J. McDonald, Brooke M. Bullard, Sarah S. Madero, Kandy T. Velazquez, FACSM, E. Angela Murphy. *University of South Carolina School of Medicine, Columbia, SC.*
- M1:      A SELF-SELECTED 16:8 TIME-RESTRICTED EATING INTERVENTION IMPROVES VARIOUS MARKERS OF CARDIOVASCULAR HEALTH IN MIDDLE-AGE MALE CYCLISTS.**  
Craig Witt<sup>1</sup>, Eric O'Neal<sup>1</sup>, Matthew McAllister<sup>2</sup>, Hunter Waldman<sup>1</sup>. <sup>1</sup>*University of North Alabama, Florence, AL.* <sup>2</sup>*Texas State University, San Marcos, TX.*

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**Thursday, February 23, 2023**

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**4:30 - 6:00      STUDENT AWARD POSTER COMPETITION (D1–D8, M1–M8, U1–U8) *Crepe Myrtle***

- M2:      EXAMINING SEX DIFFERENCES IN NIRS DERIVED MICROVASCULAR OXYGENATION WHEN CORRECTED FOR PARTICIPANT CHARACTERISTICS**  
Miranda K. Traylor, Amanda M. Cuomo, Sylvie M. Gray, Ethan C. Hill, Joshua L. Keller. *University of South Alabama, Mobile, AL.*
- M3:      TEMPERATURE CONTROLLED MATTRESS TOPPER IMPROVES SLEEP AND RECOVERY IN NCAA DIVISION I FEMALE SOCCER PLAYERS**  
Casey Greenwalt, Marine Dupuit, Elisa Angeles, Phillipe Gaillard, Owen Munro, Sachin Narayanan, Michael Ormsbee, FACSM. *Florida State University, Tallahassee, FL.*
- M4:      IDENTIFYING THE QUIET EYE - DURATION AND TARGET ACQUISITION SIGNIFICANCE IN PITCHING**  
Jake Isaiah Kuchmaner, FACSM. *East Carolina University, Greenville, NC.*
- M5:      RESISTANCE EXERCISE-INDUCED CHANGES IN PLASMA BRAIN-DERIVED NEUROTROPHIC FACTOR ARE ASSOCIATED WITH TRAINING VOLUME IN FEMALES**  
Caitlyn White<sup>1</sup>, Katie Kennedy<sup>2</sup>, Ryan Colquhoun<sup>1</sup>, Neil Schwarz<sup>1</sup>. <sup>1</sup>*University of South Alabama, Mobile, AL.* <sup>2</sup>*Texas Tech University, Lubbock, TX.*
- M6:      COMPARISONS OF JOINT MOMENTS ESTIMATED BY MARKERLESS AND MARKER-BASED MOTION CAPTURE SYSTEMS DURING TREADMILL RUNNING**  
Hui Tang<sup>1</sup>, Jiahao Pan<sup>2</sup>, Barry Munkasy<sup>1</sup>, Li Li, FACSM<sup>1</sup>. <sup>1</sup>*Georgia Southern University, Statesboro, GA.* <sup>2</sup>*Boise State University, Boise, ID.*
- M7:      SLEEP AND MENOPAUSAL SYMPTOMS: AN EVALUATION ACROSS THE MENOPAUSE TRANSITION**  
Alex N. Ladan, Hannah E. Cabre, Sam R. Moore, Kelly E. Joniak, Abbie E. Smith-Ryan, FACSM. *University of North Carolina at Chapel Hill, Chapel Hill, NC.*
- M8:      RESPONSES TO HANDGRIP HOLDS TO FAILURE AT TWO UNIQUE FATIGUE THRESHOLDS IN MEN AND WOMEN**  
Minyoung Kwak, Pasquale J. Succi, Brian Benitez, Jody L. Clasey, FACSM, Haley C. Bergstrom. *University of Kentucky, Lexington, KY.*
- U1:      PRIOR SARS-COV-2 INFECTION DOES NOT REDUCE IMMUNOCOMPETENCE IN HUMANS CHALLENGED WITH EXERTIONAL HEAT STRESS**  
Karissa Fryar<sup>1</sup>, Nathan Conrad<sup>1</sup>, Ben Lee<sup>2</sup>, Matthew Kuennen<sup>1</sup>. <sup>1</sup>*High Point University, High Point, NC.* <sup>2</sup>*Coventry University, Coventry, United Kingdom.*
- U2:      SIMILAR NEUROMUSCULAR RESPONSES TO AN ACUTE BOUT OF BLOOD FLOW RESTRICTED AND TRADITIONAL RESISTANCE EXERCISE**  
Mary A. Wilkenson<sup>1</sup>, Micaela C. Dusseault<sup>1</sup>, Katie G. Kennedy<sup>2</sup>, Ryan J. Colquhoun<sup>1</sup>. <sup>1</sup>*University of South Alabama, Mobile, AL.* <sup>2</sup>*Texas Tech University, Lubbock, TX.*
- U3:      MUSCLE MITOCHONDRIAL CAPACITY IS IMPAIRED IMMEDIATELY FOLLOWING STRENUOUS EXERCISE**  
Callie G. Dickinson, Makayla D. Holyfield, Nicholas T. Bachelor, Kristin M. Mendez, Kevin K. McCully. *University of Georgia, Athens, GA.*

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**Thursday, February 23, 2023**

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**4:30 - 6:00      STUDENT AWARD POSTER COMPETITION (D1–D8, M1–M8, U1–U8) *Crepe Myrtle***

- U4:      EFFECT OF PERSONALITY AND COMPETITION ANXIETY ON HEART RATE VARIABILITY AND SALIVARY STRESS MARKERS**  
Jenna Mallory<sup>1</sup>, Anna Helen Marshall<sup>1</sup>, Matthew Williams<sup>2</sup>, James Heilman<sup>3</sup>, Madison Shoemaker<sup>3</sup>, Jarrett Walbolt<sup>1</sup>. <sup>1</sup>Montreat College, Montreat, NC. <sup>2</sup>Baylor University, Waco, TX. <sup>3</sup>University of Maryland, College Park, MD.
- U5:      LOWER BODY POWER IS RELATED TO HITTING PERFORMANCE IN YOUTH BASEBALL ATHLETES**  
Trent Agee, Nicole Bordelon, Katherine Everhart, Anthony Fava, Billy Lozowski, Yuki Yanagita, Adam Nebel, Gretchen Oliver, FACSM. *Auburn University, Auburn, AL.*
- U6:      SEX AND CUFF PRESSURE SPECIFIC HEMODYNAMIC RESPONSES TO BLOOD FLOW RESTRICTION LEG EXTENSIONS**  
Sylvie M. Gray<sup>1</sup>, Amanda M. Cuomo<sup>1</sup>, Miranda K. Traylor<sup>1</sup>, Ethan C. Hill<sup>2</sup>, Joshua L. Keller<sup>1</sup>. <sup>1</sup>University of South Alabama, Mobile, AL. <sup>2</sup>University of Central Florida, Orlando, FL.
- U7:      AD LIBITUM WATER CONSUMPTION PREVENTS EXCESSIVE DEHYDRATION DURING SIMULATED WORK IN THE HEAT**  
Annabel E. Leonard, Anne M. Mulholland, Jonathan E. Wingo, FACSM. *The University of Alabama, Tuscaloosa, AL.*
- U8:      ACCENTUATED ECCENTRIC OVERLOAD AS A POST-ACTIVATION POTENTIATION ENHANCEMENT OF SHORTSPRINT PERFORMANCE**  
John Kennington, Jarrod Kennington, Cole Anderton, Gene Hurst, Rebecca R. Rogers, Christopher G. Ballmann, FACSM, Tyler D. Williams. *Samford, Birmingham, AL.*

**5:00 – 5:50      SYMPOSIUM 3      *Regency Ballrooms D & E***

Chair: Trent Hargens, *James Madison University*

- S3:      EXERCISE IS MEDICINE ON CAMPUS: SCOPING REVIEW & CALL FOR COLLABORATION**  
Patricia Bauer<sup>1</sup>, Cayla McAvoy<sup>2</sup>, A'Naja Newsome<sup>3</sup>, Rebecca Battista, FACSM<sup>4</sup>. <sup>1</sup>Florida Gulf Coast University, Fort Myers, FL. <sup>2</sup>University of North Carolina-Charlotte, Charlotte, NC. <sup>3</sup>University of Central Florida, Orlando, FL. <sup>4</sup>Appalachian State University, Boone, NC.

**5:00 - 5:50      SYMPOSIUM 4      *Regency Ballroom H***

Chair: Leanna Ross, *Duke University School of Medicine*

- S4:      RELATIVE ENERGY DEFICIENCY SYNDROME (RED-S) AND HYPERTENSION IN ATHLETES; LIMITATIONS OF A LARGER PROBLEM**  
Troy M. Purdom. *North Carolina Agricultural and Technical State University, Greensboro, NC.*

**5:00 - 5:50      TUTORIAL 3      *Redbud***

Chair: Lee Stoner, *University of North Carolina-Chapel Hill*

- T3:      DRUG USE IN SPORT: HOW MANY ATHLETES ARE BEING CAUGHT AND WHAT ARE THEY TAKING?**  
David Hooper. *Jacksonville University, Jacksonville, FL.*

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**Thursday, February 23, 2023**

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**5:00 - 5:50****TUTORIAL 4****Regency Ballroom C**Chair: J. Grant Mouser, *Troy University***T4: EXERCISE-INDUCED ADAPTATION IN SKELETAL MUSCLES: IMPACT OF REDOX SIGNALING**Scott Powers, FACSM. *Stetson University, Deland, FL.***5:00 - 5:50****TUTORIAL 5****Regency Ballroom G**Chair: Eric Hall, *Elon University***T5: NOVEL TEACHING METHODS USING AN ECO-FRIENDLY OUTDOOR MOBILE GYM**Sarah Davis, Mary Beth Yarbrough, Rebecca Collins. *Georgia Southern University, Statesboro, GA.***7:30–9:00 PM****OPENING REMARKS AND KEYNOTE ADDRESS****Regency Ballroom A & B & C**Presiding: Danielle Wadsworth, FACSM. *Auburn University, Auburn, AL.*Speaker introduction: Shawn Arent, FACSM. *University of South Carolina, Columbia, SC.***Designing Physical Activity Interventions for Scalability**Sara Wilcox, PhD, FACSM. *University of South Carolina, Columbia, SC.*

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**Friday, February 24, 2023**


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**6:45–7:45 AM****EMILY HAYMES MENTORING BREAKFAST****Teal**Presiding: Leanna Ross. *Duke University, Durham, NC.***8:00 – 8:50****SYMPOSIUM 5****Regency Ballroom C**Chair: Cody Morris, *University of Alabama-Birmingham***S5: BUILDING BIGGER MUSCLES WITH RESISTANCE TRAINING: PAST, PRESENT, AND FUTURE RESEARCH THEMES**Michael D. Roberts, Joshua S. Godwin, Bradley A. Ruple. *Auburn University, Auburn, AL.***8:00 - 8:50****SYMPOSIUM 6****Regency Ballroom H**Chair: David Edwards, *University of Virginia***S6: TREATING THE 'INVISIBLE' EFFECTS OF STROKE: EXPLORING EXERCISE AND BRAIN STIMULATION FOR DEPRESSION AND FATIGUE**John H. Kindred<sup>1,2</sup>, Ryan E. Ross<sup>1,2</sup>. <sup>1</sup>*Ralph H Johnson VA Health Care System, Charleston, SC.*  
<sup>2</sup>*Medical University of South Carolina, Charleston, SC.***8:00 - 8:50****TUTORIAL 6****Regency Ballroom G**Chair: Patricia Bauer, *Florida Gulf Coast University***T6: MENTAL HEALTH AND ATHLETIC IDENTITY IN COLLEGE ATHLETES**Kylie Roberts, Kiersten Kulhman, Tamerah Hunt, FACSM. *Georgia Southern University, Statesboro, GA.***8:00 - 8:50****TUTORIAL 7****Redbud**Chair: Robert Kowalsky, *Appalachian State University***T7: OPTIMIZING STUDENT LEARNING WITH RETRIEVAL PRACTICES IN FACE-TO-FACE AND ONLINE COURSES**Samantha L. Johnson, Jennifer L. Caputo, Amiyah J. Banks, Sara N. Fawcett. *Middle Tennessee State University, Murfreesboro, TN.***8:00 - 10:00****ORAL PRESENTATION SESSION 2 (O9-O16)****Regency Ballroom F**Chair: Christopher Wilburn, *Auburn University***O9: COMPARISON OF PEAK SHOULDER DISTRACTION FORCES BETWEEN PAIN AND PAIN-FREE YOUTH BASEBALL PITCHERS**Adam R. Nebel<sup>1</sup>, Anthony Fava<sup>1</sup>, Billy Lozowski<sup>1</sup>, Yuki Yanagita<sup>1</sup>, Thomas van Hogerwou<sup>2</sup>, Gretchen D. Oliver, FACSM<sup>1</sup>. <sup>1</sup>*Auburn University, Auburn, AL.* <sup>2</sup>*Technical University of Delft, Delft.***O10: THE IMPACT OF LIMITED WEIGHT ROOM ACCESS ON COLLEGE PITCHING METRICS**Karie Abel, Mackenzie Kennon, Brennen Hogan, Colin Corcoran, FACSM, Charles Williams, Jacob Gdovin. *University Of North Florida, Jacksonville, FL.*

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**Friday, February 24, 2023**


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**8:00 - 10:00 ORAL PRESENTATION SESSION 2 (O9-O16)***Regency Ballroom F*

- O11: STRIDE-LEG KINETICS IN SOFTBALL PITCHERS ACROSS A SIMULATED GAME AND DOUBLE HEADER**  
Anthony W. Fava<sup>1</sup>, Jessica Downs-Talmage<sup>2</sup>, Nicole Bordelon<sup>1</sup>, Gretchen D. Oliver, FACSM<sup>1</sup>.  
<sup>1</sup>Auburn University, Auburn, AL. <sup>2</sup>Northern State University, Aberdeen, SD.
- O12: THE RELATIONSHIP BETWEEN STRIDE MECHANICS AT FOOT CONTACT AND HITTING PERFORMANCE IN COLLEGIATE SOFTBALL ATHLETES**  
Maia Engelkes, Nicole Bordelon, Jessica Downs-Talmage, Anthony Fava, Billy Lozowski, Adam Nebel, Gretchen Oliver, FACSM. Auburn University, Auburn, AL.
- O13: SHOULDER KINETICS AND INFRASPINATUS EMG DURING DECELERATION PHASE IN YOUTH BASEBALL PITCHERS**  
Chris Novellino<sup>1</sup>, Anthony Fava<sup>1</sup>, Adam Nebel<sup>1</sup>, Christopher O'Grady<sup>2</sup>, Jack Iandoli<sup>3</sup>, Hillary Plummer<sup>4</sup>, Thomas van Hogerwou<sup>1</sup>, Gretchen Oliver, FACSM<sup>1</sup>. <sup>1</sup>Auburn University, Auburn, AL. <sup>2</sup>Florida Bone and Joint Specialists, Gulf Breeze, FL. <sup>3</sup>OhioHealth Department of Orthopedic Surgery, Columbus, OH. <sup>4</sup>San Diego Padres, San Diego, CA.
- O14: COMPARISON OF TIMING METHOD AND START TECHNIQUES FOR BASE STEALING AMONG DIVISION II BASEBALL PLAYERS**  
Cheryl Matthews, Carson Bowers, Clayton Nicks, Kate Early, Brian Tyo. Columbus State University, Columbus, GA.
- O15: RELATIONSHIP IN FITNESS AND START TECHNIQUES FOR BASE STEALING AMONG DIVISION 2 BASEBALL PLAYERS**  
Kaitlyn Shepherd, Carson Bowers, Kate Early, Clayton Nicks, Brian Tyo. Columbus State University, Columbus, GA.
- O16: SHOULD THE BASEBALL BE ADJUSTED TO BETTER SUIT YOUNGER PLAYERS' PHYSICAL CHARACTERISTICS?**  
Matthew Robert Poczatek, Billy Lozowski, Anthony W. Fava, Gretchen D. Oliver, FACSM. The Auburn University, Auburn, AL.

**8:00 - 9:30 THEMATIC POSTER SESSION 2 (TP8-TP16)***Crepe Myrtle*

Chair: Austin Robinson, Auburn University

- TP8: CHANGES IN THE QT INTERVAL FOLLOWING HIGH-LOAD AND LOW-LOAD BLOOD FLOW RESTRICTION EXERCISE**  
Abbey C. Hafler, Daniela Rincon Garcia, Erica M. Marshall. Florida Southern College, Lakeland, FL.
- TP9: EFFECT OF MUSCLE BLOOD FLOW RESTRICTION ON RESTING HEMODYNAMICS IN HEALTHY MEN AND WOMEN**  
Amanda M. Cuomo<sup>1</sup>, Joshua L. Keller<sup>1</sup>, Miranda K. Traylor<sup>1</sup>, Sylvie M. Gray<sup>1</sup>, Ethan C. Hill<sup>2</sup>.  
<sup>1</sup>University of South Alabama, Mobile, AL. <sup>2</sup>University of Central Florida, Orlando, FL.
- TP10: ACUTE HYPEREMIC RESPONSE TO BLOOD FLOW RESTRICTION AND ISCHEMIC PRECONDITIONING PROTOCOLS**  
Daphney M. Stanford, Brianna N. Cupp, Matthew A. Chatlaong, Matthew B. Jessee. University of Mississippi, Oxford, MS.

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**Friday, February 24, 2023**

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**8:00 - 9:30 THEMATIC POSTER SESSION 2 (TP8-TP16)***Crepe Myrtle*

- TP11: THE MICROVASCULAR HYPEREMIC RESPONSE TO OCCLUSIVE OR PARTIAL BLOOD FLOW RESTRICTION**  
Brianna N. Cupp, Daphney M. Stanford, Matthew A. Chatlaong, Matthew B. Jessee. *The University of Mississippi, University, MS.*
- TP12: THE INFLUENCE OF PRE-EXERCISE BLOOD FLOW RESTRICTION ON MUSCLE SIZE AND STRENGTH ADAPTATIONS.**  
Enrique N. Moreno, William B. Hammert, Cole C. Martin, Samuel L. Buckner. *University of South Florida, Tampa, FL.*
- TP13: COMPARISON OF RPE AND REPETITIONS COMPLETED DURING BLOOD FLOWRESTRICTED AND TRADITIONAL RESISTANCE EXERCISE**  
Micaela C. Dusseault, Mary A. Wilkenson, Katie G. Kennedy, Ryan J. Colquhoun. *University of South Alabama, Mobile, AL.*
- TP15: BLOOD FLOW RESTRICTION DURING ACUTE HIGH LOAD BENCH PRESS DOES NOT INCREASE VELOCITY OR POWER**  
Andrew LeMense, Harrison Labanowski, Sam Gomez, John Lewis, Abby Fleming, Lee Winchester. *University of Alabama, Tuscaloosa, AL.*
- TP16: UPPER BODY HIGH LOAD BLOOD FLOW RESTRICTION EXERCISE DOES NOT SIGNIFICANTLY ALTER BLOOD LACTATE CONCENTRATION**  
John Lewis, Andrew LeMense, Samuel Gomez, Lee Winchester. *The University of Alabama, Tuscaloosa, AL.*

**8:00 - 9:30 POSTER PRESENTATION SESSION 2 (P41-P105)***Studio 220*Chair: Danielle Wadsworth, *Auburn University*

- P41: ABSTRACT WITHDRAWN**
- P42: BMI IS A PREDICTOR ON SIT TO STAND POWER IN YOUNG ADULTS**  
Sebastian Daniel Ibarra, Cameron Addie, Vaughn Barry, Brandon Grubbs, Angela Bowman, Sarah C. Martinez-Sepanski. *Middle Tennessee State University, Murfreesboro, TN.*
- P43: RELATIONSHIP BETWEEN BODY MASS INDEX AND HEALTH VARIABLES IN LAW ENFORCEMENT**  
Alyssa N. Fail. *Georgia Southern, Statesboro, GA.*
- P44: THE IMPACT OF THE 16-WEEK HEALTHYOU PROGRAM ON THE MITIGATION OF METABOLIC DISEASE RISK FACTORS**  
Talya Emily Geller, Svetlana Nepocatych, Elizabeth Bailey. *Elon University, Elon, NC.*
- P45: CREATINE SUPPLEMENTATION ON BODY COMPOSITION AND TOTAL BODY WATER MEASURED BY MULTI-FREQUENCY BIOELECTRICAL IMPEDANCE**  
Emily A. Buck, Michael J. Saunders, Elizabeth S. Edwards, FACSM, Christopher J. Womack, FACSM. *James Madison University, Harrisonburg, VA.*

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**Friday, February 24, 2023**

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**8:00 - 9:30****POSTER PRESENTATION SESSION 2 (P41-P105)****Studio 220**

- P46: MODERATION AND MEDIATION OF BODY COMPOSITION ON THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND ARTERIAL HEALTH**  
Brantley K. Ballenger, Sydni L. Carter, Grant Norman, Stamatis Agiovlasis, FACSM. *Mississippi State University, Mississippi State, MS.*
- P47: BODY FAT PERCENTAGE AND BACK PAIN IN FIREFIGHTERS**  
Shelby Sanregret. *Augusta University, Augusta, GA.*
- P48: BODY COMPOSITION CHANGES AMONG COLLEGE STUDENTS ENROLLED IN ACTIVITY CLASSES**  
Jonathan J. Ruiz-Ramie, Mervin Jijika, Kenneth S. Anderson, Andrew Craig-Jones, Daniel R. Greene. *Augusta University, Augusta, GA.*
- P49: EFFECTS OF WEIGHT LOSS AND WEIGHT MAINTENANCE ON APOB IN OVERWEIGHT AND OBESE ADULTS**  
Emily E. Grammer<sup>1</sup>, Joshua E. McGee<sup>2</sup>, Taylor T. Brown<sup>2</sup>, Marie C. Clunan<sup>2</sup>, Anna C. Huff<sup>2</sup>, Briceida G. Osborne<sup>2</sup>, Laura E. Matarese<sup>2</sup>, Walter J. Pories<sup>2</sup>, Joseph A. Houmard, FACSM<sup>2</sup>, Robert A. Carels<sup>2</sup>, Mark A. Sarzynski, FACSM<sup>3</sup>, Damon L. Swift<sup>1</sup>. <sup>1</sup>*University of Virginia, Charlottesville, VA.* <sup>2</sup>*East Carolina University, Greenville, NC.* <sup>3</sup>*University of South Carolina, Columbia, SC.*
- P50: HEALTHY AND OBESE CLASSIFICATIONS: INFLUENCE ON CONSTANT LOAD TREADMILL BOUTS RESULTS**  
Mariana V. Jacobs, Trey R. Naylor, Justin Pol, Michael Samaan, Jody L. Clasey, FACSM. *University of Kentucky, Lexington, KY.*
- P51: RELATIONSHIPS OF BODY COMPOSITION FACTORS WITH COMPONENTS OF PHYSICAL ACTIVITY AND MUSCULAR FITNESS**  
Andrew D. Fields, Katherine Sullivan, Casey Metoyer, Jacob Broeckel, Madelyn K. Simmang, Mary Lovelady, Maddy Schwing, Michael V. Fedewa, Michael R. Esco, FACSM. *University of Alabama, Tuscaloosa, AL.*
- P52: EFFECTS OF LATERAL COSTOCHONDRAL RIB DEFORMITY ON POSTERIOR MUSCLE CHAIN: A CASE STUDY**  
Allison R. Rhodes, Courtney Meyer, Amy Hand. *University of South Carolina, Columbia, SC.*
- P53: THE INFLUENCE OF RESTROOM ACCESSIBILITY ON FLUID CONSUMPTION HABITS AND CARDIOVASCULAR HEALTH MEASURES IN TEACHERS**  
Tiffany L. Adams, Delaney R. Baird, Cailin J. Kerch, Alison L. Hooper, Lee J. Winchester. *The University of Alabama, Tuscaloosa, AL.*
- P54: RELATIONSHIP BETWEEN STEP COUNTS AND BODY COMPOSITION IN MIDDLE-AGED ADULTS**  
Andre Canino, Brian Kliszczewicz, FACSM, Robert Buresh, FACSM. *Kennesaw State University, Kennesaw, GA, GA.*
- P55: PHYSICAL ACTIVITY AND BODY COMPOSITION ASSOCIATIONS DURING THE FIRST YEAR POSTPARTUM**  
Erin E. Kishman, Michal T. Smith, Xuewen Wang. *University of South Carolina, Columbia, SC.*

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**Friday, February 24, 2023**

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**8:00 - 9:30****POSTER PRESENTATION SESSION 2 (P41-P105)****Studio 220**

- P56: BODY COMPOSITION CHANGES AFTER NINE WEEKS OF HIGH- OR LOW- LOAD RESISTANCE TRAINING**  
Marissa L. Bello<sup>1</sup>, Abigail N. Shilling<sup>2</sup>, Morgan R. Wood<sup>3</sup>, JohnEric W. Smith<sup>3</sup>. <sup>1</sup>University of Alabama at Birmingham, Birmingham, AL. <sup>2</sup>Stetson University, Deland, FL. <sup>3</sup>Mississippi State University, Mississippi State, MS.
- P57: ASSESSING THE IMPACT OF BODY COMPOSITION ON SKIING ERGOMETER PERFORMANCE IN COLLEGIATE FEMALES**  
Andy Bosak<sup>1</sup>, Hannah Nelson<sup>2</sup>, Ruessell Lowell<sup>3</sup>, Branden Ziebell<sup>1</sup>. <sup>1</sup>Liberty University, Lynchburg, VA. <sup>2</sup>University of Mississippi, Oxford, MS. <sup>3</sup>Mississippi State University, Starkville, MS.
- P58: ENERGY AND MACRONUTRIENT INTAKE FOLLOWING SLEEP IN TEMPERATE AND HOT CONDITIONS**  
Hannah R. Koch<sup>1</sup>, Jesse N. L. Sims<sup>1</sup>, Mitchell E. Zaplatosch<sup>1</sup>, David Messer<sup>1</sup>, Laurie Wideman, FACSM<sup>1</sup>, William M. Adams, FACSM<sup>2</sup>, Jessica McNeil<sup>1</sup>. <sup>1</sup>UNC- Greensboro, Greensboro, NC. <sup>2</sup>United States Olympic & Paralympic Committee, Colorado Springs, CO.
- P60: EFFECT OF ENERGY INTAKE AND NUTRITION BEHAVIORS ON BODY COMPOSITION ACROSS A COLLEGIATE WRESTLING SEASON**  
Alexandra L. Krause<sup>1</sup>, William Dixon<sup>1</sup>, Marco Meucci<sup>1</sup>, Paul Moore<sup>1</sup>, Bhibha Das, FACSM<sup>2</sup>, Laurel Wentz<sup>1</sup>. <sup>1</sup>Appalachian State University, Boone, NC. <sup>2</sup>Eastern Carolina University, Greenville, NC.
- P61: NOTCH INHIBITION AFFECTS WNT AND PROTEIN SYNTHESIS IN EXERCISED SKELETAL MUSCLE**  
Carl Williams, FACSM. University of North Carolina at Charlotte, Charlotte, NC.
- P62: HIGH-INTENSITY INTERVAL TRAINING FOLLOWING SEVEN WEEKS OF RESISTANCE TRAINING ALTERS MUSCLE CALPAIN AND AUTOPHAGY MARKERS**  
Daniel L. Plotkin<sup>1</sup>, J. Max Michel<sup>1</sup>, Joshua S. Godwin<sup>1</sup>, Paulo H.C. Mesquita<sup>1</sup>, Bradley A. Ruple<sup>1</sup>, Mason C. McIntosh<sup>1</sup>, Cleiton A. Libardi<sup>2</sup>, Andreas N. Kavazis<sup>1</sup>, Michael D. Roberts<sup>1,3</sup>. <sup>1</sup>Auburn University, Auburn, AL. <sup>2</sup>Federal University of Sao Carlos, Sao Carlos. <sup>3</sup>Edward Via College of Osteopathic Medicine-Auburn Campus, Auburn, AL.
- P63: VITAMIN D IS ASSOCIATED WITH SLEEP DURATION VARIABILITY BUT NOT SLEEP DURATION IN YOUNG ADULTS**  
Meral N. Culver<sup>1</sup>, Braxton A. Linder<sup>1</sup>, Delaney E. Lyons<sup>1</sup>, Soolim Jeong<sup>1</sup>, Zach J. Hutchison<sup>1</sup>, Alex M. Barnett<sup>1</sup>, Catherine L. Garrett<sup>1</sup>, Jessica McNeil<sup>2</sup>, Austin N. Robinson<sup>1</sup>. <sup>1</sup>Auburn University, Auburn, AL. <sup>2</sup>University of North Carolina at Greensboro, Greensboro, NC.
- P64: THE EFFECTS OF CALCIUM DEFICIENCY ON HIGH BLOOD PRESSURE IN DIVISION I COLLEGIATE ATHLETES**  
Sydnee G. Brothers, Marc Cook, FACSM, Heather Colleran, Lauren San Diego, Troy Purdom. North Carolina A&T, Greensboro, NC.
- P65: IRON DEFICIENCY AND HIGH BLOOD PRESSURE IN DIVISION I AFRICAN AMERICAN ATHLETES**  
Dora R. Rice, Cook Marc, FACSM, Heather Colleran, Lauren San Diego, Troy M. Purdom. North Carolina Agricultural and Technical State University, Greensboro, NC.
- P66: MICRONUTRIENTS AS PREDICTORS FOR MARKERS OF BONE HEALTH IN ATHLETES**  
Noah Stallard<sup>1</sup>, Rohit Ramadoss<sup>1</sup>, Kristin L. Osterberg<sup>2</sup>, Stella L. Volpe, FACSM<sup>1</sup>. <sup>1</sup>Virginia Polytechnic Institute and State University, Blacksburg, VA. <sup>2</sup>Gatorade Sports Science Institute, Bradenton, FL.

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**Friday, February 24, 2023**

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**8:00 - 9:30****POSTER PRESENTATION SESSION 2 (P41-P105)***Studio 220*

- P67: THE EFFECTS OF WATER OR AN ELECTROLYTE SPORTS DRINK ON ROWING PERFORMANCE AND REHYDRATION FOLLOWING FLUID RESTRICTION**  
Allie Rae Bates, Peighton Cumbie, Courteney Benjamin, Evelyn Rogers, Rebecca Rogers, Christopher Ballmann, FACSM. *Samford University, Birmingham, AL.*
- P68: THE EFFECTS OF FLUID RESTRICTION ON REACTION TIME IN HEALTHY FEMALES AND MALES**  
Halee E. Morris, Karson E. Fallin, Rebecca R. Rogers, Tyler D. Williams, Mallory R. Marshall, FACSM, Chris G. Ballmann, FACSM, Courteney L. Benjamin. *Samford University, Birmingham, AL.*
- P69: THE EFFECTS OF ACUTE BEETROOT JUICE INGESTION ON DIURNAL VARIATION IN MAXIMAL ISOMETRIC AND VERTICAL JUMP PERFORMANCE**  
Jillian Hart, Kathryn Hoppers, Rebecca R. Rogers, Tyler D. Williams, Christopher G. Ballmann, FACSM. *Samford University, Birmingham, AL.*
- P70: THE EFFECTS OF ACUTE BEETROOT JUICE INGESTION ON DIURNAL VARIATION IN REPEATED JUMP ABILITY**  
Payton Benoit, Luke Harms, Rebecca R. Rogers, Tyler D. Williams, Christopher G. Ballmann, FACSM. *Samford University, Birmingham, AL.*
- P71: ENERGY INTAKE OVER MULTIPLE DAYS OF HIGH INTENSITY BIKE RACING: A PILOT STUDY**  
Samantha Goldenstein, Mitch Zaplatosch, Laurie Wideman, FACSM. *University of North Carolina-Greensboro, Greensboro, NC.*
- P72: CANNABIDIOL (CBD), ECCENTRIC EXERCISE, AND INFLAMMATION**  
Whitley Jo Stone, Danilo Tolusso, Guillermo Pacheco, Shea Brgoch, Van Thuan Nguyen. *Western Kentucky University, Bowling Green, KY.*
- P73: THE EFFECTS OF PREFERRED AND NON-PREFERRED TASTE ON REPEATED SPRINT ABILITY**  
Davis Henry, Anna Lawrence Pemberton, Rebecca Rogers, Christopher Ballmann, FACSM. *Samford University, Birmingham, AL.*
- P74: IMPACT OF WORKLOAD AND STRESS ON HEALTH-RELATED BEHAVIORS IN COLLEGE STUDENTS**  
Jose Navarrete<sup>1</sup>, Jeremy A. Steeves<sup>1</sup>, Scott A. Conger, FACSM<sup>2</sup>. <sup>1</sup>*Maryville College, Maryville, TN.* <sup>2</sup>*Boise State University, Boise, ID.*
- P75: THE EFFECTS OF OXYGEN NANOBUBBLE CONSUMPTION REPEATED BENCH PRESS PERFORMANCE**  
David Blackburn, Julianne Hill, Rebecca R. Rogers, Tyler D. Williams, Christopher G. Ballmann, FACSM. *Samford University, Birmingham, AL.*
- P76: A DIVERSE SET OF VARIABLES PREDICTS GASTROINTESTINAL SYMPTOMS DURING ENDURANCE RUNNING RACES**  
Patrick B. Wilson<sup>1</sup>, Brian Ferguson<sup>1</sup>, Moe Mavins<sup>1</sup>, Alex Ehlert<sup>2</sup>. <sup>1</sup>*Old Dominion University, Norfolk, VA.* <sup>2</sup>*North Carolina Wesleyan College, Rocky Mount, NC.*

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**Friday, February 24, 2023**

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**8:00 - 9:30****POSTER PRESENTATION SESSION 2 (P41-P105)****Studio 220**

- P77: DIETARY NITRATE SUPPLEMENTATION ENHANCES HEAVY LOAD CARRIAGE PERFORMANCE IN MILITARY CADETS**  
Nicholas Cole Bordonie<sup>1</sup>, Michael J. Saunders, FACSM<sup>2</sup>, Joaquin Ortiz de Zevallos<sup>3</sup>, Stephanie P. Kurti<sup>2</sup>, Nicholas D. Luden<sup>2</sup>, Jenny H. Crance<sup>4</sup>, Daniel A. Baur<sup>4</sup>. <sup>1</sup>*Auburn University, Auburn, AL.* <sup>2</sup>*James Madison University, Harrisonburg, VA.* <sup>3</sup>*University of Virginia, Charlottesville, VA.* <sup>4</sup>*Virginia Military Institute, Lexington, VA.*
- P78: THE IMPACT OF STRUCTURE ON PHYSICAL ACTIVITY OF PRESCHOOL-AGED CHILDREN**  
Hannah Parker, Sarah Burkart, Layton Reesor-Oyer, Michal T. Smith, Lauren von Klinggraeff, Roddrick Dugger, James W. White III, Olivia Finnegan, Meghan Bastyr, Christopher D. Pfledderer, Elizabeth L. Adams, R. Glenn Weaver, Michael W. Beets, Bridget Armstrong. *University of South Carolina, Columbia, SC.*
- P79: DETERMINING CORRELATION BETWEEN AGE AT FIRST CONCUSSION AND SUBSEQUENT MENTAL HEALTH SYMPTOM EXACERBATIONS**  
Aaron Kesinger, Megan Leonard, Coral Holt, Yathavan Rajakulasingam, MD, Vicki Nelson, MD. *University of South Carolina Greenville School of Medicine, Greenville, SC.*
- P80: FAMILY DIETARY CHARACTERISTICS AND EATING HABITS IN HIGH SCHOOL SENIORS**  
Anna Morton<sup>1</sup>, Simon Higgins<sup>2</sup>, Eric Hall, FACSM<sup>1</sup>, Svetlana Nepocatych<sup>1</sup>. <sup>1</sup>*Elon University, Elon, NC.* <sup>2</sup>*University of North Carolina at Chapel Hill, Chapel Hill, NC.*
- P81: WELLNESS FOLLOWING WINS & LOSSES BASED ON PSYCHOLOGICAL HARDINESS IN DIVISION I WOMEN'S LACROSSE**  
Abigail P. Cooley<sup>1</sup>, Sarah L. Grace<sup>1</sup>, Paula Parker<sup>1</sup>, Jennifer A. Bunn, FACSM<sup>2</sup>. <sup>1</sup>*Campbell University, Buies Creek, NC.* <sup>2</sup>*Sam Houston State University, Huntsville, TX.*
- P82: THE EFFECT OF LOWER-LIMB VENOUS POOLING ON EXECUTIVE FUNCTIONING**  
Joseph N. Wenz, Alexander Pomeroy, Katie Standford, Lee Stoner, FACSM. *University of North Carolina at Chapel Hill, Chapel Hill, NC.*
- P83: PERCEPTIONS OF PERSONALIZED READINESS-TO-EXERCISE PROFILES DETERMINED USING 21-DAY ECOLOGICAL MOMENTARY ASSESSMENT DATA**  
Adam Hussain Ibrahim, Cory T. Beaumont, Jessica K. Fleming, Dawn P. Coe, FACSM, Jeff T. Larsen, Kelley Strohacker, FACSM. *University of Tennessee Knoxville, Knoxville, TN.*
- P84: ABSTRACT WITHDRAWN**
- P86: EXERCISE PREFERENCES AND MOTIVATORS IN YOUNG ADULT WOMEN WHO EXERCISE REGULARLY**  
Chloe S. Jones, Danielle D. Wadsworth. *Auburn University, Auburn, AL.*
- P87: MUSCLE-STRENGTHENING ACTIVITY AMONG COLLEGE STUDENTS: DIFFERENCES BY SEX AND ASSOCIATIONS WITH FEELINGS OF FATIGUE**  
Ginny M. Frederick<sup>1</sup>, Benjamin D. Boudreaux<sup>2</sup>, Michael D. Schmidt<sup>1</sup>, Patrick J. O'Connor, FACSM<sup>1</sup>, Ellen M. Evans, FACSM<sup>3</sup>. <sup>1</sup>*University of Georgia, Athens, GA.* <sup>2</sup>*Columbia University Irving Medical Center, New York, NY.* <sup>3</sup>*Indiana University - Bloomington, Bloomington, IN.*

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**Friday, February 24, 2023**

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**8:00 - 9:30****POSTER PRESENTATION SESSION 2 (P41-P105)****Studio 220**

- P88: CADETS' PERCEPTION OF MENTAL RESILIENCE TRAINING IN STATEWIDE POLICE ACADEMY: A PILOT STUDY**  
Erika Moeller<sup>1</sup>, Richard Cleveland<sup>1</sup>, Bridget Melton<sup>1</sup>, Barry Joyner<sup>1</sup>, Joseph Dulla<sup>2</sup>. <sup>1</sup>Georgia Southern University, Statesboro, GA. <sup>2</sup>Bond University, Gold Coast.
- P89: USING THE MILITARY TRAINING MENTAL TOUGHNESS INVENTORY ON FIREFIGHTERS: PRELIMINARY EVIDENCE ON INTER-RATER RELIABILITY**  
Budell Noel<sup>1</sup>, Peter Beitia<sup>1</sup>, Andreas Stamatidis, FACSM<sup>2</sup>, Zacharias Papadakis<sup>1</sup>. <sup>1</sup>Barry University, Miami Shores, FL. <sup>2</sup>SUNY Plattsburgh, Plattsburgh, NY.
- P90: CHARACTERIZING HORMONAL CONTRACEPTION USE AND ASSOCIATED SIDE EFFECTS IN ACTIVE WOMEN**  
Hannah E. Cabre, Sam R. Moore, Abbie E. Smith-Ryan, FACSM. *The University of North Carolina, Chapel Hill, NC.*
- P91: TEST-RETEST RELIABILITY AND MEASUREMENT ERROR OF UNCONTROLLED MANIFOLD ANALYSIS IN FINGER PRESSING TASK**  
Adrien M. Buttram<sup>1</sup>, Stephanie Gibson<sup>1</sup>, Joel Hager<sup>1</sup>, Karlie Abernathy<sup>1</sup>, José Canelon<sup>1</sup>, Benjamin Thomas<sup>1</sup>, Damon Knighton<sup>1</sup>, Daniele Piscitelli<sup>2</sup>, Stanislaw Solnik<sup>1</sup>. <sup>1</sup>University of North Georgia, Dahlonega, GA. <sup>2</sup>University of Connecticut, Mansfield, CT.
- P92: DO COMPRESSION GARMENTS INFLUENCE OXYGEN CONSUMPTION AND HEART RATE DURING A SUBMAXIMAL ENDURANCE RUN?**  
Haley L. Gilbert, Priya L. Giddens, Andrew Craig-Jones. *Augusta University, Augusta, GA.*
- P93: THE EFFECTS OF ORAL APPLIANCE USE ON RESPIRATORY OUTCOMES DURING MAXIMAL EXERCISE**  
Caleb Raab, Benjamin Knight, Kimbo Yee, Dena Garner. *The Citadel, Charleston, SC.*
- P94: EFFECTS OF TRAINING AND SEX ON EXPIRATORY FLOW LIMITATION PREVALENCE AND SEVERITY IN YOUTH CYCLISTS**  
Will Burton<sup>1</sup>, Sarah Ridgeway<sup>1</sup>, Katherine Cox<sup>1</sup>, Joshua Smith<sup>2</sup>, Nicholas Luden<sup>1</sup>, Michael Saunders, FACSM<sup>1</sup>, Stephanie Kurti<sup>1</sup>. <sup>1</sup>Human Performance Laboratory, James Madison University, Harrisonburg, VA. <sup>2</sup>Department of Cardiovascular Medicine, Mayo Clinic, Rochester, MN.
- P95: SNIFF TEST FOR INSPIRATORY STRENGTH: REPRODUCIBILITY AND VALIDITY IN YOUNG, HEALTHY PEOPLE**  
Ami D. Patel, Hayden D. Kopp, Justin M. Oh, Kristin M. Mendez, Kevin K. McCully, FACSM. *University of Georgia, Athens, GA.*
- P96: POSITIVE RELATIONSHIP OF UNLIMITED ONLINE QUIZZES ON SUBSEQUENT EXAM SCORES IN A HUMAN PHYSIOLOGY COURSE**  
Grayson F. Lipford<sup>1</sup>, John J. Herring<sup>2</sup>. <sup>1</sup>Hampton University, Hampton, VA. <sup>2</sup>Wake County Public School System, Raleigh, NC.
- P97: THE EFFECTS OF AN 8-WEEK ACTIVE PLAY INTERVENTION ON PRESCHOOLERS FMS**  
Katherine E. Spring, Alexandra V. Carroll, Danielle D. Wadsworth. *Auburn University, Auburn, AL.*
- P98: PANDEMIC-RELATED CHANGES IN CHILD WEIGHT STATUS AND GRADE-LEVEL READING ATTAINMENT**  
Bailee N. Heatwole, Elizabeth I. Ackley. *Roanoke College, Salem, VA.*

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**Friday, February 24, 2023**


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**8:00 - 9:30      POSTER PRESENTATION SESSION 2 (P41-P105)      *Studio 220***

- P99:      METABOLIC SYNDROME SEVERITY SCORES INCREASE ACROSS ADOLESCENCE: LONGITUDINAL DATA FROM THE RIGHT TRACK HEALTH STUDY**  
Laurie Wideman, FACSM<sup>1</sup>, Jessica M. Dollar<sup>1</sup>, Lenka H. Shriver<sup>1</sup>, Susan P. Keane<sup>1</sup>, Lilly Shanahan<sup>2</sup>. <sup>1</sup>UNC Greensboro, Greensboro, NC. <sup>2</sup>University of Zurich, Zurich.
- P100:      CHANGE IN DAILY STEPS IN A REMOTE DELIVERED PROGRAM IN OLDER ADULTS WITH CHRONIC PAIN.**  
Justin Robison, Jason Fanning. Wake Forest University, Winston Salem, NC.
- P102:      EXERCISE, BUT NOT WINE, IMPROVES GLYCEMIC CONTROL IN INSULIN-RESISTANT PARTICIPANTS**  
Ava Hutt, Kirk A. Abraham. Transylvania University, Lexington, KY.
- P103:      EVIDENCE-BASED CLASSIFICATION: VALID MEASURES OF IMPAIRMENT IN POWER SOCCER**  
JP Barfield, FACSM<sup>1</sup>, Kirsten Clancy<sup>2</sup>, Allison Foster<sup>2</sup>, Hannah Millsaps<sup>2</sup>, Samuel T. Rutherford<sup>2</sup>, Sarah Whitsett<sup>2</sup>, Stephanie Williams<sup>3</sup>. <sup>1</sup>UNC Charlotte, Charlotte, NC. <sup>2</sup>Emory & Henry College, Marion, VA. <sup>3</sup>Emory & Henry College, Emory, VA.
- P104:      ABSTRACT WITHDRAWN**
- P105:      FEASIBILITY OF A HYBRID DELIVERY OF HOME-BASED RESISTANCE TRAINING IN LUNG CANCER**  
Alec Schumpp<sup>1</sup>, Jake Dawson<sup>1</sup>, Lauren Williamson<sup>1</sup>, Otis Owens<sup>1</sup>, Kristina Kendall<sup>2</sup>, James Steele<sup>3</sup>, Christopher Latella<sup>2</sup>, Morgan Blake<sup>4</sup>, Lauren Marcotte<sup>5</sup>, Carolyn Peddle-McIntyre<sup>2</sup>, Karen McDonnell<sup>1</sup>, Ciaran Fairman<sup>1</sup>. <sup>1</sup>University of South Carolina, Columbia, SC. <sup>2</sup>Edith Cowan University, Joondalup. <sup>3</sup>Solent University, Southampton. <sup>4</sup>South College, Knoxville, TN. <sup>5</sup>University of British Columbia, Vancouver, BC.

**9:00 – 9:50      SYMPOSIUM 7      *Regency Ballrooms D & E***

Chair: Audrey Collins, AdventHealth

- S7:      IMPROVING CARDIOMETABOLIC OUTCOMES IN THE YOUNG ADULT QUEER COMMUNITY: MOTIVATING LIFESTYLE BEHAVIOR CHANGE**  
Jake C. Diana, Zachary Y. Kerr, Lee Stoner, FACSM. University of North Carolina at Chapel Hill, Chapel Hill, NC.

**9:00 - 9:50      SYMPOSIUM 8      *Regency Ballroom G***

Chair: Kevin McCully, University of Georgia

- S8:      THE LIFE OF A GRADUATE STUDENT - A GUIDE TO MANAGING COMPETING EXPECTATIONS**  
Patricia Pagan Lassalle, Alexander Pomeroy, Emma S. Cowley, Lauren Bates-Fraser, Lee Stoner, FACSM. The University of North Carolina at Chapel Hill, Chapel Hill, NC.

**Friday, February 24, 2023****9:00 - 9:50 TUTORIAL 8 Redbud**

Chair: Chris Mojock, *University of Georgia*

**T8: CONNECT AND DIRECT: INCREASING YOUR NETWORK AND STEPPING INTO LEADERSHIP**

Rebecca A. Battista, FACSM<sup>1</sup>, Dawn P. Coe, FACSM<sup>2</sup>, Stella L. Volpe, FACSM<sup>3</sup>, Amelia B. Leicht<sup>4</sup>.  
<sup>1</sup>*Appalachian State University, Boone, NC.* <sup>2</sup>*University of Tennessee, Knoxville, TN.* <sup>3</sup>*Virginia Polytechnic Institute and State University, Blacksburg, VA.* <sup>4</sup>*University of Virginia, Charlottesville, VA.*

**9:00 - 9:50 TUTORIAL 9 Regency Ballroom C**

Chair: Paul Davis, *University of North Carolina-Greensboro*

**T9: BIOENERGETICS OF THE TWO-HOUR MARATHON**

L. Bruce Gladden, FACSM. *Auburn University, Auburn, AL.*

**9:00 - 9:50 TUTORIAL 10 Regency Ballroom H**

Chair: Robert Herron, *University of Montevallo*

**T10: REDUCING THE ENGAGEMENT GAP**

Brittany Pinkerton<sup>1</sup>, Hannah Bennett<sup>1</sup>, Samantha Johnson<sup>2</sup>. <sup>1</sup>*Augusta University, Augusta, GA.*  
<sup>2</sup>*Middle Tennessee State University, Murfreesboro, TN.*

**10:00–11:00 AM BASIC SCIENCE LECTURE Regency Ballroom A & B**

Presiding: Danielle Wadsworth, FACSM. *Auburn University, Auburn, AL.*

Speaker introduction: Marc Cook, *North Carolina A&T State University, Greensboro, NC*

**EFFECTS OF EXERCISE ON IN VIVO AND IN VITRO ENDOTHELIAL FUNCTION**

Michael Brown, PhD, FACSM. *University of Maryland, College Park, MD.*

**1:15–2:15 PM ANDREW KOZAR ACSM PRESIDENTIAL ADDRESS Regency Ballroom A & B**

Presiding: Danielle Wadsworth, FACSM. *Auburn University, Auburn, AL.*

Speaker introduction: Bruce Gladden, FACSM. *Auburn University, Auburn, AL.*

**THE LEARNING CONNECTION: HOW NUTRITION, NURTURING, AND ACTIVITY HELP BUILD A HEALTHY KID**

Anastasia Fischer, MD, FACSM. *Nationwide Children's Hospital and The Ohio State University College of Medicine, Columbus, OH.*

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**Friday, February 24, 2023**

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**2:30 - 3:20 SYMPOSIUM 9****Redbud**Chair: Mark Schafer, *Western Kentucky University***S9: SITTING ON THE BENCH TO STANDING BY THE BEDSIDE: CONCEPTION, GRANT WRITING, AND SEDENTARY BEHAVIOR POLICY DEVELOPMENT**Simon Higgins, Craig Paterson, Lee Stoner, FACSM. *University of North Carolina at Chapel Hill, Chapel Hill, NC.***2:30 - 3:20 SYMPOSIUM 10****Regency Ballrooms D & E**Chair: Wendi Weimar, *Auburn University***S10: THE GROWING FIELD OF TACTICAL STRENGTH AND CONDITIONING: THE CULTURE OF LAW ENFORCEMENT**Bridget F. Melton<sup>1</sup>, Mark Abel<sup>2</sup>, Nicholas Hunt<sup>1</sup>, Derick Anglin<sup>1</sup>, Sarah Lanham<sup>2</sup>. <sup>1</sup>*Georgia Southern University, Statesboro, GA.* <sup>2</sup>*University of Kentucky, Lexington, KY.***2:30 - 3:20 TUTORIAL 11****Regency Ballroom G**Chair: Mark Sarzynski, *University of South Carolina***T11: LEARNING HOW TO CONDUCT PSYCHOMOTOR ASSESSMENTS ONLINE**Heather Lynn Disney. *University of Saint Augustine for Health Sciences, San Marcos, CA.***2:30 - 4:30 ORAL PRESENTATION SESSION 3 (O17-O24)****Regency Ballroom F**Chair: Scott Lyons, *University of North Alabama***O17: ASTAXANTHIN DOES NOT IMPACT MARKERS OF MUSCLE DAMAGE OR INFLAMMATION FOLLOWING AN MUSCLE DAMAGE PROTOCOL**Gaven A. Barker<sup>1</sup>, Andrea Bryant<sup>1</sup>, Alyssa L. Parten<sup>1</sup>, Corey Grozier<sup>1</sup>, Matthew McAllister<sup>2</sup>, Hunter S. Waldman<sup>1</sup>. <sup>1</sup>*University of North Alabama, Florence, AL.* <sup>2</sup>*Teaxs State, San Marcos, TX.***O18: A PILOT STUDY CHARACTERIZING DIETARY INTAKE IN WOMEN OF VARYING RACE AND ETHNICITY**Keanu Lettley, Malia Blue, Navaeh Nez. *UNC Chapel Hill, Chapel Hill, NC.***O19: POSTMENOPAUSAL DARK CHOCOLATE CONSUMPTION ELEVATES RESTING ENERGY EXPENDITURE**Aubrey L. Johnson<sup>1</sup>, MICHAEL J. WEBSTER, FACSM<sup>2</sup>. <sup>1</sup>*Virginia Polytechnic Institute and State University, Blacksburg, VA.* <sup>2</sup>*Valdosta State University, Valdosta, GA.***O21: ROLE OF SHORT DURATION INTERMITTENT FASTING ON ACUITY AND BODY COMPOSITION IN YOUNG ADULT FEMALES**Lauren P. Durkee, John C. Sieverdes, Wesley D. Dudgeon. *College of Charleston, Charleston, SC.***O22: METABOLIC EFFECTS OF R-1,3 BUTANEDIOL (KETONEIQ) DURING AEROBIC AND ANAEROBIC EXERCISE BOUTS.**Mathew C. Soto<sup>1</sup>, Andrew J. Jakiel<sup>1</sup>, Latt Mansor<sup>2</sup>, Nicholas P. Alden<sup>1</sup>, Megan C. Milian<sup>1</sup>, Rachel B. Crowe<sup>1</sup>, Jacob I. Dashiell<sup>1</sup>, Samuel G. Sanders<sup>1</sup>, Jenica D. Alvarez<sup>1</sup>, Ashley M. Bruce<sup>1</sup>, Stephen B. Podsen<sup>1</sup>, Sabrina R. Fordham<sup>1</sup>, Parker N. Hyde<sup>1</sup>. <sup>1</sup>*University of North Georgia, Dahlonega, GA.* <sup>2</sup>*Health Via Modern Nutrition (HVMN), Miami, FL.*

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**Friday, February 24, 2023**


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**2:30 - 4:30 ORAL PRESENTATION SESSION 3 (O17-O24)***Regency Ballroom F***O23: THE EFFECTS OF ACUTE RAUWOLSCINE SUPPLEMENTATION ON STRENGTH, POWER, AND AGILITY**

Seth Ford, Cameron Vidal, Rebecca R. Rogers, Christopher G. Ballmann, FACSM, Tyler D. Williams. *Samford University, Birmingham, AL.*

**O24: VARIATIONS IN COPEPTIN AND CORTISOL ARE NOT ASSOCIATED WITH AD-LIBITUM BREAKFAST CONSUMPTION**

Mitchell E. Zaplatosch<sup>1</sup>, Jesse N.L. Sims<sup>1</sup>, Hannah R. Koch<sup>1</sup>, David A. Messer<sup>1</sup>, Travis Anderson<sup>2</sup>, Laurie Wideman, FACSM<sup>1</sup>, William M. Adams, FACSM<sup>2</sup>, Jessica McNeil<sup>1</sup>. <sup>1</sup>*University of North Carolina at Greensboro, Greensboro, NC.* <sup>2</sup>*United States Olympic & Paralympic Committee, Colorado Springs, CO.*

**2:30 - 4:00 THEMATIC POSTER SESSION 3 (TP17-TP24)***Crepe Myrtle*

Chair: Trudy Moore-Harrison, *University of North Carolina-Charlotte*

**TP17: CHARACTERIZING BODY COMPOSITION AND PERFORMANCE IN DIVISION I FEMALE SOCCER PLAYERS**

Kelly E. Joniak, Hannah E. Cabre, Sam R. Moore, Alex N. Ladan, Abbie E. Smith-Ryan, FACSM. *University of North Carolina at Chapel Hill, Chapel Hill, NC.*

**TP19: MATCH RESULT IMPACT ON TEAM AND POSITION GROUP PERFORMANCE VARIABLES IN PROFESSIONAL SOCCER PLAYERS**

Greg A. Ryan<sup>1</sup>, Cameron M. Horsfall<sup>2</sup>, Hannah E. Ramirez<sup>2</sup>, Drew S. DeJohn<sup>3</sup>, Samuel J. Wilson<sup>2</sup>, Robert L. Herron<sup>4</sup>, Stephen J. Rossi<sup>2</sup>. <sup>1</sup>*Piedmont University, Demorest, GA.* <sup>2</sup>*Georgia Southern University, Statesboro, GA.* <sup>3</sup>*South Georgia Tormenta FC, Statesboro, GA.* <sup>4</sup>*University of Montevallo, Montevallo, AL.*

**TP20: THE IMPACT OF WEEKLY SUMMATED TRAINING ON MATCH OUTCOME IN PROFESSIONAL SOCCER PLAYERS**

Cameron Matthew Horsfall<sup>1</sup>, Greg Ryan<sup>2</sup>, Hannah Ramirez<sup>1</sup>, John Matthew Morris<sup>1</sup>, Stephen Rossi<sup>1</sup>. <sup>1</sup>*Georgia Southern University, Statesboro, GA.* <sup>2</sup>*Piedmont University, Demorest, GA.*

**TP21: EPIDEMIOLOGICAL COMPARISON IN KNEE INJURIES BETWEEN NCAA AND NAIA WOMEN'S SOCCER**

Makenzie Hoyt, Lyndsey Darden, Katie Stovall, Jeremiah Lukers. *Truett McConnell University, Cleveland, GA.*

**TP22: PRE-SEASON COUNTERMOVEMENT JUMP DERIVED NEUROMUSCULAR PERFORMANCE IN FEMALE NCAA DIVISION III SOCCER PLAYERS**

Kelsey R. Hutchison<sup>1</sup>, Isabel M. Neall<sup>1</sup>, Matan Amitay<sup>1</sup>, Vanessa B. Batchelor<sup>1</sup>, Shannon K. Crowley<sup>1</sup>, Jay R. Hoffman, FACSM<sup>2</sup>, Meir Magal, FACSM<sup>1</sup>. <sup>1</sup>*North Carolina Wesleyan University, Rocky Mount, NC.* <sup>2</sup>*Ariel University, Ariel, Israel.*

**TP23: HIGH AND LOW PERFORMER DIFFERENCES IN COUNTERMOVEMENT JUMP DERIVED NEUROMUSCULAR PERFORMANCE IN FEMALE NCAA DIVISION III SOCCER PLAYERS**

Isabel M. Neall<sup>1</sup>, Kelsey R. Hutchison<sup>1</sup>, Vanessa B. Batchelor<sup>1</sup>, Matan Amitay<sup>1</sup>, Shannon K. Crowley<sup>1</sup>, Jay R. Hoffman, FACSM<sup>2</sup>, Meir Magal, FACSM<sup>1</sup>. <sup>1</sup>*North Carolina Wesleyan University, Rocky Mount, NC.* <sup>2</sup>*Ariel University, Ariel, Israel.*

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**Friday, February 24, 2023**

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**2:30 - 4:00 THEMATIC POSTER SESSION 3 (TP17-TP24)***Crepe Myrtle***TP24: EFFECT OF CAFFEINE ON PHYSICAL PERFORMANCE IN DIVISION-1 FEMALE SOCCER PLAYERS**

David Lara, Gaven Barker, Victor Alves, Alyssa Parten, Lauren G. Killen. *University of North Alabama, Florence, AL.*

**2:30 - 4:00 POSTER PRESENTATION SESSION 3 (P106-P170)***Studio 220*

Chair: Dawn Coe, *University of Tennessee, Knoxville*

**P106: A PILOT STUDY: ACCELEROMETER AND RPE DATA REDUCTION METHODS MEASURING MUSCLE OSCILLATION WITH COMPRESSION GARMENTS?**

Priya Leigh Giddens, Haley L. Gilbert, Andrew Craig-Jones. *Augusta University, Augusta, GA.*

**P107: ACTIVATION PATTERNS OF GLUTEAL AND THIGH MUSCLES IN CLASSICALLY TRAINED BALLET DANCERS**

Victoria Conn<sup>1</sup>, Sara Pecina<sup>1</sup>, David Elmer<sup>1</sup>, Jessica Washington<sup>2</sup>. <sup>1</sup>*Berry College, Mount Berry, GA.* <sup>2</sup>*Florida Southern College, Lakeland, FL.*

**P108: GAIT MECHANICS IN PEOPLE WITH CLINICALLY DIAGNOSED HYPERMOBILITY EHLERS DANLOS SYNDROME**

Lindsey Nicole Ball, Stephen Duncan, Mary Sheppard, Michael Samaan. *University of Kentucky, Lexington, KY.*

**P109: LOWER EXTREMITY JOINT LOADING IS ALTERED IN PEOPLE WITH MARFAN SYNDROME DURING A SIT-TO-STAND TASK**

Justin Pol, Christopher McLouth, Mariana Jacobs, Mary Sheppard, Michael A. Samaan. *University of Kentucky, Lexington, KY.*

**P110: LIMITS OF POSTURAL STABILITY IN VARIOUS OCCUPATIONAL FOOTWEAR**

Nathan O. Conner<sup>1</sup>, Sachini Kodithuwakku Arachchige<sup>2</sup>, John Garner<sup>3</sup>, Chip Wade<sup>4</sup>, Adam C. Knight<sup>1</sup>, Harish Chander<sup>1</sup>. <sup>1</sup>*Mississippi State University, Mississippi State, MS.* <sup>2</sup>*Weber State University, Ogden, UT.* <sup>3</sup>*Troy University, Troy, AL.* <sup>4</sup>*University of Mississippi, University, MS.*

**P111: LOWER EXTREMITY SAGITTAL PLANE KINEMATICS IN NON-SLIP SOCK DURING GAIT**

John Grace. *Auburn University, Auburn, AL.*

**P112: SHOE COLLAR HEIGHT AFFECTS GROUND REACTION FORCES AND ANKLE LANDING BIOMECHANICS IN COLLEGIATE VOLLEYBALL PLAYERS**

Lindsey Legg, Tyler Donahue, Shelby Peel, Scott Piland, Tanner Thorsen. *University of Southern Mississippi, Hattiesburg, MS.*

**P113: EXAMINATION OF GAIT PARAMETERS IN VARIOUS NON-SLIP SOCKS**

Jordan Elisabeth Tompkins. *Auburn University, Auburn, AL.*

**P114: TACTICAL BOOTS MODIFIED WITH ENERGY RETURN PLATES REDUCE WALKING GAIT ASYMMETRIES**

Bahman Adlou, Jerad J. Kosek, Meghan E. Hancock, Jordan E. Tompkins, Hannah Houde Houde, John L. Grace, Christopher M. Wilburn, Wendi H. Weimar. *Auburn University, Auburn, AL.*

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**Friday, February 24, 2023**

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**2:30 - 4:00 POSTER PRESENTATION SESSION 3 (P106-P170)****Studio 220**

- P115: INFLUENCE OF A PRE-COUNTERMOVEMENT ARM SWING ON HORIZONTAL AND VERTICAL JUMPING**  
Jerad Kosek, Imani Hill, Hannah Houde, Christopher Wilburn, Wendi Weimar. *Auburn University, Auburn, AL.*
- P116: HIPS DON'T LIE: HIP POTENTIATION CONTRIBUTES TO JUMP HEIGHT ENHANCEMENT IN CHILDREN**  
Lauren Elizabeth Smith, Harshvardhan Singh. *University of Alabama at Birmingham, Birmingham, AL.*
- P117: HIP BUT NOT KNEE AND ANKLE STRATEGIES IMPROVE JUMP HEIGHT DURING INCREASINGLY CHALLENGING JUMP CONDITIONS**  
Phuong T.M. Quach, Richard Preus, Bethany A. Moore, Gary Hunter, FACSM, Patricia Perez, Harshvardhan Singh. *University of Alabama at Birmingham, Birmingham, AL.*
- P118: EFFECTS OF AUDITORY AND VISUAL STIMULI ON REACTION AND RESPONSE TIME DURING COUNTERMOVEMENT JUMPS**  
Russell Lowell, David Saucier, Harish Chander, Reuben Burch, Zachary Gillen. *Mississippi State University, Starkville, MS.*
- P119: ADIPOSITY NEGATIVELY AFFECTS JOINT-SPECIFIC ECCENTRIC-TO-CONCENTRIC TRANSITION TIME AND JUMP PERFORMANCE IN CHILDREN**  
Eden Gee<sup>1</sup>, Austin Nguyen<sup>1</sup>, Pratham Shah<sup>2</sup>, Harshvardhan Singh<sup>1</sup>. <sup>1</sup>*University of Alabama at Birmingham, Birmingham, AL.* <sup>2</sup>*University of Alabama at Birmingham, Dothan, AL.*
- P120: DOES LOWER BODY FATIGUE INFLUENCE BIOMECHANICAL FACTORS DURING LANDING?**  
Andrew Craig-Jones, Haley Gilbert, Priya Giddens, Daniel Greene, Jonathan Ruiz-Ramie. *Augusta University, Augusta, GA.*
- P121: A METHOD FOR FLEXION EXTENSION IMAGING OF THE LUMBAR SPINE IN TREATING LOW BACK PAIN**  
Kaitlyn Armstrong, Chip Wade, Thomas L. Andre, Corbit Franks. *The University of Mississippi, Oxford, MS.*
- P122: A FEASIBILITY STUDY USING ACTION SPORT CAMERAS FOR 3D MOTION ANALYSIS**  
Michael Hales, John D. Johnson. *Kennesaw State University, Kennesaw, GA.*
- P123: THE EFFECTS OF EDUCATION OR CORRECTIVE EXERCISE ON FORWARD HEAD POSTURE- A RANDOMIZED CONTROLLED TRIAL**  
David Titcomb<sup>1,2</sup>, Bridget Melton<sup>3</sup>, Theresa Miyashita<sup>2</sup>, Helen Bland<sup>3</sup>. <sup>1</sup>*Liberty University, Lynchburg, VA.* <sup>2</sup>*Concordia University Chicago, River Forest, IL.* <sup>3</sup>*Georgia Southern University, Statesboro, GA.*
- P124: EFFECT OF SURFACE STABILITY DURING DUAL TASKING ON MEMORY AND COGNITION**  
Maria Miller<sup>1</sup>, Leiden Rounds<sup>1</sup>, Rebecca R. Rogers<sup>1</sup>, Mallory R. Marshall, FACSM<sup>2</sup>. <sup>1</sup>*Samford University, Birmingham, AL.* <sup>2</sup>*Samford University, Hoover, AL.*
- P125: NETWORK PHYSIOLOGY OF INTER-MUSCULAR INTERACTIONS**  
Maddie Sayre<sup>1</sup>, Celeste Childs<sup>1</sup>, Libby Connolly<sup>1</sup>, Maddie Davis<sup>1</sup>, Quinlyn Shannehan<sup>1</sup>, Gabriela Simpson<sup>1</sup>, Sergi Garcia-Retortillo<sup>1</sup>, Plamen Ch Ivanov<sup>2</sup>. <sup>1</sup>*Wake Forest University, Winston-Salem, NC.* <sup>2</sup>*Boston University, Boston, MA.*

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**Friday, February 24, 2023**

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**2:30 - 4:00****POSTER PRESENTATION SESSION 3 (P106-P170)****Studio 220**

- P126: ASSESSMENT OF GAIT HARMONY IN PRIMARY SCHOOL-AGED CHILDREN USING A GOLDEN RATIO-CENTERED APPROACH**  
Brandi E. Decoux<sup>1</sup>, Christopher M. Wilburn<sup>2</sup>, Wendi H. Weimar<sup>2</sup>, Portia T. Williams<sup>3</sup>, Megan Gordon<sup>1</sup>, Bovorn Sirikul<sup>1</sup>, Sarah Price<sup>4</sup>. <sup>1</sup>*Southeastern Louisiana University, Hammond, LA.* <sup>2</sup>*Auburn University, Auburn, AL.* <sup>3</sup>*North Carolina Agricultural and Technical State University, Greensboro, NC.* <sup>4</sup>*Florida Agricultural and Mechanical University, Tallahassee, FL.*
- P127: INFLUENCE OF NATURAL GRASS AND ARTIFICIAL TURF SURFACES ON ATHLETE PERFORMANCE AND PERCEIVED PERFORMANCE SATISFACTION**  
Hannah Reck<sup>1</sup>, Brandi Decoux<sup>1</sup>, Samantha Carson<sup>1</sup>, Daniel B. Hollander<sup>1</sup>, Megan Gordon<sup>1</sup>, Bovorn Sirikul<sup>1</sup>, Christopher Wilburn<sup>2</sup>, Wendi Weimar<sup>2</sup>. <sup>1</sup>*Southeastern Louisiana University, Hammond, LA.* <sup>2</sup>*Auburn University, Auburn, AL.*
- P128: RETURN TO DUTY RATES IN ACTIVE-DUTY MILITARY FOLLOWING MINIMALLY INVASIVE CERVICAL SPINE SURGERY**  
chip wade, Kaitlyn Armstrong, Corbit Franks, Thomas Andre. *University of Mississippi, University, MS.*
- P129: CAN 4-WEEKS OF BACKWARD EXERCISE STRATEGY EFFECT MOBILITY AND GAIT OUTCOMES IN THE AGING? - A DESCRIPTIVE CASE SERIES**  
Mia Colucci<sup>1</sup>, Kylee West<sup>1</sup>, Jacob Smith<sup>2</sup>, Savannah Lyons<sup>1</sup>, Nick J. Siekirk<sup>1</sup>. <sup>1</sup>*Georgia Southern University, Statesboro, GA.* <sup>2</sup>*University of Texas at Austin, Austin, TX.*
- P130: COMPARING TRAJECTORIES AND PERFORMANCE OF THE STANDARD, SWISS, AND CAMBERED SWISS BARBELL BENCH PRESS IN RESISTANCE TRAINED INDIVIDUALS**  
Matthew J. Johnson, Megahn Schulte, Andrew A. Flatt, Bryan L. Riemann. *Georgia Southern University, Savannah, GA.*
- P131: RELATIONSHIP BETWEEN FRONTAL PLANE KINEMATICS DURING THE SINGLE-LEG SQUAT: A PILOT STUDY**  
Havana O. Charles<sup>1</sup>, JP Barfield<sup>2</sup>, FACSM. <sup>1</sup>*Lander University, Greenwood, SC.* <sup>2</sup>*UNC Charlotte, Charlotte, NC.*
- P132: ASSOCIATION BETWEEN ECCENTRIC ISOTONIC MUSCLE PERFORMANCE AND KNEE FLEXION MUSCLE KINETICS DURING SUBMAXIMAL RUNNING**  
Emily E. Rouse, Sean P. Langan, Wayne M. Johnson, George J. Davies, Bryan L. Riemann. *Georgia Southern University - Armstrong Campus, Savannah, GA.*
- P133: COORDINATION COUPLING: THE EVALUATION OF WALKING COORDINATION IN AUTISTIC SIBLINGS**  
Lauren A. Luginsland, Justin A. Haegele, Hunter J. Bennett. *Old Dominion University, Norfolk, VA.*
- P134: CERVICAL ERECTOR SPINAE INTERMUSCULAR COORDINATION WHILE USING NOISE CANCELLATION HEADPHONES DURING WALKING**  
Kia Golzari<sup>1</sup>, Ali Boolani<sup>2</sup>, Zacharias Papadakis<sup>3</sup>, Sergi Garcia-Retortillo<sup>4</sup>, Andreas Stamatis, FACSM<sup>5</sup>, Emily Locke<sup>2</sup>, Ryan McCarthy<sup>2</sup>, Kwadwo Osei Appiah-Kubi<sup>2</sup>, Ahmed Kadry<sup>2</sup>, Ahmed Torad<sup>2</sup>, Mostafa Elwan<sup>2</sup>, Hugo Posada-Quintero<sup>1</sup>. <sup>1</sup>*University of Connecticut, Storrs, CT.* <sup>2</sup>*Clarkson University, Potsdam, NY.* <sup>3</sup>*Barry University, Miami Shores, FL.* <sup>4</sup>*Wake Forest University, Winston-Salem, NC.* <sup>5</sup>*State University of New York Plattsburgh, Plattsburgh, NY.*
- P135: ASSOCIATIONS BETWEEN GROUND CONTACT TIME AND BODY MASS COMPONENTS IN FIREFIGHTERS WEARING FULL TURNOUT GEAR**  
Austin Kohler, Andrew Moore, Maleah Winkler. *Augusta University, Augusta, GA.*

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**Friday, February 24, 2023**

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**2:30 - 4:00****POSTER PRESENTATION SESSION 3 (P106-P170)****Studio 220**

- P136: DYNAMIC BALANCE FOLLOWING SIX MINUTES OF BRISK WALKING IN FEMALES: PRELIMINARY FINDINGS**  
Esther Steingold, Lacy Harper, Melanie Antonio, William Reed, Valentina Taddia, Breanna McDonald, Micah Poisal, Kaden Buford, Garrett Hester. *Kennesaw State University, Kennesaw, GA.*
- P137: EFFECTS OF A BRISK 6-MINUTE WALK ON MAXIMAL AND RAPID TORQUE PRODUCTION IN FEMALES: PRELIMINARY FINDINGS**  
William Reed, Lacey Harper, Melanie Antonio, Valentina Taddia, Breanna McDonald, Micah Poisal, Kaden Buford, Esther Steingold, Garrett Hester. *Kennesaw State University, Kennesaw, GA.*
- P138: EFFECTS OF A LAW ENFORCEMENT DUTY BELT AND VEST ON MUSCULAR ACTIVITY WHILE WALKING**  
Megan Sax van der Weyden, James Kearney, Joel Martin. *George Mason University, Manassas, VA.*
- P139: BAREFOOT VERSUS SHOD COMPARISONS ON BIPEDAL POSTUROGRAPHY USING BALANCE TRACKING SYSTEM (BTRACKS)**  
Hunter Derby<sup>1</sup>, Sachini Kodithuwakku Arachchige<sup>2</sup>, Daniel Young<sup>1</sup>, Sydni Carter<sup>1</sup>, Luke Ramsey<sup>1</sup>, Adam C. Knight<sup>1</sup>, Harish Chander<sup>1</sup>. <sup>1</sup>*Mississippi State University, Mississippi State, MS.* <sup>2</sup>*Weber State University, Ogden, UT.*
- P140: THE ACCURACY OF THE APPLE HEALTH APPLICATION MOBILITY DATA DURING OVERGROUND AND TREADMILL WALKING**  
Caroline Kaylor, Grace Lehman, Christopher G. Ballmann, FACSM, Patrick Marsh, Rebecca R. Rogers. *Samford University, Birmingham, AL.*
- P141: STRIDE LENGTH VS. CENTER OF MASS LOCATION: AN EXPLORATORY EXAMINATION OF GAIT PATTERNS**  
Meghan E. Hancock<sup>1</sup>, Christopher M. Wilburn<sup>1</sup>, Brandi E. Decoux<sup>2</sup>, Jordan E. Tompkins<sup>1</sup>, Hannah H. Houde<sup>1</sup>, Jared J. Kosek<sup>1</sup>, Baham Adlou<sup>1</sup>, John L. Grace<sup>1</sup>, Wendi H. Weimar<sup>1</sup>. <sup>1</sup>*Auburn University, Auburn, AL.* <sup>2</sup>*Southeastern Louisiana University, Hammond, LA.*
- P142: DISTANCE RUNNING PELVIS MOTION AND STRIDE TO STRIDE VARIABILITY DURING STANCE**  
Will M. White, Jeff T. Wight, Nico Arciniegas, Ryan S. Sloan, David R. Hooper, Jordon Garman, George G.A. Pujalte, FACSM. *Jacksonville University, Jacksonville, FL.*
- P143: DISTANCE RUNNING PELVIS MOTION AND STRIDE TO STRIDE VARIABILITY DURING SWING**  
Nicolas Arciniegas, Jeff T. Wight, Will M. White, David R. Hooper, George G.A. Pujalte, FACSM. *Jacksonville University, Jacksonville, FL.*
- P144: EFFECTS OF 15 MINUTES OF DORSIFLEXION STRETCH ON RANGE OF MOTION, STIFFNESS, AND HYSTERESIS AREA**  
Petra Kis, Li Li, FACSM. *Georgia Southern University, Statesboro, GA.*
- P145: ROTATION SEQUENCES FOR SHOULDER KINEMATICS IN THE VOLLEYBALL ATTACK**  
Kiara Barrett, Hunter J. Bennett. *Old Dominion University, Norfolk, VA.*

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**Friday, February 24, 2023**

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**2:30 - 4:00****POSTER PRESENTATION SESSION 3 (P106-P170)****Studio 220**

- P146: METABOLIC HEALTH CHANGES: CLEAN KETOGENIC DIET VS. A CLEAN KETOGENIC DIET WITH INTERMITTENT FASTING**  
Todd Sherman, Angie MacKewn, Julie Floyd, Alison Ellis, Anna Mallory. *University of Tennessee at Martin, Martin, TN.*
- P147: THE IMPACT OF AN ACUTE EXERCISE AND NUTRITION INTERVENTION ON ADVERSE POSTPRANDIAL METABOLIC OUTCOMES**  
Lexi J. Ater, Ellie K. Plantz, Turner D. Manning, Elizabeth S. Edwards, FACSM, Jeremy D. Akers, Stephanie P. Kurti. *James Madison University, Harrisonburg, VA.*
- P148: THE RELATIONSHIP BETWEEN BODY COMPOSITION AND TWO-HOUR GLUCOSE FOLLOWING OGTT**  
Pedro Chung, Abigail Marmurowicz, Andre Canino, Keilah Vaughan, Gabe Wilner, Robert Buresh, FACSM, Cherilyn McLester, Brian Kliszczewicz, FACSM. *Kennesaw State University, Kennesaw, GA.*
- P149: THE RELATIONSHIP BETWEEN RESTING HEART RATE VARIABILITY AND FASTING GLUCOSE**  
Abigail Marmurowicz, Andre Canino, Gabe Wilner, Pedro Chung, Keilah Vaughan, Robert Buresh, FACSM, Cherilyn McLester, Brian Kliszczewicz, FACSM. *Kennesaw State University, Kennesaw, GA.*
- P150: DOES ACUTE RESISTANCE EXERCISE ATTENUATE POST-PRANDIAL METABOLIC RESPONSES POST-HIGH FAT MEAL IN ADULTS OVER 50?**  
Summer G. Simulcik<sup>1</sup>, Naomi Hemphill<sup>2</sup>, Sophie Bollinger<sup>2</sup>, Stephanie P. Kurti<sup>2</sup>, Michael J. Saunders<sup>2</sup>, Elizabeth S. Edwards, FACSM<sup>2</sup>. <sup>1</sup>*Virginia Commonwealth University, Richmond, VA.* <sup>2</sup>*James Madison University, Harrisonburg, VA.*
- P151: TRUNK-TO-LEG-VOLUME RATIO IS NEUTRALLY ASSOCIATED WITH BONE DENSITY RELATIVE TO BMI AND WAIST CIRCUMFERENCE**  
Brian Ferguson, Patrick Wilson. *Old Dominion University, Norfolk, VA.*
- P152: QUANTIFYING SKELETAL MUSCLE MASS USING THE D3-CREATINE METHOD IN THE INVEST IN BONE HEALTH TRIAL**  
Allison E. Avery<sup>1</sup>, Peggy M. Cawthorn<sup>2</sup>, Mahalakshmi Shankaran<sup>3</sup>, William J. Evans<sup>3</sup>, Kristen M. Beavers<sup>1</sup>. <sup>1</sup>*Wake Forest University, Winston-Salem, NC.* <sup>2</sup>*California Pacific Medical Center, Research Institute, San Francisco, CA.* <sup>3</sup>*University of California, Berkeley, CA.*
- P153: A CONSERVATIVE APPROACH TO POSTURE RELATED NECK AND SHOULDER PAIN: A CASE STUDY**  
Christine Danh, Heather Lynn Disney. *University of Saint Augustine for Health Sciences, San Marcos, CA.*
- P154: A COMPARISON OF TECHNIQUES ASSESSING THE MORPHOLOGICAL CHARACTERISTICS OF SKELETAL MUSCLE FIBERS**  
Breanna J. Mueller, Paulo H. C. Mesquita, Bradley A. Ruple, Joshua S. Godwin, Casey L. Sexton, Shelby C. Osburn, Mason C. McIntosh, Andreas N. Kavazis, FACSM, Cleiton A. Libardi, Kaelin C. Young, Michael D. Roberts. *Auburn University, Auburn, AL.*

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**Friday, February 24, 2023**

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**2:30 - 4:00****POSTER PRESENTATION SESSION 3 (P106-P170)****Studio 220**

- P155: THE UBIQUITIN-PROTEASOME SYSTEM: IMPLICATED IN HIIT INDUCED MUSCLE ATROPHY FOLLOWING SEVEN WEEKS OF RESISTANCE TRAINING**  
J. Max Michel<sup>1</sup>, Daniel L. Plotkin<sup>1</sup>, Joshua S. Godwin<sup>1</sup>, Paulo H.C. Mesquita<sup>1</sup>, Bradley A. Ruple<sup>1</sup>, Mason C. McIntosh<sup>1</sup>, Cleiton A. Libardi<sup>2</sup>, Andreas N. Kavazis<sup>1</sup>, Michael D. Roberts<sup>3,1</sup>. <sup>1</sup>Auburn University, Auburn, AL. <sup>2</sup>Federal University of Sao Carlos, Sao Carlos, Brazil. <sup>3</sup>Edward Via College of Osteopathic Medicine-Auburn Campus, Auburn, AL.
- P156: THE EFFECTS OF NEAR VOLITIONAL FATIGUE RESISTANCE TRAINING ON STRENGTH & HYPERTROPHY IN TRAINED INDIVIDUALS**  
Nicholas Kontos, FACSM, Michael Roberts, FACSM, Bradley Ruple, FACSM, Joshua Godwin, FACSM. Auburn University, Auburn, AL.
- P157: FATIGUE-RELATED RESPONSES FOR EXPLOSIVE NEUROMUSCULAR FUNCTION AND PERIPHERAL FATIGUE FOLLOWING RAPID AND RAMP ISOMETRIC CONTRACTIONS**  
Lacey Harper<sup>1</sup>, Benjamin Dalton<sup>2</sup>, Michaela Alesi<sup>1</sup>, Michael Cooper<sup>1</sup>, Jacob McDougale<sup>1</sup>, Trisha VanDusseldorp<sup>3</sup>, Robert Buresh, FACSM<sup>1</sup>, Yuri Feito, FACSM<sup>4</sup>, Garrett Hester<sup>1</sup>. <sup>1</sup>Kennesaw State University, Kennesaw, GA. <sup>2</sup>University of Guelph, Guelph, ON. <sup>3</sup>Bonafide Health, Harrison, NY. <sup>4</sup>American College of Sports Medicine, Indianapolis, IN.
- P158: THE EFFECTS OF SLEEP RESTRICTION ON MUSCLE STRENGTH AND VOLUNTARY ACTIVATION**  
Scott Sigrist. University of Kentucky, Lexington, KY.
- P159: CHANGES IN BLOOD PRESSURE ACROSS THE LIFESPAN AMONG INSUFFICIENTLY ACTIVE ADULTS IN THE AMERICAN SOUTHWEST**  
Nathan R. Weeldreyer<sup>1</sup>, Zachary S. Leicht<sup>1</sup>, Marc A. Adams<sup>2</sup>, Siddhartha S. Angadi, FACSM<sup>1</sup>. <sup>1</sup>University of Virginia, Charlottesville, VA. <sup>2</sup>Arizona State University, Phoenix, AZ.
- P160: BASELINE CARDIORESPIRATORY AS A PREDICTOR OF BP STATUS IN INSUFFICIENTLY ACTIVE ADULTS**  
Zachary S. Leicht<sup>1</sup>, Nathan R. Weeldreyer<sup>1</sup>, Marc A. Adams<sup>2</sup>, Siddhartha S. Angadi, FACSM<sup>1</sup>. <sup>1</sup>University of Virginia, Charlottesville, VA. <sup>2</sup>Arizona State University, Phoenix, AZ.
- P161: RELATIONSHIP BETWEEN BMI, PHYSICAL ACTIVITY AND OTHER HEALTH COVARIABLES, AND DEPRESSION IN ADULTS**  
Ian C. Macali<sup>1</sup>, Megan E. Holmes<sup>1</sup>, Erik Lind<sup>2</sup>. <sup>1</sup>Mississippi State, Mississippi State, MS. <sup>2</sup>State University of New York, Cortland, NY.
- P162: PHYSICAL ACTIVITY, COGNITIVE FUNCTION STATUS, AND ALL-CAUSE MORTALITY RISK IN STROKE SURVIVORS: 1999-2002 NHANES**  
Sarah Wilson. University of North Florida, Jacksonville, FL.
- P163: PHYSICAL ACTIVITY AND SEDENTARY TIME IN U.S. ADULTS WITH AND WITHOUT HEART FAILURE: 2007-2018 NHANES**  
Jessica Geller. University of North Florida, Jacksonville, FL.
- P164: 24-HOUR ACTIVITY BEHAVIORS IN LUNG CANCER PATIENTS AND SURVIVORS**  
Robert M. Czynewski (1), Lauren C. Bates-Frazer (1,2,3), Lee Stoner (1,2,4), FACSM, Erik D. Hanson (1,2,3), FACSM. University of North Carolina at Chapel Hill, Chapel Hill, NC.

**Friday, February 24, 2023****2:30 - 4:00 POSTER PRESENTATION SESSION 3 (P106-P170) Studio 220****P165: SEDENTARY BEHAVIOR CONTEXTS CLUSTER IN US ADULTS WITH AND WITHOUT CANCER: IMPLICATIONS FOR FUTURE INTERVENTION TARGETS**

Lauren C. Bates-Fraser, Emma Cowley, Lee Stoner, FACSM, Erik D. Hanson, FACSM. *The University of North Carolina Chapel Hill, Chapel Hill, NC.*

**P166: 24-HOUR ACTIVITY BEHAVIOR INVESTIGATION IN WHITE AND BLACK ENDOMETRIAL CANCER POPULATIONS**

Caroline Inga Shealy, Lauren C. Bates-Fraser, Lee Stoner, FACSM, Erik D. Hanson, FACSM. *University of North Carolina at Chapel Hill, Chapel Hill, NC, NC.*

**P167: 24-HOUR ACTIVITY BEHAVIORS AMONG CANCER SURVIVORS DURING AND FOLLOWING COVID-19**

Graceanne Boone, Lauren C. Bates-Fraser, Lee Stoner, FACSM, Erik D. Hanson, FACSM. *The University of North Carolina at Chapel Hill, Chapel Hill, NC.*

**P168: 24-HOUR ACTIVITY BEHAVIORS IN KIDNEY CANCER PATIENTS AND SURVIVORS**

Kailyn E. Lowder. *University of North Carolina at Chapel Hill, Chapel Hill, NC.*

**P169: PARENTAL CORRELATES OF SELF-REPORTED PHYSICAL LITERACY AMONG GIRLS**

Jamie Henning<sup>1</sup>, Johanna Hoch<sup>1</sup>, Rachel Kleis<sup>2</sup>, Molly Taylor<sup>1</sup>, Deirdre Dlugonski<sup>1</sup>. <sup>1</sup>*University of Kentucky, Lexington, KY.* <sup>2</sup>*University of Wisconsin Eau Claire, Eau Claire, WI.*

**P170: EXERCISE HABITS AND RESOURCES FOR SOUTHEASTERN UNITED STATES FIREFIGHTERS**

Phil J. Agostinelli<sup>1</sup>, Rebecca M. Hirschhorn<sup>2</sup>, JoEllen M. Sefton<sup>1</sup>. <sup>1</sup>*Auburn University, Auburn, AL.* <sup>2</sup>*Louisiana State University, Baton Rouge, LA.*

**3:30 - 4:20 SYMPOSIUM 11 Redbud**

Chair: Brian Kliszczewicz, *Kennesaw State University*

**S11: TRAINING RESILIENCY IN FIREFIGHTERS**

Blake Hamil, Daniel Greene, Austin Kohler, Maleah Holland-Winkler. *Augusta University, Augusta, GA.*

**3:30 - 4:20 SYMPOSIUM 12 Regency Ballrooms D & E**

Chair: Curtis Fennell, *University of Montevallo*

**S12: EVALUATING GAME VOLUME IN ATHLETES THROUGH VARIOUS VIEWS AND STATISTICAL METHODS**

Andrew R. Thornton, Jennifer A. Bunn, FACSM. *Sam Houston State University, Huntsville, TX.*

**3:30 - 4:20 TUTORIAL 12 Regency Ballroom G**

Chair: Ryan T Connors, *University of Alabama in Huntsville*

**T12: QUICK WITS: INCORPORATING CRITICAL THINKING INTO CLASSROOM ACTIVITIES**

Karissa L. Peyer. *University of Tennessee at Chattanooga, Chattanooga, TN.*

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**Saturday, February 25, 2023**


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**8:00–8:50 AM      CLINICAL CROSSOVER LECTURE****Regency Ballroom A & B**Presiding: Ryan Draper, DO, FACSM. *Cone Health, Greensboro, NC.*Speaker introduction: Ryan Draper, DO, FACSM. *Cone Health, Greensboro, NC.***Sports Medicine: The Role of a Multi-Disciplinary Team. aka: What Does It Take to Be Successful in Sports Medicine**Jason Zaremski, MD, FACSM. *University of Florida, Gainesville, FL.***8:00 – 8:50      TUTORIAL 14****Regency Ballroom G**Chair: Louisa Summers, *Berea University***T14:      PARTICIPATORY RESEARCH: GIVING POWER TO PARTICIPANTS**Kristin M. Mendez, Kevin K. McCully, FACSM. *University of Georgia, Athens, GA.***8:00 - 8:50      TUTORIAL 15****Regency Ballroom H**Chair: Jonathan Ruiz-Ramie, *Augusta University***T15:      IMPLEMENTATION OF A STUDENT-CENTERED UNDERGRADUATE RESEARCH COURSE SEQUENCE**Ryan T. Conners, FACSM, Paul N. Whitehead. *The University of Alabama in Huntsville, Huntsville, AL.***8:00 - 10:00      ORAL PRESENTATION SESSION 4 (O25-O32)****Redbud**Chair: Liz Edwards, *James Madison University***O25:      OPTIMIZING STRESS MANAGEMENT IN COLLEGE STUDENTS**Yuechun Yao, Jason Fanning. *Wake Forest University, Winston Salem, NC.***O27:      A MODERATE-TO-HEAVY INTENSITY WEIGHT TRAINING SESSION IMPROVES MOOD IN MALE AND FEMALE STUDENT-ATHLETES**Lauren M. Biscardi<sup>1</sup>, Cassidy Jordan Reeves<sup>1</sup>, Debra A. Stroiney<sup>2</sup>. <sup>1</sup>*Barton College, Wilson, NC.*  
<sup>2</sup>*George Mason University, Fairfax, VA.***O28:      AUGMENTING PSYCHOLOGICAL SAFETY IN COLLEGIATE ATHLETICS**Andre George Simmond, Seomgyun Lee, Kofan Lee, Thomas Andre, Kaitlyn Armstrong.  
*University of Mississippi, Oxford, MS.***O29:      EXAMINING AFFECTIVE EXPERIENCES AND CURRENT RESISTANCE TRAINING BEHAVIOR IN YOUNG ADULTS**Jenna A. Parsons, Kelley Strohacker, FACSM. *University of Tennessee Knoxville, Knoxville, TN.*

**Saturday, February 25, 2023****8:00 - 10:00 ORAL PRESENTATION SESSION 4 (O25-O32)***Redbud*

- O30: CHANGES IN PHYSICAL ACTIVITY, MENTAL HEALTH, AND MOTIVATION IN COLLEGE STUDENTS AFTER COVID-19**  
Lauren Elliott, Emma Cate Jones, Rebecca Rogers, Christopher Ballmann, FACSM, Patrick Marsh. *Samford University, Birmingham, AL.*
- O31: THE MENTAL HEALTH OF COLLEGIATE STUDENT-ATHLETES: A COMPARISON OF STRESS BETWEEN MALE AND FEMALE COLLEGIATE STUDENT-ATHLETES**  
Jenica D. Alvarez, Ashley Bruce, Sabrina R. Fordham, Andrew J. Jakiel, Blake Podsen, Parker N. Hyde. *University of North Georgia, Dahlonega, GA.*
- O32: ASSOCIATION BETWEEN HEALTH-RELATED COMPONENTS AND BODY DISSATISFACTION IN WOMEN**  
Katherine Sullivan, Jacob Broeckel, Casey J. Metoyer, Andrew D. Fields, Madelyn K. Simmang, Michael R. Esco, FACSM, Michael V. Fedewa. *University of Alabama, Tuscaloosa, AL.*

**8:00 - 10:00 ORAL PRESENTATION SESSION 5 (O33-O39)***Regency Ballroom F*Chair: Jessica McNeil, *University of North Carolina Greensboro*

- O33: LOAD CARRIAGE REDUCES STROKE VOLUME IN NORMOXIA, BUT NOT HYPOXIA**  
Daniel A. Baur, Katherine G. Baur, Abaigeal G. Doody, Beverley K. Buchanan, Miles J. Ortiz. *Virginia Military Institute, Lexington, VA.*
- O34: VENTILATORY RESPONSES TO LOAD CARRIAGE IN NORMOXIA AND HYPOXIA**  
Beverley K. Buchanan, Abaigeal G. Doody, Miles J. Ortiz, Katherine G. Baur, Daniel A. Baur. *Virginia Military Institute, Lexington, VA.*
- O35: METABOLIC RESPONSES TO LOAD CARRIAGE IN NORMOXIA AND HYPOXIA**  
Miles J. Ortiz, Beverley K. Buchanan, Abaigeal G. Doody, Katherine G. Baur, Daniel A. Baur. *Virginia Military Institute, Lexington, VA.*
- O36: EFFECTS OF QUENCHING THIRST VERSUS FULL FLUID REPLENISHMENT ON MOOD AND COGNITIVE CHANGES AFTER MILD HYPOHYDRATION**  
Brian Hack, HyunGyu Suh, Mindy Millard-Stafford, FACSM. *Georgia Institute of Technology, Atlanta, GA.*
- O37: SARS-COV-2 INFECTION DOES NOT ALTER CELLULAR STRESS RESPONSE DURING PROLONGED EXERTIONAL HEAT STRESS**  
Nathan Conrad<sup>1</sup>, Karissa Fryar<sup>1</sup>, Ben Lee<sup>2</sup>, Matthew Kuennen<sup>1</sup>. <sup>1</sup>*High Point University, High Point, NC.* <sup>2</sup>*Coventry University, Coventry, United Kingdom.*
- O38: EFFECTS OF CELL PHONE USE DURING GREEN EXERCISE ON IMMEDIATE EMOTIONAL STATE**  
Anna K. Leal, Marco A. Basteris. *Centenary College, Shreveport, LA.*
- O39: ASSOCIATIONS BETWEEN SUBJECTIVE THIRST RATINGS WITH ENERGY INTAKE FOLLOWING SLEEP IN HOT AND TEMPERATE CONDITIONS**  
David A. Messer<sup>1</sup>, Hannah R. Koch<sup>1</sup>, Jesse L. Sims<sup>1</sup>, Mitchell E. Zaplatosch<sup>1</sup>, William M. Adams, FACSM<sup>2</sup>, Jessica McNeil<sup>1</sup>. <sup>1</sup>*University of North Carolina at Greensboro, Greensboro, NC.* <sup>2</sup>*United States Olympic & Paralympic Committee, Colorado Springs, CO.*

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**Saturday, February 25, 2023**


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**8:00 - 9:30 THEMATIC POSTER SESSION 4 (TP25-TP30)***Think Tank*Chair: Becki Battista, *Appalachian State University*

- TP25: THE TEST-RETEST RELIABILITY OF BODY COMPOSITION MEASURED USING DIGITAL IMAGES FROM A SMARTPHONE APPLICATION**  
Madeline L. Schwing, Casey J. Metoyer, Katherine Sullivan, Mary E. Lovelady, Michael R. Esco, FACSM, Michael V. Fedewa, FACSM. *University of Alabama, Tuscaloosa, AL, AL.*
- TP26: RELIABILITY OF BODY COMPOSITION MEASURED USING A SMARTPHONE APPLICATION AND DIFFERENT CAMERA RESOLUTIONS**  
Mary E. Lovelady, Casey J. Metoyer, Katherine Sullivan, Jacob Broeckel, Michael R. Esco, FACSM, Michael V. Fedewa. *University Of Alabama, Tuscaloosa, AL.*
- TP27: RELIABILITY OF A 2D IMAGE APPLICATION FOR MEASURING BODY COMPOSITION ACROSS DIFFERENT COLOR BACKGROUNDS**  
Casey J. Metoyer, Katherine Sullivan, Mary Lovelady, Jacob Broeckel, Madelyn Simmang, Andrew Fields, Michael Fedewa, Michael Esco, FACSM. *University of Alabama, Tuscaloosa, AL.*
- TP28: RELIABILITY OF LIGHTING CONDITIONS FOR MEASURING BODY FAT PERCENTAGE VIA IMAGE CAPTURE**  
Madelyn K. Simmang, Katherine Sullivan, Casey J. Metoyer, Jacob Broeckel, Andrew D. Fields, Mary Lovelady, Maddy Schwing, Michael V. Fedewa, Michael R. Esco, FACSM. *University of Alabama, Tuscaloosa, AL.*
- TP29: THE EFFECTS OF FOOD CONSUMPTION ON DUAL-ENERGY X-RAY ABSORPTIOMETRY BODY COMPOSITION MEASUREMENTS**  
Hope Sternenber, William Lee, Rebecca R. Rogers, Christopher G. Ballmann, FACSM, Tyler D. Williams. *Samford, Birmingham, AL.*
- TP30: INNOVATIVE CUSTOM REGIONS OF INTEREST TO FURTHER UNDERSTAND LEG ASYMMETRIES AMONG DIVISION I ATHLETES**  
Noah D. Patterson, Kelly E. Joniak, Sam R. Moore, Hannah E. Cabre, Alex N. Ladan, Abbie E. Smith-Ryan, FACSM. *University of North Carolina at Chapel Hill, Chapel Hill, NC.*

**8:00 - 9:30 POSTER PRESENTATION SESSION 4 (P171-P235)***Studio 220*Chair: Douglas Gregory, *Tennessee Wesleyan University*

- P171: SHORT-TERM, HIGH-INTENSITY EXERCISE, BUT NOT HISTAMINE BLOCKADE, ALTERS INTERARM BLOOD PRESSURE.**  
Olivia Kocuba<sup>1,2</sup>, Lauren Weber<sup>2</sup>, Jesse Trube<sup>2</sup>, Brock Jensen<sup>2</sup>, Michael Holmstrup, FACSM<sup>2</sup>.  
<sup>1</sup>*University of South Carolina, Columbia, SC.* <sup>2</sup>*Slippery Rock University, Slippery Rock, PA.*
- P172: INFLUENCE OF ABSOLUTE FORCE ON AUGMENTED EXERCISE BLOOD PRESSURE DURING ISOMETRIC HAND-GRIPPING WITH FEMALE AGING**  
Nina L. Stute<sup>1</sup>, Matthew C. Babcock<sup>2,3</sup>, Kamilla U. Pollin<sup>4,3</sup>, Austin T. Robinson<sup>1,3</sup>, Joseph C. Watso<sup>5,3</sup>. <sup>1</sup>*Auburn University, Auburn, AL.* <sup>2</sup>*University of Colorado Anschutz Medical Campus, Aurora, CO.* <sup>3</sup>*University of Delaware, Newark, DE.* <sup>4</sup>*Washington DC Veteran Affairs Medical Center, Washington DC, DC.* <sup>5</sup>*Florida State University, Tallahassee, FL.*

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**Saturday, February 25, 2023**

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**8:00 - 9:30****POSTER PRESENTATION SESSION 4 (P171-P235)****Studio 220**

- P173: INFLUENCE OF DIETARY SODIUM AND FIBER ON BLOOD PRESSURE AND VASCULAR FUNCTION IN YOUNG ADULTS**  
Zach J. Hutchison<sup>1</sup>, Braxton A. Linder<sup>1</sup>, McKenna A. Tharpe<sup>1</sup>, Alex M. Barnett<sup>1</sup>, Meral N. Culver<sup>1</sup>, Sofia O. Sanchez<sup>1</sup>, Soolim Jeong<sup>1</sup>, Joseph C. Watson<sup>2</sup>, Gregory J. Grosicki<sup>3</sup>, Austin T. Robinson<sup>1</sup>.  
<sup>1</sup>Auburn University, Auburn, AL. <sup>2</sup>Florida State University, Tallahassee, FL. <sup>3</sup>Georgia Southern University, Savannah, GA.
- P174: ACUTE EFFECT OF SMARTPHONE APPLICATION GUIDED BREATHING ON BLOOD PRESSURE, BAROREFLEX SENSITIVITY, AND AORTIC STIFFNESS**  
Joseph D. Vondrasek<sup>1</sup>, Brett L. Cross<sup>1,2</sup>, Gregory J. Grosicki<sup>1</sup>, Andrew A. Flatt<sup>1</sup>. <sup>1</sup>Georgia Southern University, Savannah, GA. <sup>2</sup>Florida State University, Tallahassee, FL.
- P175: ACUTE TRUNK STRETCHING EFFECTS ON CENTRAL AND PERIPHERAL BLOOD PRESSURE IN MIDDLE-AGED TO OLDER ADULTS**  
Kaelyn Spears<sup>1</sup>, Kylee West<sup>2,1</sup>, Gregory J. Grosicki<sup>1</sup>, Barry Joyner<sup>2</sup>, Collin Smith<sup>3</sup>, Nick J. Siekirk<sup>2</sup>.  
<sup>1</sup>Georgia Southern University (Armstrong), Savannah, GA. <sup>2</sup>Georgia Southern University, Statesboro, GA. <sup>3</sup>East Georgia Regional Hospital, Statesboro, GA.
- P176: HABITUATION ATTENUATES THE SEX-SPECIFIC ASSOCIATIONS BETWEEN ISCHEMIC PAIN, BLOOD PRESSURE, AND ARTERIAL STIFFNESS**  
Andrew M. Roberts<sup>1</sup>, Zoe R. Lincoln<sup>1</sup>, Wesley Blumenburg<sup>1</sup>, Brett Cross<sup>1</sup>, Joseph Vondrasek<sup>1</sup>, Joseph Watson<sup>2</sup>, Andrew Flatt<sup>1</sup>, Braxton Linder<sup>3</sup>, Austin Robinson<sup>3</sup>, Gregory Grosicki<sup>1</sup>. <sup>1</sup>Georgia Southern University (Armstrong Campus), Savannah, GA. <sup>2</sup>Florida State University, Tallahassee, FL. <sup>3</sup>Auburn University, Auburn, AL.
- P177: INFLUENCE OF DIETARY SODIUM AND FIBER ON AMBULATORY BLOOD PRESSURE IN HEALTHY YOUNG ADULTS**  
Soolim Jeong<sup>1</sup>, Joseph D. Vondrasek<sup>2</sup>, Braxton A. Linder<sup>1</sup>, Zach J. Hutchison<sup>1</sup>, Jordan E. Kinnel<sup>3</sup>, Meral N. Culver<sup>1</sup>, McKenna A. Tharpe<sup>1</sup>, Sofia O. Sanchez<sup>1</sup>, Joseph C. Watson<sup>4</sup>, Gregory J. Grosicki<sup>2</sup>, Austin T. Robinson<sup>1</sup>. <sup>1</sup>Auburn University, Auburn, AL. <sup>2</sup>Georgia Southern University, Savannah, GA. <sup>3</sup>Tuskegee University, Tuskegee, AL. <sup>4</sup>Florida State University, Tallahassee, FL.
- P178: CAN WHITE-COAT BLOOD PRESSURE ELEVATIONS BE REDUCED USING A VIRTUAL REALITY HEADSET?**  
Ryan Milon<sup>1</sup>, Jeffery T. Wight<sup>2,1</sup>, Thomas Waller<sup>1</sup>, Shaylee Befus<sup>1</sup>, Akhil Mandavalli<sup>1</sup>, Sofia Rohde<sup>1</sup>, Tatiana Lino<sup>1</sup>, George G.A Pujalte, FACSM<sup>1</sup>. <sup>1</sup>Mayo Clinic, Jacksonville, FL. <sup>2</sup>Jacksonville University, Jacksonville, FL.
- P180: COMPARING POST-OCCLUSIVE REACTIVE HYPEREMIA IN HABITUAL CAFFEINE USERS WHEN CONSUMING AND ABSTAINING FROM CAFFEINE**  
Chance J. Davidson, Matthew A. Chatlaong, Daphney M. Stanford, Matthew B. Jessee. *University of Mississippi, University, MS.*
- P181: THE INFLUENCE OF BEETROOT JUICE ON RACIAL DISPARITIES IN VASCULAR HEALTH**  
James E. Brown<sup>1</sup>, Brett L. Cross<sup>1</sup>, Joseph D. Vondrasek<sup>1</sup>, Josiah M. Frederick<sup>1</sup>, Zoe R. Lincoln<sup>1</sup>, Peter Gaither<sup>1</sup>, Wesley T. Blumenburg<sup>1</sup>, Amy Chall<sup>1</sup>, Anna Bryan<sup>1</sup>, Ana Palacios<sup>1</sup>, Andrew A. Flatt<sup>1</sup>, Austin T. Robinson<sup>2</sup>, Gregory J. Grosicki<sup>1</sup>. <sup>1</sup>Georgia Southern University (Armstrong Campus), Savannah, GA. <sup>2</sup>Auburn University, Auburn, AL.

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**Saturday, February 25, 2023**

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**8:00 - 9:30****POSTER PRESENTATION SESSION 4 (P171-P235)****Studio 220**

- P182: THE EFFECTS OF A HIGH SALT DIET ON URINARY NEPHRIN EXCRETION IN HEALTHY YOUNG ADULTS**  
Eric R. Schroeder<sup>1</sup>, Soolim Jeong<sup>1</sup>, Matthew C. Babcock<sup>2</sup>, Joseph C. Watso<sup>3</sup>, Austin T. Robinson<sup>1</sup>.  
<sup>1</sup>Auburn University, Auburn, AL. <sup>2</sup>University Of Colorado, Aurora, CO. <sup>3</sup>Florida State University, Tallahassee, FL.
- P183: CHARACTERIZING THE PULMONARY AND CARDIOMETABOLIC RESPONSES TO EXERCISE IN PEOPLE WITH LONG COVID**  
Peyton C. Thompson<sup>1</sup>, Natalie E. Bonvie-Hill<sup>2</sup>, Igor A. Fernandes<sup>2</sup>, Brian P. Shapiro<sup>2</sup>, Bryan J. Taylor, FACSM<sup>2</sup>. <sup>1</sup>Duke University, Durham, NC. <sup>2</sup>Mayo Clinic, Jacksonville, FL.
- P184: ACUTE CARDIOVASCULAR AND THERMODYNAMIC EFFECTS OF PASSIVE HEATING AND AEROBIC EXERCISE**  
Nicholas Barefoot, Michael Kinderman, Grant Malone, Stefanie Wind, Jonathan Wingo, FACSM, Hayley MacDonald. *University of Alabama, Tuscaloosa, AL.*
- P185: A COMPARISON OF FITNESS CHARACTERISTICS BETWEEN FIREFIGHTERS AND POLICE OFFICERS**  
Paige Schaa, Jeremy Gross, Clayton Nicks, Brian Tyo, Kate Early. *Columbus State University, Columbus, GA.*
- P186: PERIPHERAL AND CENTRAL ARTERIAL STIFFNESS AND HEMODYNAMICS IN ADULTS WITH AND WITHOUT DOWN SYNDROME**  
Grant Norman, Brantley K. Ballenger, Sydni L. Carter, Stamatis Agiovlasis, FACSM. *Mississippi State University, Mississippi State, MS.*
- P187: ACUTE EFFECTS OF TRUNK STRETCHING ON AORTIC ARTERIAL STIFFNESS IN MIDDLE-AGED TO OLDER ADULTS**  
Kylee West<sup>1,2</sup>, Gregory J. Grosicki<sup>2</sup>, Kaelyn Spears<sup>2</sup>, Barry Joyner<sup>3</sup>, Collin Smith<sup>4</sup>, Nick J. Siekirk<sup>1,3</sup>. <sup>1</sup>Biomechanics Lab, Georgia Southern University, Statesboro, GA. <sup>2</sup>Biodynamics and Human Performance Center, Georgia Southern University (Armstrong), Savannah, GA. <sup>3</sup>Center for Rehabilitation and Independent Living, Waters College of Health Professions, Statesboro, GA. <sup>4</sup>Internal Medicine, East Georgia Regional Hospital, Savannah, GA.
- P188: COMPARING BRACHIAL ARTERY SHEAR RATE RESPONSES TO 1- AND 2- 20-SECOND CYCLING SPRINTS**  
Matthew A. Chatlaong, Lori M. Keys, Daphney M. Stanford, Matthew B. Jessee. *University of Mississippi, University, MS.*
- P189: SEGMENTAL LEG BLOOD FLOW MEASURED WITH NEAR-INFRARED SPECTROSCOPY**  
Jalyn A. Boyles, Ryan J. Willoughby, Hieu T. Vu, Chloe E. Blum, Zabilon S. Dessalegn, Abisola R. Akinbobola, Kevin K. McCully, FACSM. *University of Georgia, Athens, GA.*
- P190: EXERCISE CAPACITY AND CENTRAL ARTERIAL HEMODYNAMICS IN HEART FAILURE WITH PRESERVED EJECTION FRACTION**  
Natalie J. Bohmke<sup>1</sup>, Domenico A. Chavez<sup>1</sup>, Hayley E. Billingsley<sup>1</sup>, Michele Golino<sup>1</sup>, Sebastian Pinel<sup>1</sup>, Roshanak Markley<sup>1</sup>, Antonio Abbate<sup>2</sup>, Salvatore Carbone<sup>1</sup>, Danielle L. Kirkman<sup>1</sup>. <sup>1</sup>Virginia Commonwealth University, Richmond, VA. <sup>2</sup>University of Virginia, Charlottesville, VA.
- P191: LEG-LIFTS TO MEASURE BLOOD FLOW RECOVERY USING NEAR-INFRARED SPECTROSCOPY**  
Ryan J. Willoughby, Jalyn A. Boyles, Hieu Vu, Zabilon Dessalegn, Chloe Blum, Abisola R. Akinbobola, Kevin McCully, FACSM. *University of Georgia, Athens, GA.*

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**Saturday, February 25, 2023**

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**8:00 - 9:30****POSTER PRESENTATION SESSION 4 (P171-P235)****Studio 220**

- P192: TRIMETHYLAMINE N-OXIDE IS ASSOCIATED WITH VASCULAR DYSFUNCTION AND PHYSICAL ACTIVITY IN LIVER TRANSPLANT RECIPIENTS**  
Domenico A. Chavez, Marie-Claire Evans, Natalie J. Bohmke, Chandra Bhati, Susan Wolver, Mohammad S. Siddiqui, Danielle L. Kirkman. *Virginia Commonwealth University, Richmond, VA.*
- P193: AGREEMENT BETWEEN CAROTID- AND HEART-FEMORAL PULSE WAVE VELOCITY MEASURED WITH ELECTROCARDIOGRAM AND PHOTOPLETHYSMOGRAPHY**  
Jacklyn Rojas, Alexander Pomeroy, Madeline Rheault, Craig Paterson, Lee Stoner, FACSM. *University of North Carolina at Chapel Hill, Chapel Hill, NC.*
- P194: AGREEMENT BETWEEN TWO MEASURES OF CEREBRAL ARTERIAL STIFFNESS AS MEASURED WITH TRANSCRANIAL DOPPLER**  
Alexander Pomeroy, Madeline Rheault, Jacklyn Rojas, Craig Paterson, Lee Stoner, FACSM. *University of North Carolina at Chapel Hill, Chapel Hill, NC.*
- P195: AGREEMENT BETWEEN TWO MEASURES OF CAROTID-CEREBRAL PULSE WAVE VELOCITY AS MEASURED WITH TRANSCRANIAL DOPPLER AND PHOTOPLETHYSMOGRAPHY**  
Madeline L. Rheault, Alexander Pomeroy, Jacklyn Rojas, Craig Paterson, Lee Stoner, FACSM. *University of North Carolina, Chapel Hill, NC.*
- P196: CENTRAL VASCULAR HEMODYNAMICS IN FEMALE ATHLETES VERSUS SEDENTARY/ RECREATIONALLY ACTIVE WOMEN**  
Marnie K. McLean, Abigail Brunson, Anna Thamasett, Jasmin Parker-Brown, Abbi Lane. *University of South Carolina, Columbia, SC.*
- P197: EFFECTS OF RESTROOM ACCESS AND FLUID CONSUMPTION ON TEACHER RENAL AND CARDIOVASCULAR HEALTH**  
Delaney R. Baird, Cailin J. Kerch, Alison L. Hooper, Lee J. Winchester. *The University of Alabama, Tuscaloosa, AL.*
- P198: PHYSIOLOGICAL STRAIN AMONG FIRE FIGHTERS PERFORMING NON-FIRE EMERGENCY SERVICES**  
Grant Malone<sup>1</sup>, Nicholas Barefoot<sup>1</sup>, Anne M. Mulholland<sup>1</sup>, Jacob Mota<sup>2</sup>, Colleen Geary<sup>1</sup>, Hayley MacDonald<sup>1</sup>. <sup>1</sup>*The University of Alabama, Tuscaloosa, AL.* <sup>2</sup>*Texas Tech University, Lubbock, TX.*
- P199: COMBINED INFLUENCE OF POSTURE AND ISOMETRIC HANDGRIP ON PHASE IIA RESPONSES TO THE VALSALVA MANEUVER**  
Barry Faulkner, Marshall Dearmon, Kenneth R. Ladner, Ta'Quoris Newsome, Ryan Aultman, Jon Stavres. *University of Southern Mississippi, Hattiesburg, MS.*
- P200: INFLUENCE OF BODY POSITION ON VALSALVA RESPONSES IN YOUNG BLACK AND AFRICAN AMERICAN ADULTS**  
Ryan Aultman, Marshall Dearmon, Kenneth R. Ladner, Barry Faulkner, Ta'quoris Newsome, Jon Stavres. *The University of Southern Mississippi, Hattiesburg, MS.*
- P201: INFLUENCE OF ISOMETRIC HANDGRIP AND BODY POSITION ON BAROREFLEX SENSITIVITY IN BLACK AND WHITE ADULTS**  
Ta'Quoris Newsome, Marshall Dearmon, Kenneth R. Ladner, Barry Faulkner, Hunter Haynes, Ryan Aultman, Jon Stavres. *University of Southern Mississippi, Hattiesburg, MS.*
- P202: PHYSICAL ACTIVITY, SLEEP, AND RACIAL DISPARITIES IN CARDIOVASCULAR HEALTH**  
Brett L. Cross. *Florida State University, Tallahassee, FL.*

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**Saturday, February 25, 2023**

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**8:00 - 9:30****POSTER PRESENTATION SESSION 4 (P171-P235)****Studio 220**

- P203: CORRELATION BETWEEN NON-INVASIVE MITOCHONDRIAL CAPACITY ASSESSMENT AND OXYGEN UPTAKE KINETICS FOLLOWING MODERATE INTENSITY EXERCISE**  
Alexis Coleman, Justin P. Guilkey, Timothy R. Rotarius. *Coastal Carolina University, Conway, SC.*
- P204: COMPARISON OF PRESEASON FALL TRAINING CAMP EXTERNAL DEMANDS OF NCAA DIVISION I COLLEGE FOOTBALL PLAYERS**  
Emma E. Worley. *University of South Carolina, Columbia, SC.*
- P206: ISOMETRIC MID-THIGH PULL KINETICS PREDICT DRIVER CLUB HEAD SPEED IN COLLEGIATE GOLFERS**  
Samuel J. Wilson<sup>1</sup>, Jessica A. Mutchler<sup>1</sup>, John C. Garner<sup>2</sup>, Kyle B. Rank<sup>3</sup>, Jeffrey D. Simpson<sup>3</sup>. <sup>1</sup>Georgia Southern University, Statesboro, GA. <sup>2</sup>Troy University, Troy, AL. <sup>3</sup>University of West Florida, Pensacola, FL.
- P207: THE EFFECTS OF GOLF BAG TRANSPORT STYLE ON PERCEIVED EXERTION, HEART RATE, AND ENERGY EXPENDITURE**  
Diego Castro-Diaz<sup>1</sup>, Austen L. Arnold<sup>1</sup>, Cameron M. Horsfall<sup>1</sup>, Benjamin Paquette<sup>1</sup>, Jessica A. Mutchler<sup>1</sup>, Nicholas J. Siekirk<sup>1</sup>, Barry A. Munkasy<sup>1</sup>, John C. Garner<sup>2</sup>, Samuel J. Wilson<sup>1</sup>. <sup>1</sup>Georgia Southern University, Statesboro, GA. <sup>2</sup>Troy University, Troy, AL.
- P208: COMPARISON OF VERTICAL JUMP PERFORMANCE BETWEEN FEMALE COLLEGIATE BASKETBALL AND VOLLEYBALL ATHLETES**  
Ayden K. McInnis, Megan Rush, Thomas Littlefield, Courtney Calci, Paul T. Donahue. *University of Southern Mississippi, Hattiesburg, MS.*
- P209: PRE-MATCH COUNTERMOVEMENT JUMPS POSITIVELY CORRELATE WITH MATCH MECHANICAL LOAD**  
Silvio Polly da Costa Valladao, Julia Phillips, Thomas Andre. *University of Mississippi, Oxford, MS.*
- P210: COMPARISON OF GAME DATA BETWEEN HALVES AND QUARTERS IN DIVISION I WOMEN'S LACROSSE**  
Andrew R. Thornton, Jennifer A. Bunn, FACSM. *Sam Houston State University, Huntsville, TX.*
- P211: PREDICTING GAME OUTCOME BASED ON GAME LOCATION AND WELLNESS IN DIVISION I WOMEN'S LACROSSE ATHLETES**  
Sarah L. Grace<sup>1</sup>, Abigail P. Cooley<sup>1</sup>, Paula Parker<sup>1</sup>, Jennifer A. Bunn, FACSM<sup>2</sup>. <sup>1</sup>Campbell University, Buies Creek, NC. <sup>2</sup>Sam Houston State University, Huntsville, TX.
- P212: A PILOT INVESTIGATION OF LOW BACK PAIN, MOBILITY, AND MECHANICS IN COLLEGIATE POLE VAULTERS**  
Clare M. Kinney, Elizabeth I. Ackley. *Roanoke College, Salem, VA.*
- P213: THE ASSOCIATION BETWEEN FAT DISTRIBUTION PATTERNS AND HAMSTRING STRENGTH IN DIVISION I ATHLETES**  
Nevaeh R. Nez<sup>1</sup>, Keanu Lettley<sup>1</sup>, Brett Pexa<sup>2</sup>, Christopher Johnson<sup>2</sup>, Malia Blue<sup>1</sup>. <sup>1</sup>University of North Carolina Chapel Hill, Chapel Hill, NC. <sup>2</sup>High Point University, High Point, NC.
- P214: EXAMINING STRENGTH DIFFERENCE BETWEEN POWER-FIRST AND PARALLEL PROGRESSION LIFTING MODEL IN DIVISION I VOLLEYBALL**  
Julia Phillips, Thomas L. Andre, Christina Lodato. *University of Mississippi, Oxford, MS.*

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**Saturday, February 25, 2023**

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**8:00 - 9:30****POSTER PRESENTATION SESSION 4 (P171-P235)****Studio 220**

- P215: PRESEASON VERSUS INSEASON WORKLOAD COMPARISON BY VELOCITY BAND IN MENS COLLEGIATE SOCCER**  
Dylan Wright<sup>1</sup>, Evan Kilby<sup>1</sup>, Jacob Gdovin<sup>2</sup>, Charles Williams<sup>1</sup>. <sup>1</sup>University of North Florida, Jacksonville, FL. <sup>2</sup>Winthrop University, Rock Hill, SC.
- P216: CHANGES IN CLEAN BARBELL KINETICS WITH INCREASING LOAD IN MASTERS OLYMPIC WEIGHTLIFTING**  
Matthew Helms, Isabell Delgado, Jeremy Ford, Jadeon Carreker, Robert LeFavi, Bryan L. Riemann. Georgia Southern University Armstrong Campus, Savannah, GA.
- P217: MEASURES OF ATHLETE READINESS THROUGHOUT A DIVISION I COLLEGIATE VOLLEYBALL SEASON**  
Alexa Jenny Chandler<sup>1</sup>, Mallory Dixon<sup>1</sup>, Bridget A. McFadden<sup>2</sup>, Harry P. Cintineo<sup>3</sup>, Blaine S. Lints<sup>1</sup>, Gianna F. Mastrofini<sup>1</sup>, Shawn M. Arent, FACSM<sup>1</sup>. <sup>1</sup>University of South Carolina, Columbia, SC. <sup>2</sup>Queens College, Flushing, NY. <sup>3</sup>Lindenwood University, St. Charles, MO.
- P218: MUSCLE ACTIVITY COMPARISONS DURING FUNCTIONAL MOVEMENTS IN WOMEN WITH AND WITHOUT PATELLOFEMORAL PAIN**  
Conor Theiss<sup>1</sup>, Sarah Martinez-Sepanski<sup>1</sup>, Kelton Mehls<sup>2</sup>, Dave Clark<sup>1</sup>. <sup>1</sup>Middle Tennessee State University, Murfreesboro, TN. <sup>2</sup>Duquesne University, Pittsburgh, PA.
- P219: ROCK OUT WORKOUT: CARDIODRUMMING'S IMPACT ON FUNCTION WITH DOWN SYNDROME**  
Ana Avendano, Whitley Stone, Mark Schafer. Western Kentucky University, Bowling Green, KY.
- P220: ECG CHARACTERISTICS OF YOUNG HIGH SCHOOL ATHLETES IN NORTHWEST FLORIDA**  
Ludmila Cosio Lima, FACSM, Lauren Adlof, Anthony Farmand, Youngil Lee, Benny Segovia-Ruiz. University of West Florida, Pensacola, FL.
- P221: IMPACT OF 10-WEEK BINGOCIZE® PROGRAM ON SELF-REPORTED GENERAL HEALTH, FEAR OF FALLING, AND PHYSICAL ACTIVITY**  
Mark Schafer<sup>1</sup>, Sarah Scali<sup>1</sup>, Whitley Stone<sup>1</sup>, Scott Lyons, FACSM<sup>2</sup>, Jason Crandall<sup>1</sup>. <sup>1</sup>Western Kentucky University, Bowling Green, KY. <sup>2</sup>University of North Alabama, Florence, AL.
- P222: A TAILORED PHYSICAL ACTIVITY INTERVENTION'S EFFECTS ON SELF-EFFICACY, PHYSICAL ACTIVITY, AND HEALTH-RELATED QUALITY OF LIFE.**  
Brianna R. Wolle<sup>1</sup>, Shannon Mihalko<sup>1</sup>, Peter Brubaker<sup>1</sup>, Juliana Costa<sup>1</sup>, Sam Norton<sup>1</sup>, Bennett Ann McIver<sup>1</sup>, Alexander Lucas<sup>2</sup>, Gregory Hundley<sup>2</sup>. <sup>1</sup>Wake Forest University, Winston-Salem, NC. <sup>2</sup>Virginia Commonwealth University, Richmond, VA.
- P223: ASSESSMENT OF ACSM'S PREPARTICIPATION SCREENING IN OLDER ADULTS AND THOSE WITH CHRONIC DISEASES**  
Kyle W. Reason, Lauren G. Killen, Victor A. Alves, Jacquelyn A. Allen, James M. Green, FACSM. University of North Alabama, Florence, AL.
- P224: EXAMINING PAIN LEVELS IN COMPETITION AND PERFORMANCE OF FEMALE ATHLETES**  
Elizabeth Niswonger. Georgia College and State University, Milledgeville, GA.

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**Saturday, February 25, 2023**

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**8:00 - 9:30****POSTER PRESENTATION SESSION 4 (P171-P235)****Studio 220**

- P225: EFFECTS OF A BACTERIAL/VIRAL FILTER ON PARTICLE GENERATION AND CARDIOPULMONARY RESPONSES DURING MAXIMAL EXERCISE TESTING**  
Emma C. Barnes<sup>1,2</sup>, Igor Fernandes<sup>1,3</sup>, Peyton C. Thompson<sup>1,4</sup>, Angel S. Pagan-Jimenez<sup>1,5</sup>, Sherry Pinkstaff<sup>1,2</sup>, Hollie Saunders<sup>1</sup>, Arvind Balavenkataraman<sup>1</sup>, Scott A. Helgeson<sup>1</sup>, Bryan J. Taylor, FACSM<sup>1</sup>. <sup>1</sup>Mayo Clinic Florida, Jacksonville, FL. <sup>2</sup>University of North Florida, Jacksonville, FL. <sup>3</sup>Purdue University, West Lafayette, IN. <sup>4</sup>Duke University, Durham, NC. <sup>5</sup>University of Puerto Rico, San Juan, PR.
- P226: DESIGNING FOR INTEGRATION: PLANNING AND EVALUATION OF A CLINICAL EXERCISE ONCOLOGY PROGRAM**  
Alex Brooks<sup>1</sup>, Shana Harrington<sup>1</sup>, Alec Schumpp<sup>1</sup>, Mary Kennedy<sup>2</sup>, Amul Dhaliwal<sup>1</sup>, Jake Dawson<sup>1</sup>, Sydney Brewster<sup>1</sup>, Emily Andriello<sup>1</sup>, Reghan Truesdell<sup>1</sup>, Annie Griffin<sup>1</sup>, Lauren Williamson<sup>1</sup>, Emily Parsowith<sup>1</sup>, Estefania Lanzagorta<sup>1</sup>, Madison Owens<sup>1</sup>, Ciaran Fairman<sup>1</sup>. <sup>1</sup>University of South Carolina, Columbia, SC. <sup>2</sup>Edith Cowan University, Perth.
- P227: EFFECTS OF SEX AND AGE ON PHYSICAL ACTIVITY LEVELS IN 4-YEAR-OLD CHILDREN ATTENDING A DAY CAMP AT THE DIET AND NUTRITION LABORATORY.**  
Faten Hasan, Macy Stahl, Damon Swift, Sibylle Kranz. *University of Virginia, Charlottesville, VA.*
- P228: ACCURACY OF HEALTH METRICS FROM WRIST-WORN FITNESS DEVICES DURING EXERCISE WITHIN DIVERSE COHORTS.**  
Cooper R. Neeble, Cory M. Scott. *Roanoke College, Salem, VA.*
- P229: SELF REPORTED AEROBIC PHYSICAL ACTIVITY COMPARED WITH ACTIVPAL TECHNOLOGIES**  
Cameron D. Addie, Vaughn Barry, Brandon Grubbs, Sarah C. Martinez-Sepanski. *Middle Tennessee State University, Murfreesboro, TN.*
- P230: SEX-DIFFERENCES IN REPETITIONS TO FAILURE AND NEUROMUSCULAR FATIGUE OF THE ELBOW FLEXORS**  
Heather Day<sup>1</sup>, Mary Wilkenson<sup>1</sup>, Micaela Dusseault<sup>1</sup>, Katie Kennedy<sup>2</sup>, Ryan Colquhoun<sup>1</sup>. <sup>1</sup>University of South Alabama, Mobile, AL. <sup>2</sup>Texas Tech University, Lubbock, TX.
- P231: IMPACT OF PROTECTIVE GEAR ON LOWER BODY DYNAMIC BALANCE AND MOTOR CONTROL IN FIREFIGHTERS**  
Matthew Dohmeier, James Bernedo, Eva Janofsky, Mike Iosia. *Lee University, Cleveland, TN.*
- P232: IMPACT OF PROTECTIVE GEAR ON DYNAMIC BALANCE AND MOBILITY IN FIREFIGHTERS USING THE Y-BALANCE SCALE**  
James R. Bernedo, Matthew Dohmeier, Eva Janofsky, Mike Iosia. *Lee University, Cleveland, TN.*
- P233: ACTIGRAPH AND STEPWATCH STEP COUNT COMPARISONS FOLLOWING GYM-BASED AEROBIC EXERCISES**  
Cristal Benitez<sup>1</sup>, Andrew Gomez<sup>2</sup>, Lindsay P. Toth<sup>2</sup>. <sup>1</sup>University of Alabama, Tuscaloosa, AL. <sup>2</sup>University of North Florida, Jacksonville, FL.
- P234: TIME SPENT IN SEDENTARY AND PHYSICAL ACTIVITY IN COLLEGE-AGED WOMEN BASED ON BODY COMPOSITION**  
Elizabeth A. Easley, Sarah H. Sellhorst, William F. Riner, FACSM. *University of South Carolina Lancaster, Lancaster, SC.*

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**Saturday, February 25, 2023**

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**8:00 - 9:30      POSTER PRESENTATION SESSION 4 (P171-P235)      *Studio 220*****P235:      PERCEPTIONS OF PHYSICAL ACTIVITY CO-PARTICIPATION IN MOTHERS WITH YOUNG CHILDREN**

Katrina D. DuBose, FACSM<sup>1</sup>, Kristen Cook<sup>1</sup>, Deirdre Dlugonski<sup>2</sup>, Linda May<sup>1</sup>, Thomas D. Raedeke<sup>1</sup>. <sup>1</sup>East Carolina University, Greenville, NC. <sup>2</sup>University of Kentucky, Lexington, KY.

**9:00 - 9:50      SYMPOSIUM 13      *Regency Ballroom G***

Chair: Bhibha Das, *East Carolina University*

**S13:      DESIGNED AND DELIVERED! AN EXAMPLE OF AN EFFECTIVE EDUCATION-BASED LIFESTYLE INTERVENTION PROGRAM**

Svetlana Nepocatykh, Elizabeth Bailey, Talya Geller. *Elon University, Elon, NC.*

**9:00 - 9:50      TUTORIAL 13      *Crepe Myrtle***

Chair: Erica M Marshall, *Florida Southern College*

**T13:      INCLUSIVE TEACHING PRACTICES IN EXERCISE SCIENCE: FROM THE CLASSROOM TO THE DEPARTMENT**

Matthew C. Scott. *Virginia Commonwealth University, Richmond, VA.*

**9:00 - 9:50      TUTORIAL 16      *Regency Ballroom H***

Chair: Heather Webb, *Mercer University*

**T16:      HOW TO MAKE AN IMPACT IN THE WORKFORCE: TIPS AND TRICKS FOR BUILDING COMMUNITY AS NOVICE SPORTS MEDICINE PROFESSIONALS**

Melissa K. Kossman<sup>1</sup>, Tamerah N. Hunt, FACSM<sup>2</sup>. <sup>1</sup>University of Southern Mississippi, Hattiesburg, MS. <sup>2</sup>Georgia Southern University, Statesboro, GA.

**9:00 - 9:50      TUTORIAL 18      *Regency Ballroom C***

Chair: Stella Volpe, *Virginia Polytechnic Institute and State University*

**T18:      INTERACTION OF GENETICS AND LIFESTYLE AND THEIR EFFECTS ON HEALTH**

James S. Skinner, FACSM. *Indiana University, Bloomington, IN.*

**9:30 - 11:00      POSTER PRESENTATION SESSION 5 (P236-P300)      *Studio 220***

Chair: Chloe Jones, *Auburn University*

**P236:      THE EFFECTS OF ACUTE YOHIMBINE HYDROCHLORIDE INGESTION ON DIURNAL CHANGES IN EXERCISE PERFORMANCE**

Megan Barnes, Camryn Cowan, Rebecca Rogers, Christopher Ballmann, FACSM. *Samford University, Birmingham, AL.*

**P237:      THE EFFECTS OF OXYGEN NANOBUBBLE CONSUMPTION ON REPEATED WINGATE SPRINT PERFORMANCE**

Camryn Cowan, Megan Barnes, Rebecca Rogers, Christopher Ballmann, FACSM. *Samford University, Birmingham, AL.*

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**Saturday, February 25, 2023**

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**9:30 - 11:00 POSTER PRESENTATION SESSION 5 (P236-P300)****Studio 220**

- P238: EXERCISE PRESCRIPTION INTERVENTION ON A 21-YEAR-OLD FEMALE WITH DIAGNOSED MIGRAINES WITH AURA**  
Nicole K. Longman, Mark Erickson, Patricia Bauer. *Florida Gulf Coast University, Fort Myers, FL.*
- P239: COMPARISON OF HYDRATION STATUS DETERMINED BY USG AND SERUM OSMOLALITY IN DIVISION I SOCCER PLAYERS**  
Blaine Lints. *University of South Carolina, Columbia, SC.*
- P240: EFFECTS OF AN ARM SWING ON COUNTERMOVEMENT JUMP PERFORMANCE IN RECREATIONALLY TRAINED ADULTS**  
Dallas Johnson, Russell Lowell, Zachary Gillen. *Mississippi State University, Mississippi State, MS.*
- P241: WEARING A PERFORMANCE MOUTHPIECE DOES NOT EFFECT PEAK FORCE AND POWER OUTPUT DURING VERTICAL JUMP**  
Emma Nieves, Stephen Roth, Charles Allen. *Florida Southern College, Lakeland, FL.*
- P242: THE EFFECTS OF MUSIC PREFERENCE ON VERTICAL JUMP AND MAXIMAL ISOMETRIC PERFORMANCE**  
Emma Nester, Grace Owens, Rebecca Rogers, Patrick Marsh, Tyler Williams, Christopher Ballmann, FACSM. *Samford University, Birmingham, AL.*
- P243: EFFECTS OF FREQUENT EXERCISE ON PERCEIVED WORK-RELATED PRODUCTIVITY IN INDIVIDUALS WORKING FROM HOME**  
Megan B. Walker, Henry M. Lang. *University of Mary, Bismarck, ND.*
- P244: PHYSIOLOGICAL, PERCEPTUAL, AND NEUROMUSCULAR RESPONSES TO VO<sub>2</sub>-CLAMP CYCLE ERGOMETRY EXERCISE**  
Pasquale J. Succi<sup>1</sup>, Taylor K. Dinyer-McNeely<sup>2</sup>, Caleb C. Voskuil<sup>3</sup>, Brian Benitez<sup>1</sup>, Minyoung Kwak<sup>1</sup>, Mark G. Abel<sup>1</sup>, Jody L. Clasey, FACSM<sup>1</sup>, Haley C. Bergstrom<sup>1</sup>. <sup>1</sup>*University of Kentucky, Lexington, KY.* <sup>2</sup>*Oklahoma State University, Stillwater, OK.* <sup>3</sup>*Texas Christian University, Fort Worth, TX.*
- P245: INDIVIDUAL AND COMPOSITE ELECTROMYOGRAPHIC RESPONSES DURING FATIGUING FOREARM FLEXION EXERCISE**  
Brian Benitez<sup>1</sup>, Minyoung Kwak<sup>1</sup>, Taylor K. Dinyer-McNeely<sup>2</sup>, Pasquale J. Succi<sup>1</sup>, Lindsay McCallum<sup>1</sup>, Haley C. Bergstrom<sup>1</sup>. <sup>1</sup>*University of Kentucky, Lexington, KY.* <sup>2</sup>*Oklahoma State University, Stillwater, OK.*
- P246: THE CORRELATION BETWEEN THE TIMED UP-AND-GO TEST AND CARDIOVASCULAR HEALTH**  
Samantha Webb<sup>1</sup>, Trudy Moore-Harrison<sup>1</sup>, L. Jerome Brandon, FACSM<sup>2</sup>. <sup>1</sup>*UNC Charlotte, Charlotte, NC.* <sup>2</sup>*Georgia State University, Atlanta, GA.*
- P247: SEDENTARY BEHAVIOR IN ADULTS WITH AND WITHOUT DOWN SYNDROME**  
Sydni L. Carter, Brantley K. Ballenger, Grant Norman, Stamatis Agiovlasis, FACSM. *Mississippi State University, Mississippi State, MS.*
- P248: A PILOT STUDY COMPARING THE TRADITIONAL BAR GRIP AND THE PELVIC BELT METHODS TO MEASURE MID-THIGH ISOMETRIC PULL PERFORMANCE IN COLLEGIATE MALE ATHLETES**  
Matan Amitay<sup>1</sup>, Snejana Spinache<sup>1</sup>, Kelsey R. Hutchinson<sup>1</sup>, Isabel M. Neall<sup>1</sup>, Vanessa B. Batchelor<sup>1</sup>, Shannon K. Crowley<sup>1</sup>, Jay R. Hoffman, FACSM<sup>2</sup>, Meir Magal, FACSM<sup>1</sup>. <sup>1</sup>*North Carolina Wesleyan College, Rocky Mount, NC.* <sup>2</sup>*Ariel University, Ariel, Israel.*

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**Saturday, February 25, 2023**

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**9:30 - 11:00 POSTER PRESENTATION SESSION 5 (P236-P300)****Studio 220**

- P249: A PRELIMINARY ANALYSIS OF RESPONSES TO EXERCISE ANCHORED TO VIGOROUS INTENSITY HEART RATES**  
Djadmam Gustave, Pasquale J. Succi, Brian Benitez, Minyoung Kwak, Jody L. Clasey, FACSM, Kathryn R. Lanphere, Haley C. Bergstrom. *University of Kentucky, Lexington, KY.*
- P250: CARDIOVASCULAR RESPONSES TO A THREE WEEK LOW-VOLUME HIGH-INTENSITY CYCLING PROTOCOL**  
Bovorn Sirikul. *Southeastern Louisiana University, Hammond, LA.*
- P251: VO<sub>2</sub>MAX OBSERVATION WINDOW DIFFERENCES IN FEMALE NCAA CROSS-COUNTRY ATHLETES**  
Savanna N. Knight<sup>1</sup>, Lynnsey R. Bowling<sup>1</sup>, Mac J. Carder<sup>2</sup>, Eric M. Scudamore<sup>2</sup>, Veronika Pribyslavska<sup>2</sup>, Eric K. O'Neal<sup>1</sup>. <sup>1</sup>*University of North Alabama, Florence, AL.* <sup>2</sup>*Arkansas State, Jonesboro, AR.*
- P252: VO<sub>2</sub>MAX OBSERVATION WINDOW DIFFERENCES IN MALE NCAA CROSS-COUNTRY ATHLETES**  
Lynnsey R. Bowling<sup>1</sup>, Savanna N. Knight<sup>1</sup>, Mac J. Carder<sup>2</sup>, Eric M. Scudamore<sup>2</sup>, Veronika Pribyslavska<sup>2</sup>, Eric K. O'Neal<sup>1</sup>. <sup>1</sup>*University of North Alabama, Florence, AL.* <sup>2</sup>*Arkansas State University, Jonesboro, AR.*
- P253: CHARACTERIZING POWER PRODUCTION AND CARDIOVASCULAR RESPONSES TO 2 X 20 SECOND MAXIMAL CYCLING SPRINTS**  
Lori M. Keys, Matthew A. Chatlaong, Daphney M. Stanford, Matthew B. Jessee. *University of Mississippi, University, MS.*
- P254: CARDIORESPIRATORY RESPONSES TO INCREMENTAL EXERCISE IN FLYWHEEL-BASED INERTIAL TRAINING (FIT) SQUATS**  
Clara J. Mitchinson<sup>1</sup>, Stuart Best<sup>1</sup>, John Caruso<sup>2</sup>, Lance M. Bollinger<sup>1</sup>. <sup>1</sup>*University of Kentucky, Lexington, KY.* <sup>2</sup>*University of Louisville, Louisville, KY.*
- P255: EXPLORING THE PHYSIOLOGICAL EFFECTS OF VIRTUAL REALITY BOXING RELATIVE TO STEADY STATE CARDIOVASCULAR EXERCISE**  
Mervin Jijika, Jonathan J. Ruiz-Ramie, Kenneth S. Anderson, Daniel R. Greene. *Augusta University, Augusta, GA.*
- P256: COMPARING EXERCISE INTENSITY OF VIRTUAL REALITY GAMING TO TRADITIONAL GAMING AND EXERCISE IN YOUTH (8-12)**  
Chandler Godfrey<sup>1</sup>, Jennifer F. Oody<sup>1</sup>, Scott A. Conger, FACSM<sup>2</sup>, Jeremy A. Steeves<sup>1</sup>. <sup>1</sup>*Maryville College, Maryville, TN.* <sup>2</sup>*Boise State University, Boise, ID.*
- P257: EFFECTS OF A BRISK 6-MINUTE WALK ON NON-LOCAL PERFORMANCE FATIGUE: PRELIMINARY FINDINGS**  
Kaden Buford, Lacey Harper, Melanie Antonio, William Reed, Valentina Taddia, Breanna McDonald, Micah Poisal, Esther Steingold, Garrett Hester. *Kennesaw State University, Kennesaw, GA.*
- P258: FUNCTIONAL FITNESS AND DAILY STEPS OF COMMUNITY-DWELLING OLDER ADULTS**  
B. Sue Graves, FACSM<sup>1</sup>, Fereshteh Ahmadabadi<sup>2</sup>, John Crimmins<sup>2</sup>. <sup>1</sup>*Florida Atlantic University, Boca Raton, FL.* <sup>2</sup>*Keiser University, West Palm Beach, FL.*

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**Saturday, February 25, 2023**

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**9:30 - 11:00 POSTER PRESENTATION SESSION 5 (P236-P300)****Studio 220**

- P259: RELATIONSHIP BETWEEN CHANGE IN VO<sub>2</sub>VT<sub>2</sub> AND CHANGE IN 2-MILE RUN TIME**  
Nathaniel D. Rhoades<sup>1</sup>, Jacob J. May<sup>1</sup>, Blaine S. Lints<sup>1</sup>, Harry P. Cintineo<sup>2</sup>, Alexa J. Chandler<sup>1</sup>, Bridget A. McFadden<sup>3</sup>, Gianna F. Mastrofini<sup>1</sup>, Shawn M. Arent, FACSM<sup>1</sup>. <sup>1</sup>University of South Carolina, Columbia, SC. <sup>2</sup>Lindenwood University, Saint Charles, MO. <sup>3</sup>Queens College, New York, NY.
- P260: EFFECTS OF VIRTUAL INTERACTIVE CYCLING ON PERCEIVED DURATION AND EXERCISE ENJOYMENT IN SEDENTARY ADULTS**  
Pedrica Bain, Kyle Reason, Lauren G. Killen, Manly Barksdale, Scott Lyons, FACSM, Matt Green, FACSM, Jean Ann Allen. *University of North Alabama, Florence, AL.*
- P261: WRIST ACCELEROMETER CUT-POINTS FOR MEASURING PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR IN ADULTS WITH DOWN SYNDROME**  
Morgan Bailey, Brantley K. Ballenger, Maggie Chamberlain, Stamatis Agiovlasis, FACSM. *Mississippi State University, Mississippi State, MS.*
- P262: ACCELEROMETER CUT POINTS FOR ADULTS WITH DOWN SYNDROME: METS VS. OXYGEN UPTAKE RESERVE**  
Maggie Chamberlain, Brantley K. Ballenger, Morgan Bailey, Stamatis Agiovlasis, FACSM. *Mississippi State University, Mississippi State, MS.*
- P263: COMPARISON OF DIFFERENT VO<sub>2</sub>MAX SCALING MODELS IN NON-OBESE AND OBESE ADULTS**  
Riley Galloway<sup>1</sup>, Scott Owens<sup>2</sup>, Heontae Kim<sup>2</sup>, Martha Bass<sup>2</sup>, Minsoo Kang<sup>2</sup>, Mark Loftin, FACSM<sup>2</sup>. <sup>1</sup>The University of Southern Mississippi, Hattiesburg, MS. <sup>2</sup>The University of Mississippi, University, MS.
- P264: PHYSICAL ACTIVITY ESTIMATED BY DIFFERENT ACCELEROMETER CUT-POINTS IN ADULTS WITH DOWN SYNDROME**  
Maria Haider, Brantley K. Ballenger, Sydney L. Carter, Grant Norman, Stamatis Agiovlasis, FACSM. *Mississippi State University, Mississippi State, MS.*
- P265: EFFECT OF MELANIN CONCENTRATION ON HEART RATE READINGS OF WEARABLE FITNESS MONITORS**  
Lauren Boag, AnnaGrace Gardner, Rebecca R. Rogers, Mallory R. Marshall, FACSM. *Samford University, Birmingham, AL.*
- P266: EXERCISE INTENSITY CLASSIFICATION OF ACTIVE VIRTUAL REALITY GAMES IN YOUTH (8-12)**  
Jeremy A. Steeves<sup>1</sup>, Chandler Godfrey<sup>1</sup>, Jennifer F. Oody<sup>1</sup>, Scott A. Conger, FACSM<sup>2</sup>. <sup>1</sup>Maryville College, Maryville, TN. <sup>2</sup>Boise State University, Boise, ID.
- P267: THE RELATIONSHIP BETWEEN MEASURED VO<sub>2</sub> DURING A NOVEL AEROBIC FIELD TEST AND VO<sub>2</sub>MAX**  
David H. Stem, Andrew Khoury, Michael C. McDowell, Kimbo E. Yee, George L. Grieve. *The Citadel, The Military College of South Carolina, Charleston, SC.*
- P268: 7-WEEK ACCOMMODATING RESISTANCE TRAINING IMPROVES WINGATE PEAK POWER BUT NOT MUSCULAR STRENGTH OR ENDURANCE IN STRENGTH-TRAINED, FEMALES.**  
Alyssa L. Parten. *University of North Alabama, Florence, AL.*

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**Saturday, February 25, 2023**

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**9:30 - 11:00 POSTER PRESENTATION SESSION 5 (P236-P300)****Studio 220**

- P269: THE EFFECT OF ANKLE BAND JOINT FLOSSING ON SQUAT PERFORMANCE**  
Bailey Bodkin, Caroline Cammack, Tyler D. Williams, Christopher G. Ballmann, FACSM, Patrick Marsh, Rebecca R. Rogers. *Samford University, Birmingham, AL.*
- P270: HIGH- VS. LOW-LOAD RESISTANCE TRAINING: COMPARING STRENGTH CHANGES IN THE LOWER BODY**  
Morgan R. Wood<sup>1</sup>, Marissa Bello<sup>2</sup>, Zachary Gillen<sup>1</sup>, JohnEric Smith<sup>1</sup>. <sup>1</sup>Mississippi State University, Mississippi State, MS. <sup>2</sup>Univeristy of Alabama at Birmingham, Birmingham, AL.
- P271: THE EFFECTS OF LYRICAL VERSUS INSTRUMENTAL MUSIC ON BENCH PRESS EXERCISE PERFORMANCE**  
Gabrielle Faulkner, Cole Anderton, Carson Elwell, Luke Harms, Nick Washmuth, Tyler D. Williams, Rebecca R. Rogers, Christopher G. Ballmann, FACSM. *Samford, Birmingham, AL.*
- P272: THE EFFECT OF CARBON-PLATED RUNNING SHOES ON PERFORMANCE**  
Dominic Collichio<sup>1</sup>, Kyle Edgar<sup>1</sup>, Erik Hanson, FACSM<sup>1</sup>, Claudio Battaglini, FACSM<sup>1</sup>, Mark Belio<sup>1</sup>, Lilly Niehaus<sup>1</sup>, Zack Bennett<sup>1</sup>, Brian Jensen<sup>1</sup>, Benjamin Gordon<sup>2</sup>. <sup>1</sup>UNC, Chapel Hill, NC. <sup>2</sup>University of Pittsburgh, Pittsburgh, PA.
- P273: BINGE TWITCH STREAMING RUINS SWEET DREAMING: A CASE STUDY**  
Ian J. Schultz, Meral N. Culver, Braxton A. Linder, Austin T. Robinson. *Auburn University, Auburn, AL.*
- P274: ABSTRACT WITHDRAWN**
- P275: EFFECT OF AGE ON FIREFIGHTER FITNESS IN A DEPARTMENT WITH ANNUAL FITNESS ASSESSMENTS**  
Arasta Wahab<sup>1</sup>, Mike Toczko<sup>1</sup>, Robert Lockie<sup>2</sup>, Shane Caswell<sup>1</sup>, Joel Martin<sup>1</sup>. <sup>1</sup>George Mason University, Manassas, VA. <sup>2</sup>California State University, Fullerton, CA.
- P276: PHYSICAL FITNESS IN FIREFIGHTERS DIFFERS ACROSS YEARS OF SERVICE**  
Kayleigh Newman<sup>1</sup>, Michael Toczko<sup>1</sup>, Jatin Ambegaonkar<sup>1</sup>, Anne Akagi<sup>2</sup>, Megan Sax van der Weyden<sup>1</sup>, Marcie Fyock-Martin<sup>1</sup>, Joel Martin<sup>1</sup>. <sup>1</sup>George Mason University, Manassas, VA. <sup>2</sup>Charleston Southern University, Charleston, SC.
- P277: THE EFFECT OF A STRUCTURED PHYSICAL CONDITIONING PROGRAM ON RECRUITS AT LAW ENFORCEMENT ACADEMIES**  
Derick A. Anglin<sup>1</sup>, Bridget F. Melton<sup>1</sup>, Thomas R. Nagel<sup>1</sup>, Sarah N. Lanham<sup>2</sup>, Greg A. Ryan<sup>3</sup>. <sup>1</sup>Georgia Southern, Statesboro, GA. <sup>2</sup>University of Kentucky, Lexington, KY. <sup>3</sup>Piedmont University, Demorest, GA.
- P278: PHYSICAL ACTIVITY LEVELS AND CARDIOVASCULAR HEALTH RISK IN FIRST RESPONDERS**  
Maleah Holland-Winkler, Austin Kohler, Andrew Moore, Gabriella Benavides. *Augusta University, Augusta, GA.*
- P279: ASSESSING THE EFFECTIVENESS OF FITNESS EDUCATION TO PROMOTE WELLNESS AMONG RURAL FIREFIGHTERS: A PILOT STUDY**  
Kayden Lowe<sup>1</sup>, Petra Kis<sup>1</sup>, Greg A. Ryan<sup>2</sup>, Bridget F. Melton<sup>1</sup>. <sup>1</sup>Georgia Southern University, Statesboro, GA. <sup>2</sup>Piedmont University, Demorest, GA.

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**Saturday, February 25, 2023**

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**9:30 - 11:00 POSTER PRESENTATION SESSION 5 (P236-P300)****Studio 220**

- P280: PREDICTING FIREFIGHTERS' PHYSICAL ABILITY TEST SCORES FROM ANAEROBIC FITNESS PARAMETERS**  
Peter Beitia<sup>1</sup>, Zacharias Papadakis<sup>1</sup>, Andreas Stamatis, FACSM<sup>2</sup>, Tal Amasay<sup>1</sup>. <sup>1</sup>Barry University, Miami Shores, FL. <sup>2</sup>SUNY Plattsburgh, Plattsburgh, NY.
- P281: NAVAL RESERVE OFFICERS' TRAINING CORPS MILITARY PERFORMANCE AND FITNESS CHARACTERISTICS ACROSS ACADEMIC YEARS**  
Gianna F. Mastrofini<sup>1</sup>, Alexa J. Chandler<sup>1</sup>, Blaine S. Lints<sup>1</sup>, Harry P. Cintineo<sup>2</sup>, Bridget A. McFadden<sup>3</sup>, Shawn M. Arent, FACSM<sup>1</sup>. <sup>1</sup>University of South Carolina, Columbia, SC. <sup>2</sup>Lindenwood University, Saint Charles, MO. <sup>3</sup>Queens College, Queens, NY.
- P282: INFLUENCE OF PERCEIVED INTENSITY IN THE POLICE ACADEMY ON EXERCISE INTENTION POST-ACADEMY**  
Nicholas Hunt<sup>1</sup>, Richard Cleveland<sup>1</sup>, Joseph Dulla<sup>2</sup>, Gregory Ryan<sup>3</sup>, Mark G. Abel<sup>4</sup>, Bridget Melton<sup>1</sup>. <sup>1</sup>Georgia Southern University, Statesboro, GA. <sup>2</sup>Bond University, Robina, Australia. <sup>3</sup>Piedmont University, Demorest, GA. <sup>4</sup>University of Kentucky, Lexington, KY.
- P283: COMPARISON OF FITNESS CHARACTERISTICS BETWEEN FIREFIGHTERS AND POLICE OFFICERS**  
Tanya Miller, Brian Tyo, Clayton Nicks, Kate Early. Columbus State University, Columbus, GA.
- P284: INFLUENCE OF CALL VOLUME ON FIREFIGHTERS' PHYSICAL ACTIVITY LEVEL AND TRAINING LOAD**  
Mark G. Abel<sup>1</sup>, Emily L. Langford<sup>2</sup>, Sarah N. Lanham<sup>1</sup>, Jamal L. Thruston<sup>1</sup>, Alyssa Q. Eastman<sup>3</sup>, Jackson B. Miller<sup>1</sup>, Lauren T. Higginbotham<sup>2</sup>, Luis Monteiro<sup>4</sup>, Vanessa Santos<sup>5</sup>, Bridget Melton<sup>6</sup>. <sup>1</sup>University of Kentucky, Lexington, KY. <sup>2</sup>University of Montevallo, Montevallo, AL. <sup>3</sup>Mayo Clinic, Rochester, MN. <sup>4</sup>Lusofona University, Lisbon, Portugal, KY. <sup>5</sup>ICPOL Research Center, Higher Institute of Police Sciences and Internal Security, Lisbon, Portugal, KY. <sup>6</sup>Georgia Southern, Statesboro, GA.
- P285: INFLUENCE OF AGE ON FIREFIGHTERS' PHYSICAL ACTIVITY LEVEL AND TRAINING LOAD**  
Sarah N. Lanham<sup>1</sup>, Jamal L. Thruston<sup>1</sup>, Emily L. Langford<sup>2</sup>, Alyssa Q. Eastman<sup>3</sup>, Jackson B. Miller<sup>1</sup>, Lauren T. Higginbotham<sup>2</sup>, Luis Monteiro<sup>4</sup>, Vanessa Santos<sup>5</sup>, Bridget Melton<sup>6</sup>, Mark G. Abel<sup>1</sup>. <sup>1</sup>University of Kentucky, Lexington, KY. <sup>2</sup>University of Montevallo, Montevallo, AL. <sup>3</sup>Mayo Clinic, Rochester, MN. <sup>4</sup>Lusofona University, Lisbon, Portugal. <sup>5</sup>ICPOL Research Center, Higher Institute of Police Sciences and Internal Security, Lisbon, Portugal. <sup>6</sup>Georgia Southern University, Statesboro, GA.
- P286: EFFECTS OF IMPLEMENTING A CONSEQUENTIAL ANNUAL FITNESS ASSESSMENT IN A LARGE COUNTY FIRE DEPARTMENT**  
Michael Toczko<sup>1</sup>, Robert Lockie<sup>2</sup>, Megan Sax van der Weyden<sup>1</sup>, Marcie Fyock-Martin<sup>1</sup>, Joel Martin<sup>1</sup>. <sup>1</sup>George Mason University, Manassas, VA. <sup>2</sup>California State University, Fullerton, CA.
- P287: INFLUENCE OF SECONDARY JOB STATUS ON FIREFIGHTERS' PHYSICAL ACTIVITY LEVEL AND TRAINING LOAD**  
Emily L. Langford<sup>1</sup>, Lauren T. Higginbotham<sup>1</sup>, Sarah N. Lanham<sup>2</sup>, Jamal L. Thruston<sup>2</sup>, Alyssa Q. Eastman<sup>3</sup>, Jackson B. Miller<sup>2</sup>, Vanessa Santos<sup>4</sup>, Luis Monteiro<sup>4</sup>, Mark G. Abel<sup>2</sup>. <sup>1</sup>University of Montevallo, Montevallo, AL. <sup>2</sup>University of Kentucky, Lexington, KY. <sup>3</sup>Mayo Clinic, Rochester, MN. <sup>4</sup>ICPOL Research Center, Lisbon.

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**Saturday, February 25, 2023**

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**9:30 - 11:00 POSTER PRESENTATION SESSION 5 (P236-P300)****Studio 220**

- P288: EFFECT OF LAW ENFORCEMENT LOAD-BEARING EQUIPMENT ON PHYSICAL AND JOB-SPECIFIC TASK PERFORMANCE**  
Christopher J. Sole, Giovanna Leone, Ryan S. Sacko, Kimbo E. Yee, George L. Grieve, Christopher R. Bellon. *The Citadel, Charleston, SC.*
- P289: ENDURANCE EXERCISE TRAINING IMPROVES THE ANTI-OXIDATIVE PROPERTIES OF HIGH-DENSITY LIPOPROTEINS (HDL)**  
Charles S. Schwartz<sup>1</sup>, Jacob L. Barber<sup>2,1</sup>, Sujoy Ghosh<sup>3,4</sup>, Anand Rohatgi<sup>5</sup>, Theodoros Kelesidis<sup>6</sup>, Claude Bouchard, FACSM<sup>4</sup>, Mark A. Sarzynski, FACSM<sup>1</sup>. <sup>1</sup>University of South Carolina, Columbia, SC. <sup>2</sup>Beth Israel Deaconess Medical Center, Boston, MA. <sup>3</sup>Duke-National University of Singapore Medical School, Singapore. <sup>4</sup>Pennington Biomedical Research Center, Baton Rouge, LA. <sup>5</sup>University of Texas Southwestern Medical Center, Dallas, TX. <sup>6</sup>University of California Los Angeles, Los Angeles, CA.
- P290: FACTORS THAT INFLUENCE PHYSICAL FITNESS PARTICIPATION IN OLDER ADULTS IN A METROPOLITAN COUNTY**  
Amelia Joy Alamen<sup>1</sup>, Trudy Moore-Harrison<sup>1</sup>, L. Jerome Brandon, FACSM<sup>2</sup>. <sup>1</sup>University of North Carolina at Charlotte, Charlotte, NC. <sup>2</sup>Georgia State University, Atlanta, GA.
- P291: ATTENUATION OF VO<sub>2</sub> SLOW COMPONENT DURING HEAVY-INTENSITY INTERVAL EXERCISE**  
Cade Carter, Jakob D. Lauver, Timothy R. Rotarius. *Coastal Carolina University, Conway, SC.*
- P292: ABSTRACT WITHDRAWN**
- P293: RELATIONSHIP BETWEEN HEART RATE VARIABILITY DERIVED FROM FINAPRES SOFTWARE AND KUBIOS**  
Gabe Wilner, Abigail Marmurowicz, Andre Canino, Pedro Chung, Keilah Vaughan, Robert Buresh, FACSM, Cherilyn McLester, Brian Kliszczewicz, FACSM. *Kennesaw State University, Kennesaw, GA.*
- P294: RELIABILITY OF MULTIPLE ORAL GLUCOSE TOLERANCE TESTS WITHIN A 10-DAY PERIOD**  
Keilah Vaughan, Abigail Marmurowicz, Andre Canino, Pedro Chung, Gabe Wilner, Robert Buresh, FACSM, Cherilyn McLester, Brian Kliszczewicz, FACSM. *Kennesaw State University, Kennesaw, GA.*
- P295: ARE RECRUITMENT STRATEGIES BIASED DURING BILATERAL ECCENTRIC HAMSTRING EXERCISES? - A REPEATED MEASURES DESIGN**  
Nick J. Siekirk<sup>1,2</sup>, Jacob Smith<sup>3</sup>, Kylee West<sup>1</sup>, Jordan Brown<sup>1</sup>, Brianna Simmons<sup>1</sup>, Austen Arnold<sup>1</sup>, Derick Anglin<sup>1</sup>, Sarah North<sup>1</sup>. <sup>1</sup>Department of Health Sciences and Kinesiology, Georgia Southern University, Statesboro, GA. <sup>2</sup>Center for Rehabilitation and Independent Living, Waters College of Health Professions, Statesboro, GA. <sup>3</sup>University of Texas at Austin, Austin, TX.
- P296: THE EFFECT OF ONE NIGHT OF SLEEP FRAGMENTATION ON SUBSEQUENT AEROBIC PERFORMANCE**  
Trent A. Hargens, FACSM, Tara L. Thompson, Nicki Stallings, Nicholas D. Luden. *James Madison University, Harrisonburg, VA.*
- P297: THE VALIDITY OF THE VMAXPRO DURING COUNTERMOVEMENT JUMP AND BACK SQUAT PERFORMANCE**  
Hunter Haynes, Riley Galloway, Paul T. Donahue, Scott Piland, Nuno Oliveira. *University of Southern Mississippi, Hattiesburg, MS.*

**Saturday, February 25, 2023****9:30 - 11:00 POSTER PRESENTATION SESSION 5 (P236-P300)***Studio 220*

- P298: AN EXPLORATION OF ACL RECONSTRUCTION COSTS AND SOCIAL DETERMINANTS OF HEALTH**  
Johanna M. Hoch, Rachel Hogg-Graham. *University of Kentucky, Lexington, KY.*
- P299: IMPACT OF CANNABIDIOL (CBD) OIL AFTER ECCENTRIC LOADING ON PHYSICAL PERFORMANCE AND PAIN**  
Guillermo Pacheco, Danilo Tolusso, Whitley Stone, Shea Brgoch, Van Thuan Nguyen. *Western Kentucky University, Bowling Green, KY.*
- P300: DISCORDANCE OF SEDENTARY TIME REPORTING IN ADULTS WITH TOTAL KNEE REPLACEMENT**  
Katherine E. DeVivo, Scott Jamieson, Chih-Hsiang Yang, Christine Pellegrini. *University of South Carolina, Columbia, SC.*

**10:00 – 10:50 SYMPOSIUM 14***Regency Ballroom G*Chair: Susan Arthur, *University of North Carolina Charlotte*

- S14: SCIDUCIO: A PRACTICAL FRAMEWORK FOR GUIDING THE DEVELOPMENT AND LEADERSHIP OF ACADEMIC RESEARCH**  
Craig Paterson<sup>1</sup>, Yolanda Lassalle<sup>2</sup>, Lee Stoner, FACSM<sup>1</sup>. <sup>1</sup>*University of North Carolina at Chapel Hill, Chapel Hill, NC.* <sup>2</sup>*LaSalle Group, Guaynabo, PR.*

**10:00 - 10:50 TUTORIAL 17***Regency Ballroom H*Chair: George Grieve, *The Citadel*

- T17: GENERATION Z(OOM): ACADEMIC LONG HAUL COVID-19 SYMPTOMS**  
Robert L. Herron<sup>1</sup>, Greg A. Ryan<sup>2</sup>. <sup>1</sup>*University of Montevallo, Montevallo, AL.* <sup>2</sup>*Piedmont University, Demorest, GA.*

**11:00 AM–12:00 PM HENRY J. MONTOYE AWARD LECTURE***Regency Ballroom C*Presiding: Matt Green, FACSM. *University of North Alabama, Florence, AL.*Speaker introduction: Matt Green, FACSM. *University of North Alabama, Florence, AL.***RIDING THE COATTAILS OF MY STUDENTS: THE IMPORTANCE OF RESISTANCE TRAINING IN CLINICAL POPULATIONS**Lynn Panton, PhD, FACSM. *Florida State University, Tallahassee, FL***12:00–2:00 PM SEACSM LUNCH AND LECTURE***Regency Ballroom A & B*Presiding: Danielle Wadsworth, FACSM. *Auburn University, Auburn, AL*Speaker introduction: Steve Bailey, *Elon University, Elon, NC.***STATS SONGS: THE MUSIC THAT MADE STATISTICS JUST A WEE BIT LESS PAINFUL**Michael Berry, PhD, FACSM. *Wake Forest University, Winston-Salem, NC.*

## Abstracts

### PRECONFERENCE SESSION (PC1-PC9)

#### PC1: LONGITUDINAL ASSOCIATIONS BETWEEN SLEEP AND PHYSICAL ACTIVITY IN INFANTS AND TODDLERS

Agnes Bucko. *University of North Carolina at Charlotte, Charlotte, NC.*

**BACKGROUND:** Although there appears to be a positive relationship between sleep and PA among older populations, it is still unclear whether this relationship exists in infants and young children. This study aimed to examine whether average physical activity (PA) levels in children from 6-24 months old are associated with sleep duration and sleep quality, and examine whether changes in PA levels are associated with sleep duration and sleep quality. **METHODS:** Data were collected on 109 mother and child dyads when children were 6, 12, 18, and 24 months old (44% female, 50% Non-Hispanic White). Daytime, nighttime, and 24-hour sleep duration and the number of nighttime awakenings were measured with actigraphy. Daytime PA was assessed using accelerometry. Demographic characteristics were reported by the child's mother at baseline and included sex, race/ethnicity, and Women, Infants and Children Nutrition Program status. Separate associations of between-person differences and within-person changes in PA were estimated with each of the sleep variables as the outcome in separate linear mixed model analyses adjusting for demographic characteristics. **RESULTS:** Children with higher total PA levels slept less during the day compared to children with lower total PA levels. When children were more physically active compared to their own average PA levels, their 24-hour sleep duration was lower. **CONCLUSIONS:** There is an inverse association between sleep and PA in infants, which is inconsistent with the results of similar studies in older children and adolescents. Future research should assess whether the relationship varies depending on PA intensity once PA intensity cut points are established for infants. **Funding information:** This work was supported by grants from the National Institutes of Health [R01-HD091483 and T32-GM081740].

#### PC2: PHASE-SPECIFIC COUNTERMOVEMENT VERTICAL JUMP PREDICTORS OF DRIVER CLUB HEAD SPEED IN COLLEGIATE GOLFERS

Jeffrey Simpson<sup>1</sup>, Kyle Rank<sup>1</sup>, John Garner<sup>2</sup>. <sup>1</sup>*University of West Florida, Pensacola, FL.* <sup>2</sup>*Troy University, Troy, AL.*

**BACKGROUND:** Countermovement vertical jumps (CMVJ) are often used to predict club head speed (CHS) in golfers of varying skill. Relationships between some CMVJ metrics and CHS have been identified, however, metrics used to predict CHS capability from CMVJ tests rarely consider the temporal characteristics of the golf swing and could provide false-positives for CHS predictability. This study aimed to identify predictors of CHS from a CMVJ based on phase-specific temporal and force-time variables. **METHODS:** Division II male and female golfers (n=18; age: 20±1 y; height: 171.4±4.7 cm; mass: 69.7±17.5 kg) completed the study. Participants completed 10 swings on a FlightScope Mevo+ with their driver to determine CHS. On a separate day, 3 trials of a CMVJ were completed on a force platform. Vertical ground reaction force data from the force platform was used to identify the unloading, eccentric yielding, eccentric braking and propulsion phases of the CMVJ. Phase times and vertical impulse were computed for each of the respective CMVJ phases and entered into separate stepwise multiple regression models using backward elimination to identify predictors of driver CHS (p<0.05). **RESULTS:** Average driver CHS from the sample was 47.16±5.32 m/s. Eccentric braking phase time (0.22 ±0.06 s) was the only significant temporal predictor of CHS with a strong linear relationship (p=0.020; r=0.541) and explained 29.3% of the variance in driver CHS. Similarly, eccentric braking vertical impulse (3.15±0.52 Ns/kg) was the only significant predictor of CHS with a strong linear relationship (p=0.008; r=0.600), which explained 36.0% of the variance in driver CHS. Temporal and force-time variables during the unloading, eccentric yielding and propulsion phases of the CMVJ were not significant predictors of driver CHS. **CONCLUSION:** The results from this study indicate that

eccentric braking phase time and eccentric braking vertical impulse during a CMVJ are strong predictors of driver CHS in collegiate golfers. Practitioners using CMVJ tests should consider force-time metrics during the eccentric braking phase to reduce false-positives for predicting CHS capability in golfers.

#### PC3: READY-SET-GO: VIRTUAL REALITY GAMING VERSUS TRADITIONAL CARDIO TO IMPROVE PSYCHOLOGICAL STATES FOLLOWING ACUTE EXERCISE

Daniel R. Greene, Mervin Jijika, Kenneth S. Anderson, Jonathan J. Ruiz-Ramie. *Augusta University, Augusta, GA.*

With the advancement of technology, individuals are getting less and less physical activity throughout daily life. However, what if that same technology was used to encourage exercise participation? **PURPOSE:** Compare affective states before (Pre), immediately after (Post0), and 20-minutes after (Post20) a bout of traditional cardio exercise and virtual reality boxing. **METHODS:** Participants [N= 14, 7 females; age (M ± SD); 27.1 ± 7.7 yrs; BMI (M ± SD); 27.3 ± 5.9] completed a 30-min moderate-intensity cardiovascular exercise (MICE) bout and a 30-min virtual reality boxing workout (VR). Each exercise session consisted of a 5-min warm-up, 20-min exercise bout, and 5-min cool-down. Energy, tiredness, tension, calmness, and state anxiety were assessed via the Activation-Deactivation Checklist (AD-ACL; Thayer 1986) at Pre, Post0, and Post20; exercise enjoyment was assessed at Post0 via The Physical Activity Enjoyment Scale (PACES; Kendzierski & DeCarlo, 1991). **Results:** Participants reported increased energy [all P's < .001] from Pre to Post0 in both conditions, but energy at Post20 was elevated following VR only [P = .04; Cohen's d = 0.72]. Additionally, tiredness was decreased from Pre to Post0 following both conditions [all P's < .02], but tiredness remained decrease at Post20 following VR only [P = .02; Cohen's d = 0.51]. Calmness decreased from Pre to Post0 following VR [P < .001] and MICE [P < .001] but returned to baseline by Post20 VR [P = .52] and MICE [P = .27]. Tension increased from Pre to Post0 VR [P = .01] but was not different at Post20 relative to Pre [P = .13]. Tension did not change at any time point following MICE [all P's > .44]. Additionally, state anxiety was not different from baseline following MICE [all P's > .38] but was significantly reduced by Post20 relative to Pre VR [P = .03; Cohen's d = 0.72]. Finally, post-exercise enjoyment was significantly greater following VR relative to MICE [(M<sub>diff</sub> ± SD); 31.3 ± 5.7; P < .001; Cohen's d = 1.93]. **CONCLUSION:** While both VR and MICE resulted in improved psychological states, it appears these beneficial effects were larger and more sustainable following VR. Interestingly, none of these improved psychological states were present Post20 MICE but did remain Post20 VR. Coupled with the notion that VR resulted in significantly greater enjoyment, this study highlights the potential psychological benefits of virtual reality exercise.

#### PC4: COMBINATION OF AEROBIC EXERCISE TRAINING AND BERBERINE ATTENUATE KIDNEY CACHEXIA IN DIABETIC RATS BY INCREASING THE BCL-2/BAX RATIO

Fereshteh Ahmadi, FACS<sup>1</sup>, Somayeh Azizi<sup>2</sup>, Marziyeh Saghebjoo<sup>2</sup>, Javad Mohiti-Ardakani<sup>3</sup>, B.Sue Graves, FACS<sup>4</sup>. <sup>1</sup>*Keiser University, West Palm Beach, FL.* <sup>2</sup>*University of Birjand, Birjand, FL.* <sup>3</sup>*Shahid Sadoughi University of Medical Science, Yazd, FL.* <sup>4</sup>*Florida Atlantic University, Boca Raton, FL.*

**Background:** This study examined the effects of aerobic exercise training (AET) and berberine (BBR) supplementation on apoptosis indices in renal tissue of streptozotocin (STZ) induced diabetic Wistar rats. **Methods:** Forty-two Wistar rats were divided into two groups: control (Ctr) and aerobic exercise training (AET, 3 d/wk, 50-55% VO<sub>2max</sub> for 6 weeks), and four diabetic groups: diabetic (D), DAET, DBBR (50 mg/kg), and DAET+BBR. Diabetes was induced by intraperitoneal injection of STZ (60 mg/kg dissolved in 0.1 M citrate buffer, pH 4.5). The one-way ANOVA with LSD's post-hoc test was used to determine the significance of differences between groups for caspase-3, Bax, Bcl-2, and Bcl-2 to Bax ratio. **Results:** The level of

Bax in AET, DAET, and DAET+BBR were lower than the Ctr and D, with a greater improvement of the Bax level observed in the AET and DAET vs. DBBR. While the levels of caspase-3 and Bcl-2 showed no significant differences between groups, the level of Bcl-2 to Bax ratio exhibited a higher level only in the DAET+BBR compared to Ctr, D, AET, DAET, and BBR in the renal tissue. **Conclusion:** These results indicated that the synergetic treatment of aerobic exercise training combined with DBBR can possibly suppress the mitochondrial apoptosis pathway through increasing the Bcl-2 to Bax ratio in the kidney tissue of diabetic rats.

**PC5: ASSOCIATIONS BETWEEN SLEEP, ADIPOSITY AND METABOLIC HORMONES IN EMERGING ADULTS: RIGHT TRACK HEALTH STUDY**

Jessica McNeil<sup>1</sup>, Nathaniel T. Berry<sup>1</sup>, Lenka H. Shriver<sup>1</sup>, Jessica M. Dollar<sup>1</sup>, Susan P. Keane<sup>1</sup>, Lilly Shanahan<sup>2</sup>, Laurie Wideman, FACSM<sup>1</sup>.  
<sup>1</sup>University of North Carolina at Greensboro, Greensboro, NC.  
<sup>2</sup>University of Zurich, Zurich.

**BACKGROUND:** There is strong evidence that inadequate sleep (e.g., short sleep duration, poor sleep efficiency) is associated with a greater risk of obesity. Despite significant declines in sleep duration and increases in obesity in emerging adults (ages 18-25 years), data on sleep is scarce in this age group. This study assessed associations between multiple sleep variables, adiposity markers and metabolic hormones in a sample of emerging adults. **METHODS:** Cross-sectional data in 156 emerging adults (age = 19.4±1.3 years; body mass index (BMI) = 26.0±6.6 kg/m<sup>2</sup>; sleep duration = 6.0±1.9 hours/day; sleep efficiency = 87.4±4.1%, sleep timing midpoint = 4h51±2h30AM; 58% female; 65% White) from the RIGHT Track Health study were used. Measures included actigraphy-assessed sleep duration (minutes/day), sleep efficiency (sleep duration/time in bed; %), sleep timing midpoint (wake time - ½ sleep duration; clock time), and sleep duration variability (root mean square of sleep duration change across days - mean sleep duration; minutes/day), Bod Pod-assessed adiposity markers (BMI, fat mass index (FMI), fat-free mass index (FFMI) and FM/FFM ratio), and metabolic hormones (insulin and leptin; fasting blood sample). Associations between sleep variables (tertile groups) with adiposity markers and metabolic hormones were assessed with linear regression models adjusted for age, sex, race, and sleep variables (when not the predictor of interest). **RESULTS:** Compared to the longest sleep duration tertile, individuals with the shortest sleep durations had significantly greater BMI (24.3±5.2 vs. 27.3±7.9 kg/m<sup>2</sup>; *P* = 0.03), FMI (6.4±4.3 vs. 8.1±6.5 kg/m<sup>2</sup>; *P* = 0.03) and FFMI ( $\beta$  = 18.1±2.3 vs. 19.2±2.8 kg/m<sup>2</sup>; *P* = 0.03). Compared to the middle sleep timing midpoint tertile, individuals with a later sleep timing midpoint had significantly lower BMI (27.3±7.9 vs. 24.3±5.4 kg/m<sup>2</sup>; *P* = 0.04) and FFMI (19.3±3.1 vs. 18.1±2.2 kg/m<sup>2</sup>; *P* = 0.01). No significant associations were noted between sleep efficiency and sleep duration variability with adiposity markers and metabolic hormones. **CONCLUSIONS:** These results suggest that sleep duration and sleep timing midpoint are associated with adiposity markers in emerging adults. Notably, those with the shortest sleep durations had greater BMI characterized by greater FMI and FFMI, whereas those with the latest sleep timing midpoint had lower BMI characterized by lower FFMI, but not FMI. **Grant or funding information:** Supported by NIH Grant R01 HD078346-01A1

**PC6: THE EFFECTS OF ALMOND CONSUMPTION ON CARDIOVASCULAR HEALTH IN ACTIVE, OVERWEIGHT/OBESE ADULTS: PRELIMINARY RESULTS**

Taylor A. Behl<sup>1</sup>, Holly E. Clarke<sup>2</sup>, Neda S. Akhavan<sup>2</sup>, Saiful Singar<sup>2</sup>, Bahram H. Arjmandi<sup>2</sup>, Robert C. Hickner, FACSM<sup>2</sup>, David W. Eccles<sup>2</sup>, Jeong-Su Kim, FACSM<sup>2</sup>, Lynn B. Panton, FACSM<sup>2</sup>. <sup>1</sup>Flagler College, St. Augustine, FL. <sup>2</sup>Florida State University, Tallahassee, FL.

**BACKGROUND:** Arterial stiffening and endothelial dysfunction are two primary age-related vascular changes associated with increased cardiovascular disease risk. These changes partly result from increased oxidative stress, which is likely inevitable with aging; however, other age-related health problems (e.g., poor sleep) can exacerbate vascular health decline. Almonds are rich in antioxidant nutrients that may combat vascular health decline. The purpose of this study was to determine the effects of almond consumption on vascular health and sleep. **METHODS:** Ten active (11,992±3,483 steps/day), older adults (56±4yrs) who were overweight or obese (body mass index 27.7±2.5 kg/m<sup>2</sup>) completed participation in an ongoing randomized, cross-over study. Participants consumed an almond (ALM) regimen (64 g/day: 384 kcal) or a granola bar isocaloric control (IC (84 g/day)) for 12

weeks, with a 4-week washout. Vascular health was assessed through flow-mediated dilation (FMD) to determine endothelial function, pulse-wave velocity (PWV) to determine arterial stiffness, and blood draws to determine total antioxidant capacity (TAC). Sleep parameters (sleep efficiency and wake after sleep onset) were determined through wrist worn ActiGraph accelerometry. A two-way repeated measures analysis of variance was used to assess the effects of intervention (ALM, IC), time (baseline, post), and their interaction on outcomes. **RESULTS:** Preliminary results show that there was a significant treatment x time interaction for FMD,  $F_{(1,9)}=13.7$ ,  $p=0.005$ ,  $\eta^2=0.60$  (ALM baseline 7.38±2.14%, ALM post 9.05±2.87%; IC baseline 7.76±2.63%, IC post 6.61±2.04%). There were no significant interactions for PWV or TAC. There was a significant treatment x time interaction for sleep efficiency,  $F_{(1,7)}=8.23$ ,  $p=0.02$ ,  $\eta^2=0.54$  (ALM baseline 90±4%, ALM post 92±2 %; IC baseline, 92±3, IC post 88±6%). There was a significant treatment x time interaction for wake after sleep onset,  $F_{(1,7)}=7.33$ ,  $p=0.030$ ,  $\eta^2=0.511$  (ALM baseline 43±22 min, ALM post 37±13 min; IC baseline 30±9 min, IC post 56±32 min). **CONCLUSIONS:** Our findings indicate that ALM may improve endothelial function and sleep in active, older adults who are overweight or obese, both of which are important for cardiovascular health. **FUNDING:** Almond Board of California

**PC7: SELF-REPORTED SORENESS INDICATES PREVIOUS DAY WORKLOAD IN MALE INTERCOLLEGIATE SOCCER PLAYERS**

Troy Coppus, Katie Delinsky, J. Grant Mouser. Troy University, Troy, AL.

**BACKGROUND:** Data analytics to inform coaches and team personnel on training and performance decisions has become commonplace in elite levels of soccer. Many sub-elite soccer organizations lack the finances and/or personnel to adequately monitor training load and assess the findings in the same fashion. For those who wish to make data-driven decisions despite limited resources, collecting specific subjective data from the participants could be a minimalistic alternative to gauge training load. The aim of this study was to determine the relationship between a subjective soreness measure and various objective training load measures taken during activity the previous day. **METHODS:** An NCAA Division I men's soccer team (*n* = 28; mean ± SD: age = 20.5 ± 1.5 years, mass = 76.40 ± 9.44 kg, height = 183.88 ± 8.24 cm, college soccer eligibility = 2.57 ± 1.2 years) used Polar Team Pro devices and Polar Flow software to record caloric expenditure, distance traveled, number of sprints (defined as running over 3.0 m/s for > 3 seconds), and TrainingLoad score during training sessions and matches throughout the 2019 fall NCAA championship season, totaling 1760 observations. Daily morning questionnaires asking for soreness on a 0-10 scale were completed electronically by each player. Relationships between the subjective soreness measure and each objective measure were assessed using Spearman's rho. Statistical significance was set *a priori* at  $\alpha = .05$ . **RESULTS:** There were significant positive correlations between caloric expenditure ( $r = .233$ ,  $P < 0.0005$ ), distance traveled ( $r = .311$ ,  $P < 0.0005$ ), number of sprints ( $r = .232$ ,  $P < 0.0005$ ), and TrainingLoad score ( $r = .326$ ,  $P < 0.0005$ ) and self-report soreness. **CONCLUSIONS:** The subjective soreness measure was shown to have a close positive relationship with four objective measures of workload. While the results of this study cannot be applied to other soccer athlete populations, they initiate conversation on how training load may be measured in various soccer populations, outside a male intercollegiate team, who lack resources. These findings suggest that male intercollegiate teams could record soreness subjectively to give coaches and associated personnel a simple, yet accurate assessment of their workload the previous day.

**PC8: NO EFFECT OF MODE FAMILIARITY ON TIME PERCEPTION DURING EXERCISE**

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**BACKGROUND** Time is perceived to pass differently in unique situations. Several factors, including physiological arousal and attentional focus, contribute to these alterations in perceived time. Physical activity impacts time perception at high intensities, but more familiar modes of exercise require less attention to coordinate movement. The effect of exercise familiarity on timing has not been investigated, therefore the purpose of this study was to determine the impact of familiar and unfamiliar exercise modes on time perception during exercise. **METHODS** Recreational runners (4 total; 2 men; age 37.5 ± 6.6 years) completed exercise trials of 5, 10, and 15 min of perceived duration on familiar (treadmill running) and unfamiliar (arm

ergometer) exercise modes, in two different sessions separated by at least 48 hours. On a given session, all exercise trials were completed on one mode in a randomized and counterbalanced manner with no watches or timing devices present during testing. Subjects were instructed to exercise at a self-adjusted Borg rating of perceived exertion (RPE) score of 15 ("hard") for what they believed was the specified amount of time. The actual time of the exercise trials was measured and compared to the respective goal time to yield a value of time estimation accuracy (TEA), wherein a higher TEA indicates time was perceived to move slowly. The effects of mode (familiar and unfamiliar) and estimate length (5, 10, and 15 min) were assessed with a 2 x 3 repeated-measures ANOVA,  $\alpha = .05$ . **RESULTS** TEA decreased at each level of estimate length from 5 min ( $1.09 \pm 0.06$ ) to 10 min ( $0.94 \pm 0.07$ ) to 15 min ( $0.86 \pm 0.18$ ), but these differences were not significant despite a large effect size ( $p = .05$ ,  $\omega^2 = .33$ ). There was no interaction effect between mode and estimate length on TEA ( $p = .86$ ,  $\omega^2 = .00$ ) or main effect of mode on time TEA ( $p = .55$ ,  $\omega^2 = .00$ ). **CONCLUSION** Exercise familiarity did not impact TEA among recreational runners during physical activity at a self-selected intensity of RPE 15. A possible explanation is that subjects regulated work rate and attention in a manner that preserved time estimation ability regardless of exercise mode due to robust physical activity experience. There was a trend for longer time periods to be perceived as being shorter, possibly implicating exercise fatigue in the time estimation process. Ongoing data collection will more clearly elucidate the effect of time estimate and mode on TEA.

#### PC9: EFFECT OF BLOOD FLOW RESTRICTION TRAINING AT VARIABLE LOADS AND REPETITION SPEEDS ON MUSCULAR FATIGUE

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**BACKGROUND:** Blood flow restriction (BFR) is a training method used to restrict venous return by partially occluding limbs to increase metabolic stress using lighter loads during exercise training. This modality has been proven to increase muscular conditioning and elicit changes in muscular cross-sectional area and endurance. Conventional BFR training methodologies often utilize a 30-15-15-15 rep scheme. The purpose of this study is to investigate the feasibility of other exercise parameters on time-under tension (TUT) and load interactions on muscular fatigue. **METHODS:** Five resistance-trained men (mean age = 21.0 [SD1.9] yrs) attended 3 laboratory visits. Baseline biceps brachii peak torque was assessed using an isokinetic arm curl protocol on a Biodex dynamometer. Four BFR arm-curl conditions (i.e., all 30% occlusion with 30 second rest between sets) were randomized to each arm for per visit resulting in 5 measures for each condition (A: standard 30% 1RM, 30,15,15,15 reps 3 sec/rep; B: 50% 1RM, 15, 10, 10, 10 reps, 6 sec/rep; C: 30%1RM, 12, 9, 9, 9 reps, 6 sec/rep; D:50%1RM, 15, 10, 10, 10, 10, 3 sec/rep. Blood lactate was assessed for 5 minutes after the exercise with peak arm isokinetic curl torque measured at 7 minutes. **RESULTS:** Participants were able to complete 91% of condition A's repetitions, 41% of condition B, 99% of condition C, and 68% of condition D. RPE was highest for condition B, followed by D, A, then C. Muscular time by load burden was calculated by TUT and TUT x load. Condition A had notably higher session TUT (191 sec;  $p = .035$ ) and TUT x load = 7388.11 sec\*kg ( $p = .001$ ) compared to the next highest condition C (TUT = 109, TUT \* load = 1994.9 sec\*kg. Non-statistically significant changes in max isokinetic torque between baseline and conditions showed fatigue for A (-3.9 [SD8.62]) but not for B (1.27 [SD 11.04]), C (3.47 [SD 10.17]), or D (2.17 [SD 9.4]). Peak lactate trended higher for condition A at 3.8 (SD.86) and B at 3.5 (SD.61) with conditions D (3.0 [SD1.02]) and C (2.4 [SD.68]) being lower ( $p$ -value = .074). **CONCLUSION:** Increasing the %1RM and or slowing rep speed resulted in participants not meeting the repetition targets and resulted in significantly lower exercise volume than the standard 30%1RM with a 30, 15, 15, 15 repetition scheme.

#### STUDENT AWARD POSTER COMPETITION (D1–D8, M1–M8, U1–U8)

##### D1: COMPARISON OF RAW ACCELERATION FROM CONSUMER WEARABLES AND ACTIGRAPH ACCELEROMETERS USING A MECHANICAL SHAKER TABLE

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**BACKGROUND:** Though the proprietary signal processing of acceleration output from consumer wearables limits their use for research on physical activity (PA) and sleep assessment, it may be possible to develop open-source prediction equations for estimating PA and sleep based on raw acceleration estimates from these devices. Thus, the aim of this study was to compare raw acceleration output from ActiGraph wGT3X-BT (ActiGraph) and consumer wearables (i.e., Garmin Vivoactive 4S [Garmin] and Apple Watch Series 7 [Apple]) using a mechanical shaker table (Scientific Industries; Mini-300 Orbital Genie, Model 1500). **METHODS:** A total of 30 devices, including 10 ActiGraph accelerometers and 10 of each consumer wearable were analyzed in this study. Validity of raw acceleration estimates from consumer wearables was tested against a criterion of ActiGraph. Devices were mounted directly to the twin ratcheting clamps of the shaker table and were oscillated at various speeds (i.e., 0.6 Hz, 1.0 Hz, 1.5 Hz, 1.9 Hz, 2.4 Hz, 2.8 Hz, and 3.2 Hz) for 2-minutes each (i.e., 7 speeds for 2 minutes each) until all consumer wearables were compared to all ActiGraph devices. The raw acceleration values for the x, y, and z axes were extracted from the middle minute of each 2-minute speed, and the maximum vector magnitude was calculated for each second. Pearson product moment ( $r$ ) and Lin's concordance correlation coefficients (CCC) were calculated. Bland-Altman plots were also constructed with mean bias and 95% limits of agreement. **RESULTS:** The correlations of Garmin and Apple with ActiGraph were  $r = 0.881$  and  $r = 0.933$ , respectively. CCC from raw acceleration estimates for Garmin and Apple were 0.763 and 0.918, respectively. Bland-Altman plots (consumer wearable minus ActiGraph) revealed mean differences 0.044 (95% CI: -0.054, 0.142) between Garmin and ActiGraph and -0.002 (95% CI: -0.097, 0.094) between Apple and ActiGraph. **CONCLUSIONS:** There was moderate concordance and strong correlation between raw acceleration estimates from Garmin and ActiGraph, while there was strong concordance and correlation between raw acceleration estimates from Apple compared to ActiGraph. Garmin and Apple provide comparable estimates of raw acceleration compared to ActiGraph, suggesting that raw acceleration estimates from consumer wearables can be used to develop open-source prediction equations for estimating PA and sleep. **Grant or funding information:** Research reported in this abstract was supported by the National Institute of Diabetes and Digestive Kidney Diseases of the National Institutes of Health under Award Number R01DK129215. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

##### D2: EVALUATION OF THE RELATIONSHIP BETWEEN BODY COMPOSITION AND MENOPAUSE SYMPTOMS ACROSS THE MENOPAUSE TRANSITION

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**BACKGROUND:** Up to 85% of women experience physical and psychological menopausal symptoms, which can last on average for over 7 years during the menopause transition (MT). The MT is also associated with unfavorable body composition changes of increased adipose tissue and decreased fat-free mass (FFM; lean mass and bone mineral content). The purpose of this study was to characterize the contribution of changes in body composition (percent body fat [%BF] and fat-free mass index [FFMI]) to total number of menopausal symptoms (TMS) across pre- (PRE), peri- (PERI), and post-menopausal (POST) groups. **METHODS:** Seventy-two healthy females were categorized by menopause status: PRE ( $n = 24$ , Age =  $39.8 \pm 3.3$  yrs; %BF =  $31.8 \pm 7.6\%$ ) eumenorrheic; PERI ( $n = 24$ , Age =  $50.0 \pm 3.4$  yrs; %BF =  $39.0 \pm 7.1\%$ ) irregular periods or amenorrheic for <12 months and  $\geq 38$  years old; and POST ( $n = 24$ , Age =  $54.7 \pm 3.5$  yrs; %BF =  $38.0 \pm 6.9\%$ ) amenorrheic for  $\geq 12$  months. The North American Menopause Society Validated Questionnaire was used to determine TMS. A whole-body dual energy x-ray absorptiometry (DXA) scan was used to evaluate %BF and FFM. FFMI was calculated from DXA-derived FFM (kg) relative to height ( $m^2$ ). Bivariate correlations were used to analyze strength of relationships between body composition and TMS. Stepwise linear regressions were then applied to evaluate the independent effects of %BF and FFMI on TMS. **RESULTS:** %BF demonstrated a significant positive correlation with TMS ( $r = 0.464$ ;  $p < 0.001$ ), while FFMI did not ( $r = -0.021$ ;  $p = 0.862$ ) for the entire sample. %BF was a significant predictor for TMS across the entire sample ( $R^2 = 0.215$ ;  $p < 0.001$ ), however when stratified by group, %BF was significant for the PERI group only ( $R^2 = 0.442$ ;  $p < 0.001$ ), explaining 44% of the variation in TMS. FFMI was not a significant predictor for TMS. **CONCLUSION:** %BF predicted nearly half of the variance in TMS in PERI women, demonstrating a sizeable impact of body fat accumulation across the MT. The need and potential for targeted exercise and nutrition interventions to alleviate changes in body fat may also reduce menopausal-related symptoms

for women in peri-menopause. **Funding information:** This study was supported by the UNC Center for Women's Health Research.

### D3: EFFECTS OF RESISTANCE TRAINING ON MITOCHONDRIAL ADAPTATIONS TO SUBSEQUENT ENDURANCE TRAINING

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**BACKGROUND:** While resistance training (RT) has long been appreciated for enhancing muscle mass and strength, it is widely underappreciated and under-utilized by endurance athletes and practitioners. However, several studies have shown beneficial effects of RT on endurance performance, which is usually linked to an improvement of running economy through neuromuscular adaptations. Emerging evidence highlights that RT may also promote positive mitochondrial adaptations, which could ultimately enhance endurance performance. Even though there are several studies investigating the effects of concurrent training, to the best of our knowledge, no study to date has investigated the effects of performing a block of RT-only before initiating endurance training (ET)-only. Therefore, the goal of the present study was to investigate the effects of RT on adaptations to subsequent ET. **METHODS:** 23 young untrained males were recruited and divided into two groups: 1) ET-only (n=12), which performed 7 weeks of high-intensity interval training; 2) RT+ET (n=11), which performed 7 weeks of RT twice weekly before initiating 7 weeks of the same endurance training performed by ET-only. All participants performed a maximal oxygen uptake test on a treadmill for determination of  $\dot{V}O_{2max}$  and speed at onset of blood lactate accumulation (OBLA) before (PRE) and after (POST) ET. Furthermore, muscle biopsies were obtained from participants' vastus lateralis at PRE and POST and used to determine the levels of proteins involved in mitochondrial remodeling. **RESULTS:** Both groups significantly increased  $\dot{V}O_{2max}$  and speed at OBLA ( $p < 0.001$ ) similarly. Protein levels of mitochondrial complexes I, II, and III, and Mitofusin 2 (Mfn2) increased, while Parkin decreased similarly in both groups (main effect of time,  $p < 0.05$ ). Significant interactions were found for complex IV (ET-only (PRE < POST),  $p = 0.039$ ) and PGC-1 $\alpha$  (ET-only-POST > RT+ET-POST,  $p = 0.001$ ). **CONCLUSIONS:** Our results suggest that performing RT prior to ET had no additional benefit on mitochondrial and endurance performance adaptations to ET in young untrained males. Participant compensation as well as select reagents related to analyses presented herein were funded by a grant awarded by National Strength and Conditioning Association Foundation to Paulo H.C. Mesquita.

### D4: HIGH SALT-INDUCED ELEVATIONS IN MCP-1 AND BLOOD PRESSURE REACTIVITY ARE NOT CORRELATED IN YOUNG ADULTS

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**Background:** Americans overconsume dietary salt, which is a major risk factor for hypertension and cardiovascular disease. We have demonstrated that short-term high salt (HS) increases blood pressure reactivity (BPR), which is prognostic of incident hypertension. Additionally, HS increases the inflammatory marker monocyte chemoattractant protein-1 (MCP-1), which is associated with increased resting blood pressure (BP) in patient populations. However, it is unclear whether MCP-1 is associated with BPR in healthy young adults. Therefore, the purpose of this study was to examine the relation between resting MCP-1 and BPR during exercise in healthy young adults after 10 days of HS. **Methods:** We used a randomized, crossover, double-blinded design. 20 young adults (12M/8F, 24  $\pm$  4 yrs, BMI = 23.0  $\pm$  0.6 kg/m<sup>2</sup>, BP = 111  $\pm$  10/64  $\pm$  8 mmHg) consumed HS (3.9 g sodium) or placebo (PLA; dextrose) capsules for 10 days separated by  $\geq$  two weeks. On day 10 of each intervention, we collected a blood sample and participants completed 50 minutes of 60%  $\dot{V}O_{2max}$  cycling. We used finger photoplethysmography (Finapres Finometer Pro) to assess beat-to-beat BP. We calculated BPR as the difference in average BP from rest compared to average BP during exercise. We used ELISA (R&D Systems) to assess plasma MCP-1 concentrations. We compared MCP-1 concentrations and BPR differences between HS and PLA using a Student's *t* or Wilcoxon test. We assessed relations between resting MCP-1 and resting BP and exercising BPR using Pearson's correlations (*r*; normally distributed data) and Spearman's rank correlation ( $\rho$ ; non-normally distributed data). Significance was set *a priori* to  $p \leq 0.05$ . **Results:** There were no differences in resting BP between HS and PLA ( $ps > 0.831$ ). MCP-1 (PLA; 72.4  $\pm$  12.5, HS; 78.1  $\pm$  14.7,  $p = 0.010$ ) and systolic BPR (PLA; 30.0  $\pm$  16.3, HS; 38.3  $\pm$  19.3,  $p = 0.33$ ) were significantly

higher after HS versus PLA. However, changes in MCP-1 and systolic BPR were not correlated ( $r = 0.05$ ,  $p = 0.758$ ). While MCP-1 was not correlated with BPR within conditions, irrespective of condition, MCP-1 was correlated with resting systolic and mean BP ( $ps < 0.05$ ). **Conclusion:** MCP-1 and BP reactivity are increased after 10 days of HS consumption in healthy young adults. There were no correlations between high salt-induced changes in MCP-1 and BPR, however, MCP-1 did correlate with resting systolic and mean BP.

### D5: TRANSIENT RESPONSES OF MYOSTATIN SIGNALING MARKERS TO ACUTE BOUTS OF RESISTANCE TRAINING

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**BACKGROUND:** The myostatin (MSTN) gene has been heavily researched for its role in repressing skeletal muscle hypertrophy and the anabolic mTORC1 signaling pathway. Preliminary data from our laboratory has shown a significant hypermethylation of cytosine phosphate guanine sites within the MSTN gene as well as a significant downregulation of MSTN mRNA following acute bouts of resistance exercise to failure (i.e., training at 30% one repetition maximum versus 80% one repetition maximum). This study sought to determine the changes of MSTN-related and mTORC1 signaling proteins following two bouts of resistance exercise to failure. We hypothesized there to be significant time-effects of assayed markers in response to each bout of resistance training. **METHODS:** Eleven previously-trained college-aged men (age: 23  $\pm$  4 years, 11.4  $\pm$  6.4 percent fat, 4  $\pm$  3 years training experience) participated in this study. Each participant performed two resistance training sessions (spaced one week apart) involving either: i) 30FAIL training; 4 sets of back squats and 4 sets of leg extensors to failure at 30% of one-repetition maximum (1RM), or: ii) 80FAIL training; 4 sets of both exercises at 80% of 1RM. Vastus lateralis muscle biopsies were obtained prior to each training session (PRE), 3 hours following training (3hPOST), and 6 hours following training (6hPOST). Western blots were performed on biopsied muscle to determine the relative expression of phosphorylated (p)-mTOR (Ser2448), p-p70S6K (Thr389), p-AKT (Ser473), p-rpS6 (Ser235/236), follistatin (FST), and MSTN. **RESULTS:** There were no significant bout\*time interactions for any of the assayed markers. There were significant differences observed for p-p70S6K ( $p = 0.001$ ; PRE to 3hPOST) and FST ( $p = 0.021$ ; PRE to 6hPOST). There were no significant main time effects observed for p-mTOR, p-AKT, or p-rps6. **CONCLUSIONS:** The two modes of resistance training elicited similar effects on p-p70S6K and FST protein expression. These results suggest, regardless of training load, mTORC1 markers and MSTN-related protein expression respond similarly in previously-trained college-aged men.

### D6: INTERACTION BETWEEN ENVIRONMENTAL SLEEPING CONDITIONS AND NEXT DAY CORTISOL AND COPEPTIN ON COGNITION

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**BACKGROUND:** Elevated morning concentrations of cortisol and copeptin are associated with poor executive function, but the influence of these hormones on cognitive function (cognitive inhibition domain, i.e., response inhibition and interference control) following sleep in hot environmental conditions is not known. This study examined the influence of sleep environment on cortisol and copeptin and their interaction with cognitive inhibition (CI). **METHODS:** Ten healthy adults (female, n=1; age, 25 $\pm$ 4 y; height, 177.9 $\pm$ 7.4 cm; body mass, 75.8 $\pm$ 13.8 kg; body fat, 13.5 $\pm$ 7.1%) completed two nights of in-laboratory assessments while sleeping in temperate ( $T_{TEMP}$ , 25°C, 30% RH) and hot ( $T_{HOT}$ , 30°C, 30% RH) environmental conditions. Upon awakening, blood was collected to examine serum copeptin, and salivary samples were collected 0, 30, and 45 minutes post-awakening, and the greatest morning cortisol concentration ( $C_{PEAK}$ ) was determined. CI was assessed via the Stroop Color Word Interference task with inhibitory control (measured by inverse incongruity and inverse congruity) reflecting the participants' ability to resist distractions and respond faster to stimuli, indicating better cognitive performance. Paired samples *t*-tests evaluated between-condition differences in hormones and CI between sleep environments. Linear mixed models assessed the effect of hormones and environmental conditions on CI. **RESULTS:** Hormone concentrations did not differ between conditions (mean $\pm$ SD, [collapsed across conditions], Copeptin, 8.77 $\pm$ 3.13pmol/L;  $C_{PEAK}$ , 21.83 $\pm$ 5.62 ng/mL ( $p > 0.05$ ). There were no differences in CI across conditions when measured by inverse incongruity (MD [95% CI], -27.73 ms [-107.88, 52.42],  $p = 0.45$ ) or

inverse congruency (8.29 ms [-38.18, 54.78],  $p=0.69$ ). When controlling for environmental conditions, higher  $C_{PEAK}$  was associated with lower CI ( $\beta = -8.68$  [95%CI, -14.71, -2.54],  $p=0.02$ ) however, there was no significant effect of serum copeptin concentrations on CI ( $p>0.05$ ). **CONCLUSIONS:** Higher awakening cortisol levels following a bout of sleep in a hot environment were associated with reduced incongruency, or an ability to display interference control and resist distractions during a computer-based cognitive inhibition task. Changes in environmental sleeping conditions may not affect CI the next morning, however, the effect of morning cortisol concentrations on this response requires further exploration.

#### **D7: EXERCISE PRIOR TO TUMOR-BEARING PROTECTS CARDIAC FUNCTION AND INHIBITS TUMOR GROWTH IN FEMALE TUMOR-BEARING MICE**

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**Background:** Cancer cachexia, a metabolic wasting syndrome, leads to death in up to 20% of cancer patients. There are no clear diagnostic criteria and cancer cachexia remains an untreated condition. Aerobic exercise has been shown to slow the development of cachexia and attenuate cachexia-mediated muscle loss. However, the most effective timing, intensity, and duration of exercise as a protective and preventative measure against cancer cachexia remains unknown. Therefore, the purpose of this study was to examine the effects and underlying pathways of preconditioning exercise as a protective measure for tumor-mediated muscle wasting. **Methods:** Female LC3 Tg+ and WT mice were randomly separated into four groups, sedentary non-tumor bearing (SED+NT), sedentary tumor bearing (SED+T), treadmill exercise non-tumor bearing (TM+NT), and treadmill exercise tumor bearing (TM+T). Mice underwent an 8-week treadmill exercise protocol (TM) or remained sedentary (SED). Next, T groups were implanted with tumor cells ( $5 \times 10^5$  LLC cells in flank) while NT groups remained non-tumor for additional 4 weeks. To examine effects of exercise on tumor growth and muscle wasting, grip strength, echocardiography, and tumor evaluations were taken at baseline, 8-week, and 12-week time points. After the 12-week study, muscle and tumor tissue was collected and weighed. **Results:** Tumor bearing resulted in significant decline in cardiac function. SED+T showed significant decrease in fractional shortening ( $P<0.05$ ). Interestingly, preconditioning exercise (*prior* to tumor bearing) appeared to preserve cardiac function (TM+T not significantly different than SED+NT). Exercise-mediated cardioprotection coincided with lower TGF- $\beta$  and p62 protein expression and downregulated early-phase autophagy in TM+T mice compared to SED+T mice. Additionally, TM resulted in a 20-fold decrease in estimated tumor volume ( $P<0.05$ ) and a 60% decrease in tumor mass ( $P<0.05$ ) compared to SED tumors. **Conclusion:** These data indicate cardioprotective and tumor suppressive effects of preconditioning exercise by preserving cardiac function, regulating autophagic pathways, and stunting tumor growth. These findings are crucial in identifying the significance of exercise, specifically the timing of exercise, as a protective and preventative measure against the detrimental effects of cancer cachexia.

#### **D8: OBESITY ACCELERATED TUMORIGENESIS AND DID NOT PROTECT AGAINST MURINE CANCER CACHEXIA**

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**BACKGROUND:** Cancer cachexia is the unintentional loss of lean mass and directly contributes to functional dependency, poor treatment outcomes, and decreased survival in cancer patients. Obesity has been suggested to protect against the severity of cachexia due to having 'more to spare'; however, mechanistic support is lacking to promote obesity's benefit. Further, obesity increases cancer risk contributing to the likelihood that cancer patients will be overweight or obese. Thus, the purpose of this study is to investigate the impact of obesity on cancer-induced skeletal muscle loss and function, survival, along with mitochondrial dysfunction and loss using the Lewis Lung Carcinoma (LLC) model of cancer cachexia. **METHODS:** Lean and obese C57/BL6 male mice ( $n=49$ ) were implanted with LLC cells [ $1 \times 10^6$  cells] in the right flank or underwent sham surgery. Skeletal muscle was excised for transmission electron microscopy (TEM), histology, protein analysis, and cellular respiration 25 days following implantation or sham surgery. Cage activity and grip strength were assessed at day 0, 14, and 24. T-tests and mixed effects models were used to assess statistical differences. **RESULTS:** Obese LLC mice had increased tumor area (+83%;  $p<.001$ ) and mass (+176%;  $p<.001$ ), reduced survival (-40%;  $p=.018$ ), along with identical decreases in body weight (-12%;  $p<.001$ ) and skeletal muscle mass loss (-21%;  $p<.001$ ) compared to lean LLC mice. Preliminary TEM analysis unveils

obese mice had greater evidence of mitochondrial dysfunction [auto(mito)phagic, altered cristae, contact area] (+ $\Delta 299\%$ ) regardless of LLC implantation, and identical decreases in mitochondrial content (- $\Delta 47\%$ ) and area (- $\Delta 53\%$ ) in obese and lean LLC mice. Cellular respiration (- $\Delta 43\%$ ;  $p=.007$ ), cage activity (- $\Delta 66\%$ ;  $p<.001$ ), and relative grip strength (- $\Delta 56\%$ ;  $p<.001$ ) were decreased in obese mice compared to lean mice but were not impacted by LLC implantation.

**CONCLUSIONS:** Collectively, these data demonstrate obese mice had decreased survival and were not protected against skeletal muscle loss or mitochondrial perturbations associated with the LLC model of cancer cachexia. Moreover, our data highlight distinct obesity-dependent changes in muscle function and mitochondrial health which need to be explored further due their relevance in cancer-associated muscle wasting.

#### **M1: A SELF-SELECTED 16:8 TIME-RESTRICTED EATING INTERVENTION IMPROVES VARIOUS MARKERS OF CARDIOVASCULAR HEALTH IN MIDDLE-AGE MALE CYCLISTS.**

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Time-restricted eating (TRE) is one dietary intervention that may offer some protection against cardiovascular disease (CVD), while also preserving performance in athletes. To date however, research on TRE in an active population has solely been conducted in college-age cohorts and the effects of TRE in an older, trained population are less understood. Therefore, this study compared the effects of a 4-week, 16:8 TRE intervention on markers of CVD risk in middle-age, male cyclists. Participants ( $n=12$ ; age,  $51.9 \pm 8.6$  y; training duration/week,  $37.5 \pm 14.0$  min;  $VO_{2peak}$ ,  $41.8 \pm 5.6$  mL·kg<sup>-1</sup>·min<sup>-1</sup>) reported to the laboratory for 2 sessions (i.e., baseline and post-TRE) where blood was drawn from an antecubital vein after an 8-hour overnight fast. Dependent variables measured at baseline and post-TRE included insulin, cortisol, brain-derived neurotrophic factor, free testosterone, thyroxine, triiodothyronine, c-reactive protein, advanced oxidative protein products, glutathione, tumor necrosis factor-alpha (TNF- $\alpha$ ), glucose, and a full lipid profile. Compared with baseline, TRE significantly lowered TNF- $\alpha$  ( $12.3 \pm 3.4$  vs.  $9.2 \pm 2.4$  pg·mL<sup>-1</sup>;  $p=0.02$ ) and glucose concentrations ( $93.4 \pm 9.7$  vs.  $87.5 \pm 7.9$  mg·dL<sup>-1</sup>;  $p=0.01$ ), as well as significantly elevated high-density lipoprotein cholesterol levels ( $45.7 \pm 13.7$  vs.  $49.2 \pm 12.3$  mg·dL<sup>-1</sup>;  $p=0.04$ ), respectively. No further statistical changes were observed between all remaining variables (all  $p>0.05$ ). Overall, these data suggest that incorporating a 4-week TRE intervention with habitual endurance training can significantly improve some markers of CVD risk and may compliment the robust health benefits derived from a regular exercise regimen.

#### **M2: EXAMINING SEX DIFFERENCES IN NIRS DERIVED MICROVASCULAR OXYGENATION WHEN CORRECTED FOR PARTICIPANT CHARACTERISTICS**

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**Background:** During vascular occlusion tests (VOT) and with near-infrared spectroscopy (NIRS), it has been shown that men desaturate and re-saturate faster than women, yet inconsistencies have been reported. Therefore, our purpose was to determine if sex differences in VOT variables would persist after normalizing for adipose tissue thickness (ATT), bilateral leg extension one-repetition maximum (1RM), leg circumference, and lean body mass (LBM).

**Methods:** Thirty-one adults (16 men, 15 women) were assessed during a VOT as well as for 1RM, ATT and LBM. A NIRS device was attached to the vastus lateralis during the VOT (1 min baseline, 5 min of femoral artery occlusion, 3 min reperfusion). Before this VOT, an ultrasound quantified ATT. Leg circumference was determined by a tape measure. Body composition was determined via FIT3D. The 1RM was defined as the maximum load moved through the complete range of motion of a bilateral leg extension. The VOT was 9 min and a data point for the skeletal muscle tissue oxygenation (StO<sub>2</sub>,%) was determined every 30-s yielding 18 data points. Following the calculation of these points, they were normalized to the previously defined participant characteristics. Separate 2-way ANOVAs (Sex x Time) were used to examine mean differences in the following: uncorrected StO<sub>2</sub>, StO<sub>2</sub>-ATT, StO<sub>2</sub>-1RM, StO<sub>2</sub>-leg circumference, StO<sub>2</sub>-LBM. A  $p<0.05$  was considered significant.

**Results:** The men exhibited greater 1RM ( $98.2 \pm 11.9$  vs.  $59.4 \pm 11.6$  kg), leg circumference ( $57.2 \pm 4.8$  vs.  $51.8 \pm 3.4$  cm), and LBM ( $64.5 \pm 9.7$  vs.  $45.6 \pm 4.9$  kg), but the women exhibited greater ATT value ( $0.77 \pm 0.2$  vs.  $0.54 \pm 0.2$  cm). The uncorrected NIRS-VOT responses indicated that there was an interaction ( $p<0.001$ ), and the follow-up t-tests demonstrated that men desaturated and re-saturated faster than women. When normalizing the downslope values to circumference and ATT, the men still exhibited a faster rate of

desaturation than women, but normalizing to LBM or strength eliminated this difference. The upslope findings matched the downslope responses.

**Conclusion:** Sex differences related to microvascular responses were partially robust to our normalization approaches. Specifically, we again reported that men exhibit faster rates of desaturation and re-perfusion even when accounting for leg size and ATT, which further supports the notion that these differences are perhaps due to mitochondrial function and/or muscle fiber type.

### M3: TEMPERATURE CONTROLLED MATTRESS TOPPER IMPROVES SLEEP AND RECOVERY IN NCAA DIVISION I FEMALE SOCCER PLAYERS

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**BACKGROUND:** Sleep is imperative to physiological restitution and may have indices to improve performance. There is evidence to suggest that sleep quantity and quality may improve when sleeping in temperatures under 21° C. There is little data surrounding the topic of sleep temperature on performance and recovery in elite athletes, let alone elite female athletes. Therefore, the purpose of this study was to examine the impact that controlled sleep temperature has on sleep quantity, sleep quality, and markers of recovery (resting heart rate, heart rate variability, respiratory rate, and recovery score) in elite female athletes. **METHODS:** 24 Division I female soccer players wore a WHOOP® band continuously for 24h a day throughout the course of a season to measure their activity, sleep, and recovery metrics. Additionally, the players were provided a temperature-controlled mattress topper (ChiliPad®) to help regulate their sleep temperature. Sleep quantity and quality, as well as recovery measurements were recorded before two soccer home matches against top-20 ranked opponents; one with the temperature-controlled mattress (TCM) topper and one without (CON). Data were collected by the strength and conditioning staff as part of their regular athletic performance program, deidentified, and shared with the research team. **RESULTS:** TCM (7hours 33min) resulted in significantly more total hours of sleep (+32 min,  $p = 0.011$ ) compared to CON (7 hours 01 min). Recovery score was not significantly altered between TCM ( $65.4 \pm 13.2\%$ ) and CON ( $56.8 \pm 15.9\%$ ;  $p = 0.082$ ). Subjective sleep quality (based on a scale from 1-10) was significantly higher with TCM ( $6.9 \pm 0.6\text{AU}$ ) vs. CON ( $6.0 \pm 1.0\text{AU}$ ,  $p = 0.002$ ). **CONCLUSION:** The use of temperature-controlled sleep mattress toppers may help to improve sleep quantity and quality, however, more research is needed to understand how recovery and performance are impacted by the use of TCM. This study was funded in part by WHOOP, Inc. and SleepMe, Inc.

### M4: IDENTIFYING THE QUIET EYE - DURATION AND TARGET ACQUISITION SIGNIFICANCE IN PITCHING

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**BACKGROUND:** The Quiet Eye (QE) is defined as the final fixation prior to the initiation of movement and is defined as an eye movement that lasts for 100ms and remains within 3° of visual angle. In targeting sports, QE periods that locate the target early and for longer durations allow performers to retrieve and coordinate motor programs appropriate for the task. In golf putting and basketball shooting studies, earlier onsets and longer fixation times correlate to higher performance outcomes. The purpose of the study is to determine how elite pitchers use their eyes to locate and fixate on a target and execute a pitch being called to that specific location. Researchers hypothesized that QE duration will be significantly longer when the pitchers are shown a target. Moreover, it was also hypothesized that, on average, pitches that are recorded as strikes (S) will show a significantly longer QE fixation duration compared to pitches recorded as balls (B). **METHODS:** A sample of 3 elite level pitchers each threw 30 pitches to live hitters in set targeted and non-set targeted conditions (S= 15, N = 15). In the set targeted condition, the catcher flashed and held his glove to the pitcher at the intended target immediately following the designated pitch call. In the non-set targeted condition, the catcher did not move until after the ball was released. Eye tracking data was recorded on PubiLabs Invisible Eye Tracking Glasses. The Rapsodo 3.0 pitch tracker was used to measure pitch outcomes in terms of strikes (Y) and balls (N). The gaze data was tracked and analyzed through iMotions. All data was accumulated and transferred to JASP 0.16.0 to determine outcomes and significance. Significance was set at  $p > 0.05$ . **RESULTS:** There was a significant difference in fixation duration in the S vs. N conditions ( $1126.88 \pm 563.50$  vs.  $811.21 \pm 532.27\text{ms}$ ,  $p = 0.008$ ). Pitch results (Y vs. N) showed no significant difference ( $977.53 \pm 567.65$  vs.  $946.98 \pm 578.79$ ). **CONCLUSIONS:** These findings suggest that pitchers need a target to fixate for longer durations. Further research is needed

to investigate the spatial and temporal aspects of the target. Moreover, these findings also suggest that fixation duration did not impact a pitcher's ability to throw the ball to the intended target in the strike zone. Further research with more participants is needed to determine QE fixation duration and its effects on pitch outcomes.

### M5: RESISTANCE EXERCISE-INDUCED CHANGES IN PLASMA BRAIN-DERIVED NEUROTROPHIC FACTOR ARE ASSOCIATED WITH TRAINING VOLUME IN FEMALES

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**BACKGROUND:** Brain-derived neurotrophic factor (BDNF) is a neurotrophin hormone involved in neuronal plasticity. BDNF increases due to acute resistance exercise, but much remains to be elucidated to determine the factors affecting the magnitude of the change in acute circulating BDNF. The purpose of this study was to determine the relationship between resistance training volume and circulating BDNF. **METHODS:** Twenty-three participants (16M; 7F) donated blood prior to and immediately after a resistance training exercise bout. Blood samples were processed to obtain normal plasma (NP) and platelet-poor plasma (PPP). Relative resistance training volume was calculated as number of reps performed multiplied by percentage of 1-RM (training intensity) and volume load was calculated as total reps multiplied by absolute training load. Pearson correlation tests were performed to determine the relationship between resistance training volumes and delta BDNF values from pre-to-post exercise for each sample type. Significance was set *a priori* at  $p = 0.05$ . **RESULTS:** Overall, there were no significant associations between the delta BDNF values and relative training volume or volume load for any sample type (all  $p > 0.05$ ). However, when only female participants were analyzed, there was a statistically significant, strong positive correlation between acute NP response and relative training volume,  $r(5) = .90$ ,  $p < .01$ , with relative training volume explaining 81% of the variation in acute NP response. Further, there were statistically significant, strong positive correlations between acute PPP response and relative training volume,  $r(5) = .91$ ,  $p < .01$ , and acute PPP response and volume load,  $r(5) = .77$ ,  $p < .05$ , with relative training volume explaining 82% of the variation and volume load explaining 59% of the variation in acute PPP response. **CONCLUSIONS:** Overall, acute pre-to-post exercise changes in circulating BDNF were not associated with relative resistance training volume or volume load. However, when differentiated by sex, higher resistance training volumes were associated with a greater acute increase in plasma BDNF concentrations in female participants. No such association was found in male participants. Further research is necessary to determine if resistance training volume differentially affects plasma circulating BDNF in females compared with males when larger sample sizes are considered.

### M6: COMPARISONS OF JOINT MOMENTS ESTIMATED BY MARKERLESS AND MARKER-BASED MOTION CAPTURE SYSTEMS DURING TREADMILL RUNNING

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**BACKGROUND:** Markerless (ML) motion capture may transform biomechanics. The feasibility of an ML system to analyze lower extremity kinematics has been reported. However, no literature was found that compares inverse dynamics estimates of joint moments between ML and marker-based (MB) systems. **PURPOSE:** To compare lower extremity joint moments estimated by ML and MB systems during treadmill running. **METHODS:** 16 healthy recreational active young adults were recruited. Participants ran on an instrumented treadmill at 3.58 m/s for 2 min. Kinematic data were recorded simultaneously by 8 infrared and 8 high-resolution video cameras. An instrumented treadmill recorded the force data. Sagittal plane moments at the right hip, knee, and ankle were calculated. The dependent variables were extracted from the last 10 strides from both ML and MB systems. Local peak moment values (Nm) and the relative time (% gait cycle) to peak values were identified within each stride. Peak moments of the hip were: extension in the early stance phase (HM<sub>1</sub>), flexion in the stance-swing transition phase (HM<sub>2</sub>), and extension at the end of the swing phase (HM<sub>3</sub>); for the knee, extension moment in the early stance phase (KM<sub>1</sub>), and flexion at the end of the swing phase (KM<sub>2</sub>); for the ankle, extension moment in the stance phase (AM<sub>1</sub>). Paired t-test with Bonferroni correction was used for statistical analysis.  $\alpha$  level was set at .008 (.05/7). **RESULTS:** Compared to the MB system, the ML system had similar patterns but showed significantly ( $p < .008$ ) greater peak joint moment magnitudes at HM<sub>2</sub> (ML:  $-1.73 \pm 0.27$ , MB:  $-1.38 \pm 0.29$ ), HM<sub>3</sub> (ML:  $2.27 \pm 0.45$ , MB:  $1.42 \pm 0.29$ ), KM<sub>2</sub> (ML:  $-1.17 \pm 0.24$ , MB:  $-0.74 \pm 0.13$ ), and AM<sub>1</sub> (ML:

3.32±0.55, MB: 3.14±0.51), but less peak magnitude at KM<sub>1</sub> (ML: 1.28±0.32, MB: 1.40±0.42). In addition, relative timing to the peak was significantly ( $p < .008$ ) different between MB and ML systems. To be specific, ML took longer than MB to reach HM<sub>1</sub> (ML: 6.74±3.40, MB: 5.16±1.27), HM<sub>2</sub> (ML: 43.59±7.00, MB: 40.26±6.90), HM<sub>3</sub> (ML: 92.73±3.00, MB: 90.58±3.39), KM<sub>1</sub> (ML: 13.53±3.89, MB: 12.98±2.18), and KM<sub>2</sub> (ML: 92.19±2.51, MB: 90.93±2.21). No difference in HM<sub>1</sub> and time to AM<sub>1</sub> was detected. **CONCLUSIONS:** ML was characterized by greater joint moment magnitudes and temporal differences than the MB system. While differences were present, the kinetic and temporal results from an ML system make it promising for biomechanical applications.

#### M7: SLEEP AND MENOPAUSAL SYMPTOMS: AN EVALUATION ACROSS THE MENOPAUSAL TRANSITION

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**BACKGROUND:** Sleep disturbances are a core symptom of menopause. Understanding sleep changes during the menopause transition may mitigate disruptions to overall health and quality of life. The purpose of this study was to evaluate sleep quantity and quality and the relationship with menopausal symptoms in pre-, peri-, and post-menopausal women. **METHODS:** 72 healthy women (mean ± SD; Age=48.0 ± 7.2 years, Ht=163.0 ± 6.3 cm, Wt=69.0 ± 14.2 kg) were stratified as pre-menopausal (PRE; n=24) who were eumenorrhoeic, peri-menopausal (PERI; n=24) who had irregular cycle lengths, and post-menopausal (POST; n=24) who had no period for 12 consecutive months prior to their visit. Overall self-reported sleep quality was quantified by The Pittsburgh Sleep Quality Index (PSQI) to calculate a global score (GS) and reported as minutes asleep per night (RM, min). Participants wore a wrist tracker for at least six consecutive days to evaluate minutes asleep (MA, min), Rapid Eye Movement minutes (REM), and light and deep sleep averages per night. The validated Menopause Health Questionnaire from the North American Menopause Society was used to characterize total number of menopausal symptoms. **RESULTS:** A one-way ANOVA revealed no significant difference between groups in GS, RM or MA ( $p > 0.05$ ). POST had less REM sleep than PRE [mean difference (MD) ± standard error: -14.82 ± 6.07 min;  $p = 0.052$ ]. PERI had more light (MD: 29.21 ± 9.79 min;  $p = 0.012$ ) and less deep sleep (MD: -10.19 ± 4.20 min;  $p = 0.054$ ) than PRE. PERI experienced more hot flashes (MD: 0.75 ± 0.18;  $p = 0.001$ ), night sweats (MD: 0.92 ± 0.21;  $p = 0.001$ ), and tiredness (MD: 0.63 ± 0.22;  $p = 0.020$ ) than PRE. PERI experienced a greater total number of menopausal symptoms (MD: 6.58 ± 1.51;  $p = 0.001$ ) than PRE. GS was significantly positively related to total number of symptoms ( $R = 0.323$ ,  $p = 0.006$ ). There was no significant correlation between REM, light, deep, or MA and total number of symptoms. **CONCLUSION:** Perimenopausal women may experience more sleep disruptive menopausal symptoms that contribute to poor sleep quality. Targeting sleep remediation for perimenopause may be important for improving their health and quality of life.

#### M8: RESPONSES TO HANDGRIP HOLDS TO FAILURE AT TWO UNIQUE FATIGUE THRESHOLDS IN MEN AND WOMEN

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**BACKGROUND:** Critical force (CF) reflects the highest force that can be maintained for a very long time without fatigue. Physical working capacity at the rating of perceived exertion (PWC<sub>RPE</sub>) is the highest force output that can be maintained for a very long time without an increase in RPE. This study compared the force, time to exhaustion (T<sub>lim</sub>), and muscle oxygen saturation responses (SmO<sub>2</sub>) of men and women during continuous, isometric, handgrip holds to failure (HTF) at two fatigue thresholds, CF and PWC<sub>RPE</sub>. **METHODS:** The CF and PWC<sub>RPE</sub> were estimated for 10 men (Mean ± SD: Age 24.8 ± 4.1 yrs) and 10 women (Age 26.5 ± 3.5 yrs) from handgrip HTF at 4 different submaximal intensities (% maximum voluntary isometric contraction [MVIC]) force. CF (kg) was the slope coefficient of the total work (W<sub>lim</sub>) for the 4 holds plotted as a function of T<sub>lim</sub>. RPE was recorded every 10s during the 4 holds. PWC<sub>RPE</sub> (kg) was the y-intercept of the slope coefficients for the RPE vs. time relationships plotted as a function of force. During CF and PWC<sub>RPE</sub> HTF, T<sub>lim</sub> was recorded and SmO<sub>2</sub> responses were measured from the flexor digitorum superficialis with near-infrared spectroscopy. Analyses included 2-way mixed model ANOVAs and polynomial regression ( $p < 0.05$ ). **RESULTS:** For absolute force, there was a main effect ( $p = 0.027$ ) for sex (collapsed across threshold: Men 7.3 ± 2.8kg, Women 5.5 ± 1.8kg). There were no sex x threshold interactions ( $p = 0.531-0.747$ ) or main effects for relative force (collapsed across sex and threshold, %MVIC= 18.9 ± 6.4%) or T<sub>lim</sub> (collapsed across sex and threshold, T<sub>lim</sub>= 685.6 ± 386.0s). There were negative, quadratic relationships between SmO<sub>2</sub> and time for CF

( $R^2 = 0.852$ ,  $p = 0.013$ , SmO<sub>2</sub>Δ= -6.7 ± 17.1%) and PWC<sub>RPE</sub> ( $R^2 = 0.910$ ,  $p < 0.001$ , SmO<sub>2</sub>Δ= -5.8 ± 16.6%) for the men, and a negative, cubic response for PWC<sub>RPE</sub> for the women ( $R^2 = 0.885$ ,  $p = 0.016$ , SmO<sub>2</sub>Δ= -0.7 ± 10.9%). However, there was no relationship between SmO<sub>2</sub> and time for CF for women ( $r^2 = 0.076$ ,  $p > 0.05$ , SmO<sub>2</sub>Δ= -0.5 ± 8.6).

**CONCLUSIONS:** The lack of differences in relative force or in the sustainability (T<sub>lim</sub>) of CF and PWC<sub>RPE</sub> indicated that these thresholds reflect a similar intensity for the men and women. Interestingly, the negative, quadratic patterns of responses for SmO<sub>2</sub> at CF and PWC<sub>RPE</sub> for the men, but no change at CF and a small (<1%) decrease in SmO<sub>2</sub> at the PWC<sub>RPE</sub> for the women, suggested that men may desaturate more during a fatiguing handgrip task.

#### U1: PRIOR SARS-COV-2 INFECTION DOES NOT REDUCE IMMUNOCOMPETENCE IN HUMANS CHALLENGED WITH EXERTIONAL HEAT STRESS

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**BACKGROUND:** Data from animal models suggest that some forms of viral infection can increase risk for exertional heatstroke (EHS), possibly via reductions in immunocompetence. This study examined immunocompetence in persons with prior clinical diagnosis of SARS-CoV-2 infection, who were challenged with 60min of cycling exercise in hot, dry ambient conditions. **METHODS:** Eighteen participants (Age: 21 ± 1 years, Stature: 1.7±0.1 m, Mass: 70.3±2.7 kg, VO<sub>2max</sub>: 47±2 mL<sup>-1</sup>kg lean body mass<sup>-1</sup>.min<sup>-1</sup>) completed 1hr of cycling exercise in an environmental chamber (35°C/35% RH) at an intensity that elicited 9.0 W/kg of metabolic heat production. Ten participants had been previously diagnosed with SARS-CoV-2, and the other eight participants served as Control. Blood samples collected before (Pre), after (Post), 1h after (1-Post), and 3h after (3-Post) exercise, were assayed for soluble cluster of differentiation 14 (sCD-14), soluble intercellular adhesion molecule 1 (sICAM-1), interferon gamma (IFN-γ), and interleukin 8 (IL-8). Heart rate (HR), esophageal temperature (T<sub>c</sub>), mean body temperature (T<sub>b</sub>), minute ventilation (VE), and oxygen consumption (VO<sub>2</sub>) were also measured throughout exercise. Between-group differences were examined using RM-ANOVA with Bonferroni Post Hoc. **RESULTS:** Persons with prior SARS-Cov-2 infection exhibited elevated plasma concentrations of sCD-14 at Pre, Post, 1-Post, and 3-Post (Range: 8.2-17.1%; all  $p < 0.05$ ). They also exhibited elevated IFN-γ concentrations at 1-Post exercise (59.6±11pg/ml;  $p < 0.05$ ). Plasma IL-8 and sICAM-1 concentrations were not different between groups [both  $p > 0.05$ ] and as compared to Control, persons with prior SARS-CoV-2 infection did not exhibit greater elevations in HR (87±5% vs 82±8% of HR<sub>max</sub>), T<sub>c</sub> (1.27±0.50 vs 1.25±0.63 °C), T<sub>b</sub> (1.21±0.41 vs 1.12±0.47 °C), VE (40.7±7.0 vs 36.8±7.8 L/min) or VO<sub>2</sub> (22.9±2.7 vs 24.3±2.4 mL<sup>-1</sup>kg lean body mass<sup>-1</sup>.min<sup>-1</sup>) during the 1hr cycling challenge [all  $p > 0.05$ ]. **CONCLUSIONS:** IFN-γ exhibits direct anti-viral activity and is secreted by activated t-lymphocytes. sCD-14 mediates lipopolysaccharide (LPS) clearance via transport of cell-bound LPS to plasma lipoproteins. Collectively, we interpret the elevated IFN-γ and sCD-14 in persons with prior SARS-CoV-2 infection to indicate that immunocompetence was maintained in the hours following exertional heat stress. These data may have additional context in the area(s) of latent infection and viral reactivation, but require further study before definitive statements can be made.

#### U2: SIMILAR NEUROMUSCULAR RESPONSES TO AN ACUTE BOUT OF BLOOD FLOW RESTRICTED AND TRADITIONAL RESISTANCE EXERCISE

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**BACKGROUND:** The purpose of this investigation was to examine the changes in neuromuscular function of the elbow flexors following an acute bout of traditional (TREx) or blood flow restricted (BFR) exercise. **METHODS:** Eighteen healthy, resistance-trained subjects (7 females) completed one repetition maximum (1RM) testing, as well as two experimental visits. During the experimental visits, subjects completed 4 sets (1x30, 3x15 repetitions) of elbow flexion exercise at 30% 1RM with (BFR) or without BFR (TREx). Thirty seconds of rest was given between each set, and the order of conditions was randomized and counterbalanced across subjects. Visits were separated by at least 48 hours and took place at the same time of day (±1 hour). For the BFR condition, the cuffs were rapidly inflated to 60% arterial occlusion pressure. Prior to and immediately following the exercise bouts, maximal voluntary isometric contraction (MVIC) strength of the participants' dominant arm was assessed, during which surface electromyography (EMG) of the biceps brachii was recorded. All force and EMG signals were processed offline to calculate peak force (PF),

EMG amplitude ( $EMG_{AMP}$ ), and EMG median power frequency ( $EMG_{MDF}$ ). **RESULTS:** There was a significant condition (BFR/TREx)  $\times$  time (PRE/POST) interaction effect for  $EMG_{MDF}$  ( $p=0.003$ ), but not for PF ( $p=0.402$ ) or  $EMG_{AMP}$  ( $p=0.330$ ). Post-hoc analyses indicated that  $EMG_{MDF}$  significantly decreased from PRE to POST in the BFR condition (PRE:  $87.3 \pm 23.7$  Hz; POST:  $68.9 \pm 19.0$  Hz;  $p=0.001$ ), but not in TREx (PRE:  $80.0 \pm 18.4$  Hz; POST:  $78.9 \pm 24.0$  Hz;  $p=0.801$ ).  $EMG_{MDF}$  was also significantly greater post-exercise in the BFR condition when compared to TREx ( $p=0.035$ ). There were simple main effects for time ( $p<0.001$ ) and condition ( $p=0.008$ ) for PF and  $EMG_{AMP}$ , respectively. When collapsed across time, PF significantly decreased from PRE to POST (PRE:  $296.3 \pm 97.8$  N; POST:  $230.5 \pm 68.2$  N;  $p<0.001$ ). When collapsed across condition,  $EMG_{AMP}$  was significantly greater during TREx when compared to BFR (TREx:  $0.26 \pm 0.12$  mV; BFR:  $0.22 \pm 0.10$ ;  $p=0.008$ ). **CONCLUSIONS:** The results of the present investigation suggest that neuromuscular fatigue and decrements in PF are similar following acute bouts of BFR and TREx of the elbow flexors. However,  $EMG_{MDF}$  significantly decreased following BFR, but not TREx, suggesting that the mechanisms of fatigue may differ between modalities.

### U3: MUSCLE MITOCHONDRIAL CAPACITY IS IMPAIRED IMMEDIATELY FOLLOWING STRENUOUS EXERCISE

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**BACKGROUND:** Muscle mitochondria play an essential role supplying energy, especially during strenuous exercise. Near infrared spectroscopy (NIRS) has been developed as a method of noninvasively assessing muscle mitochondrial capacity as a rate of recovery of muscle metabolism after exercise. The purpose of this study was to adapt the NIRS measurements to allow for rapid and repeated assessments of mitochondrial capacity, and to measure the time course of changes in mitochondrial capacity after strenuous, fatigue-inducing exercise. **METHODS:** Healthy male and female, college-aged participants were tested ( $n=9$ , age= $20.7 \pm 1.5$  yrs, BMI= $24.5 \pm 3.6$  Kg/M<sup>2</sup>). Subjects performed one minute of rapid ( $\sim 2$  Hz) plantar flexion exercise on a custom pneumatic ergometer. Muscle mitochondrial capacity was measured before and immediately after the exercise. A NIRS was device was placed on the left medial gastrocnemius muscle. The mitochondrial capacity test used 30-second electrical stimulation to activate the muscle (except right after plantar flexion exercise) followed by six, five-second cuff occlusions repeated four times. The four trials were collected at 49, 154, 259, and 365 seconds post-exercise, each resulting in a separate mitochondrial capacity rate constant. **RESULTS:** Muscle acceleration decreased to  $50.9 \pm 16.9\%$  of starting values indicating muscle fatigue resulting from the strenuous exercise. Mitochondrial capacity was reduced at the first time point from  $2.25 \pm 0.45$  to  $1.0 \pm 0.4$  ( $p<0.01$ ). The fourth time point had significant recovery from the first post-exercise time point ( $2.1 \pm 0.6$ ,  $p<0.01$ ) and was not significantly different from the initial pre-exercise values ( $p=0.479$ ). **CONCLUSIONS:** The 54% reduction in mitochondrial capacity supports the hypothesis that a minute of strenuous exercise transiently impairs mitochondrial capacity that recovers in six minutes in young, healthy individuals. The NIRS method has the potential to follow time course changes in muscle mitochondrial capacity. Further studies of the transient effects of exercise on muscle mitochondrial capacity in healthy as well as diseased populations is warranted.

### U4: EFFECT OF PERSONALITY AND COMPETITION ANXIETY ON HEART RATE VARIABILITY AND SALIVARY STRESS MARKERS

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**BACKGROUND:** Understanding the effects of personality and anxiety on the competing forces of the parasympathetic and sympathetic nervous systems may help guide clinical and performance decisions. It has been found that competition anxiety has been linked to poorer heart rate variability (HRV) post-competition, but this effect has yet to be benchmarked with biological markers such as cortisol. The purpose of this study was to determine the effects of competition anxiety and the big 5 personality traits on heart rate variability and cortisol. **METHODS:** 14 endurance runners competing in a 25 kilometer trail race were recruited. Saliva, HRV, and resting heart rate were collected pre-race (before warm-up), post-race (within 5 minutes of completion), and 1hr post-race. The IPIP-NEO-120 big 5 personality survey and the Competitive State Anxiety Inventory-2 were given to participants pre-race. The collected data was analyzed using a bivariate correlation test. **RESULTS:** There was no significant relationship between any sub-category of competition anxiety and HRV at any time point. There was a correlation between cortisol and both

somatic and cognitive anxiety at the pre-race time point ( $r=0.69$ ,  $p=0.029$  and  $r=0.70$ ,  $p=0.025$ ; respectively). Somatic anxiety also shares a correlation with cognitive anxiety pre-competition ( $r=0.68$ ,  $p=0.008$ ). 60 minute post-race HRV and the personality trait of openness displayed significant relationship ( $r=-0.58$ ,  $p=0.030$ ). Agreeableness was associated with competition self-confidence ( $r=0.55$ ,  $p=0.042$ ). Openness was also significantly correlated with somatic competition anxiety ( $r=0.58$ ,  $p=0.029$ ). HRV by RMSSD at 60 minutes post-race was significantly associated cortisol at both 5 and 60 minutes post-race ( $r=-0.59$ ,  $p=0.027$  and  $r=-0.57$ ,  $p=0.044$ ; respectively). **CONCLUSION:** While competition anxiety and HRV were not significantly associated, HRV was benchmarked by cortisol post-race. Some big 5 personality traits predicted competition anxiety and HRV, suggesting further research into personality's effect on the autonomic nervous system during and in preparation for exercise is warranted.

### U5: LOWER BODY POWER IS RELATED TO HITTING PERFORMANCE IN YOUTH BASEBALL ATHLETES

Trent Agee, Nicole Bordelon, Katherine Everhart, Anthony Fava, Billy Lozowski, Yuki Yanagita, Adam Nebel, Gretchen Oliver, FACSM. *Auburn University, Auburn, AL.*

**BACKGROUND:** Baseball hitting requires force generated at the lower extremities to be transferred through the trunk, upper extremities, and finally the bat to maximize performance. Therefore, lower body power may be related to hitting performance. The purpose of this study was to determine the relationship between lower body power and baseball hitting performance. **METHODS:** Fifty-one youth (9-17 yrs) baseball athletes [right-handed ( $n=48$ );  $11.5 \pm 1.7$  yrs,  $152.4 \pm 13.2$  cm,  $50.5 \pm 15.5$  kg] who were active on a team roster and injury free for the past six months participated. Athletes performed two trials each of a maximal effort standing broad jump (SBJ), triple broad jump (TBJ), and single leg lateral rotational jump (LRJ) (bilaterally). Athletes were then instructed to perform three maximal effort swings off a stationary tee positioned in the center of the strike zone. Hitting performance (exit velocity) was measured using a Rapsodo® Hitting 2.0 unit positioned 4.3 meters from home plate. Peak values for the SBJ, TBJ, single leg LRJ, and exit velocity were used for analysis. Pearson-product moment correlations were used to determine bivariate associations between jump distances (cm) and exit velocity (mph). A forward multiple linear regression, including height (cm) and jump distances, was performed to determine the best predictor of exit velocity. Height was entered initially to estimate the proportion of variance accounted for by the anthropometric measure. The additional predictive value of each jump distance, above and beyond the predictive effects of height were also estimated ( $\Delta R^2$ ). Statistical significance was set *a priori* to  $p < .05$ . **RESULTS:** The mean peak exit velocity was  $56.1 \pm 8.03$  mph. Bivariate correlations determined SBJ, TBJ, and single leg LRJ distances were all significantly and positively related to exit velocity (all  $p$ -values  $< .001$ ). The regression analysis indicated that body height accounted for 65.9% of the variance in exit velocity alone. The predictive model was improved by adding peak SBJ [ $\Delta R^2 = .090$ ;  $R^2 = 0.749$ ,  $F(2, 48) = 71.7$ ,  $p < .001$ ]. On average, the model predicted that a 1.1 mph increase in exit velocity for every 10 cm increase in peak SBJ ( $\beta = .376$ ,  $p < .001$ ). **CONCLUSIONS:** Lower body power is positively related to hitting performance in youth baseball hitters. Specifically, the SBJ had the highest correlation to exit velocity with height held constant.

### U6: SEX AND CUFF PRESSURE SPECIFIC HEMODYNAMIC RESPONSES TO BLOOD FLOW RESTRICTION LEG EXTENSIONS

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**Background.** Resistance training with blood flow restriction (RT+BFR) has emerged as a relevant and popular exercise prescription in nearly all populations engaging in physical activity (e.g., athletic, clinical, older, etc.). However, there is limited data related to the influence of various cuff pressures on the exercise pressor reflex (EPR) and resulting blood pressure (BP) increase, especially in women who have previously been excluded from several prominent lines of biomedical research. Therefore, our purpose was to investigate the cuff pressure- and sex-specific hemodynamic responses to RT+BFR. **Methods.** 33 healthy college-aged ( $24 \pm 6$  yrs) adults (16 male, 17 female) completed 2 randomized, experimental visits. These were randomized such that one day the participants completed the RT+BFR with 40% of the minimum pressure to occlude each femoral artery (AOP), whereas the other day participants exercised with 60% AOP. The exercise consisted of 4 sets (1x30, 3x15) of bilateral leg extension with a load corresponding to 30% of each respective one-repetition maximum (1RM). Following each set, heart rate (HR) was recorded, whereas BP was recorded only at baseline and after the last set. Percent change

from baseline was calculated for HR and BP. Two, mixed-factorial ANOVAs were performed to examine mean differences in percent change of mean arterial pressure (MAP) and HR. **Results.** The mixed-factorial ANOVA for MAP indicated that there was no Sex  $\times$  Cuff Pressure interaction ( $p=0.480$ ) or main effect for Sex ( $p=0.481$ ), but there was a main effect for Cuff Pressure ( $p=0.028$ ). The 60% AOP provoked a significantly greater percent increase than 40% AOP ( $23.2 \pm 11.5\%$  vs.  $17.4 \pm 10.9\%$ ;  $\Delta=5.8\%$ ,  $CI_{95\%}= 6.5 - 11.0$ ). For HR, there was no significant ( $p>0.05$ ) interaction or main effects, but every value was positive suggesting HR increased indiscriminately across the exercise bout. **Conclusions.** Our results indicated that an acute bout of RT+BFR likely elicited an augmented EPR such that the typically observed sex difference in increase of MAP was not observed. That is, men and women increased MAP to a similar extent in response to RT+BFR with a cuff pressure of 40% and 60% AOP. Thus, prescribing a cuff pressure on the basis of sex is likely not needed based on the current findings. Also, our results may be useful to clinicians concerned with an augmented EPR such that 40% AOP may be the safest in terms of BP.

#### U7: AD LIBITUM WATER CONSUMPTION PREVENTS EXCESSIVE DEHYDRATION DURING SIMULATED WORK IN THE HEAT

Annabel E. Leonard, Anne M. Mulholland, Jonathan E. Wingo, FACSM. *The University of Alabama, Tuscaloosa, AL.*

**BACKGROUND:** The National Institute for Occupational Safety and Health (NIOSH) recommends workers follow work-to-rest ratios and consume at least 237 mL of water every 15-20 minutes ( $\leq 1.4$  L/h) to reduce heat injury risk. Ad libitum water intake of a smaller volume may also be effective if work-to-ratios are followed, but this has not been tested. Accordingly, this study tested the hypothesis that ad libitum room temperature water intake prevents excessive dehydration (body mass loss  $<2\%$ ) during simulated moderate intensity work in the heat when following a 45:15-min work:rest ratio. **METHODS:** Eight subjects [5 women; (mean $\pm$ SD) age=25 $\pm$ 5 y; body mass=74.8 $\pm$ 11.6 kg; body fat=24.0 $\pm$ 9.0%] completed one visit. Hydration status was measured upon arrival, with adequate hydration defined as urine specific gravity (USG)  $\leq 1.020$ . Participants then completed 120 min of simulated moderate-intensity work in hot conditions [indoor wet bulb globe temperature=29.0 $\pm$ 0.6  $^{\circ}$ C], utilizing the NIOSH-recommended 45:15-min work:rest ratio for the test conditions. Moderate work was achieved by 2.5 min of arm curls (4.5 kg at 20/min) and 20 min of treadmill walking ( $VO_2=1.0-1.1$  L $\cdot$ min $^{-1}$ ), repeated once for a total of 45 min of work, and followed by 15 min of seated rest. Two 45:15 work:rest cycles were completed in succession. Subjects were provided an initial 500 mL of water at room temperature (21  $^{\circ}$ C) and instructed to drink at any time. Additional water was provided automatically if participants consumed all 500 mL prior to the end of the protocol. Whole body sweat loss was calculated from the difference in pre- and post-exercise nude body mass, adjusted for fluid consumed, respiratory water loss, metabolic mass loss, and urine output. **RESULTS:** Participants were adequately hydrated upon arrival (USG=1.008 $\pm$ 0.005). Over 120 min of work and rest, participants drank 0.44 $\pm$ 0.30 L of 21.4 $\pm$ 4.4  $^{\circ}$ C water ad libitum, which did not fully replace sweat losses (-1.2 $\pm$ 0.1 kg,  $P=0.001$ ). This resulted in a body mass loss of 0.9% $\pm$ 0.4% (range: 0.3%-1.6%), which remained below the 2% threshold ( $P<0.001$ ). **CONCLUSION:** Ad libitum consumption of room temperature water prevents body mass loss  $>2\%$  during 120 min of simulated moderate intensity work in the heat when adhering to NIOSH work:rest guidelines. This study was funded by the Deep South Center for Occupational Health and Safety, a NIOSH Education and Research Center.

#### U8: ACCENTUATED ECCENTRIC OVERLOAD AS A POST-ACTIVATION POTENTIATION ENHANCEMENT OF SHORTSPRINT PERFORMANCE

John Kennington, Jarrod Kennington, Cole Anderton, Gene Hurst, Rebecca R. Rogers, Christopher G. Ballmann, FACSM, Tyler D. Williams. *Samford, Birmingham, AL.*

**BACKGROUND:** Post-activation potentiation enhancement (PAPE) strategies are used to improve acute sprint performance. While PAPE techniques have conflicting evidence, accentuated eccentric overload (AEO) is a strategy that allows for a supramaximal eccentric load which may potentiate subsequent performance. Thus, the purpose of this study was to examine the effects of Bulgarian split squat (BSS) with and without AEO on 10-yd sprint performance. **METHODS:** Eight resistance-trained, college-aged males were recruited for this study. In a crossover, counterbalanced study design, participants completed 3 testing sessions. During the first test session, participants completed a BSS one-repetition maximum (1RM) assessment for the dominant and non-dominant leg. For the second and third session, participants completed two baseline 10-yd sprints with 2 minutes of rest between. Next, participants performed a PAPE exercise. During the BSS trial,

participants completed 2 repetitions each leg at 80% 1RM. In the AEO trial, participants completed 2 repetitions each leg where the eccentric load was 120% 1RM and the concentric load was 80% 1RM. Participants completed a 10-yd sprint at 1-, 4-, 7-, and 10-minutes post-PAPE exercise. Timing gates were used to measure 10-yd sprint times and a repeated measures ANOVA compared sprint performance between conditions and recovery times. **RESULTS:** There was no interaction or main effect for condition ( $p>0.05$ ). There was a main effect for time ( $p<0.001$ ). Sprint performance was significantly faster at 10-min compared to baseline ( $p=0.049$ ), 4-min ( $p=0.011$ ), and 7-min ( $p=0.020$ ) post-PAPE. Additionally, 7-min was significantly faster than 4-min ( $p=0.024$ ). **CONCLUSIONS:** The results of this study suggest that performing a unilateral PAPE exercise with 10 minutes of rest may improve 10-yd sprint performance in resistance-trained individuals. Furthermore, the addition of AEO to the unilateral exercise resulted in no additional benefit to subsequent sprint performance.

#### SYMPOSIUMS (S1-S14)

##### S1: MOVING AWAY FROM BMI MEASURES: THE NEED FOR A CENTRALIZED REPOSITORY

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Body mass index (BMI) is widely used as a proxy for body composition (BC); however, its validity is limited by differences in the distribution of body fat (BF) and fat free mass (FFM) for a given BMI across age, sex, race, and patients with chronic diseases. Therefore, major efforts are needed to establish an international standard classification of BC parameters. Core to these efforts is constructing a reliable and high-quality database with BF and FFM measures made up of a representative sample of the world's population. Considering the known association between BF and risk of adverse health outcomes, the purpose of this symposium is to discuss the need for a master repository by merging datasets of national health data registries from different regions of the world (United States, Korea, and United Kingdom) to develop a BC classification system accepted universally. Dr. Jaggars will discuss the current state of BC literature and risk of chronic disease, Dr. Porter will discuss research from NHANES related to BF and disease risk, Dr. Kindred will discuss research from the United Kingdom Biobank dataset related to BF and disease risk, and Dr. Sui will discuss research from the Korean NHANES dataset related to BF and disease risk. Researchers and practitioners will gain an understanding of the impact BC has on health outcomes and how they differ across global populations. This symposium will identify a critical need for a master repository of global BC data to produce a more robust BC classification system that does not discriminate, while also highlighting the implications that could be discovered by having a centralized global database so healthcare professionals from any region of the world could provide international patients with better advice regarding the adverse risk dysfunctional BC could have on their health.

##### S2: MUSCLE WASTING IN CANCER: OPPORTUNITIES AND CHALLENGES FOR EXERCISE IN CLINICAL CANCER TRIALS

Ciaran M. Fairman. *University of South Carolina, Columbia, SC.*

Despite the well-known benefits of exercise, there remains a paucity of clinical evidence supporting the impact of exercise in cancer-related muscle loss. There are numerous challenges to reversing muscle loss with exercise in clinical cancer settings, ranging from the impact of cancer/treatments on the molecular regulation of muscle mass, to clinical challenges in responsiveness to an exercise intervention. For example, tumor-related/treatment-related factors (e.g. nausea, pain, anaemia, and neutropenia), presence of comorbidities (e.g. diabetes, arthritis, and chronic obstructive pulmonary disease), injuries, disease progression and bone metastases, concomitant medications (e.g., metformin), can negatively affect an individual's ability to exercise safely and limit subsequent adaptation. Further, vague and overlapping operational conditions between different scenarios of low muscle mass (i.e. cachexia vs. sarcopenia) make it difficult to achieve consensus, and to study these conditions appropriately. Lastly, the lack of consensus on what a successful outcome is in these conditions, preclude advancement of research towards establishing recommendations for their management. This symposium will summarize relevant literature to (i) review the factors influencing skeletal muscle mass regulation, (ii) provide an overview of how cancer/treatments negatively impact these, (iii) review factors beyond muscle signaling that can impact the ability to participate in and respond to an exercise intervention to counteract muscle loss in

cancer, and (iv) provide perspectives on critical areas of future research.

### **S3: EXERCISE IS MEDICINE ON CAMPUS: SCOPING REVIEW & CALL FOR COLLABORATION**

Patricia Bauer<sup>1</sup>, Cayla McAvoy<sup>2</sup>, A'Naja Newsome<sup>3</sup>, Rebecca Battista, FACSM<sup>4</sup>. <sup>1</sup>Florida Gulf Coast University, Fort Myers, FL. <sup>2</sup>University of North Carolina-Charlotte, Charlotte, NC. <sup>3</sup>University of Central Florida, Orlando, FL. <sup>4</sup>Appalachian State University, Boone, NC.

Exercise is Medicine on Campus (EIM-OC) provides universities an opportunity to collaborate and opens a dialogue with public health officials on how to promote physical activity and its health benefits (ACSM, 2022). Universities and colleges may register their program with the ACSM and join over 220 other registered college campuses by encouraging faculty and students to get-up and get-moving. The EIM-OC program has three levels of recognition: bronze, silver, and gold. Gold level universities or colleges must agree to one silver-level activity and one bronze-level activity, to institute the Physical Activity Vital Sign (PAVS), or some type of routine Physical Activity assessment, within Campus Health, and a Plus One Referral Activity. However, despite over 150 institutions being recognized for implementing EIM-OC programs in 2022, the current status of literature shows gaps in program content, outcome measures and collaborations across EIM-OC programs. The symposium will cover a general historical summary of EIM-OC programming, expose the current status of literature, and explore ideas for improved collaboration and support. Each presenter will give a brief description of common practice and current issues from their gold, silver, and bronze level EIM-OC programs (App State, FGCU, UCF and UNC-C). The objectives of this symposium are to increase awareness of current EIM-OC program practices across the region, provide common recommendations based on experienced program advisors, explore the role of EIM-OC regarding mental health, and work to encourage and support collaborations to enhance program impacts. To achieve these objectives, the symposium will focus on the following EIM-OC related topics: (1) Evidence-based summary of EIM-OC Gold level program common components; (2) Use and expansion of current referral systems to increase participation; and (3) Explore the role of mental health assessments in EIM-OC. Finally, we will offer a framework that may assist in program evaluation to enhance communication of program outcomes and increase potential for funding.

### **S4: RELATIVE ENERGY DEFICIENCY SYNDROME (RED-S) AND HYPERTENSION IN ATHLETES; LIMITATIONS OF A LARGER PROBLEM**

Troy M. Purdom. *North Carolina Agricultural and Technical State University, Greensboro, NC.*

Large percentages of athletes suffer from low energy availability or LEA during training and competition by not consuming adequate calories to meet total daily energy expenditure. LEA in as little as four days in female collegiate athletes has been shown to disrupt hypothalamic-pituitary-gonadal axis indicating the acute nature of a syndrome known as relative energy deficiency syndrome or RED-S. Despite the prevalence of LEA amongst athletes and known performance decrements, concern is emerging amongst experts indicating a larger problem that includes male and female athletes alike that includes but not limited to compromised bone, mental, endocrine, and cardiovascular health. RED-S when chronic can increase the sympathetic stress response at results in hypertension. However, in athletes as a result of the high intensity exercise, they participate in, positive adaptations affecting hemostatic function include cardiac chamber dimension, myocardial thickness, and vascular adaptations to improve cardiovascular performance. This presents a paradox whereby, despite these positive cardiovascular changes, chronic systemic stress due to LEA can negatively resonate as RED-S in the form of hypertension. Hypertension is the most commonly observed cardiovascular disease within athletic populations. Post-mortem forensic studies show that 80% of all sudden cardiac deaths SCD in athletes are the result of cardiomyopathy directly related to hypertension. Pilot data indicate that 85% of athletes with LEA expressed elevated blood pressure which is shown to progress into hypertension during the competitive season. Therefore, the purpose of the symposium is 1. to evaluate the relationship with LEA and cardiovascular disease; 2. consider the nutrient content of those with on cardiovascular function and RED-S; 3. explore the contributions of social determinants of health e.g.: sex, ethnicity, socioeconomic status, nutrition knowledge, and chronic stress that are known to influence the development of RED-S. Researchers and practitioners will gain understanding of the influence of nutritional deficiencies on health-related outcomes and athletes. Further benefit includes discussion on current limitations of evaluating LEA and how they perpetuate morbidity in athletes despite the perception of health.

### **S5: BUILDING BIGGER MUSCLES WITH RESISTANCE TRAINING: PAST, PRESENT, AND FUTURE RESEARCH THEMES**

Michael D. Roberts, Joshua S. Godwin, Bradley A. Ruple. *Auburn University, Auburn, AL.*

For the past 40 years, researchers have sought to identify mechanisms associated with mechanical overload-induced skeletal muscle hypertrophy. Although much of the research to date supports the involvement of mammalian/mechanistic target of rapamycin complex 1 (mTORC1) signaling, ribosome biogenesis, and an increased satellite cell abundance and myonuclear accretion, there are several lines of emerging evidence suggesting additional mechanisms that feed into or are independent of these processes are also involved. There is also emerging evidence to suggest that methods used to assess hypertrophy outcomes do not show good agreement, and little is known regarding the myofiber-morphology adaptations to resistance training. This symposium will consist of lectures related to a) the historical context of muscle hypertrophy research (Introduction, Mike Roberts), b) methodology agreement issues in human resistance training interventions (Brad Ruple), c) sarcolemmal proteome adaptations to resistance training in humans (Joshua Godwin), and d) emerging research themes in muscle biology that have stark implications related to mechanical overload-induced skeletal muscle hypertrophy (Mike Roberts). This symposium should appeal to a broad audience ranging from students, practitioners, and basic scientists.

### **S6: TREATING THE 'INVISIBLE' EFFECTS OF STROKE: EXPLORING EXERCISE AND BRAIN STIMULATION FOR DEPRESSION AND FATIGUE**

John H. Kindred<sup>1,2</sup>, Ryan E. Ross<sup>1,2</sup>. <sup>1</sup>Ralph H Johnson VA Health Care System, Charleston, SC. <sup>2</sup>Medical University of South Carolina, Charleston, SC.

Stroke is one of the leading causes of long-term disability in the United States. In the Southeast, it is especially important to understand stroke and its consequences because this region has higher than average prevalence, hospitalization, and death rates. The first-ever stroke death rate has decreased significantly over the last several decades. However, the increased survival rate leads to more people having lifelong disabilities. The most visible and common post-stroke impairments are motor-related, such as altered gait and reaching kinematics and kinetics. Many stroke survivors also develop comorbid psychological and cognitive disorders that contribute to reduced participation in physical and social activities in addition to their motor impairments. Depression and fatigue are highly prevalent post-stroke sequelae, with estimated rates around 33% and 50% respectively. Post-stroke depression (PSD) and fatigue (PSF) are associated with increased mortality, reduce participation in rehabilitation, and lower quality of life. These conditions are often present simultaneously, suggesting that they may have overlapping pathophysiologies. Despite PSD and PSF's high prevalence and comorbidity, little is known about their pathophysiological mechanisms. Consequently, effective evidence-based treatments for PSD and PSF are not available to people who need them. Exercise and non-invasive brain stimulation are non-pharmacological interventions that can directly affect the central nervous system. As both PSD and PSF have origins within the brain, exercise and brain stimulation could be effective treatment options for PSD and PSF. However, their beneficial effects remain largely unexplored as treatment options. During this symposium we will: 1) define post-stroke depression and fatigue, 2) discuss the consequences of post-stroke depression and fatigue, 3) review and discuss some of the neurocircuitry involved in both conditions, and 4) present data from our ongoing research programs which are focused on increasing our understanding of these conditions and developing effective evidence-based exercise and non-invasive brain stimulation treatments for PSD and PSF.

### **S7: IMPROVING CARDIOMETABOLIC OUTCOMES IN THE YOUNG ADULT QUEER COMMUNITY: MOTIVATING LIFESTYLE BEHAVIOR CHANGE**

Jake C. Diana, Zachary Y. Kerr, Lee Stoner, FACSM. *University of North Carolina at Chapel Hill, Chapel Hill, NC.*

Despite significant progress for the rights and livelihoods of LGBTQ+ individuals, research on the importance of 24-hour activity behaviors (24-AB: physical activity, sedentary behavior, sleep) to cardiometabolic disease risk have largely overlooked queer young adults. This is despite the fact that all queer individuals of differing sexual orientations and gender expressions within the LGBTQ+ community are at greater risk for several cardiometabolic disorders. For example, national organizations like the American Heart Association (AHA) and analysis from NHANES cite bisexual men are twice as likely to be hypertensive compared to their cisgendered, heterosexual peers. These disparities are rooted in structural

discrimination, pervasive sociological stigma, experienced interpersonal homophobic acts, and the subsequent mental trauma. Queer youth must internalize this aspect of their lives brought on by a heteronormative society in addition to the traditional tribulations towards adulthood. The unique precursors, motivators, and barriers from these experiences towards healthy 24-AB are drastically understudied. Establishing a research line to study the diverse LGBTQ+ community and its complex, historical relationship to 24-AB will strengthen the health and identity of those who seek shelter within its inclusion. A rounded discussion on this research line will include the following: (i) historical and present health disparities within the community; (ii) existing research connecting 24-AB to cardiometabolic health; (iii) unique barriers to healthy 24-AB in the LGBTQ+ community; and (iv) proposed interventions to improve 24-AB in the queer community. This symposium will be led by openly gay presenters passionate for seeking change in the community's attitude towards exercise and its adjacent topics. Discussions will be chaired by a researcher who specializes in 24-AB and cardiometabolic disease risk.

#### **S8: THE LIFE OF A GRADUATE STUDENT - A GUIDE TO MANAGING COMPETING EXPECTATIONS**

Patricia Pagan Lassalle, Alexander Pomeroy, Emma S. Cowley, Lauren Bates-Fraser, Lee Stoner, FACSM. *The University of North Carolina at Chapel Hill, Chapel Hill, NC.*

Navigating the expectations of graduate school can be exceptionally challenging as it presents a range of novel obstacles. Students can find themselves juggling a myriad of tasks including coursework, grantsmanship, teaching, mentorship, and finding "work-life balance" - all while being expected to identify the next steps and opportunities to continue their academic career. This volume of often competing responsibilities can lead to chronic stress, with one in three graduate students presenting with depression. This statistic is outstanding in comparison to both the prevalence in the general U.S. population (~8%), and the prevalence for U.S. young adults outside of academia or graduate study (17%). In this symposium, we will discuss some of the common pain points of a graduate student, and practical strategies to manage and streamline expectations. We will also share the perspectives and stories of students and faculty at different stages in their careers (Master's, PhD, postdoc, and tenured). To assist students in planning for the next steps in their academic careers, we will also provide tips and advice on optimizing mentorship, the application and interview process, and the importance of finding a lab culture in line with your values.

#### **S9: SITTING ON THE BENCH TO STANDING BY THE BEDSIDE: CONCEPTION, GRANT WRITING, AND SEDENTARY BEHAVIOR POLICY DEVELOPMENT**

Simon Higgins, Craig Paterson, Lee Stoner, FACSM. *University of North Carolina at Chapel Hill, Chapel Hill, NC.*

Considering the average US adult spends over 50% of their day (~9 hrs.) in the seated posture, sedentary behavior reduction is a highly modifiable target. Prolonged sitting and other sedentary behaviors are a biologically novel cardiovascular disease risk factor that, despite their ubiquity, have been far less researched than physical activity. While global guidelines suggest that individuals should limit the amount of time spent sedentary and replace this time with physical activity, such vague public health messaging is unlikely to have a major effect on population-level behavior change. Accordingly, public health messaging regarding the optimal strategy for sedentary behavior interruption or guidelines around total volumes of sedentary behavior are needed. In pursuing such guidelines, it is pertinent to consider the policy development process, including the frameworks used by major governing bodies and the evidence required to facilitate policy generation. This symposium will attempt to guide sedentary behavior policy development and move scientists from sitting on the bench to standing at the bedside, via discussion of a) the processes and criteria used by policymakers when developing public health policy (e.g., establishing biological plausibility, exploring feasibility, testing efficacy and effectiveness), b) examples of ongoing funded sedentary behavior research developed with these criteria in mind, and c) lessons learned and tips for writing successful grants.

#### **S10: THE GROWING FIELD OF TACTICAL STRENGTH AND CONDITIONING: THE CULTURE OF LAW ENFORCEMENT**

Bridget F. Melton<sup>1</sup>, Mark Abel<sup>2</sup>, Nicholas Hunt<sup>1</sup>, Derick Anglin<sup>1</sup>, Sarah Lanham<sup>2</sup>. <sup>1</sup>Georgia Southern University, Statesboro, GA. <sup>2</sup>University of Kentucky, Lexington, KY.

Working with and training tactical athletes (law enforcement, military, firefighters, etc.) is of increasing interest to practitioners and

researchers. Tactical athletes, specifically law enforcement officers (LEOs), need to maintain fitness levels to enhance occupational readiness. Comprehensive wellness programs are imperative to prepare LEOs for occupational demands but also to mitigate the negative health outcomes associated with law enforcement, such as psychological stress, musculoskeletal injuries, and cardiovascular disease risk. This presentation will review current research trends, highlight research gaps, and discuss promising approaches for improving LEOs' health and wellness. Furthermore, faculty research mentors will discuss how to establish and maintain partnerships with law enforcement agencies, whereas graduate students will provide perspectives on working directly with LEOs. The presentation will highlight how universities can create experiential learning opportunities for undergraduate and graduate students. It will further discuss the students' insights on navigating the landmines of working with tactical athletes.

#### **S11: TRAINING RESILIENCY IN FIREFIGHTERS**

Blake Hamil, Daniel Greene, Austin Kohler, Maleah Holland-Winkler. *Augusta University, Augusta, GA.*

Firefighters are exposed to dangerous and often traumatic events due to the nature of their occupational demands. This repeated exposure to trauma combined with stressful work demands increases their risk for negative physiological and psychological health outcomes. The high prevalence of adverse health outcomes highlights the need for interventions to improve resiliency in firefighters. Resiliency is the ability to reduce the effect of crisis, rebound from adversity, and to recover to pre-stimulus homeostasis. When traumatic exposures are unavoidable, as is the case with firefighters, it is important to buffer the resulting consequences on health. While resilience has a genetic component, interventions targeting physiological, psychological, and social components have been successful at improving resilience. These factors are of specific interest as increases in resilience have been linked to improved PTSD symptomology/severity, depression, anxiety, autonomic nervous system activation, hypothalamus-pituitary axis balance, and brain-derived neurotrophic factor. The purpose of this session is to identify interventions that improve resiliency in firefighters. Dr. Winkler will introduce the topic and discuss physiological components associated with resiliency. Strategies that have been shown to improve resiliency and associated physiological markers will be discussed. Research has identified increased resiliency is associated with higher levels of exercise, social support, and mindfulness. Therefore, Dr. Greene will discuss exercise, Mr. Kohler will discuss mindfulness, and Mr. Hamil will discuss social support interventions.

#### **S12: EVALUATING GAME VOLUME IN ATHLETES THROUGH VARIOUS VIEWS AND STATISTICAL METHODS**

Andrew R. Thornton, Jennifer A. Bunn, FACSM. *Sam Houston State University, Huntsville, TX.*

The field of sport science has advanced substantially over the years with the addition and expansion of wearable technology. This addition has added many new variables to evaluate for training and games in conjunction with a variety of methods to evaluate them. All of this may result in paralysis by analysis for coaches and support staff. This symposium will discuss evaluation of game workload through a variety of statistical methods and viewpoints. Information in the symposium will include methods for selecting appropriate variables for the sport, development of key performance indicators, evaluating the relationship between global positioning system (GPS) based variables and game statistics, in-conference versus out-of-conference game demands, balancing the gameday demands between key and bench players, evaluating changes in game demands across a season, methods for comparing different portions of the game, and concepts for evaluating positions with unorthodox movements. The studies discussed in this presentation will focus on collegiate women's lacrosse for continuity, but the concepts will be applicable across different sports. GPS-based metrics of importance may vary across sports with a focus on different bioenergetics systems and strategies, thus methods for cross-over between sports will be discussed. Collectively, the information presented will be packaged to help sport scientists and coaches to evaluate a game, a season, and individual athlete performance.

### **S13: DESIGNED AND DELIVERED! AN EXAMPLE OF AN EFFECTIVE EDUCATION-BASED LIFESTYLE INTERVENTION PROGRAM**

Svetlana Nepocatych, Elizabeth Bailey, Talya Geller. *Elon University, Elon, NC.*

In the United States, over the past decade the prevalence of Metabolic Syndrome (MetS) has been steadily increasing reaching 38.3% in 2018. MetS contributes to the development of diabetes and cardiovascular disease, leading causes of death in the U.S. Education-based, lifestyle intervention and behavior modification programs appear to be most effective in reducing markers of MetS and other chronic diseases. Workplace nutrition and physical activity education programs have also had significant positive impacts on the health outcomes of employees, workplace productivity, and employer healthcare costs. Group education sessions in combination with individualized cognitive strategies have led to the most sustainable long term behavioral changes. In addition, the use of a person-based approach and community needs assessment to plan, design, and assess intervention programs appears to be essential to ensuring program feasibility. This approach allows for intervention programs to be more accessible, relevant and engaging to participants, thus enhancing their success in mitigating risk. The purpose of the symposium is to discuss the use of a person-based approach in the development and practical implementation of a nutrition and physical activity education program for the mitigation of risks associated with MetS among faculty and staff at Elon University. Dr. Svetlana Nepocatych will present the core elements of the person-based approach used to enhance the feasibility and development of the nutrition and physical activity education program, HealthEYou. Prof. Bailey will discuss intervention development, outcomes and evaluation for sustainability of the program. Talya Geller will reflect on the value of undergraduate student involvement in the program as an opportunity for student growth and development, and in providing essential program support. Attendees will gain an understanding of nutrition and physical activity program development and the factors affecting program sustainability and success, as well as best practices for the delivery of an effective workplace intervention program.

### **S14: SCIDUCIO: A PRACTICAL FRAMEWORK FOR GUIDING THE DEVELOPMENT AND LEADERSHIP OF ACADEMIC RESEARCH**

Craig Paterson<sup>1</sup>, Yolanda Lassalle<sup>2</sup>, Lee Stoner, FACSM<sup>1</sup>. <sup>1</sup>*University of North Carolina at Chapel Hill, Chapel Hill, NC.* <sup>2</sup>*LaSalle Group, Guaynabo, PR.*

The goal of this symposium is to introduce Sciducio, a term coined by amalgamating the Latin noun for science (scientia) and verbs for develop (adduco) and lead (adduco). The intent of Sciducio is to provide a practical framework for guiding the development and subsequent leadership of an academic research environment. The framework consistent of eight components: (1) strategic planning (e.g., key activities), (2) leadership (e.g., development mindset, culture, and mentees), (3) management (e.g., roles and responsibilities), (4) decision making environment (e.g., institutional culture), (5) supply chain (e.g., needs analysis), (6) financial management (e.g., funding plan), (7) relationship building (e.g., networking), and (8) promotion and dissemination (e.g., branding and deliverables). In this talk, we will first describe the theory supporting Sciducio, the eight components comprising the framework, and suggested instructions for use with real-world examples. The intended audience includes new assistant professors, doctoral and postdoctoral trainees, and established professors seeking new strategies to manage their lab.

## **TUTORIALS (T1-T18)**

### **T1: DIP YOUR TOES IN OUR ACADEMIC WATER**

Christopher Wilburn<sup>1</sup>, Brandi Decoux<sup>2</sup>, Wendi Weimar<sup>3</sup>. <sup>1</sup>*Auburn University, AUBURN, AL.* <sup>2</sup>*Southeast Louisiana State University, Hammond, LA.* <sup>3</sup>*Auburn University, Auburn, AL.*

**Background:** This tutorial will focus on the function of the foot and ways in which we can enhance foot function. The foot often receives cursory coverage in many kinesiology classes, yet it plays a critical role in healthy, athletic, and clinical populations. Dr. Decoux will discuss the ability of the foot to maintain its structural alignments and yet adapt to any surface upon which we may walk (firm, compliant, smooth, or uneven). Dr. Weimar will discuss the mechanical pulleys of the foot and how the big toe can aid in the functioning of the gluteal group. Dr. Wilburn will discuss the proper selection of footwear and how this external constraint may aid the foot by offering protection contributing to performance enhancement through various features

such as sole materials and lacing methods, while improper selection can actually restrict mobility and diminish its dynamic function. By thoughtfully engaging the foot and taking into consideration the influence of footwear, the natural features of the foot can help us be better movers. **Learning Objectives:** At the end of this tutorial the attendees will: (1) Have knowledge of how the foot and ankle components function together to become rigid enough to propel us forward as well as adapt to different surfaces; (2) Understand the components of an athletic shoe, how the foot and shoe work function as a unit, and how different lacing techniques that take full advantage of a shoe's features can be employed to aid in proper foot function; (4) Understand how engagement of the arch and big toe can help recruit the posterior chain for muscle development and explosive movements; and (5) Be familiar with different short foot exercises that can help develop a better functioning foot arch.

### **T2: DO CARDIOMETABOLIC RISK FACTORS PROVIDE SIMILAR EFFECTIVENESS PREDICTING CARDIOVASCULAR DISEASE IN AFRICAN AND EUROPEAN AMERICANS**

Trudy Moore-Harrison<sup>1</sup>, L. Jerome Brandon, FACSM<sup>2</sup>. <sup>1</sup>*University of North Carolina at Charlotte, Charlotte, NC.* <sup>2</sup>*Georgia State University, Atlanta, GA.*

Cardiometabolic risk factors (CMR) are used to estimate the relative risk of developing cardiovascular disease (CVD). The same variables and cut points are used to predict CVD in both European (EA) and African Americans (AA). Research indicate that lipids and lipoproteins best predict CVD development in EA while blood pressure (BP) and body composition/obesity are best at predicting CVD development in AA (Montvida et al., 2020). The body segment of body composition/obesity that is best for predicting CVD in AA compared with EA is not clear. Lipids, lipoproteins, and blood glucose are reported to have different relationships with other CMR variables and CVD development in AA and EA. Greater specificity is needed when predicting CVD from CMR and body composition/obesity variables in different populations (Preston et al., 2015). Therefore, this tutorial is designed to present a literature review and lab data summary of the relationships between CMR in middle age and older AA and EA adults to determine if the same CMR with the same cut points are appropriate for middle aged and older AA and EA. Whether different body composition/obesity variables are related to other CMR variables and have a similar influence on CVD predictability in EA and AA will also be discussed. Finally, does relationship changes among CMR variables during aging affect predicting CVD development in older AA and EA. The expectation is that this tutorial will help provide greater clarity on the influence of CMR and body composition/obesity variables when predicting CVD in middle aged and older AA and EA.

### **T3: DRUG USE IN SPORT: HOW MANY ATHLETES ARE BEING CAUGHT AND WHAT ARE THEY TAKING?**

David Hooper. *Jacksonville University, Jacksonville, FL.*

Performance enhancing drug use remains commonplace in sport. Despite the appearance of extensive testing procedures, drug use continues to be high and surprisingly few athletes are caught. Extensive reports are published each year by the World Anti-Doping Agency (WADA), detailing how many samples are analyzed and what percentage of these samples lead to anti-doping rule violations, including which drugs specifically athletes are being caught using. The most recent report will be detailed in this presentation and will be accompanied by peer-reviewed literature that has evaluated the performance enhancing effects as well as the side effects of the drugs being used, in addition to the effectiveness of the tests that are utilized to detect them. The therapeutic use exemption procedure will also be described. Finally, the presentation will discuss how athletes are evading positive tests and the measures that WADA are taking in response, such as the athlete biological passport. The learning objectives for this talk are: a) to increase awareness of the annual reports published by WADA; b) inform the audience of the contents of the report, including how many athletes are failing drug tests, and what drugs they being caught taking; c) describe the Athlete Biological Passport, a newer effort to curtail drug use in sport.

### **T4: EXERCISE-INDUCED ADAPTATION IN SKELETAL MUSCLES: IMPACT OF REDOX SIGNALING**

Scott Powers, FACSM. *Stetson University, Deland, FL.*

Skeletal muscle fibers are plastic and undergo rapid remodeling in response to increased contractile activity (i.e., exercise). Investigations into the cell signaling pathways regulating exercise-induced skeletal muscle adaptations reveal that redox signaling plays a key role in the control of skeletal muscle remodeling in response to endurance exercise training. Specifically, muscular exercise results in

an acute increase in the production of reactive oxygen species (ROS) in the contracting fibers; this increased ROS production during exercise stimulates cell-signaling pathways that activate both genomic and nongenomic mechanisms to promote muscle remodeling. This research tutorial will debate the sources of ROS production in contracting muscles and will highlight the specific redox-sensitive signaling pathways that promote skeletal muscle adaptation in response to endurance exercise training. Moreover, the lecture will address the controversial topic "does antioxidant supplementation blunt exercise-training-induced adaptations in skeletal muscles?" Lastly, in hopes of stimulating future research, unanswered questions in this exciting research field will also be highlighted. Attendees will gain an understanding of the sources of ROS production in contracting muscles and the important role that redox signaling plays in skeletal muscle adaptation to endurance exercise training.

**T5: NOVEL TEACHING METHODS USING AN ECO-FRIENDLY OUTDOOR MOBILE GYM**

Sarah Davis, Mary Beth Yarbrough, Rebecca Collins. *Georgia Southern University, Statesboro, GA.*

Readily accessible and consistent participation in muscular strength, muscular endurance, flexibility, and cardiorespiratory endurance programming are important components to an overall physical fitness program. Due to limited indoor spaces, social distancing, campuses spanning multiple cities, and in order to enhance the ability to offer more creative courses, our team created an innovative proposal for a sustainability grant on Georgia Southern University's campus. With accepted funding, we were able to purchase an eco-friendly workout trailer prototype housing equipment and training systems able to support group fitness classes of approximately thirty individuals. The purpose of the presentation is to discuss the use of this mobile workout trailer within the Health Sciences and Kinesiology Department. Mrs. Davis will discuss how our Physical Activity and Lifestyle Program (PAL) courses implement using the equipment for mobile outdoor physical activity classes for course credit. Mrs. Yarbrough will discuss how our undergraduate and graduate Exercise Science students are learning how to program and lead physical activity in a variety of settings (ie outdoors) to diverse populations. Mrs. Collins will discuss how the eco-friendly trailer is used in various ways in our community to provide service learning opportunities to students and faculty. The learning objectives are to a) discuss successful and unique approaches for qualifying for our internal grant and b) discuss and share the various methods of use for the eco-friendly trailer system in various environments and with a wide variety of populations emphasizing innovative training strategies and group exercise class designs which can positively impact the campus and community. The target audience for this tutorial will be faculty or others who may be interested in applying for an internal sustainability grant and implementation of novel teaching methods in physical activity.

**T6: MENTAL HEALTH AND ATHLETIC IDENTITY IN COLLEGE ATHLETES**

Kylie Roberts, Kiersten Kuhlman, Tamerah Hunt, FACSM. *Georgia Southern University, Statesboro, GA.*

Mental health continues to be at the forefront of many discussions today with conversations across multiple avenues such as high profile athlete testimony and advertisements aimed at the general population to combat rising incidence of mental health diagnoses following COVID-19. According to the National Institute of Mental Health (NIMH), young adults aged 18-25 years show the highest prevalence of mental illness at 30.6%. This age range is representative of college aged individuals, including collegiate student athletes. Although mental health can serve as a major resource for athletes in relation to their performance and development, student athletes face a number of mental health risk factors compared to their non-athlete peers (Schinke et al., 2017). Current research suggests that there is a relationship between mental health-related problems and the pressures associated with being an athlete. Athletic identity (AI) is defined as the "degree to which an individual identifies with an athlete role and the values and social networks associated with that identity" (Brewer et al., 1993). It is crucial that those working with athletes are able to recognize the potential implication of mental health challenges and whether an athlete has a high athletic identity in order to properly support these athletes. The purpose of this presentation is to discuss the state of mental health in the collegiate level student-athlete population and the impact of athletic identity on performance and mental health outcomes. Kylie Roberts will discuss mental health in collegiate athletes. Kiersten Kuhlman will describe AI. Dr. Tamerah Hunt will discuss how AI integrates with mental health challenges in collegiate athletes. After completing this session, attendees will 1) understand the implications of mental health on student-athletes, 2)

be able to identify athletes with high athletic identity, and 3) recognize our role in supporting athletes exhibiting the impact of high AI on mental wellness.

**T7: OPTIMIZING STUDENT LEARNING WITH RETRIEVAL PRACTICES IN FACE-TO-FACE AND ONLINE COURSES**

Samantha L. Johnson, Jennifer L. Caputo, Amiyah J. Banks, Sara N. Fawcett. *Middle Tennessee State University, Murfreesboro, TN.*

Incorporating retrieval practices in the classroom has been shown to improve long-term retention. Retrieval practices also aid in higher order thinking, moving students beyond memorization towards understanding. This focus on metacognition benefits both students and faculty by identifying content areas where further learning is needed. The purpose of this session is to familiarize faculty with the value and practice of incorporating retrieval activities in undergraduate courses, with specific emphasis on examples for implementation in Exercise Science classes. Key points of this session include: (1) defining retrieval practice, (2) discussing best practices in implementing retrieval practices in face-to-face classes, (3) discussing how retrieval practices can be adapted to an online learning environment, and (4) small group discussions to share retrieval practice strategies. After the session, participants will understand retrieval practices and the benefit of incorporating this learning strategy into their classes. Attendees will be equipped with skills to incorporate one or more retrieval practices in their face-to-face and/or online classes, which they can select based on the preparation and class time they wish to invest.

**T8: CONNECT AND DIRECT: INCREASING YOUR NETWORK AND STEPPING INTO LEADERSHIP**

Rebecca A. Battista, FACSM<sup>1</sup>, Dawn P. Coe, FACSM<sup>2</sup>, Stella L. Volpe, FACSM<sup>3</sup>, Amelia B. Leicht<sup>4</sup>. <sup>1</sup>*Appalachian State University, Boone, NC.* <sup>2</sup>*University of Tennessee, Knoxville, TN.* <sup>3</sup>*Virginia Polytechnic Institute and State University, Blacksburg, VA.* <sup>4</sup>*University of Virginia, Charlottesville, VA.*

Doctoral students and early career faculty seeking to navigate and progress in their careers are often bewildered about how to successfully manage their next 5 to 10 years. Networking is critical to professional development and career progression. Engagement in professional organizations is often related to attending conferences. Conference attendance allows for the dissemination of research and simultaneous networking. However, large organizations and conferences may lead to young professionals "getting lost in the crowd." Coupling large organization involvement with smaller, sometimes discipline-specific groups, can lead to development of professional relationships and leadership opportunities. Purpose: This tutorial session will discuss strategies for increasing networking and stepping into leadership opportunities. Developing a professional network will focus on utilizing smaller conferences and meetings to meet professionals related to your area of interest/research. Stepping into leadership includes leadership at both the institutional and/or disciplinary level. Learning how to "double and triple dip" by using networks to enhance and diversify a research agenda is important. Each speaker will discuss how they have navigated their career progression and offer lessons learned along the way. This will be followed by an interactive discussion with audience members addressing specific questions. The major points of the presentation include: 1) equipping attendees with ways to network in discipline organizations and 2) supplying career pathways of early, mid and late career professionals.

**T9: BIOENERGETICS OF THE TWO-HOUR MARATHON**

L. Bruce Gladden, FACSM. *Auburn University, Auburn, AL.*

On October 12, 2019, Eliud Kipchoge ran the marathon (26.22 miles; 42.195 km) in 1 hr 59 min 40 sec in Vienna, Austria on a mostly flat course with minimal curves in energy-efficient shoes with pacesetting runners positioned to reduce air resistance, amid excellent weather conditions. Ignoring the pacers and shoes, it is of interest to evaluate the energetic requirements of such an endeavor. This can now be done with some accuracy, thanks to published information on participants in Nike's "Breaking 2" project (Jones et al. *J Appl Physiol* 130:369-379, 2021). Key physiological characteristics include maximal oxygen uptake, running economy, oxygen uptake on-kinetics, and a measure related to the lactate threshold. In this tutorial, all these factors will be discussed to establish the physiological and bioenergetic profile of a sub-2 hour marathon performance. This symposium should appeal to a broad audience from students, to integrative physiologists to anyone with interests in the broad area of exercise physiology.

**T10: REDUCING THE ENGAGEMENT GAP**

Brittany Pinkerton<sup>1</sup>, Hannah Bennett<sup>1</sup>, Samantha Johnson<sup>2</sup>. <sup>1</sup>Augusta University, Augusta, GA. <sup>2</sup>Middle Tennessee State University, Murfreesboro, TN.

Due to the current nature of higher education regarding policies related to critical race and diversity equity and inclusion initiatives, it is imperative we explore how these topics and policies impact our students' engagement, pedagogies and lack of diversity in higher education. The purpose of this tutorial is to discuss our role in reducing the engagement gap in higher education and subsequent diversity gap in higher education employees. We intend to explore the engagement gap in four ways; first, we will define and understand what the engagement gap is in relation to motivation or motivations of students. Secondly, we will discuss strategies that have been used in K-12 and higher education settings, such as culturally relevant pedagogies and the cultural relevant cycle. Third, we will apply the previously mentioned pedagogical strategies to specific courses (i.e. exercise physiology, measurement and evaluation) and discuss ways to promote an inclusive classroom community. Last, we intend to explore how we move toward closing this gap while navigating current regulations and mandates. The learning objectives of this tutorial are (a) understand the engagement gap, (b) define culturally relevant pedagogy as a framework, and (c) apply inclusivity in the classroom. The target audience for this tutorial is any faculty member interested in learning approaches to increase student engagement.

**T11: LEARNING HOW TO CONDUCT PSYCHOMOTOR ASSESSMENTS ONLINE**

Heather Lynn Disney. *University of Saint Augustine for Health Sciences, San Marcos, CA.*

Psychomotor skills are an essential aspect of health science education. Recent studies supported using videoconference technology (VCT) for psychomotor instruction, but research on the use of VCT for psychomotor assessments is limited. Traditional kinesthetic assessments are done in face-to-face settings. However, the recent transition to virtual communication provided additional assessment opportunities with many advantages. Some of these benefits include exposing individuals to telehealth or telecommunication, promoting acceptance of online learning, and improved accessibility for individuals in rural locations. Virtual psychomotor assessments can be completed synchronously or asynchronously using various modalities. The purpose of this presentation is to discuss novel approaches to integrating technology into psychomotor assessments. Failure to understand these new approaches and uses of technology for assessment impedes establishing best pedagogical practices. Dr. Disney will describe the resources needed to initiate online psychomotor assessments (both synchronous and asynchronous methods), provide rationale for its use, and identify the advantages and disadvantages to each method. The learning objectives are to a) identify modalities and necessary resources to conduct online psychomotor assessments either synchronously or asynchronously, b) understand how to conduct online kinesthetic exams, and b) improve confidence in using technology to conduct online psychomotor assessments. The target audience for this presentation will be faculty or instructors that teach in an online or hybrid environment.

**T12: QUICK WITS: INCORPORATING CRITICAL THINKING INTO CLASSROOM ACTIVITIES**

Karissa L. Peyer. *University of Tennessee at Chattanooga, Chattanooga, TN.*

Critical thinking skills are vital to both academic and career success, but few undergraduate curricula include courses that teach these specific skills. While students may prefer problems with unambiguous answers, most real-world scenarios require the practitioner to consider specific contextual aspects such as patient/client demographics, health history and exercise experience. Critical thinking is both a set of information and belief-generating and processing skills as well as the habit of using those skills to guide behavior. Critical thinkers raise questions, gather relevant information, develop well-reasoned solutions, think open-mindedly and communicate effectively. This tutorial will discuss the importance of critical thinking and six categories of critical thinking skills (Interpretation, Analysis, Evaluation, Inference, Explanation, and Self-regulation). Three examples of short critical thinking activities that could be incorporated into either face-to-face or online classrooms will be shared and then participants/attendees will have time to brainstorm how they could adapt these approaches for their specific content areas. In addition to short activities, approaches will be presented that can be used to develop larger projects that emphasize critical thinking and formative feedback without overwhelming the instructor with grading. Breaking projects into multiple smaller sections allows for integration of

knowledge throughout the course and encourages students to review and incorporate instructor feedback. Innovative project designs such as podcasts, game creation and websites will be discussed. Attendees will be able to discuss the characteristics that distinguish critical thinkers from uncritical thinkers and will be able to design course activities that emphasize critical thinking skills within their discipline. Materials for this presentation were supported through the UTC Walker Center for Teaching and Learning Program Development Faculty Fellowship.

**T13: INCLUSIVE TEACHING PRACTICES IN EXERCISE SCIENCE: FROM THE CLASSROOM TO THE DEPARTMENT**

Matthew C. Scott. *Virginia Commonwealth University, Richmond, VA.*

As Exercise Science and Sports Medicine student populations become increasingly more diverse and we become acutely aware of teaching/learning barriers identified during the COVID-19 pandemic, it is critical that educators transform the classroom experience. Current or future faculty must reflect on the diversity of students in our classrooms and departments to develop intentional inclusive practices that promote student success, sense of belonging, engagement, and persistence. Therefore, the purpose of this tutorial is to engage attendees on what inclusion means in our academic settings and discuss inclusive teaching practices, both within and outside of the classroom. The tutorial will provide examples of adopted inclusive teaching strategies, including transparency and structured flexibility, with highlighted data on how students are perceiving these strategies in courses that range in enrollment from 25 to 250+ students at Virginia Commonwealth University (VCU). Additional examples of non-classroom-based programs implemented in the Department of Kinesiology and Health Sciences at VCU, aimed toward improving student success, will also be shared. The learning objectives are to a) enhance the understanding of intentional inclusive teaching b) encourage implementation of inclusive teaching practices within the classroom c) encourage the development of non-classroom-based programs aimed to improve student success, sense of belonging, and persistence d) develop a teaching and learning faculty network committed to the student learning experience. Funding Information: Howard Hughes Medical Institute (HHMI) Inclusive Excellence Initiative, VCU's Institute for Inclusive Excellence - STEM

**T14: PARTICIPATORY RESEARCH: GIVING POWER TO PARTICIPANTS**

Kristin M. Mendez, Kevin K. McCully, FACSM. *University of Georgia, Athens, GA.*

Participatory research originated from the work of psychologist, Kurt Lewin, and educator, Paulo Freire, where they presented the idea of action-based research. This form of research gave a voice to the underprivileged populations they served, allowing participants to be integrally involved in the research process. Often subjects are led by researcher interest, without self- or community-advocacy. By including participants in the research process, researchers can provide more impactful work, catering directly to the needs of their studied population. The purpose of this tutorial is to give background on participatory research, discuss its defining characteristics and investigate how and where to use it appropriately. We will also present an ongoing case study employing participatory research, investigating exercise and fatigue in individuals with Down syndrome. Lastly, this tutorial will facilitate a healthy discussion of participatory research techniques and ideas moving forward. Dr. McCully will present an overview and Ms. Mendez will continue with methods and the case study. Both Dr. McCully and Ms. Mendez will lead the discussion following the presentation. Upon leaving this tutorial, attendees should be able to define participatory research, understand the key features as well as its strengths and weaknesses, and have a basic understanding of its implementation.

**T15: IMPLEMENTATION OF A STUDENT-CENTERED UNDERGRADUATE RESEARCH COURSE SEQUENCE**

Ryan T. Conners, FACSM, Paul N. Whitehead. *The University of Alabama in Huntsville, Huntsville, AL.*

Incorporating research and evidence-based practice into exercise science courses is critical for student success, especially at the undergraduate level. Not only does connecting students with research provide the history and framework of the field of Kinesiology, it also allows students to become familiar with recent advancements in exercise science. Traditionally, undergraduate students have been involved with research through completing class assignments or assisting with faculty research. Both of these avenues allow students to become familiar with the research process and provide insight into future occupational opportunities that involve research. However,

there are alternate options to expose more students to academic research and provide avenues for students to develop presentations and publish their findings. The creation and utilization of a two-semester research course allows students to become familiar with rules and regulations of human subject research, select a research topic, complete the institutional review board process, and work collaboratively with their classmates and faculty supervisors. Furthermore, the second course in the sequence allows the students to perform data collection, analyze results, and disseminate their findings with written, oral, and poster presentation formats. Thus, the purpose of our presentation is to discuss the implementation and goals of a two-semester undergraduate research course sequence as part of an exercise science curriculum. Dr. Ryan T. Conners will present on course content, course delivery options, research topic selection strategies, and collaborative learning techniques utilized within the courses. Dr. Paul N. Whitehead will present on how the courses help prepare students for success beyond the undergraduate classroom, whether it is conducting graduate work as part of a master's thesis or doctoral dissertation, and how the courses incorporate professional development beyond exercise science. The learning objectives are to a) introduce a proven method of incorporating student-led research studies into an undergraduate curriculum, b) discuss the benefits of the research process in promoting life-long learning, and c) discuss the impact of the research courses on faculty pedagogy and scholarship. The target audience for this tutorial will be faculty and graduate students who currently teach or who are wanting to teach in an exercise science program.

#### **T16: HOW TO MAKE AN IMPACT IN THE WORKFORCE: TIPS AND TRICKS FOR BUILDING COMMUNITY AS NOVICE SPORTS MEDICINE PROFESSIONALS**

Melissa K. Kossman<sup>1</sup>, Tamerah N. Hunt, FACSM<sup>2</sup>. <sup>1</sup>University of Southern Mississippi, Hattiesburg, MS. <sup>2</sup>Georgia Southern University, Statesboro, GA.

Novice clinicians and professionals working in sports medicine fields are required to interact with various stakeholders in diverse capacities. Despite knowing this, little information is provided in educational curricula to support the development of a future sports medicine professional as an influential member of the community. This is challenged further by joining a new community that one does not identify with or have experience in working with; research needs to catch up to common pitfalls established in clinical practice to support novice clinicians working in a new community. Unfortunately, barriers such as cultural and community mistrust of clinicians and other sports medicine professionals can affect injury management, ultimately resulting in poor outcomes. Therefore, the purpose of this session is to better prepare future sports medicine professionals to engage with diverse communities with improved confidence upon entering the workforce. The goal being to prioritize the development of future trust, ultimately improving future patient outcomes. This session will address four primary points: 1) what do you bring to a new community (biases, assumptions, background); 2) barriers and facilitators to engaging in new communities; 3) understanding the needs of the community and pertinent stakeholders; and 4) evidence-based strategies for improving community engagement. Dr. Melissa Kossman will lead the introspective reflection and discuss barriers and facilitators to engagement. Dr. Tamerah Hunt will discuss how to identify community/stakeholder needs and evidence-based strategies for improvement. After completing this session, attendees will be able to: 1) understand their own personal biases; 2) understand factors influencing community engagement; 3) identify community needs; and 4) apply evidence-based engagement strategies in clients and patients across the sports medicine community.

#### **T17: GENERATION Z(OOM): ACADEMIC LONG HAUL COVID-19 SYMPTOMS**

Robert L. Herron<sup>1</sup>, Greg A. Ryan<sup>2</sup>. <sup>1</sup>University of Montevallo, Montevallo, AL. <sup>2</sup>Piedmont University, Demorest, GA.

Nationwide, approximately 26% ( $\approx 679,000$ ) of freshmen who enrolled in universities Fall 2019, prior COVID-19, dropped out of college the following year. This number represents the largest percentage of college dropouts in over a decade, and the percentage is higher in community colleges and smaller schools. The academic impacts of COVID-19 have been long-reaching and affected students, faculty, and staff, as everyone struggled to adjust and engage - particularly in developing relationships, practicing skills, and maintaining motivation within the virtual classroom environment. These struggles potentially turned younger Generation Z students off to higher education, as recent research reports that over two-thirds of students noted lack of motivation and feelings of isolation as primary reasons for struggling with their education during the approximately 30 months in a virtual classroom setting. The purpose of this presentation is to discuss the

long-haul symptoms of COVID-19 and how the shift to a virtual classroom environment will have lingering effects. Dr. Herron will discuss the virtual classroom environment, student retention, and how faculty can continue to use technology to enhance student education. Additionally, Dr. Ryan will explore the challenges related to reintegrating students back into the new normal and what the future is likely to hold. The learning objectives are a) identify the pedagogical impact the virtual environment has had on students; b) examine the challenges faculty will face in helping students reintegrate into the university setting; and c) recognize opportunities the virtual environment will provide moving forward. The target audience of this tutorial will be students and faculty who are reemerging to the "new normal" after almost 2.5 years of virtual education.

#### **T18: INTERACTION OF GENETICS AND LIFESTYLE AND THEIR EFFECTS ON HEALTH**

James S. Skinner, FACSM. *Indiana University, Bloomington, IN.*

Most health problems in the industrialized world are associated with lifestyle diseases. Using obesity and other health problems as examples, this tutorial will discuss how genetic factors interact with lifestyle (especially exercise and training) to influence a person's health.

#### **ORAL PRESENTATION SESSIONS (O1-O39)**

#### **O1: EFFECTS OF CAFFEINE ON PITCHING ACCURACY AND VELOCITY IN D-1 SOFTBALL PLAYERS: A PILOT STUDY**

Lauren G. Killen, Scott Lyons, FACSM, Matt Green, FACSM, Gaven Barker, Noah Bishop, Alyssa Parten, Takeo Higgins. *University of North Alabama, Florence, AL.*

**BACKGROUND-**Despite some well-established performance benefits, little is known about the impact of caffeine on pitching accuracy and velocity in softball. This study examined effects of caffeine on pitch accuracy and velocity in division I softball athletes ( $n = 4$ ) completing two pitching trials (double-blind, counterbalanced) following ingestion of 6 mg/kg of caffeine or matched placebo an hour prior. During each trial, participants completed 7 simulated innings (15 pitches each) at a target representing the strike zone with the exact center marked. Each inning was separated by a 9 min passive recovery. Following each inning, heart rate (HR) and RPE were assessed. Velocity (mph) and accuracy (distance from the target center: "delta") were recorded for each pitch. Separate 2 (trial) x 7 (innings) repeated measures ANOVAs were used for delta, and velocity. To analyze HR and RPE, 2 (trial) x 7 (innings) repeated measures ANOVAs were used. The interaction ( $p \leq 0.05$ ) and main effect for inning ( $p \leq 0.01$ ) were significant, with post hoc analyses (1 tailed t-test) showing caffeine significantly faster within inning 4 ( $59.4 \pm 3.1$  vs.  $57.7 \pm 2.2$  mph) and 6 ( $59.4 \pm 3.1$  vs.  $57.7 \pm 2.2$  mph) and approached significance within inning 2 ( $59.2 \pm 3.5$  vs  $58.4 \pm 2.0$  mph), and 3 ( $59.4 \pm 3.3$  vs.  $58.4 \pm 2.1$  mph). There was no significance for HR. Concurrent with velocity changes, RPE increased (0.5-1.5 units) for caffeine approaching significance within innings 4 ( $p = 0.06$ ) and 5 ( $p = 0.08$ ). Post-trial surveys revealed subjective responses approached significance with greater sense of fatigue ( $p = 0.08$ ) and stomach distress ( $p = 0.09$ ) with significant feelings of restlessness ( $p = 0.04$ ) and muscle tremors ( $p = 0.02$ ) following caffeine. Despite significant feelings of muscle tremors, pitch accuracy was not negatively impacted yet results support benefits to velocity. Though introductory, evidence suggests caffeine may benefit softball athletes. Understanding effects of caffeine on softball pitch accuracy and velocity could plausibly benefit overall game performance, with the potential of improving game outcome in extended play.

#### **O2: EFFECTS OF GUARANA COMPARED TO MATCHED DOSE CAFFEINE: EXERCISE PERFORMANCE BENEFITS?**

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**BACKGROUND:** Effects of guarana (*Paullinia cupana*) seed extract, a Brazilian plant containing caffeine but with additional bioactive compounds, has been observed to positively affect cognitive tasks but evidence on exercise performance is limited. The purpose of this study was to assess acute effects of guarana (GUA) compared to a matched dose of caffeine (CAF) on exercise performance. **METHODS:** Eleven endurance athletes (age:  $20 \pm 4.7$  y, ht:  $180.2 \pm 7.2$  cm, body mass:  $73.9 \pm 8.8$  kg,  $VO_{2max}$ :  $54.6 \pm 7.8$  ml/kg/min) participated in a randomized, double-blind, crossover experiment. All subjects completed three trials ingesting capsules containing: 1) 100 mg CAF; 2) 100 mg GUA, or 3) placebo (P) 60-min prior to a 75-min cycling

trial (fixed load 60-min steady state [SS] + self-paced 15-min time trial [TT]). Maximal isometric quadriceps strength was assessed before and after cycling. RESULTS: During SS, no differences ( $p > 0.05$ ) in oxygen consumption (15 min blocks averaging  $\sim 70\text{--}75\%$   $\text{VO}_{2\text{max}}$ ), heart rate (HR), or respiratory exchange ratio (RER) were observed among trials. During SS, blood glucose tended to be higher ( $p=0.13$ ) with CAF ( $4.6 \pm 0.5$  mmol) versus P ( $4.4 \pm 0.4$  mmol), and lactate higher ( $p=0.054$ ) with GUA ( $2.7 \pm 1.0$  mmol) versus P ( $2.2 \pm 0.9$  mmol). During the TT,  $\%HR_{\text{peak}}$  ( $96.3 \pm 2.3$  vs.  $94.1 \pm 2.2$  bt/min) and  $\%VO_{2\text{max}}$  ( $93.3 \pm 8.6$  vs.  $89.1 \pm 7.6\%$ ) tended to be higher ( $p=0.053$ ,  $p=0.11$ ) with GUA versus P, respectively. Mean power was 6% higher ( $p=0.012$ ) ( $269.4 \pm 47.1$  vs.  $253.8 \pm 51.5$  W) averaged over the TT and 4% more work accumulated ( $241.3 \pm 39.9$  vs.  $232.1 \pm 46.6$  kJ) with GUA vs. P, respectively. Post-exercise strength loss was not attenuated with GUA ( $-5.6\% \pm 8.5$ ) or CAF ( $-8.3\% \pm 9.4$ ) compared to P ( $-10.3\% \pm 5.1$ ). An order effect was not found ( $p=0.88$ ) for total work across trial 1 ( $236.2 \pm 42.4$  kJ), trial 2 ( $233.6 \pm 46.2$  kJ), and trial 3 ( $235.9 \pm 41.1$  kJ). CONCLUSION: High intensity cycling performance following ingestion of GUA is improved compared to P but not different from CAF. The potential ergogenicity of GUA does not appear related to changes in substrate oxidation or the maintenance of muscle strength related to fatigue and merits further investigation. Supported in part by the Fulbright Scholar Fellowship Program

### 03: EFFECTS OF CAFFEINE ON BAT SPEED AND SPRINT SPEED IN D-1 SOFTBALL PLAYERS: A PILOT STUDY

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While the performance-enhancing effects of caffeine are well known, little is known about the effects of caffeine on hitting and running performance in Division-1 (D-1) softball athletes. The purpose of this study was to examine the effects of caffeine on bat speed (BS) and sprint speed (SS) throughout the duration of a seven-inning game. Six D-1 softball athletes completed two double-blind, counterbalanced simulated game trials following ingestion of 6 mg/kg of caffeine or matched placebo taken one hour prior to data collection. During each simulated game trial, participants completed seven innings of five swings hitting a ball off a tee followed immediately by a sprint to first base after each swing. After the five swings and sprints, the players fielded ground balls continuously for three minutes. Each inning was separated by a passive six-minute rest period. Following each inning, heart rate (HR) and rating of perceived exertion (RPE) were assessed. BS and SS were measured after each swing and sprint. Fielding ground balls was used as a fatiguing protocol to simulate fatigue experienced during a game. Separate 2 (trial)  $\times$  7 (BS; SS) repeated measures analysis of variances (ANOVAs) were used to assess BS and SS for the seven innings. To analyze HR and RPE 2 (treatment)  $\times$  7 (innings) repeated measures ANOVAs were used. No differences were observed between the caffeine and placebo trials for HR or RPE. For bat speed, a main effect was observed for inning ( $p=0.005$ ) and for interaction of treatment\*inning ( $p=0.02$ ). Paired t-tests revealed significant differences in bat speed at inning one ( $p=0.02$ ) and inning four ( $p=0.004$ ). For sprint speed, a main effect was observed for inning ( $p<0.001$ ). Paired t-tests revealed significant differences in sprint speed at inning one ( $p=0.01$ ) and inning four ( $p=0.05$ ), and approached significance at inning three ( $p=0.07$ ) and inning five ( $p=0.07$ ). Post-trial surveys indicated a significantly greater sense of fatigue ( $p=0.05$ ) following caffeine, and approached significance for feelings of restlessness ( $p=0.07$ ) and muscle tremors ( $p=0.06$ ) following caffeine. These data demonstrate that caffeine may have an ergogenic benefit in both bat speed and sprint speed for softball players, thus improving performance. However, a greater sense of fatigue was also observed, which could negatively affect other performance variables not measured in this study.

### 04: THE EFFECTS OF TOPICAL MENTHOL CREAM ON ANAEROBIC EXERCISE PERFORMANCE

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BACKGROUND: Topical menthol cream has an analgesic effect that has been shown to reduce muscular pain following intense physical activity. Currently, there has been minimal investigation of the efficacy of topical menthol cream to reduce muscular discomfort during exercise and the potential effects on performance. The purpose of this study was to examine the effects of topical menthol cream on anaerobic exercise performance during repeated supramaximal cycle sprints. METHODS: Twelve physically active females were recruited for this study. In a double-blinded, counterbalanced, crossover design, subjects received a topical application of a 10% menthol cream or placebo to the anterior and posterior thigh prior to exercise testing. During each trial, subjects completed 3 sets of 15-second modified

Wingate anaerobic tests (WANt) with 2 minutes of rest between each sprint. Peak power, mean power, fatigue index, and total work were measured and recorded. Additionally, perceived exertion and pain perception were recorded following each sprint. A 2  $\times$  3 repeated measures analysis of variance was used to determine differences between conditions for each outcome measure. RESULTS: Peak power ( $p = 0.021$ ) and fatigue index ( $p = 0.022$ ) were significantly higher in the menthol condition compared to placebo. There were no differences in other performance variables between conditions ( $p > 0.05$ ). Perceived exertion was significantly lower in the menthol condition during the WANt 1 ( $p = 0.031$ ), however, there were no differences in subsequent sprints ( $p > 0.05$ ). Muscular discomfort during the sprint tests was not different between conditions ( $p > 0.05$ ). CONCLUSION: Based on the results of this study, topical menthol cream leads to increased peak power output, but may lead to greater fatigue during sprint performance.

### 05: THE EFFECTS OF YOHIMBINE INGESTION ON PSYCHOPHYSIOLOGICAL RESPONSES TO MAXIMAL EXERCISE AT VARYING TIMES OF DAY

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Maximal exercise can induce prominent alterations in psychophysiological responses to exercise, many of which may be modulated by time of day. Yohimbine Hydrochloride (YHM) is an alpha-2-adrenergic receptor antagonist popular in many commercially available supplements which increases sympathetic stimulation. Recent evidence has shown YHM increases pain tolerance, motivation, and feelings of energy in humans during exercise which may have implications for improved exercise adherence. However, it is unknown if YHM differentially influences psychophysiological responses to exercise at different times of the day. The purpose of this study was to study the effects of YHM ingestion on psychophysiological responses during maximal rowing exercise at varying times of the day. Physically active females participated in three counterbalanced rowing trials: 1) Morning-Placebo (AM-PL), 2) Morning-Yohimbine (AM-YHM), and 3) Afternoon-Control (PM). For each AM trial, participants consumed their respective treatment 20 minutes before exercise while no treatment was given for PM. Participants then completed a 2000m rowing time trial. Rate of perceived exertion (RPE), energy, fatigue, alertness, and focus was measured throughout. Findings showed that YHM ingestion resulted in greater energy levels ( $p=0.003$ ) during morning times compared to PL. However, no other differences between trials existed for RPE ( $p=0.217$ ), fatigue ( $p=0.501$ ), alertness ( $p=0.081$ ), or focus ( $p>0.999$ ). Therefore, YHM may be an effective supplemental strategy to improve feelings of energy in the morning but has limited effects on other psychophysiological responses to maximal exercise.

### 06: YOGA AS THE SOLUTION TO MOVEMENT LIMITATIONS IN BASEBALL PITCHERS

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BACKGROUND: Baseball pitchers often face physical limitations that prevent them from performing at their complete capabilities. The cause of such deficits in lack of mobility is often attributed to individual risk factors, injury, or some combination of both. The purpose of this study was to investigate how yoga can be used as an activity to promote physical health through psychological adaptations. METHODS: Nine competition eligible NCAA Division 1 baseball pitchers from Norfolk State University participated in this study (ages 18-23y). Each was given a set of questions to assess pre-intervention levels of flexibility involvement and relevant injury history. Following initial testing for Functional Movement Screen (FMS) scores, pitchers were expected to attend regular strength training, practices, and prehab, along with additional yoga sessions. Post-test FMS scores provided indication of whether the yoga activities made for positive improvements in mobility. Two final surveys detailed psychological adaptations and descriptive perceptions of the test validity.

Experimental paired t-test ( $p < 0.05$ ) was used to interpret significant differences in the FMS data. RESULTS: A statistical significance in the difference of means was not recognized in any of the seven individual screening components. A breakdown of the overall FMS scores reveals a slightly greater mean in the pre-tests ( $M=16.89$ ,  $SD=2.472$ ) than for the post-tests ( $M=16.78$ ,  $SD=1.716$ ). The difference in means for the test samples paired ( $M=0.111$ ,  $SD=2.421$ ) had the greatest statistical insignificance at  $p=0.894$ . End-of-intervention survey results supported psychological adaptations with retention in yoga participation and a 62.5% perception that yoga has been a beneficial activity for movement quality. CONCLUSIONS: The results of the FMS scores suggest that yoga does not play a significant role in changing total scores. In contrast, survey data reflects continued participation in

stretching exercises for improved mobility, as well as general agreement that yoga made for better movement. While there were adaptations psychologically, they did not cause positive adaptations physically. This movement based insight could ensure the athletes are meeting short and long-term movement goals for lifelong health.

**07: ACUTE EFFECTS OF GUARANA INGESTION COMPARED TO MATCHED DOSE CAFFEINE: METTAL PERFORMANCE BENEFITS?**

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**BACKGROUND:** Effects of guarana (*Paullinia cupana*) seed extract, a Brazilian plant containing caffeine but with additional bioactive compounds, has been observed to potentially improve cognitive performance and mood, particularly under fatiguing conditions. Our purpose was to assess the effects of acute ingestion of guarana (GUA) compared to a matched dose of caffeine (CAF) on cognitive function and mood in endurance athletes before and after high-intensity exercise. **METHODS:** Eleven endurance-trained athletes (age:  $20 \pm 4.7$  y, height:  $180.2 \pm 7.2$  cm, body mass:  $73.9 \pm 8.8$  kg,  $VO_{2max}$ :  $54.6 \pm 7.8$  ml/kg/min) participated in a randomized, double-blind, crossover experiment. All subjects completed three trials ingesting capsules containing: 1) 100 mg CAF, 2) 100 mg GUA or 3) placebo (P). Cognitive and mood tests were performed at baseline (pre-ingestion), 60 min post-ingestion of capsules, then again after cycling (60-min steady state at  $\sim 70\%$   $VO_{2max}$  [SS] + 15-min maximal effort time trial). Accuracy (% correct responses) and reaction time (RT) were recorded on Simon Task (interference/conflict resolution) and N-Back Task (working memory) followed by NASA Task Load (mental workload) and Brunel Mood Scales (fatigue and other subscales). **RESULTS:** Accuracy was not affected ( $p > 0.05$ ) by capsule treatment or time (pre-versus post-ingestion or post-exercise) for both cognitive tests. RT was only affected ( $p = 0.03$ ) by time: faster post-exercise compared to pre-ingestion on the N-Back test. Neither capsule treatment nor time of measurement influenced ( $p > 0.05$ ) mental workload or mood subscales. During the last 10 min of SS, there was a significant interaction effect ( $p = 0.042$ ) for ratings of perceived exertion (Borg Scale): ratings were lower for GUA ( $14.0 \pm 1.0$ ) versus CAF ( $15.0 \pm 1.0$ ) and tended to be lower than P ( $14.8 \pm 1.4$ ). **CONCLUSION:** Neither guarana nor a matched dose of caffeine influenced cognitive performance or mood before or after fatiguing exercise. However, guarana appeared to reduce the perceived effort for endurance-trained athletes toward the late stage of moderate-to-vigorous intensity exercise. These findings merit additional investigation to determine whether acute guarana ingestion can attenuate fatigue in different populations (clinical, sedentary, athletic individuals). Supported in part by the Fulbright Scholar Fellowship Program

**08: EFFECTS OF SPIDER TACK ON PITCHING PERFORMANCE**

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**BACKGROUND:** The use of foreign substances while pitching is one of the largest instances of cheating in major league baseball since the use of steroids in 2004. Baseball players face factors that affect grip strength such as weather, sweat, deformation of laces, and slickness of the leather. Spider tack enhances the feel of the ball to give a more consistent grip and allow pitchers to have more control despite the aforementioned factors. The purpose of this study is to determine whether the use of spider tack increases spin rate and ball drop while decreasing pitching velocity. **METHODS:** Three right-handed pitchers (ages 18-21 years) were recruited for this study. Spin rate, velocity, and break angle of each pitch were measured with a rapsodo machine. Each pitcher threw 15 pitches using spider tack and 15 pitches without any foreign substance. Data were collected in one pitching session with a break between conditions to ensure fatigue was not a factor. **RESULTS:** There was an increase in spin rate and ball movement, but little to no effect on pitch velocity. When spider tack was applied, the fastball increased from 30-100 RPM (Rotations Per Minute) at a consistent rate while the maximum RPM increased from an average of 79-200. Within their Pitches other than a fastball (off-speed pitches) all three pitchers had an increase (RPM) from 20-100 at a consistent rate and max (RPM) increased from an average of 70-150. **CONCLUSION:** The use of foreign substances can have little to no effect on velocity due to the amount of friction caused between the pitcher's fingers and the leather of the baseball. However, we did see a significant increase in off-speed pitches in both vertical drop and RPM, suggesting that spider tack can provide an effective means for control when pitching.

**09: COMPARISON OF PEAK SHOULDER DISTRACTION FORCES BETWEEN PAIN AND PAIN-FREE YOUTH BASEBALL PITCHERS**

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**Background:** Increased shoulder distraction force during a baseball pitch may make a pitcher susceptible to rotator cuff or glenohumeral labrum injuries. A precursor to a pitching injury may be pain experienced at the throwing arm. **Purpose:** To compare peak shoulder distraction (PSD) forces in youth baseball pitchers with and without upper extremity pain when throwing a fastball. A secondary purpose was to determine if differences exist in the range of PSD forces between pain and pain-free groups. **Methods:** Thirty-six baseball pitchers were separated into pain-free ( $13.2 \pm 1.7$  yrs.;  $164.4 \pm 13.8$  cm;  $56.7 \pm 15.2$  kg;  $n = 17$ ) and pain ( $13.3 \pm 1.8$  yrs.;  $164.9 \pm 12.5$  cm;  $56.7 \pm 14.0$  kg;  $n = 19$ ) groups. Pitchers in the pain group had identified in a health history questionnaire that they experience pain in their upper extremity related to throwing a baseball. Pitching mechanics for a minimum of two fastballs per pitcher were recorded with an electromagnetic tracking system and motion capture software sampling at 240Hz. PSD force was normalized to the pitcher's body weight (%BW), with intra-pitcher mean PSD (mPSD) calculated using each pitcher's average PSD of the selected trials. Trials with the highest recorded PSD were used as max effort PSD (PSDmax). Intra-pitcher PSD range (rPSD) was calculated by finding the difference in the PSD force between the trial with the highest and lowest observed force. Statistical significance was set *a priori* to  $p < .05$ . **Results:** Mean PSD force was  $114.96 \pm 35.40\%$ BW for the pain group and  $96.62 \pm 30.36\%$ BW for the pain-free group. A one-tailed Mann-Whitney *U*-test revealed that pitchers in the pain group exhibited significantly higher PSDmax forces than those in the pain-free group ( $p = .04363$ ,  $U = 107$ ,  $z = 1.71$ ). The mPSD forces ( $p = .08226$ ,  $U = 117$ ,  $z = 1.39425$ ) and rPSD forces ( $p = .0537$ ,  $U = 103$ ,  $z = 1.606$ ) were not significantly different between groups. **Conclusion:** The PSDmax force, when normalized to a pitcher's body weight, was higher in the group experiencing pain while throwing fastballs than the group who reported they were pain-free while throwing. Further studies are needed to identify what other kinetics and kinematics may differ between pain and pain-free pitchers.

**010: THE IMPACT OF LIMITED WEIGHT ROOM ACCESS ON COLLEGE PITCHING METRICS**

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**BACKGROUND:** Strength and conditioning professionals work with sport coaches to develop programs to ensure pitchers maintain or improve arm health and throwing velocity. Therefore, the purpose of this study was to determine how eliminating a structured strength training program alters pitching and performance metrics during an 8-week fall season in collegiate baseball pitchers. **METHODS:** Twelve NCAA division-I male baseball pitchers who completed the 8-week fall season participated in the study. Each participant completed every bullpen session during the 2021-2022 season. To determine pitcher readiness prior to data collection, all participants had to be pitching bullpen sessions  $>90\%$  of their spring season in-game intensity which was determined by the pitching coach. Athletes did not have access to their weight-room facility due to the COVID-19 pandemic forcing the team to conduct their conditioning programs on the field with minimal equipment limiting a traditional strength training program. All pitching data were collected using the PULSE Throw Workload Monitor (Driveline Baseball, Kent, WA, USA). Preseason testing took place prior to the start of the fall season and post-testing occurred 72 hours after the fall season concluded. Participants completed their pre-game warm-up routine with no restriction on time. After throwing no more than 10 sub-maximal pitches on a dirt mound to a catcher positioned 18.39m away, all pitchers threw 2- or 4-seam fastballs into the strike zone with maximal effort separated by 20s. Total pitch count progressively increased each week based on the throwing program designed by the pitching coach which did not exceed 50 maximal effort pitches/week. Five of those pitch trials were selected with the average of the three highest ball velocities used for analysis. A paired samples *t*-test, with an alpha level set at  $p < 0.05$ , was conducted for the two variables of interest. **RESULTS:** There was no significant difference ( $p = 0.57$ ) in elbow valgus torque between pre-test ( $66.86 \pm 15.54$ Nm) and post-test ( $64.53 \pm 13.61$ Nm) conditions. However, there was a significant difference ( $p < 0.001$ ) in ball velocity between pre-test ( $37.70 \pm 2.01$ m/s) and post-test ( $34.89 \pm 2.16$ m/s) conditions. **CONCLUSION:** Limiting access to resistance training equipment and a structured strength program negatively impacts ball velocity even with a designed throwing program.

**O11: STRIDE-LEG KINETICS IN SOFTBALL PITCHERS ACROSS A SIMULATED GAME AND DOUBLE HEADER**

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**BACKGROUND:** Softball pitchers who compete in double header (DH) games are subjected to increased daily pitch volumes with little rest time. **PURPOSE:** To determine the effects of increased daily pitch volume on stride leg kinetics in softball pitchers. **METHODS:** Twenty-six (14±1yr, 1.6±.18m, 74.8±15.8kg) high school softball pitchers active on a team roster participated. Pitchers performed a simulated game (SG) of 25 randomly assigned pitches for four innings. Following the SG, a 30-minute break was provided. After the break, participants pitched one inning of a simulated DH game. Kinematic data were collected using an electromagnetic tracking system, and kinetics were determined in biomechanical software using inverse dynamics. Net stride hip and knee forces and torques were analyzed across the first (T1) and last innings (T2) of the SG and DH inning (T3). Joint forces were normalized to bodyweight (BW), and net joint torques were normalized to BW-height (BWH). The average max kinetics from stride foot contact to ball release from 3 fastballs were analyzed. Two within-subjects multivariate ANOVA tests were used to determine if stride hip and knee kinetics significantly differed across time points. A within-subjects ANOVA was used to test changes in pitch speed. **RESULTS:** No significant changes were observed in net stride hip forces or torques between time points as daily pitch volume increased ( $\lambda=.97, F_{4,22}=.14, p=.96$ ). No significant changes in net knee forces or torques were found between time points as daily pitch volume increased ( $\lambda=.96, F_{4,22}=.21, p=.93$ ). Significant decreases in pitch speed ( $F_{2,50}=49.38, p<.001$ ) occurred between T1 and T2 ( $p<.001$ ) and T1 and T3 ( $p<.001$ ) but not T2 and T3 ( $p=.695$ ). Net hip joint forces were T1=265.2±97.3; T2= 276.6±118.9; T3=275.2±103.2 %BW. Net hip joint torques were T1=46.9±23.5; T2=47.3±18.9; T3=47.6±18.5 %BWH. Net knee joint forces were T1=216.2±86.5; T2=208.4±79.2; T3=205.2±74.4 %BW. Net knee joint torques were T1=23.9±9.6; T2=23.7±8.4; T3=23.6±7.8 %BWH. Pitch speeds were T1=52.6±4.4; T2=50.9±4.7; T3=51.2±4.0mph. **CONCLUSION:** Performance decreased while stride hip and knee joint kinetics were sustained across time. Therefore, demands on the body remain similar across bouts of pitching, which could present a risk for injury. Conditioning to support kinetics and promote energy transfer to the pitching arm should be considered.

**O12: THE RELATIONSHIP BETWEEN STRIDE MECHANICS AT FOOT CONTACT AND HITTING PERFORMANCE IN COLLEGIATE SOFTBALL ATHLETES**

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**BACKGROUND:** A relationship between exit velocity and stride mechanics in slow-pitch softball and amateur baseball athletes has been established. However, a relationship has yet to be investigated in an elite fast-pitch softball population. The purpose of the study was to determine if there is a relationship between stride mechanics and hitting performance (exit velocity) in collegiate softball athletes.

**METHODS:** Sixteen National Collegiate Athletic Association Division I collegiate softball athletes [right-handed (n = 11); 19.4 ± 0.9yrs; 171.0 ± 7.0cm; 72.2 ± 9.4kg] who were active on a team roster and injury free for the past six months participated. Participants performed three maximal effort swings off a stationary tee positioned in the middle of the strike zone. Kinematic data at stride foot contact [stride length (% body height), stride foot angle (°), stride foot position in the z-direction (°), stride knee flexion (°), stride hip flexion (°), pelvis rotation (°), and percent center-of-mass (%COM)] were collected at 240 Hz using an electromagnetic tracking system. 0% indicated the COM was directly over the back leg, whereas 100% indicated the COM was directly over the stride leg. A force plate with a sampling frequency of 1200 Hz was also used to determine stride foot contact. The participant's stride leg was defined as their lead leg. Exit velocity (mph) was measured with a Rapsodo® 2.0 hitting unit positioned at 4.3 m from the front of home plate, with the highest value for each participant used for the analysis. Simple linear regression analyses were performed to determine if there was a relationship between kinematics at stride foot contact and hitting performance in collegiate softball athletes. **RESULTS:** The mean exit velocity was 72.4 ± 5.4mph. Regression analyses indicated stride length ( $R^2 = .003$ ), stride foot angle ( $R^2 = .093$ ), stride foot position in the z-direction ( $R^2 = .013$ ), knee flexion ( $R^2 = .002$ ), hip flexion ( $R^2 = .034$ ), pelvis rotation ( $R^2 = .045$ ), and %COM ( $R^2 = .080$ ) were not related to hitting performance in this population of collegiate softball athletes (all model  $p$ -values > .288). **CONCLUSIONS:** A relationship between stride mechanics at foot contact and exit velocity did not exist in this

population of collegiate softball athletes; however, measuring kinematic values at stride foot contact is only one way to examine a hitter's stride. Future softball hitting research should examine other stride parameters such as timing and joint angular velocities.

**O13: SHOULDER KINETICS AND INFRASPINATUS EMG DURING DECELERATION PHASE IN YOUTH BASEBALL PITCHERS**

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**BACKGROUND:** Forces on the shoulder after ball release (BR) in baseball pitching are postulated to increase risk of injury to the rotator cuff due to translation of the humeral head. **PURPOSE:** To examine the relationship of peak shoulder forces on infraspinatus muscle activity during the deceleration phase of the pitch. **METHODS:** Thirty-three youth baseball pitchers [11.6±1.5y, 156.8±13.1cm, 49.4±12.0kg] active on a team roster and free from injury for the past six months participated. Electromyographic (EMG) data of the infraspinatus were collected and processed using a root-mean-square calculation with a period of 100ms and a sampling interval of 1/1500 seconds. Two, five second maximal voluntary isometric contractions (MVIC) of the infraspinatus were performed. Afterwards, pitchers threw five maximal effort four-seam fastballs to a catcher. Kinematic data were collected using an electromagnetic tracking system. The mean of the two MVIC peaks was used to normalize EMG data. Mean shoulder peak forces (distraction, anterior, and superior) as a percentage of body weight (BW) were analyzed during the deceleration phase (BR to maximum shoulder internal rotation). Linear regression was performed to predict infraspinatus activity from each kinetic variable at the shoulder. **RESULTS:** Shoulder superior force was -51.8±22.9%BW, distraction was 76.2±22.0%BW, and anterior was -51.4± 20.1%BW, while infraspinatus activity was 32.7±15.1%MVIC. There was a moderate correlation between superior force and infraspinatus activity ( $r=-.31, p=.08$ ). Weak correlations were found between distraction force ( $r=.18, p=.32$ ), and anterior force ( $r=.17, p=.35$ ) on infraspinatus EMG activity. Superior force did not predict infraspinatus activity ( $F(1, 31)=3.23, p=.08, R^2=.09, R^2_{adj}=.07$ ). Neither distraction force ( $F(1, 31)=1.02, p=.32$ ) nor anterior force ( $F=.88, p=.35$ ) predicted infraspinatus activity. **CONCLUSIONS:** Increased superior force was correlated with higher maximum infraspinatus EMG activity, yet the individual forces did not predict maximal muscle activation. The infraspinatus undergoes eccentric loading to decrease the rate of glenohumeral internal rotation and may play a minor role in mitigating superior translation of the humeral head. Examining shoulder forces and muscle activity in additional muscles can help explain mechanisms of injury.

**O14: COMPARISON OF TIMING METHOD AND START TECHNIQUES FOR BASE STEALING AMONG DIVISION II BASEBALL PLAYERS**

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**BACKGROUND:** Start technique for base stealing in baseball has the potential to improve steal times and therefore positively effect offensive scoring. In addition, the method of timing (manual versus electronic) may influence accuracy of steal times. The purpose of this study was to determine the effect of timing method (handheld stopwatch [SW] or electronic [ET]) and start techniques (crossover step [CS], drop-step [DS], jab-step [JS]) on stolen base time. **METHODS:** Anthropometrics were assessed on day 1 in 15 Division II college baseball player's (age 20.7 ± 1.4y; height 1.78 ± 0.1m; body mass 85.1 ± 12.7kg; body fat 16.1 ± 6.1%). On days 2-4, participants ran 3 sprints trials (19m) for each start technique with times for the best trial recorded. Electronic timing gates were placed 5m and 14m beyond the starting line to record a 5m split time and total time, and the 5m to 14m split time was calculated (total time - 5m split). Handheld stopwatches were also used to record a total time. **RESULTS:** The SW total time was significantly faster than ET for CS (2.8±0.2s vs. 2.9±0.1s,  $p=0.03$ ), but slower for the JS (3.1±0.2s vs. 2.9±0.1s,  $p<0.001$ ). Within the SW method, total time was significantly different among start techniques, with CS having the fastest total time ( $p<.001$ ). Within ET, there were no differences among start techniques ( $p=0.38$ ). However, CS was significantly faster at the 5m to 14m split compared to JS ( $p=.003$ ) and DS ( $p=0.01$ ). At the 5m split, JS was faster than CS ( $p=0.03$ ). **CONCLUSION:** Using a handheld SW can impact the accuracy of steal time and potentially be misleading, suggesting the ET may be better to assess base stealing in baseball players. Since the CS was faster for the 5m to 14m split, this may indicate improved running efficiency when using this technique.

Coming off the start faster (JS) may be strategically beneficial; however, this advantage must be maintained throughout the stolen base time to be practical.

#### **O15: RELATIONSHIP IN FITNESS AND START TECHNIQUES FOR BASE STEALING AMONG DIVISION 2 BASEBALL PLAYERS**

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**BACKGROUND:** Base stealing in baseball is an important offensive measure which can lead to a more productive offense. Strategizing which players may best be suited to steal bases could improve the success of base stealing. The purpose of this study was to evaluate the relationship between fitness and steal times in Division II baseball players using 3 different start techniques [crossover step (CS), drop-step (DS), jab-step (JS)]. **METHODS:** Fifteen Division II college baseball players participated in this study (age= 20.7 ±1.4y; height= 1.78 ±0.1m; body mass= 85.1 ±12.7kg; body fat= 16.1 ±6.1%). Anthropometrics were assessed on day 1. On days 2-4, participants ran 3 sprints (19 m), performing one of the start techniques each day. Electronic timing gates were placed 5m beyond the starting line to record 5m split time and 4.5m from 2<sup>nd</sup> base to record total time (TT). On test days 5-7 the subjects performed a pro-agility test and 1 RM in back squats with a Wingate Aerobic test (WAnT) on the final test day. **RESULTS:** The CS middle split (5m marker) (1.75±.10s) was significantly faster than the JS(mean=1.84±.07s) and DS (1.82±.08s) split time ( $p<.001$ ). There was not a difference in TT between CS (mean=2.9475, SD= 0.15 s), DS (mean=2.98, SD=0.13 s, and JS (mean=2.96, SD= 0.128)( $p=0.38$ ). TT and fitness testing was significantly related to all start techniques ( $p<0.001$ ). CS and JS TT were related to mean power output ( $p<0.05$ ). Regression analysis demonstrated that the pro-agility test explained >60% of the variance for all start techniques. **CONCLUSIONS:** Start technique for base stealing did not have an impact on steal time, suggesting that baseball players should choose technique based on preference. Agility and power have the biggest impact on base stealing times. Baseball players should focus on development of lower body power independent of start technique selection. Slower pro-agility time was related to lower TT for all techniques. Lower body power was predictive of faster TT for CS and JS. Together these data suggest that baseball players should improve lower body strength in order to enhance base stealing times.

#### **O16: SHOULD THE BASEBALL BE ADJUSTED TO BETTER SUIT YOUNGER PLAYERS' PHYSICAL CHARACTERISTICS?**

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**BACKGROUND:** Scaling of equipment is commonplace across various sports and has been shown to enhance skill acquisition and aid the development of better motor patterns. In baseball, bat size, field size, and protective equipment are modified to meet the needs of younger players, except for the size of the baseball. As such, hand anthropometry for each playing level has not been considered. Therefore, the purpose of this study was to investigate the differences in the hand size of males from 6 to adult (18+), in order to offer recommendations for a suitably sized baseball for each playing age group (per the United States Specialty Sports Association's guidelines). **METHODS:** PubMed, Google Scholar, and EBSCO Host databases were searched for studies including the terms: "hand size", "hand dimensions", "hand length", "hand width", "hand span", "male", and "adolescents" from 2002-2022. In total 56 studies were found, with 9 meeting the inclusion criteria by presenting hand length and width measures. Mean hand size values from a total of 3833 data points were calculated before being grouped by age. Mean hand size was then established for each playing age group: 7-8y, 9-10y, 11-12y, 13-14y, 15+, and the difference in hand size (HS, length × width) and ball coverage (BC, hand size ÷ ball surface area) was calculated. **RESULTS:** Relative to the adult group, HS was: 41.2% smaller (with 40.5% less BC) for 7-8 years; 31% smaller (with 30.5% less BC) for 9-10 years; 19.9% (with 19.5% less BC) for 11-12 years; 7.2% (with 7.1% less BC) for 13-14 years; and 3% (with 2.9% less BC) for 15+ years. **CONCLUSION:** These findings demonstrate that hand size differs considerably between adult and youth age-group players, and indicate that younger players are using a ball that is too large. If the baseball is appropriately scaled for younger players, then the sport will be comparable in all facets of the game that their senior counterparts play. This might allow youth players to mimic a more mature throwing style and help them to learn proper mechanics as early as possible. Future work should investigate how scaling a baseball can influence throwing kinematics and kinetics in youth athletes. By scaling down the baseball for younger players then the game (*or sport*) may be more replicable (*or comparable*) to the version played by their senior counterparts.

#### **O17: ASTAXANTHIN DOES NOT IMPACT MARKERS OF MUSCLE DAMAGE OR INFLAMMATION FOLLOWING AN MUSCLE DAMAGE PROTOCOL**

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It is well documented that exercise-induced muscle damage (EIMD) decreases exercise performance via elevated inflammation and subjective discomfort. Due to its potent antioxidative properties, astaxanthin (AX) may serve as a potential dietary supplement strategy for mitigating delayed-onset muscle soreness (DOMS) and enhancing recovery and performance. This study aimed to investigate the effects of AX on markers of muscle damage, inflammation, DOMS, and anaerobic performance and substrate metabolism. Thirteen resistance trained men (mean±SD, age, 23.4±2.1 years) completed a double-blind, counterbalanced and crossover design with a 1-week washout period between two, 4-week supplementation periods at 12 mg/day<sup>-1</sup> of AX or placebo. Following each supplementation period, subjects completed two trials, with trial one including a graded exercise test (GXT) and a 30-second Wingate, and trial two including an EIMD protocol followed by collection of fasting blood samples (pre-post) to measure creatine kinase (CK), advanced oxidative protein products, c-reactive protein, interleukin-6, insulin, and cortisol. AX supplementation had no statistical effects on markers of substrate metabolism during the GXT, Wingate variables, or markers of muscle damage, inflammation, or DOMS when compared to placebo (all  $p>0.05$ ). However, 4-weeks of AX supplementation did significantly lower oxygen consumption during the final stage of the GXT (12%,  $p=0.02$ ), as well as lowered systolic blood pressure (~7%,  $p=0.04$ ), and significantly lowered baseline insulin values (~24%,  $p=0.05$ ) when compared to placebo. Collectively, these data suggest that 4-weeks of AX supplementation at 12 mg/day<sup>-1</sup> did not impact markers of muscle damage, inflammation, or DOMS following an EIMD protocol in a resistance-trained male cohort.

#### **O18: A PILOT STUDY CHARACTERIZING DIETARY INTAKE IN WOMEN OF VARYING RACE AND ETHNICITY**

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**Background:** Dietary intake such as consumption of saturated fats, fruits and vegetables, and sodium can impact cardiometabolic health. In females, the risk of cardiometabolic diseases such as diabetes and hypertension vary by race and ethnicity with racial minorities often experiencing the greatest risk. Therefore, the purpose of this study was to evaluate if dietary intake differs by race and ethnicity in females. **Methods:** Fifty-seven racially diverse females (Mean±SD; Age: 27.1±6.4 yrs, BMI: 24.8±4.3 kg/m<sup>2</sup>; %body fat: 32.2±7.1 %) enrolled in the present study. Participants completed a 3-day dietary log where each reported all food and beverage intake for two weekdays and one weekend day. Data was entered into a dietary analysis software to assess total calorie intake, sugar, protein (PRO), sodium, fat, carbohydrates (CHO) and fiber intake. Participants were stratified into the following ethnicities and races: Asian (A, n=12), African American (AA, n=12), Biracial (BR, n=10), Hispanic (H, n=11), White (W, n=12). Separate one-way ANOVA tests were completed to assess racial and ethnic differences in each dietary variable. **Results:** There were no significant differences between racial or ethnic groups for any dietary variable ( $p=0.101-0.701$ ). Although not significant, there was a wide range between races and ethnicities for total calories, sugar, sodium and fiber intake (Total calories mean±SD = 1791±510 Cal, range = 1457(A) - 1987(AA) Cal,  $p= 0.114$ ; sugar: 75.1±37.7 g, 54.1(A) - 88.6(AA) g,  $p=0.101$ ; fiber: 20.5±10.3 g, 15.6(AA) - 25.8(BR) g,  $p=0.173$ ; sodium: 2600.7±1260.8 mg, 1917.5(A) - 3229.1(AA) mg,  $p= 0.107$ ). The percentage of total calories composed of fats, CHO and PRO were similar between all racial and ethnic females (% dietary fat: 36.1±7.0 %,  $p=0.367$ ; % dietary CHO: 46.5±8.5%,  $p=0.314$ ; % dietary PRO: 17.7±5.1%,  $p=0.701$ ). **Conclusions:** There were no significant dietary difference between races and ethnicities in this small sample of females. However, future studies should evaluate a larger, diverse sample of females as well as evaluate more specific dietary components such as fruits and vegetables, sugar sweetened beverages, and fast-food consumption. Additionally, as cardiometabolic health may be impacted by dietary intake, future studies should evaluate how dietary intake impacts specific outcomes such as vascular function, fasting blood glucose and body composition in a diverse group of females.

**O19: POSTMENOPAUSAL DARK CHOCOLATE CONSUMPTION ELEVATES RESTING ENERGY EXPENDITURE**

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**BACKGROUND:** Several recent reports have indicated positive health and exercise benefits of (-)-epicatechin-rich cocoa products. It was recently reported from our laboratory that 30-d of dark chocolate supplementation resulted in a 9.6% increase in resting energy expenditure in exercise trained females. The purpose of this study was to investigate the influence of dark chocolate consumption on resting and exercise metabolism in postmenopausal women. **METHODS:** Using a randomized, double-blind design 24 postmenopausal subjects were assigned to a 30-day supplementation with either 20-g per day of 70% dark chocolate (DC) (n=12) or a calorically matched white chocolate (WC) (n=12). Prior to supplementation, subjects underwent two control trials (separated by 3-7 days) for indirect calorimetry assessments (PRE1, PRE2) of resting energy expenditure (REE) and moderate intensity exercise energy expenditure (EEE) during 10 min of cycling at 30-50 watts. Upon completion of the PRE2 assessment, subjects were supplemented for 30 days, after which they repeated the assessments for REE and EEE. All data are presented as mean (SD). **RESULTS:** PRE1 and PRE2 REE and EEE were not significantly different within or between groups (REE: PRE1 DC 1215 (170), WC 1127 (174); PRE2 DC 1211 (174), WC 1145 (165) kcal/d; EEE: PRE1 DC 3.67 (170), WC 3.40 (0.81); PRE2 DC 3.41 (0.88), WC 3.39 (0.73) kcal/min). Post supplementation REE was significantly increased by 3.2% in the DC group (Pre-Post change: DC 38.6 (49), WC -15 (31.2) kcal per day, p<.05). Post supplementation EEE was not significantly different between groups (Pre-Post change: DC 0.05 (0.05), WC 0.08 (0.02) kcal/min (p > .05)). **CONCLUSION:** These results indicate that DC supplementation in postmenopausal subjects was associated with a significant 3.2% increase in REE; however, it did not significantly influence moderate intensity EEE.

**O21: ROLE OF SHORT DURATION INTERMITTENT FASTING ON ACUITY AND BODY COMPOSITION IN YOUNG ADULT FEMALES**

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**BACKGROUND:** Intermittent fasting (IF) is a dietary method to restrict caloric intake during a limited time of day. Clinical trials have found mixed results in changes of body composition and improved cognitive affective states such as concentration and mental acuity. Evidence to date has predominantly focused on middle-aged adults with pre-existing conditions. Therefore, the primary purpose of this feasibility study was to explore the effects of short-term (4-weeks) IF on mental acuity in young women, with secondary interest changes in body composition. **METHODS:** Twenty-two female subjects were randomized to either IF (n = 11) or a control groups (n = 11). The IF group was instructed to only consume calories in an 8-hour window each day for 4 weeks without intentionally changing the type/amounts of food they consumed. Baseline, mid-point and follow-up physical measures included Dual-X-ray absorptiometry (DEXA) to assess body composition while acuity testing included Cogstate computer-based testing with additional measures of alertness (i.e., Zogim-A and fatigue (FSS)). **RESULTS:** No statistically significant differences between groups were found for Cogstate testing measurements including psychomotor function, information processing speed, visual attention, visual learning, working memory and attention or for FSS or Zogim-A scales. IF group analysis showed improvements in visual learning (i.e. One Card Learning test) at 2 weeks (delta = .077 [SD.11], p = .05) and at 4 weeks (delta = .078 [SD .06], p = .002) with effect sizes of .674 and 1.30, respectively. Additionally, both groups increased their paired associate learning scores at 2 weeks (IF: p = .02, Cohen's d = .832; control: p = .10 Cohen's d = .884) and 4 weeks (IF: p = .001, Cohen's d = 1.346, control: p = .023, Cohen's d = .808). There were no observed changes in weight status, body fat, or lean mass over the course of the 4-week intervention. **CONCLUSIONS:** This pilot feasibility study found small changes in the visual learning domain of acuity during the 4-week trial IF trial. Implications of the trial suggest that other cognitive or acuity measures may be more sensitive to IF as the present study reported minimal findings. Future studies could focus on longer intervention durations, other cognitive measures or investigate diet restriction in conjunction with IF.

**O22: METABOLIC EFFECTS OF R-1,3 BUTANEDIOL (KETONEIQ) DURING AEROBIC AND ANAEROBIC EXERCISE BOUTS.**

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**BACKGROUND:** Current evidence demonstrates the efficacy of low carbohydrate/high fat ketogenic diets in clinical and athletic populations. Despite the pleiotropic effects of ketosis, many are wary of carbohydrate restriction due to decreased [glycogen]. R-1,3 butanediol (RBDO) supplements have made it possible to ingest ketone molecules, elevating blood *b*-hydroxybutyrate (*BHB*) despite consuming carbohydrates (CHO) in the diet. The purpose of this investigation was to determine metabolic effects of RBDO and CHO. **METHODS:** A randomized repeated measures placebo-controlled design was used to compare RBDO and placebo (PLA). Upon arrival blood analysis for blood *BHB* and glucose (GLU) were completed. Participants then ingested 0.5g/kg of RBDO or PLA and a standard meal (31g CHO, 2.5g fat, 13g protein). *BHB* and GLU were measured post-meal (IP), +15minutes (IP15), +30minutes (IP30) and +45minutes (IP45). Participants then conducted a 5k time-trial on a treadmill while breath gases were analyzed (COSMED, Italy). *BHB* and GLU were determined at baseline, midpoint and post run. Following aerobic testing participants completed five 10-second sprints against resistance (7.5% body mass). *BHB* and GLU were analyzed after their third and fifth effort. **Statistical Analyses:** Repeated measures analysis of variance (ANOVA) were conducted to establish group and time effects. **RESULTS:** RBDO resulted in increased *BHB* relative to PLA at IP15 (p<0.001), IP30 (p<0.001), IP45 (p<0.001), all time-points for aerobic (p<0.001 for each) and anaerobic testing (Midpoint: p<0.01, Post: p<0.01). A significant decrease in *BHB* for RBDO, from pre-run (1.9±0.2mmol) to post-run (1.2±0.2mmol), was also observed (p=0.003). The RBDO group (82mg/dL) demonstrated lower blood glucose following the final bike sprint compared to PLA (105mg/dL; p=0.03). No differences existed between groups for respiratory exchange ratio. **CONCLUSION:** Acute supplementation with RBDO significantly increases blood ketone concentrations. The observed reduction in *BHB* occurring across the aerobic trial, with no concomitant changes in [GLU] or [lactate] demonstrate a preferential oxidation of the exogenous *BHB* serving to spare muscle glycogen. RBDO blunted the sympathetic elevation of blood glucose from repeated bike sprints, possibly due to enhanced substrate availability instead of reliance of glycogenolysis. Funding: Health Via Modern Nutrition (HVMN)

**O23: THE EFFECTS OF ACUTE RAUWOLSCINE SUPPLEMENTATION ON STRENGTH, POWER, AND AGILITY**

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**BACKGROUND:** Rauwolscine is a supplement that is a sympathetic nervous system stimulant and is claimed to enhance exercise performance. While it is currently being marketed as an effective pre-exercise supplement, there have been no scientific investigations on the efficacy of rauwolscine on exercise performance. Thus, the purpose of this study was to examine the effects of acute rauwolscine supplementation on measures of strength, power, and agility. **METHODS:** Fourteen resistance-trained males were recruited to participate in this study. In a double-blinded, counterbalanced, crossover design, subjects supplemented with 2 mg of rauwolscine or a placebo 20 minutes prior to exercise testing. During each trial subjects performed 2 maximal effort countermovement vertical jumps on a force platform with 1 minute of rest between each jump. Next, subjects completed a reaction-based agility test using the FitLight timing system. Last, subjects completed an isometric mid-thigh pull assessment to measure peak force production. Subjects returned for the second visit following a minimum of 24 hours and completed the same testing battery under the opposite supplement condition. Vertical jump height, peak power, reaction time, and peak force production were recorded and analyzed using a paired samples t-test to determine differences between conditions. **RESULTS:** Gross reaction time was significantly faster in the rauwolscine trial (p = 0.015). There was no significant difference in vertical jump height, peak power, and peak force between conditions (p > 0.05). **CONCLUSIONS:** While companies are promoting the use of rauwolscine to improve muscular performance, the results of our study suggest that rauwolscine has no effect on measures of strength and power. However, rauwolscine appears to have ergogenic effects on reaction time.

**O24: VARIATIONS IN COPEPTIN AND CORTISOL ARE NOT ASSOCIATED WITH AD-LIBITUM BREAKFAST CONSUMPTION**  
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**INTRODUCTION:** Chronic elevations in cortisol are associated with preference for foods with higher fat and sugar content, which may contribute to higher energy intake (EI). Chronic underhydration has been associated with greater risk for obesity and elevated resting cortisol concentrations. However, the influence of elevated copeptin, indicative of underhydration, on cortisol responses and subsequent EI remains largely unknown. This study explored the effects of variations in copeptin and cortisol on energy and macronutrient intake during an ad-libitum breakfast. **METHODS:** Ten healthy adults (10% female; Age, 25±4 y; Height, 177.9±7.4 cm; body mass, 75.8±13.8 kg; body fat, 13.5±7.1%) received an ad-libitum breakfast with a variety of food items on two separate occasions the morning after sleeping in temperate (T<sub>TEMP</sub>, 25°C, 30% RH) and hot (T<sub>HOT</sub>, 30°C, 30% RH) environmental conditions, in a randomized order. Blood and saliva were collected immediately prior to the ad-libitum breakfast (45 minutes post-awakening), analyzed for serum copeptin (COP) and salivary cortisol (CORT), respectively. Separate random-intercept linear mixed-effects models assessed the effects of individual mean-centered copeptin and salivary cortisol concentrations on ad-libitum energy and macronutrient intake at breakfast, controlling for condition. **RESULTS:** CORT concentration (p=0.84), COP concentration (p=0.84), EI (p=0.25), and protein (p=0.53), and carbohydrate (p=0.239) consumption did not differ by condition. Within-person changes in copeptin or cortisol were not associated with EI or macronutrient intake [kcal:  $\beta_{COP} = 20.38$ , [-35.93, 76.79], p = 0.463,  $\beta_{CORT} = -14.02$ , [-33.68, 5.64], p = 0.17, protein:  $\beta_{COP} = -0.15$  [-2.74, 2.45], p = 0.91,  $\beta_{CORT} = -0.37$ , [-1.28, 0.53], p = 0.41; carbohydrates:  $\beta_{COP} = 4.90$  [-4.25, 14.0] p = 0.29,  $\beta_{CORT} = -1.34$ , [-4.53, 1.86], p = 0.398; fat  $\beta_{COP} = 0.24$  [-3.70, 4.19], p = 0.90  $\beta_{CORT} = -0.78$ , [-2.16, 0.59], p = 0.26, when controlling for condition. **CONCLUSIONS:** Variations in morning cortisol and copeptin were not associated with ad-libitum energy or macronutrient intake during breakfast. Future studies that impose perturbances in these hormones on subsequent eating behaviors and EI are needed to provide causal evidence.

**O25: OPTIMIZING STRESS MANAGEMENT IN COLLEGE STUDENTS**

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**Background:** College students encounter new and powerful stressors, predisposing them to a lifetime of poor health and unhealthy behaviors; thus, finding low-impact and attainable methods of stress management is of high importance for this population. The purpose of this study is to examine the impact on stress of a single bout of three potential stress intervention components—yoga, progressive muscle relaxation (PMR), and deep breathing technique (DBT)—delivered alone and in combination. **Methods:** A 30-minute stress reduction intervention session was conducted for 40 undergraduate college students who were randomized to one of 8 combinations of yoga (yes or no), PMR (yes or no), and/or DBT (yes or no). Participants self-reported stress via the perceived stress scale (PSS), and positive and negative affect via the positive and negative affect schedule (PANAS) before and following the session. We investigated component main effects and interactions via ANCOVA, controlling for pre-session stress or affect. **Result:** Participants were 20.6 ± 1.19 years of age on average, and 70% were female. Regarding PSS, an ANCOVA controlling for baseline PSS revealed a significant yoga x PMR interaction (F=4.67, p=0.04,  $\eta^2=0.14$ ), and an investigation of interaction plots revealed that the combination of yoga and PMR resulted in the lowest stress levels compared to all other combinations. Regarding positive affect, the ANCOVA controlling for baseline positive affect revealed an approached significant yoga x DBT interaction (F=3.76, p=0.06,  $\eta^2=0.12$ ) such that the combination of yoga and DBT resulted in the highest positive affect compared to all other combinations. **Conclusions:** These results support the value of a single session of yoga in combination with either PMR and/or DBE for enhancing recovery from stress and positive mood in college students. **Grant or funding information:** Wake Forest Research Fellowships

**O27: A MODERATE-TO-HEAVY INTENSITY WEIGHT TRAINING SESSION IMPROVES MOOD IN MALE AND FEMALE STUDENT-ATHLETES**

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**BACKGROUND:** The affective response to resistance training is less supported than the predictable affective response to aerobic exercise. Gender differences observed in the affective exercise response in the general population can be attributed to more training experience present in males. Affective exercise responses between genders may be similar in trained individuals, such as student-athletes. In general, females report a higher prevalence of anxiety and mood disorders, and female collegiate student-athletes report more mental health concerns than their male peers. The rising concerns of student-athlete well-being highlights a need for better understanding of the mood-boosting effect of exercise sessions in athletic populations. **METHODS:** 41 resistance-trained student-athletes (20.3 ± 1.6 years; 21 females) completed a full-body, multi-joint, free-weight training session lasting approximately 45 minutes. Participants were instructed to self-select moderate-to-heavy loads, representative of a typical sport-specific training session. The Subjective Exercise Experiences Scale measured positive well-being (PWB), psychological distress (PD), and fatigue (FAT) before and after the training sessions. RPE was 4.3 ± 1.8 on the Borg CR-10 scale, indicating a moderate to heavy session intensity. A mixed ANOVA with gender as a between factor and time as a within factor was run to determine differences in PWB, PD, and FAT between males and females and before and after the workout. Alpha was set at .05. **RESULTS:** No interaction effects were significant. A main effect for gender and time was observed for PWB and PD, while only a main effect for gender was found for fatigue (p < .05). PWB increased and PD decreased following the workout. Overall, females had lower PWB and higher PD and FAT than males. **CONCLUSIONS:** Regardless of gender, an acute moderate-to-heavy intensity weight training session can improve mood states in trained college student-athletes. This may be particularly beneficial for females, who tend to have lower mood states compared to their male counterparts.

**O28: AUGMENTING PSYCHOLOGICAL SAFETY IN COLLEGIATE ATHLETICS**

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**BACKGROUND:** Sports are often viewed as a neutral setting that leaves behind the real-world issues (e.g., injustice, politics) (Sage,1998). That view has changed with athletes using their voices to speak on issues outside of the context of sport (Kluch, 2020). With these changes it is important to better understand organizational and, more importantly, team environments that are conducive to these changes. Environments are essential in the development of college athletes. The purpose of the current study was to examine the predictability of psychological safety on athletes' social justice activism, athletic satisfaction, and psychological well-being. **METHODS:** Data was collected using a cross-sectional survey from a sample of college athletes (n = 60) from various NCAA Division I, II and III institutions located in the southeastern, southwestern, western, midwestern and northeastern regions of the United States. **RESULTS:** Partial least squares structural equation modeling (PLS-SEM) was employed to test the hypothesized relationships. Using a nonparametric bootstrapping procedure with 5,000 resamples, the t-statistic was calculated to test the hypothesized relationships. The paths from psychological safety to attitudes toward social justice (H1a:  $\beta = 0.767$ , t = 9.959) and from psychological safety to subjective norms (H1b:  $\beta = 0.669$ , t = 6.205) were positive and statistically significant (p < 0.001) in the hypothesized directions. The direct path from psychological safety to psychological wellbeing ( $\beta = 0.757$ , t = 10.309, p < 0.001) was also positive and significant, thus supporting Hypothesis 2. The effect of psychological safety on athletic satisfaction was significant and positive ( $\beta = 0.797$ , t = 12.374, p < 0.001), confirming Hypothesis 3. Psychological safety explained 59%, 45%, 64%, and 57% of the variance in attitudes toward social justice, subjective norms, athletic satisfaction, and psychological wellbeing, respectively, indicating the explanatory power of psychology safety on outcome variables. **CONCLUSIONS:** This study shows that creating a psychologically safe environment will allow athletes to flourish on and off of the field without explicitly addressing polaristic issues (e.g., social justice activism). The findings are seminal and allow for further research to examine psychological safety and the positive benefits at the team and organizational levels.

**O29: EXAMINING AFFECTIVE EXPERIENCES AND CURRENT RESISTANCE TRAINING BEHAVIOR IN YOUNG ADULTS**

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**BACKGROUND:** Positive exercise-related affective responses predict future behavior. Research is lacking in evaluating individuals' affective experiences regarding resistance training (RT). Our purpose was to examine affective experiences to RT, current RT behavior, and perceived changes in RT since freshman year of high school in young adults. **METHODS:** Respondents completed a survey that contained the Affective Exercise Experiences (AFFEXX) Questionnaire with modified instructions to capture perceptions for RT across 10 subscales (score range=1-7). Additional items captured dimensions of RT (target muscle groups, repetition range), perceptions of behavior, and demographics. Cronbach's alpha coefficients were used to examine internal consistency of AFFEXX subscales. Frequency and basic descriptive analyses were conducted for demographic and RT behavior. Independent t-tests were conducted to examine gender-related differences. **RESULTS:** 54 respondents (22 ±2 years old, 54% women) completed the survey. Cronbach alpha and mean ± standard deviation respondent scores for AFFEXX subscales were: Interest ( $\alpha=0.829$ ;  $6\pm 1$ ), Honor ( $\alpha=0.883$ ;  $6\pm 1$ ), Empowerment ( $\alpha=0.579$ ;  $6\pm 0.8$ ), Showing Off ( $\alpha=0.868$ ;  $4\pm 1$ ), Like Group ( $\alpha=0.902$ ;  $5\pm 2$ ), Competence ( $\alpha=0.782$ ;  $6\pm 0.9$ ), Pleasure ( $\alpha=0.824$ ;  $6\pm 0.9$ ), Energy ( $\alpha=0.895$ ;  $5\pm 1$ ), Calmness ( $\alpha=0.842$ ;  $5\pm 1$ ), and Attraction ( $\alpha=0.905$ ;  $5\pm 1$ ). No significant gender differences were observed for AFFEXX subscales; t-values ranged between -1.257 to 1.927, all p-values > 0.059. No gender differences were observed for RT frequency ( $3.4\pm 1.6$  vs.  $2.7\pm 1.8$  d/wk;  $t=-1.511$ ,  $p=0.498$ ) or the total number of exercise types per session ( $6\pm 3$  vs  $5\pm 3$ ;  $t=-1.462$ ,  $p=0.080$ ), with most men (60%) and women (72%) performing 8-14 repetitions per set. 83% of respondents targeted at least one muscle group per week for RT, with 32% men and 14% women targeting all major muscle groups at least twice per week. 40% of men and 31% of women reported performing more RT in high school. **CONCLUSION:** When modified for RT, most AFFEXX subscales demonstrated at least good reliability ( $\alpha > 0.70$ ). Affective experiences were generally rated as favorable. Compared to national averages of men and women meeting muscle-strengthening guidelines (38%, 31%), a smaller proportion of respondents would meet recommendations through RT alone. More research is needed to understand associations between affective experience ratings and RT behavior.

**O30: CHANGES IN PHYSICAL ACTIVITY, MENTAL HEALTH, AND MOTIVATION IN COLLEGE STUDENTS AFTER COVID-19**

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**BACKGROUND:** The effect of the initial COVID-19 lockdown on motivation, mental health, and physical activity (PA) has been studied considerably. Evidence largely suggests that PA decreased, and depression, anxiety, and stress increased during the lockdown compared to pre-COVID. Intrinsic versus extrinsic motivation seemed to influence how each individual reacted to the onset of COVID-19. Now that vaccines are available, facilities are opening, and people are socializing, it is important to understand potential changes in PA, mental health, and motivation in college-age individuals. **PURPOSE:** The purpose of this study is to evaluate and compare current PA, mental health, and motivational trends in college-aged individuals to the initial COVID-19 lockdown. **METHODS:** A 40-question survey was conducted using Qualtrics. The survey consisted of three sections. The first section was taken from the International Physical Activity Questionnaire-Short Form (IPAQ-SF) where each question was asked twice, once assessing activity during the COVID-19 lockdown and once assessing current activity. In section two, the Patient-Reported Outcomes Measurement Information System (PROMIS) Psychosocial Illness Impact-Negative Scale was used to assess mental health. In section three, questions evaluating motivation were developed using Marashi et al.'s (2021) study on mental health and physical activity during the COVID-19 pandemic. Participants were asked to select all of the motivational factors that applied to them during the COVID-19 lockdown and all those that apply to them currently. **RESULTS:** Participants reported higher levels of vigorous physical activity currently ( $M=2.75$  days/week,  $SD=1.97$ ) than during the COVID-19 lockdown ( $M=2.41$  days/week,  $SD=2.04$ ). The numbers of intrinsic and extrinsic motivators reported were higher currently ( $M=3.21$ ,  $SD=1.79$  intrinsic;  $M=2.20$ ,  $SD=0.98$  extrinsic) than during the COVID-19 lockdown ( $M=2.52$ ,  $SD=1.69$  intrinsic;  $M=1.51$ ,  $SD=1.06$  extrinsic). **CONCLUSIONS:** After decreases in PA during the COVID-19 lockdown, there appears to be an increase in PA among college students following the lockdown. This increase in PA is accompanied by increased motivation, both intrinsic and extrinsic, to be physically active. The increased motivation for PA and accompanying increase in

actual physical activity are positive signs for the well-being of college students following the COVID-19 lockdown.

**O31: THE MENTAL HEALTH OF COLLEGIATE STUDENT-ATHLETES: A COMPARISON OF STRESS BETWEEN MALE AND FEMALE COLLEGIATE STUDENT-ATHLETES**

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**BACKGROUND:** Collegiate student-athletes are a unique population given their ability to couple additional stressors with the physical, emotional, and mental demands of playing an intercollegiate sport. As a possible result of the additional stressors, maladaptive behaviors often evolve which play a significant role in mental health, academic performance, and student success. The purpose of this research was to investigate and report on mental health conditions that impact student-athletes, with emphasis conducted on a comparison of stress levels and stress coping mechanisms between male and female student-athletes. **METHODS:** A non-experimental quantitative survey research design was used for this research. This study utilized the American College Health Association—National College Health Assessment III (ACHA-NCHA III) to survey collegiate student-athletes ( $n=89$ ) at a NCAA Division II institution. The 66-component online survey provided self-reported data about general health topics within seven content areas: (a) health, health education, and safety; (b) alcohol, tobacco, and drugs; (c) sex behavior, perceptions, and contraception; (d) weight, nutrition and exercise; (e) mental and physical health; (f) impediments to academic performance; and (g) demographics. **RESULTS:** Female student-athletes demonstrated higher frequencies of moderate stress when compared to males (67.4% and 40.9%, respectively). Female student-athletes experienced a higher frequency of serious psychological distress when compared to males (9.8% compared to 4.5%, respectively). The percent of student-athletes reporting a positive suicide screening was 9.0%, including 6.8% of males and 11.6% of females. The percent of student-athletes reporting a suicide attempt in the last 12 months was 3.4%; 4.5% of male student-athletes and 2.4% of female student-athletes. **CONCLUSION:** With the rise in mental health problems, in conjunction with the demanding college lifestyle of student-athletes, ways to support student-athletes' mental wellbeing—and ultimately their success—need to be addressed. The occurrence of stress was expressed by 93% of the student-athlete participants. If left untreated, stress can lead to suicidal thoughts or attempts. The results contribute empirical evidence towards recommendations for intervention strategies among student-athletes, such as the employment of a sports psychologist, implementation of a mental health support team, future research to track trends over time, and teaching student-athletes how to manage stress. Just as collegiate student-athletes benefit by receiving proper physical care from the athletic trainers and coaching staff, student-athletes would also benefit from athletic departments investing in mental health services.

**O32: ASSOCIATION BETWEEN HEALTH-RELATED COMPONENTS AND BODY DISSATISFACTION IN WOMEN**

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**BACKGROUND:** Body dissatisfaction refers to a negative perception or evaluation of one's body or physical appearance. Higher body dissatisfaction negatively impacts self-esteem, perceived quality of life, and can increase the risk of disordered eating, substance abuse, anxiety, and depression. **PURPOSE:** To examine the association between body dissatisfaction and health-related components among women. **METHODS:** A convenience sample of 29 female adults were included in our analysis (90% Caucasian,  $24.8\pm 9.2$  yrs.,  $24.9\pm 3.6$  kg/m<sup>2</sup>). Body mass and height were measured and used to calculate body mass index (BMI). Body dissatisfaction scores (BDS) were calculated using the body dissatisfaction subscale of the eating disorder inventory II (EDI-BD). Where applicable, EDI-BD items were reverse scored such that, higher BDS scores indicate greater body dissatisfaction. Health-related components included waist and hip circumference (cm), number of push-ups completed until exhaustion, average dominant and non-dominant hand-grip strength (kg), participant's perceived functional ability to walk, jog, or run a one-mile and three-mile distance, BMI (kg/m<sup>2</sup>), physical activity (MET-minutes/week) derived from the short form International Physical Activity Questionnaire, and relative adiposity (%Fat) derived from Dual X-ray Absorptiometry. Bivariate correlations were used to examine the direction and strength of the association between BDS and health-related components. The strength of each r value was considered weak ( $r=0.2$ ), moderate ( $r=0.5$ ), or strong ( $r=0.8$ ). Data are presented as mean ± standard deviation, with  $p < 0.05$  used to determine statistical

significance. RESULTS: No statistically significant correlations ( $p > .05$  for all) were observed between BDS and waist or hip circumference ( $r = .144$ ,  $r = .282$ , respectively), push-ups ( $r = -.215$ ), dominant or non-dominant hand-grip strength ( $r = -.121$ ,  $r = -.086$ , respectively), perceived ability to complete one-mile or three-miles ( $r = -.289$ ,  $r = -.258$ ), BMI ( $r = .240$ ), or physical activity ( $r = .094$ ). Significant, moderate correlations were observed between BDS and %Fat ( $r = .426$ ,  $p = .021$ ). CONCLUSIONS: Our results indicate a moderate, linear relationship between %Fat and body dissatisfaction. Given the relatively homogenous age, race, and BMI characteristics of the current study, the association between body dissatisfaction and health-related components should be further examined within a larger and more diverse sample.

### O33: LOAD CARRIAGE REDUCES STROKE VOLUME IN NORMOXIA, BUT NOT HYPOXIA

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**BACKGROUND:** Soldiers are often required to carry heavy loads in high altitude environments, which necessitate compensatory increases in cardiac output. However, it is unknown to what degree load carriage influences hemodynamics nor how responses are affected by hypoxia. **METHODS:** Healthy male subjects ( $n=10$ ) performed 3 exercise tests on a treadmill consisting of the following conditions: 1) unloaded normoxic (UL:  $F_{iO_2}=20.93\%$ ), 2) loaded ( $\sim 30$  kg) normoxic (LN), and 3) loaded hypoxic simulating  $\sim 3,650$  m (LH:  $F_{iO_2}\sim 13\%$ ). Exercise consisted of  $2 \times 10$  min walking (separated by 5 min rest) with stages matched with the UL condition for absolute  $VO_2$  (1.7 L/min) and walking velocity (1.45 $\pm$ 0.15 m/s). Cardiovascular responses (i.e., stroke volume [SV], heart rate [HR], cardiac output [Q], end diastolic volume [EDV], and system vascular resistance [SVR]) were assessed via impedance cardiography. Data were analyzed via two-way repeated measures ANOVA ( $\alpha=0.05$ ). **RESULTS:** At rest, Q was increased with LH (7.1 $\pm$ 1.0 L/min) relative to the other conditions (UL: 5.9 $\pm$ 1.0 L/min; LN: 6.0 $\pm$ 0.7 L/min;  $p < 0.01$ ) owing to an increase in HR (LH: 72 $\pm$ 9; UL: 63 $\pm$ 9; LN: 62 $\pm$ 8;  $p < 0.01$ ). When matched for absolute intensity, EDV ( $p=0.002$ ) and SV ( $p=0.028$ ) were reduced with LN (177.7 $\pm$ 22.0 ml; 127.3 $\pm$ 16.2 ml, respectively) relative to UL (188.8 $\pm$ 25.2 ml; 138.0 $\pm$ 20.2 ml). Q was increased with LH (141.7 $\pm$ 10.1 L/min) relative to UL (111.5 $\pm$ 8.6 L/min;  $p < 0.01$ ) via an increase in HR (LH: 141 $\pm$ 10; UL: 111 $\pm$ 9;  $p < 0.001$ ), and versus LN (115.3 $\pm$ 9.0 L/min) due to concomitant increases in HR (LN: 115 $\pm$ 9;  $p < 0.001$ ) and SV (LH: 136.6 $\pm$ 14.6 ml; LN: 127.3 $\pm$ 16.2;  $p = 0.032$ ). At the same walking velocity, Q was increased with LH (147.7 $\pm$ 14.8 L/min) versus UL (113.1 $\pm$ 8.3 L/min;  $p < 0.001$ ) via an increase in HR (148 $\pm$ 15 vs. 113 $\pm$ 8;  $p < 0.001$ ). Q was further elevated in LH (168.8 $\pm$ 10.2 L/min) versus the other conditions ( $p < 0.01$ ) owing to larger magnitude increases in HR (169 $\pm$ 10;  $p < 0.01$ ). SVR was reduced with LH ( $\sim 100$ -250 dyn $\cdot$ s $\cdot$ cm $^{-5}$ ) relative to the other conditions at all timepoints ( $p < 0.01$ ) and with LN (331.0 $\pm$ 49.0 dyn $\cdot$ s $\cdot$ cm $^{-5}$ ) versus UL (444.6 $\pm$ 76.5 dyn $\cdot$ s $\cdot$ cm $^{-5}$ ) when matched for walking velocity ( $p < 0.001$ ). **CONCLUSIONS:** Load carriage reduces stroke volume when matched for absolute intensity. However, this effect is reversed in hypoxia suggesting increased cardiovascular strain to compensate for increased blood flow demands. **GRANTS OR FUNDING INFORMATION:** This study was funded by the Jackson Hope New Directions in Research grant.

### O34: VENTILATORY RESPONSES TO LOAD CARRIAGE IN NORMOXIA AND HYPOXIA

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**BACKGROUND:** Soldiers are required to operate in high altitude environments while carrying heavy loads. This study investigates how load carriage affects the ventilatory response in normoxic and hypoxic environments (simulated altitude of  $\sim 3,650$  m) in order to improve military training and preparedness. **METHODS:** Healthy male subjects ( $n=10$ ) performed 3 exercise tests on a treadmill consisting of the following conditions: 1) unloaded normoxic (UL:  $F_{iO_2}=20.93\%$ ), 2) loaded ( $\sim 30$  kg) normoxic (LN), and 3) loaded hypoxic simulating  $3,650$  m (LH:  $F_{iO_2}\sim 13\%$ ). Exercise consisted of  $2 \times 10$  min walking (separated by 5 min rest) with stages matched with the UL condition for absolute  $VO_2$  (1.7 L/min), and walking velocity (1.45 $\pm$ 0.15 m/s). Breath-by-breath analysis via an automated metabolic system was used to determine ventilatory responses including ventilation ( $V_E$ ), tidal volume ( $V_T$ ), and breathing frequency ( $f_B$ ). Data were analyzed via two-way repeated measures ANOVA with post hoc one-way ANOVA tests to identify differences in the case of significant interactions ( $\alpha=0.05$ ). **RESULTS:** At rest,  $V_E$  increased with LH (11.4  $\pm$  2.4 L/min) versus UL (9.8  $\pm$  1.5 L/min;  $p = 0.015$ ) and LN (10.2  $\pm$  1.6 L/min;  $p = 0.008$ ). At the same absolute intensity, there was an increase in  $V_T$  with LH (1.7  $\pm$  0.4 L) versus LN (1.5  $\pm$  0.3 L;  $p = 0.007$ ), and a trend

for an increase with UL (1.9  $\pm$  0.6 L) relative to LN ( $p = 0.065$ ). Also,  $V_E$  was higher with LH (58.1  $\pm$  6.5 L/min) versus UL (43.7  $\pm$  3.3;  $p < 0.001$ ), and LN (44.9  $\pm$  2.9 L/min;  $p < 0.001$ ). Finally, there were differences in  $f_B$  across all conditions (UL: 25.5  $\pm$  6.5; LN: 30.0  $\pm$  5.1; LH: 35.8  $\pm$  9.6;  $p < 0.05$ ). At matched velocity, there were stepwise increases in  $V_E$  (UL: 44.3  $\pm$  3.4 L/min; LN: 71.5  $\pm$  17.9 L/min; LH: 98.8  $\pm$  22.9 L/min;  $p < 0.01$ ) and  $f_B$  (UL: 26.4  $\pm$  7.2 b/min; LN: 38.2  $\pm$  9.8 b/min; LH: 46.4  $\pm$  13.3 b/min;  $p < 0.01$ ) across conditions, and  $V_T$  was increased with LH (2.2  $\pm$  0.3 L) versus LN (1.9  $\pm$  0.3 L;  $p < 0.001$ ). **CONCLUSIONS:** Load carriage seems to result in shallower breathing patterns in normoxia and hypoxia. This likely compensatory breathing mechanism may increase the respiratory muscle load and impair a soldier's capacity to march for prolonged periods of time. **Grant or funding information:** This study was funded by the Jackson Hope New Directions in Research grant.

### O35: METABOLIC RESPONSES TO LOAD CARRIAGE IN NORMOXIA AND HYPOXIA

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**BACKGROUND:** Soldiers are frequently required to carry heavy loads in challenging environments that substantially increase energy expenditures. However, few studies have investigated the influence of load carriage on substrate utilization nor how responses are impacted by hypoxia. **METHODS:** Healthy male subjects ( $n=10$ ) performed 3 exercise tests on a treadmill consisting of the following conditions: 1) unloaded normoxic (UL:  $F_{iO_2}=20.93\%$ ), 2) loaded ( $\sim 30$  kg) normoxic (LN), and 3) loaded hypoxic simulating  $3,650$  m (LH:  $F_{iO_2}\sim 13\%$ ). Exercise consisted of  $3 \times 10$  min walking (separated by 5 min rest) with stages matched with the UL condition for relative intensity (40.8  $\pm$  3.2 % $VO_{2max}$ ), absolute  $VO_2$  (1.7 L/min), and walking velocity (1.45 $\pm$ 0.15 m/s). Breath-by-breath analysis via an automated metabolic system and blood sampling were used to determine metabolic responses including carbohydrate (CHO) oxidation, the relative contribution of CHO to energy expenditure (%CHO), blood glucose, and blood lactate. Data were analyzed via two-way repeated measures ANOVA with post hoc one-way ANOVA tests to identify differences in the case of significant interactions ( $\alpha=0.05$ ). **RESULTS:** CHO oxidation was reduced with LH (0.9  $\pm$  0.2 g/min) versus UL (1.3  $\pm$  0.3 g/min) and LN (1.2  $\pm$  0.2 g/min) at the same relative intensity ( $p < 0.05$ ). However, LH increased CHO oxidation at the same absolute intensity (1.7  $\pm$  0.3 g/min) and velocity (3.2  $\pm$  0.8 g/min) versus UL (absolute: 1.3  $\pm$  0.3 g/min; velocity: 1.2  $\pm$  0.3 g/min;  $p < 0.001$ ) and LN (absolute: 1.4  $\pm$  0.3 g/min; velocity: 2.2  $\pm$  0.6 g/min;  $p < 0.01$ ). CHO oxidation was also increased with LN versus UL at the same velocity ( $p = 0.001$ ). With LH versus the other conditions, %CHO was increased at rest (LH: 80.5  $\pm$  14.6%; UL: 49.9  $\pm$  14.1%; LN: 56.2  $\pm$  15.5%;  $p < 0.05$ ) and when matched for absolute intensity (LH: 78.9  $\pm$  13.3%; UL: 59.6  $\pm$  12.8%; LN: 62.2  $\pm$  10.6%;  $p < 0.05$ ) and velocity (LH: 96.8  $\pm$  11.3%; UL: 53.7  $\pm$  13.3%; LN: 71.0  $\pm$  12.6%;  $p < 0.001$ ). Additionally, %CHO was increased with LN versus UL at the same velocity ( $p = 0.025$ ). Blood glucose was increased with LH ( $\sim 10$ -15 mg/dL) at the same relative intensity and velocity ( $p < 0.05$ ). Finally, lactate was increased with LH during exercise ( $\sim 0.35$ -5.8 mmol/L;  $p < 0.05$ ) and with LN versus UL (2.4  $\pm$  1.7 vs. 0.9  $\pm$  0.5 mmol/L) at the same velocity ( $p = 0.05$ ). **CONCLUSIONS:** CHO utilization is substantially increased with heavy load carriage when maintaining a consistent walking velocity, and this effect is exacerbated by hypoxia. These findings support the importance of CHO intake for soldier's that bear heavy loads and suggest that alterations in marching pace may be warranted for maintaining CHO availability and limiting fatigue. **GRANT OR FUNDING INFORMATION:** This study was funded by the Jackson Hope New Directions in Research grant.

### O36: EFFECTS OF QUENCHING THIRST VERSUS FULL FLUID REPLENISHMENT ON MOOD AND COGNITIVE CHANGES AFTER MILD HYPOHYDRATION

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Dehydration impairs mood and sustained attention; however, evidence regarding the time course that rehydration reverses such effects is limited. Furthermore, whether assuaging thirst reverses cognitive deficits is unclear. Our purpose was to examine effects of partial rehydration (quenching thirst) compared to full rehydration (restoring fluid balance) on cognitive changes induced by exercise-induced dehydration. **METHODS:** Fifteen physically active men (age: 23.6 $\pm$ 4.4 y; weight: 73.7 $\pm$ 7.9 kg) participated in a dehydration-rehydration protocol. Mild-hypohydration [-1.7 $\pm$ 0.3% change in body mass (%ABM)] was achieved via cycling in the heat (35°C; 40%RH) followed by 30 min rehydration (restoring >100% BM). Flanker cognitive task and Brunel Mood scale were administered at baseline

(BASE), dehydration (DEH), partial rehydration replacing 50% BM loss (PAR), and immediately following full fluid replacement (FULL0) through 180 min (FULL180). RESULTS: DEH increased ( $P < 0.05$ ) thirst from BASE ( $4.6 \pm 0.7$  to  $6.2 \pm 0.6$  cm) but PAR ( $3.5 \pm 1.5$  cm) attenuated thirst with no additional changes through FULL180 ( $3.5 \pm 1.6$  cm). Plasma osmolality decreased ( $P < 0.05$ ) from DEH to FULL0 ( $296.5 \pm 3.6$  to  $294.5 \pm 2.8$  mmol/kg) but continued lower by FULL60 ( $291.0 \pm 3.0$  mmol/kg). Copeptin also decreased ( $P < 0.05$ ) from DEH to FULL0 ( $22.1 \pm 9.1$  to  $14.5 \pm 7.3$  pmol/L) and continued lower by FULL60 ( $7.7 \pm 3.5$  pmol/L). Compared to DEH, FULL0 restored ( $P < 0.05$ )  $\% \Delta$ BM ( $0.1 \pm 0.3\%$ ) similar to BASE. However,  $\% \Delta$ BM became lower ( $P < 0.05$ ) than BASE by FULL60 ( $-0.5 \pm 0.3\%$ ) through FULL180 ( $-1.0 \pm 0.4\%$ ) although  $\% \Delta$ BM remained above DEH. Flanker incongruent reaction time decreased ( $P < 0.05$ ) from BASE ( $0.46 \pm 0.02$ s) due to DEH ( $0.42 \pm 0.02$ s) and persisted through FULL180 ( $0.42 \pm 0.02$ s). Accuracy (%correct) decreased ( $P < 0.05$ ) from BASE ( $93.7 \pm 4.7\%$ ) to DEH ( $87.0 \pm 6.7\%$ ) and remained lower through FULL180 ( $87.6 \pm 4.0\%$ ). Fatigue ratings decreased ( $P < .05$ ) from DEH ( $6.9 \pm 3.1$ ) with PAR ( $4.7 \pm 2.6$ ) and remained lower through FULL180 ( $3.2 \pm 3.5$ ) similar to BASE ( $3.1 \pm 1.7$ ). CONCLUSION: Partial rehydration attenuated thirst and improved perceived fatigue but did not reverse cognitive changes. Fully restoring fluid balance after dehydration also did not reverse cognitive changes. Effects of fluid imbalance versus thirst on cognitive deficits remains unclear. Funded by a grant from The Coca-Cola Company, Atlanta, GA

### O37: SARS-COV-2 INFECTION DOES NOT ALTER CELLULAR STRESS RESPONSE DURING PROLONGED EXERTIONAL HEAT STRESS

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**BACKGROUND:** Persons with a compromised cellular stress response are more susceptible to exertional heat stroke. The present study examined the cellular stress response in persons with prior clinical diagnosis of SARS-CoV-2 infection, who were challenged with 60min of cycling exercise in hot, dry ambient conditions. **METHODS:** Eighteen participants (Age:  $21 \pm 1$  years, Stature:  $1.7 \pm 0.1$  m, Mass:  $70.3 \pm 2.7$  kg,  $VO_{2max}$ :  $47 \pm 2$  mL<sup>-1</sup>kg lean body mass<sup>-1</sup>.min<sup>-1</sup>) completed 1hr of cycling exercise in an environmental chamber ( $35^\circ\text{C}/35\% \text{RH}$ ) at an intensity that elicited 9.0 W/kg of metabolic heat production. Ten participants had been previously diagnosed with SARS-CoV-2, and the other eight participants served as the Control group. Heart rate (HR), esophageal temperature (T<sub>c</sub>), mean body temperature (T<sub>b</sub>), minute ventilation (VE), and oxygen consumption (VO<sub>2</sub>) were examined throughout exercise. Leukocytes were isolated from blood samples collected before (Pre), after (Post), 1h after (1-Post), and 3h after (3-Post) exercise. Western blot was used to quantify the protein content of markers along the TLR signaling pathway (TLR4, pNFkB, NFkB) and mediators of the cellular stress response (HSP90, HSP70, HSP60, HSP32). Between group differences were examined using RM-ANOVA with Bonferroni Post Hoc. **RESULTS:** As compared to Control, persons with prior SARS-CoV-2 infection did not exhibit greater elevations in HR ( $87 \pm 5\%$  vs  $82 \pm 8\%$  of HR<sub>max</sub>), T<sub>c</sub> ( $1.27 \pm 0.50$  vs  $1.25 \pm 0.63$  °C), T<sub>b</sub> ( $1.21 \pm 0.41$  vs  $1.12 \pm 0.47$  °C), VE ( $40.7 \pm 7.0$  vs  $36.8 \pm 7.8$  L/min) or VO<sub>2</sub> ( $22.9 \pm 2.7$  vs  $24.3 \pm 2.4$  mL<sup>-1</sup>kg lean body mass<sup>-1</sup>.min<sup>-1</sup>) during 1hr of cycling exercise at a fixed rate of heat production in hot/dry ambient conditions [all  $p > 0.05$ ]. Participants in the Control group exhibited a  $57 \pm 27\%$  increase in TLR4 content at 1-Post ( $p < 0.05$ ), whereas TLR4 content did not increase following exercise in SARS CoV-2. HSP90 content was increased by  $83 \pm 39\%$  at 3-Post exercise in the SARS CoV-2 group ( $p < 0.05$ ), whereas HSP90 content did not increase following exercise in the Control group. HSP70, HSP60, HSP32, and the pNFkB/NFkB ratio were all increased following exercise, but there were no differences between the SARS-CoV-2 and Control groups [all  $p > 0.05$ ]. **CONCLUSIONS:** As compared to Control, persons with prior SARS-CoV-2 infection do not exhibit greater thermal or cardiovascular strain during 1hr of exertional heat stress. Increased HSP90 and diminished TLR4 content in leukocytes following exercise suggest that persons with prior SARS-CoV-2 infection may experience reduced inflammation, which might be attributable to superior activation of the cellular stress response. While the exact physiologic relevance of these adjustments remains to be determined, the present study data do not provide any evidence of an adverse response to exertional heat stress in persons with prior SARS-CoV-2 infection.

### O38: EFFECTS OF CELL PHONE USE DURING GREEN EXERCISE ON IMMEDIATE EMOTIONAL STATE

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Physical activity performed outdoors, or green exercise, has physical benefits with the added advantage of improving mental health. Conversely, research shows that phone usage negatively affects

college students. Increased cell phone use in this population has been linked to low physical activity and increased sedentary behavior; low academic performance; and increased anxiety. Therefore, the purpose of this pilot study was to determine if cell phone presence affects the anxiety- and stress-reducing properties of green exercise. Eighteen college students were randomly assigned to a control group (without phone) or phone group (with phone) and completed a 45 minute-hike at a local wildlife refuge. Before and after the hike, subjects completed the nature relatedness scale (NR-6) and the Positive and Negative Affect Schedule-Short Form (PANAS-SF). These surveys measure participants' nature-relatedness, which is associated with environmental connectedness, happiness, and ecologically sustainable behavior and degree of positive or negative affect, respectively. Before, during, and after the hike ratings of perceived exertion (RPE) were taken. Subjects in the phone group also had phone use, including frequency of use and attention to phone recorded. Based on our data, there was no significant difference between the two groups for the NR-6 or PANAS. RPE for the control group was  $8.2 \pm 0.6$  pre-hike;  $9.2 \pm 0.6$  mid-hike; and  $9.0 \pm 0.5$  post-hike, while it was  $8.9 \pm 0.6$  pre-hike;  $9.5 \pm 0.5$  mid-hike; and  $9.8 \pm 0.5$  post-hike for the phone group. There were no differences between these values. While data collected failed to reach significance, results from this pilot study inform future directions. Next, we plan on increasing the length and difficulty of the hike while expanding the number of subjects. This will allow us to determine if cell phone use affects the anxiety- and stress-reducing properties of green exercise in college students.

### O39: ASSOCIATIONS BETWEEN SUBJECTIVE THIRST RATINGS WITH ENERGY INTAKE FOLLOWING SLEEP IN HOT AND TEMPERATE CONDITIONS

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**BACKGROUND:** Mixed findings on associations between thirst perceptions with energy intake (EI) have been reported, however, the impact of sleeping in a hot versus temperate environment on thirst perceptions and ad libitum EI following waking has yet to be fully explored. This study investigated differences in thirst perceptions following sleep in hot (HOT) versus temperate (TEMP) environments, and whether differences in thirst perceptions are associated with ad libitum EI and macronutrient intake the next morning. **METHODS:** Ten healthy adults (females  $n = 1$ ; age,  $25 \pm 4$  y; height,  $177.9 \pm 7.4$  cm; body mass,  $75.8 \pm 13.8$  kg; body fat,  $13.5 \pm 7.1\%$ ) participated in a randomized crossover study where they slept overnight in an environmental chamber set at  $25^\circ\text{C}$ ,  $30\% \text{RH}$  or  $30^\circ\text{C}$ ,  $30\% \text{RH}$ . Thirst perceptions were measured with visual analogue scales (0-100, higher scores indicate greater thirst). Breakfast consisted of food and beverage items that were self-selected by participants. Paired sample  $t$ -tests evaluated between condition differences in thirst perceptions, EI, and macronutrient intake. Delta values between conditions (Hot condition - Temperate condition) were calculated. Spearman correlations were used to assess the strength of associations between changes in fasting feelings of thirst with changes in EI and macronutrient intake. **RESULTS:** There were no statistically significant differences in fasting thirst perceptions upon waking, EI (TEMP:  $627 \pm 330$  vs. HOT:  $736 \pm 81$  kcal;  $p = 0.17$ ), carbohydrate (TEMP:  $25 \pm 13$  vs. HOT:  $28 \pm 13$  kcal;  $p = 0.40$ ), fat (TEMP:  $76 \pm 43$  vs. HOT:  $87 \pm 33$  kcal;  $p = 0.31$ ), and protein (TEMP:  $24 \pm 22$  vs. HOT:  $30 \pm 16$  kcal;  $p = 0.22$ ) intake between conditions. Greater thirst perceptions prior to breakfast were associated with greater carbohydrate intake during breakfast ( $r_s(9) = 0.83$ ,  $p = 0.003$ ). Delta fasting thirst perceptions were not significantly associated with delta energy, fat, and protein intakes ( $p > 0.05$ ). **CONCLUSIONS:** No differences in thirst perceptions and EI were noted between conditions, although greater thirst perceptions were associated with greater carbohydrate intake during breakfast. This initial evidence suggests that feelings of thirst may influence carbohydrate intake during a subsequent meal, although future work with an intent of manipulating feelings of thirst/hydration on EI is needed to corroborate these findings. **Grant or Funding Information:** This study was funded in part by Bedgear, LLC.

## THEMATIC POSTER SESSIONS (TP1-TP30)

**TP1: THE EFFECT OF PHYSICAL ACTIVITY AFTER CONCUSSION ON CONCUSSION-RELATED SLEEP PROBLEMS**

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**INTRODUCTION:** Research suggests that participating in light to moderate physical activity (PA), after sustaining a sport-related concussion (SRC) may speed recovery from, and help ameliorate symptoms associated with an SRC. Sleep disturbances are one of the most commonly reported symptoms following an SRC, and sleep problems after an SRC have been linked to poorer long-term recovery. To date, there is extremely limited data regarding the impact of PA on sleep disturbances after SRC. Therefore, the aims of this study were to (1) investigate the relationship between objectively-measured PA and sleep disturbances, in athletes with a recent SRC; and (2) to compare objective and subjective measures of sleep quality between athletes with and without a recent SRC. **METHODS:** Athletes from teams with higher concussion rates (football, soccer, volleyball, and basketball) completed consent procedures at the beginning of the academic year. NCWC athletic trainers then informed the research team when a consenting athlete sustained an SRC, and a matched (by age, sex, sport, and BMI) control subject was identified. Within 4 days post-SRC, both concussed (n=9) and control (n=9) participants completed a one-week sleep and physical activity (PA) monitoring period (daily sleep diaries and wrist actigraphy). Wrist actigraphy PA cut points were used to categorize actiwatch activity counts as sedentary to light; light to moderate; or moderate to vigorous intensity PA. **RESULTS:** Preliminary results of this ongoing study showed that athletes who sustained an SRC exhibited significantly longer objectively-measured wake after sleep onset durations (66.9 min vs. 41.3 min;  $t = 2.98, p = 0.009$ ), significantly higher objectively-measured sleep fragmentation indices (33.1 vs. 25.8;  $t = 2.2, p = 0.04$ ), and significantly lower self-reported sleep quality ( $t = -3.2, p = 0.006$ ). In concussed athletes, longer daytime nap durations were significantly associated with higher nighttime sleep fragmentation indices ( $r = 0.76, p = 0.02$ ) and longer self-reported sleep onset latency ( $r = 0.73, p = 0.03$ ). Higher durations of light to moderate intensity PA behavior were associated with reduced nighttime sleep onset latency ( $r = -0.54, p = 0.10$ ; trend). **CONCLUSIONS:** Preliminary results suggest that athletes with an SRC exhibit significantly greater sleep disturbances than non-concussed athletes, and that light to moderate PA early after concussion may be protective against SRC-related sleep disturbances.

**TP2: SHORT TERM COMPARISON OF HAMSTRING FLEXIBILITY AFTER STATIC STRETCHING COMPARED TO A MASSAGE GUN TREATMENT**

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**BACKGROUND:** Massage guns have gained popularity in the athletic, clinical, and general population to increase flexibility of muscles, but there is little to no research to support that massage guns can improve muscle flexibility. The purpose of this study is to assess the short-term effects of static stretching technique vs. BodyBay Percussion Massage Gun therapy on hamstring flexibility of young healthy adults. **METHODS:** A sample of 26 participants (age 27.38 +/- 6.58) were randomly divided into two groups. One group received the static stretching intervention and the other group received the massage gun intervention. Active range of motion (AROM) was then taken for every participant prior to any intervention (PRE). Next the participants were guided through a dynamic warm up where AROM was measured (DYN). Finally, each participant received their assigned intervention and a final set of AROM was measured (INT). Range of motion was assessed using a goniometer. **RESULTS:** The results of this study were calculated using 2 (groups) x 3 (time) mixed ANOVA. There was a main effect for time ( $F=46.6694, p<0.001$ ) but not group. Pairwise comparisons showed that flexibility increased over time in the static stretching group with the greatest AROM seen after INT compared to DYN ( $p < 0.001$ ) and PRE ( $p < 0.001$ ). AROM was also greater after DYN compared to PRE ( $p < 0.001$ ) in the static stretching group. Flexibility also increased over time with the massage group. The greatest AROM was measured after INT. This was significantly greater than PRE ( $p < 0.001$ ), but not DYN (.5422). AROM after DYN was significantly greater than PRE ( $p = 0.002$ ). **CONCLUSION:** We hypothesized that BodyBay Percussion Massage Gun would be more effective in increasing short term hamstring flexibility than static stretching. After analysis of the results, there is no statistical significance between the individual intervention groups, however, both groups show a positive increase between initial and final measurements of AROM, respectively. In conclusion, static stretching,

and massage gun therapy both improve short term hamstring flexibility.

**TP3: THE ROLE OF SOCIAL SUPPORT IN IDENTITY RECONSTRUCTION OF STROKE SURVIVORS**

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**BACKGROUND:** The purpose of this research is to discover how stroke survivors have utilized their rehabilitation, social support systems, and clinicians to reconstruct their identity, as well as cope with their change in lifestyle after a stroke. Understanding the timeline of potential psychosocial effects is crucial for a clinician to prepare survivors for the identity reconstruction process, making the clinician an integral part of their post-stroke life. **METHODS:** Participants (n = 13) included Physical Therapists (n = 5), Occupational Therapists (n = 3), Speech-Language Pathologists (n = 4), and Doctor of Physical Therapy Student (n = 1). A 25-minute, semi-structured interview was conducted with each participant via Zoom, and recorded for transcription and analysis. **RESULTS:** Through conversations with practitioners, it was found that the psychosocial aspects of identity reconstruction, including post-stroke depression, are far more detrimental to the survivor than the potential physical impairments. Survivors tend to rely heavily on their clinicians for guidance through these issues, but clinicians are overwhelmed by the amount of support they are expected to give patients, despite very little education in graduate school about this aspect of rehabilitation. There are rarely mental health professionals, who specialize in the identity reconstruction process in this population, therefore the clinicians are typically the sole provider. **CONCLUSIONS:** Continued education for clinicians on how to give this support, as well as support for these clinicians by other professionals, is necessary for the best outcomes for the survivor.

**TP4: THE EFFECTS OF INTERMITTENT NEUROMUSCULAR ELECTRICAL STIMULATION (NMES) OF THE PERONEAL NERVE ON MUSCLE SORENESS AND EXPLOSIVE EXERCISE PERFORMANCE**

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Neuromuscular electrical stimulation (NMES) is a therapeutic modality widely used for rehabilitation of orthopedic related injuries. Intermittent NMES targeted to the peroneal nerve in the lower limb has been shown to improve indices of blood flow and reduce swelling. However, it is unknown if prophylactic treatment with intermittent NMES delays muscle soreness and decrements in performance following intense unaccustomed exercise. The purpose of this study was to investigate the effects of acute NMES treatment following eccentric exercise on muscle soreness and explosive performance. Untrained college-aged females participated in a randomized placebo-control design, where participants were randomly assigned to one of two groups: 1) NMES treatment (1 Hz, 20 min), 2) Placebo (PL; no NMES). For the first visit, baseline (Pre) measurements of perceived soreness, ankle range of motion (ROM), calf circumference (CC), and explosive exercise performance were obtained. Participants then completed an eccentric calf-raise protocol to induce soreness immediately followed by the administration of treatment. After 48 hours (Post) had elapsed, participants returned and repeated all measurements again. Blood was collected at the beginning of each visit to measure plasma lactate dehydrogenase (LDH) activity. Results indicated that there were no differences between PL and NMES with regards to vertical jump ( $p=0.257$ ), peak isometric force ( $p=0.337$ ), CC ( $p=0.556$ ), ROM ( $p=0.847$ ). Perceived soreness ( $p<0.001$ ) and blood LDH activity ( $p<0.001$ ) were significantly higher Post regardless of treatment. In untrained females, acute NMES treatment did not influence exercise-induced soreness outcomes, nor aid in muscle force development in isometric performance.

**TP5: PILOT STUDY TO EVALUATE THE FEASIBILITY OF KETONE SUPPLEMENTATION TO IMPROVE FUNCTIONAL OUTCOMES IN ADOLESCENTS POST SPORTS-RELATED CONCUSSION**

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**BACKGROUND:** Sports-related concussions (SRC), a form of mild traumatic brain injury, occur as a result of collision or physical contact during participation in athletics, with most of these injuries occurring in adolescents. Following SRC, glucose disposal and utilization are decreased in affected areas of the brain. Current treatment strategies (rest, hydration, and over-the-counter medications) neglect to address metabolic changes that could have long-term consequences. Emerging

evidence suggests that ketone metabolism is not impaired following SRC, leading to the hypothesis that exogenous ketones could represent an effective strategy to decrease cerebral inflammation and cognitive dysfunction. The purpose of this study was to determine if ketone supplementation within 7-14 days of SRC will attenuate associated perturbations in energy metabolism. **METHODS:** Five athletes (3 male and 2 female) aged 12-19 y who had suffered a SRC within 7-14 days were enrolled in a 4-week intervention, with measures occurring at enrollment (baseline), 7, 14, and 30 days. As part of standard of care, a licensed healthcare professional conducted the Sports Concussion Assessment Tool, Return-to-Sport, and Return-to-School assessments. Trained research personnel used the C3Logix Concussion Management System to evaluate cognitive function, balance, reaction time, and stability. The single-blind procedure involved participants being counterbalanced to one of two groups, to either receive the ketone supplement or a placebo control. A 2x4 (group x time) repeated-measures ANOVA was used to evaluate differences in the proposed outcomes. **RESULTS:** The current sample size is too small to draw definitive statistical conclusions. From August 2020 through April 2022 (20 months), 71 total patients were seen in the single-site clinic during the period studied. Of those 71, only 24 (34%) were considered eligible for the study due to defined inclusion/exclusion criteria. Of the eligible sample, six participants were initially enrolled (8% of total patients, 25% of eligible sample) and one participant dropped out. No outcome variables showed significant differences between groups ( $p > .05$ ): Balance Error Scoring System, Memory and Processing, Simple Reaction Time, Choice Reaction Time, Neuromotor Function, Symptom Severity, Visual Acuity. **CONCLUSION:** The results of the current feasibility study show that additional studies with multiple sites are needed to recruit a sufficient sample size, including more acute cases, to fully investigate this hypothesis. Future studies should aim to recruit additional clinic sites to improve recruitment and retention of an adequate sample to fully investigate this hypothesis. **Sponsor: Faculty Development Grant Program funded by the Faculty Senate of the University of Alabama at Birmingham.**

**TP6: PERCEIVED EXERTION AND COMFORT WHEN INTRODUCING PROPHYLACTIC ANKLE BRACING BEFORE A TREADMILL RUN**

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**BACKGROUND:** Prophylactic ankle bracing is a common practice in athletic populations to prevent or lower the risk of ankle injuries. The initial perceived effects of introducing a prophylactic semi-rigid ankle brace to individuals without previous or current injury has not been well explored. The purpose of this study was to determine if individuals with no history of wearing ankle braces or ankle injury would report a difference in perceived exertion and/or comfort when completing a 15-minute run with and without braces. **METHODS:** Nine physically active individuals (age 23.11±3 y) completed two sessions of a 15-minute treadmill run at a self-selected pace, one in ankle braces and one without. Sessions were one week apart on the same day of the week and time of day with no exercise permitted 24hrs prior to testing. Rate of perceived exertion (RPE) was recorded every five minutes using the BORG scale. A likert-like questionnaire assessing perceived ankle comfort, stability, confidence, tiredness, and satisfaction with performance was completed at the end of each session. Scores ranged from "1" indicating strongly agree to "7" indicating strongly disagree. Significant differences in RPE between conditions over time were determined using a repeated measures ANOVA. Differences in questionnaire scores were determined using paired-samples t-tests. **RESULTS:** A main effect for time confirmed the participants increased their exertion over the length of the protocol (RPE<sub>5</sub> 9.17±1.79, RPE<sub>10</sub> 11.17±1.70, RPE<sub>15</sub> 12.28±1.99,  $p < .001$ ). No main effect for condition ( $p = .843$ ) or interaction between condition and time for RPE measures ( $p = .711$ ) were observed. Statistically significant differences were observed in perceived comfort (Comfort<sub>Brace</sub> 2.78±1.99, Comfort<sub>NoBrace</sub> 1.22±.44,  $p = .049$ ) between brace and no-brace conditions. No other statistically significant differences were observed ( $p > .05$ ). **CONCLUSION:** The results suggest introducing semi-rigid ankle braces for prophylactic purposes may result in less perceived ankle comfort but may not affect perceived exertion when running immediately after being fitted for the braces. It may be beneficial for future research to investigate if prophylactic ankle bracing with a semi-rigid brace causes changes to lower extremity kinematics and muscle excitation when running and performing other athletic tasks.

**TP7: LONG-TERM PERCEIVED DISABILITY FOLLOWING A HAMSTRING INJURY**

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**BACKGROUND:** Injuries to the hamstrings complex are one of the most common lower extremity injuries in athletic populations. It is currently unknown how psychological or sociological factors affect an athlete after the recovery process has ended and they're returned to activity. Therefore, the purpose of this study was to explore long-term perceived disability in physically active adults following a hamstring injury. **METHODS:** Twenty-six physically active adults with (n=13) and without (n=13) a previous hamstring injury (age 21±1.68 y) completed a Qualtrics survey that included demographic questions for participant matching, the Oslo Sport Trauma's Hamstring Outcome Score (HaOS), the Injury Psychological Readiness to Return to Sport (I-PRRS), and the Athletic Fear Avoidance Questionnaire (AFAQ). Multiple one-way ANOVAs compared the HaOS subscales and total score, I-PRRS scores, and AFAQ scores between previously injured hamstring individuals and their healthy, matched control after splitting the SPSS data file between competitive (HS\_Comp and Con\_Comp) and non-competitive athletes (HS\_Non-Comp and Con\_Non-Comp). **RESULTS:** There was a significant difference between HS\_Non-Comp and Con\_Non-Comp groups when comparing Pain subscale (80.71 ± 8.5 vs. 98.57±1.96;  $p < .001$ ;  $d = 2.89$ ), Function subscale (87.86±11.85, 99.28±1.89;  $p = 0.027$ ;  $d = 1.34$ ), and Total HaOS score (81.9±7.22 vs. 92.85±2.21;  $p = .002$ ;  $d = 2.05$ ). There were also significant differences in AFAQ scores between HS\_Non-Comp and Con\_Non-Comp groups (23±11.14 vs. 11.4±3.13;  $p = 0.05$ ;  $d = 1.41$ ), but not between the HS\_Comp and Con\_Comp groups (18.5±12.96 vs. 10.13±0.35;  $p = 0.09$ ;  $d = 0.91$ ). **CONCLUSION:** Non-competitive athletes with a previous hamstring injury reported a greater degree of perceived disability due to pain and function compared to non-competitive athletes with no history of hamstring injury. The results also suggest that fear of re-injury may exist after returning to activity, but confidence in performance may not change after returning to play. Future research should focus on the injury related fear avoidance and why non-competitive athletes had long-term reports of disability whereas competitive athletes did not. Access and utilization of medical professionals by non-competitive and competitive physically active populations following hamstring injury should be explored.

**TP8: CHANGES IN THE QT INTERVAL FOLLOWING HIGH-LOAD AND LOW-LOAD BLOOD FLOW RESTRICTION EXERCISE**

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**BACKGROUND:** High-load resistance exercise (HL-RE) prolongs the QT interval, which is associated with increased risk of ventricular arrhythmias. However, the effects of low-load blood flow restriction exercise (LL-BFRE) on the QT interval are unclear. Therefore, the purpose of this study was to compare changes in the QT interval following HL-RE and LL-BFRE. **METHODS:** Nine individuals (Mean±Standard Deviation (SD): Age: 21±3 years; Men: 7; Women: 2) volunteered to participate. Heart rate (HR) signals from the electrocardiogram (ECG) were used to derive the HR and QT interval using PowerLab data acquisition system and LabChart Pro software (ADInstruments, Sydney, Australia). HR signals were collected at rest, immediately post-exercise (IP), 10-, 30- and 45-minutes post-exercise. HL-RE consisted of 4 sets of 8 repetitions at 70% of the one repetition maximum (1RM). LL-BFRE was performed with a knee wrap (LL-kBFRE) and pneumatic cuff (LL-pBFRE), which consisted of 4 sets of 30, 15, 15, and 15 repetitions at 30% of the 1RM. Prior to analysis, QT interval was rate corrected (QTc) according to Bazett. Two-Way Repeated Measures ANOVAs were used to examine the effect of condition (HL-RE, LL-kBFRE, LL-pBFRE) across time (Rest, 10, 30 and 45 minutes) on HR and QTc interval. Significant effects were analyzed using pairwise comparisons with a Sidak correction factor. Statistical significance was set a priori at  $p \leq 0.05$ . **RESULTS:** There were significant condition by time interactions for HR ( $p = 0.006$ ,  $\eta_p^2 = 0.38$ ) and QTc interval ( $p = 0.015$ ,  $\eta_p^2 = 0.38$ ), as well as main effects of time for HR ( $p \leq 0.001$ ,  $\eta_p^2 = 0.81$ ) and QTc interval ( $p \leq 0.001$ ,  $\eta_p^2 = 0.82$ ). Across all conditions, HR was increased IP (74±12 bpm), and at 10 (68±11 bpm) and 30-minutes (63±8 bpm) compared to Rest (55±8 bpm). However, the HR response was greater following HL-RE (80±17 bpm) compared to LL-pBFRE (69±11 bpm) in the IP period. The QTc interval was also increased across all conditions IP (3970.1±187.5 msec) and at 10 minutes (3851.6±210.2 msec) compared to Rest (3667.6±274.8 msec), but prolongation was greater following HL-RE (4053.3±243.0 msec) compared to LL-pBFRE (3868.1±173.9 msec). **CONCLUSIONS:** This study suggests that HLRE and LL-BFRE transiently increase the HR and lengthen the QT interval. However, for

at least 10 minutes, these changes are augmented following HLRE more so than LL-pBFR.

#### TP9: EFFECT OF MUSCLE BLOOD FLOW RESTRICTION ON RESTING HEMODYNAMICS IN HEALTHY MEN AND WOMEN

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**Background.** Applications of blood flow restriction (BFR) during exercise and rest have garnered interest in different populations. During rest it was demonstrated that men did not exhibit hemodynamic changes in response to bilateral BFR applied to the upper legs at a pressure of 120 mmHg. However, more common and inclusive practices would suggest standardizing the cuff pressure to the minimum pressure needed to occlude the relevant artery (*i.e.*, arterial occlusion pressure [AOP]) as well as including women, especially considering previous studies have shown sex-specific responses. Therefore, our purpose was to evaluate hemodynamic changes at rest with BFR set to 40% and 60% AOP in healthy men and women. **Methods.** 29 participants (17 women, 12 men) participated in two separate visits each consisting of a 10 min resting period with either 40% or 60% AOP bilaterally applied to the proximal thigh. During the rest, skeletal muscle tissue oxygen saturation (StO<sub>2</sub>%), heart rate (HR), and mean arterial pressure (MAP) were assessed at baseline (0-min), the mid-point (5-min), and at the end (10-min). The StO<sub>2</sub> was assessed from a randomized vastus lateralis (dominant or non-dominant) with a near-infrared spectroscopy device. A patient monitor was used to collect MAP and HR. For these measures, separate Cuff Pressure (40% AOP and 60% AOP) × Time (Baseline, Mid-point, and End) repeated measures ANOVAs were conducted. A *p*-value ≤ 0.05 was considered significant. **Results.** There was a significant (*p*<0.001) Cuff Pressure × Time interaction. Follow-up analyses indicated there was no difference between the cuff pressures at Baseline (69.5±7.0 vs. 70.8±8.5%) or Mid-point (60.4±8.5 vs. 56.7±7.25). However, at the End, the 60% AOP condition (54.5±6.6%) exhibited a significantly (*p*<0.01;  $\Delta$ =5.0, CI<sub>95%</sub>=2.4 - 7.7) lower StO<sub>2</sub> value than 40% (59.5±7.7%). There was no significant (*p*>0.05) change in MAP or HR across time for either cuff pressure condition. **Conclusions.** These findings extended and strengthened previous reports such that here women were included in the analyses as well as relative cuff pressures were used. Specifically, we demonstrated that 40% and 60% AOP were not sufficient enough to evoke a change in homeostasis. Future studies should continue to explore sex as a biological factor and differences inherent to various cardiovascular reflexes such as the exercise pressor and/or metabo-reflex.

#### TP10: ACUTE HYPEREMIC RESPONSE TO BLOOD FLOW RESTRICTION AND ISCHEMIC PRECONDITIONING PROTOCOLS

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**BACKGROUND:** Ischemic preconditioning (IPC) typically improves vascular health, but it is unknown if a non-ischemic protocol would have a similar acute stimulus. The purpose of this study was to compare the acute hyperemic response of IPC and blood flow restriction (BFR). **METHODS:** 20 subjects (45% female) completed 3 conditions over 3 visits (randomized and counterbalanced). While supine, a pneumatic cuff was placed on the upper right arm, and following 5min rest, arterial occlusion pressure (AOP, mmHg) was measured, then following a second 5min rest the protocol started. For IPC, a cuff inflated (105%AOP) for 5min with 5min of rest for 4 cycles. For BFR, a cuff inflated (80%AOP) for 5min with 3min rest for 5 cycles. CON had a deflated cuff on for 40min. Using duplex ultrasound distal to the cuff, brachial artery blood velocity (cm/s) and diameter (cm) were recorded at baseline (Pre) and after cuff deflation. The first 30s of blood velocity after cuff deflation was averaged, and the last 30s of artery diameter after cuff deflation was averaged. AOP was measured immediately after (Post) the protocol. Discomfort (DIS, A.U.) was asked with a 0-10 scale at Pre and Post. Changes in artery diameter and blood velocity (last cycle-Pre), and changes in AOP and DIS (Post-Pre) were compared across conditions using Bayesian repeated measures ANOVAs. Results presented as mean±SD. BF<sub>10</sub>=likelihood of the best model vs the null. **RESULTS:** The change in artery diameter (Condition: BF<sub>10</sub>=400.697) for BFR (.01±.02) was higher than CON (-.01±.02; BF<sub>10</sub>=2.651), and lower than IPC (.02±.03; BF<sub>10</sub>=1.569). IPC was higher than CON (BF<sub>10</sub>=82.853). The hyperemic response (Condition: BF<sub>10</sub>=5.887e+15) for BFR (6.7±7.3) was higher than CON (-3.1±5.1; BF<sub>10</sub>=148.630), and lower than IPC (34.2±14.2; BF<sub>10</sub>=156409.519). IPC was higher than CON (BF<sub>10</sub>=3.128e+7). The change in AOP (Condition: BF<sub>10</sub>=1.296) was higher in BFR (-8.95±10.83) when compared to CON (-2.26±9.69; BF<sub>10</sub>=1.268), but similar to IPC (-6.53±5.81; BF<sub>10</sub>=.345). IPC and CON were similar

(BF<sub>10</sub>=.576). The change in DIS (Condition: BF<sub>10</sub>= 19526.876) was higher in BFR (4.08±2.6) when compared to CON (1.3±2.1; BF<sub>10</sub>=195.289), but similar to IPC (4.03±2.63; BF<sub>10</sub>=.244). IPC was higher than CON (BF<sub>10</sub>=141.363). **CONCLUSION:** Individuals may want to implement bouts of IPC instead of BFR for vascular health because the acute stimulus is stronger while the discomfort is similar between protocols.

#### TP11: THE MICROVASCULAR HYPEREMIC RESPONSE TO OCCLUSIVE OR PARTIAL BLOOD FLOW RESTRICTION

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**BACKGROUND.** Blood flow restriction (BFR) alone decreases muscle atrophy following immobilization. It is unknown what effect BFR alone has on microvasculature. The purpose of this study is to determine the acute effect of BFR alone on oxygen extraction rate (Slope 1, S1) and reactive hyperemia (Slope 2, S2) when compared to a protocol known to improve vascular function. **METHODS.** 9 females and 11 males (height: 164.2±21.1 cm; weight: 72.7±29.0 kg; age: 27.6±10.6 y) completed 3 protocols (separate visits), on the right arm, while supine. For all conditions a cuff was secured on the upper arm. First, after a 5min rest, AOP was measured. After another 5min rest, the protocol started. For control (CON), the cuff remained deflated. For BFR, a cuff was inflated to 80% arterial occlusion pressure (AOP) for 5 cycles (5min inflation/3min deflation). For ischemic preconditioning (IPC), a cuff was inflated to 105% AOP for 4 cycles (5min inflation/5min deflation). A near-infrared spectroscopy device (NIRS) continuously estimated deoxy(Hb,  $\mu\text{M}\cdot\text{s}^{-1}$ )/oxy(O<sub>2</sub>,  $\mu\text{M}\cdot\text{s}^{-1}$ ) heme and tissue saturation index (TSI, %·s<sup>-1</sup>) at the forearm. S1 was the 60s following cuff inflation and S2 was the 30s immediately after cuff deflation. The regression slopes from each cycle were averaged and compared across conditions with Bayesian RMANOVA. Results presented as mean±SD. BF<sub>10</sub>=likelihood of the best model vs the null. **RESULTS.** S1 for TSI (Condition: BF<sub>10</sub>=4.518e+13) was steeper in BFR (-0.07±0.04) when compared to CON (0.01±0.01; BF<sub>10</sub>=202810.265), but flatter than IPC (-0.10±0.03; BF<sub>10</sub>=7.330). IPC was steeper compared to CON (BF<sub>10</sub>=1.524e+8). S1 for O<sub>2</sub> (Condition: BF<sub>10</sub>=6.682e+11) was positive and steeper in BFR (0.17±0.11) than CON (0.01±0.01; BF<sub>10</sub>=24409.937) and IPC (-.05±0.07; BF<sub>10</sub>=407178.004). IPC was negative compared to CON (BF<sub>10</sub>=32.242). S1 for Hb (Condition: BF<sub>10</sub>=3.856e+22) was positive and steeper in BFR (0.21±0.05) than CON (-0.01±0.0; BF<sub>10</sub>=4.626e+10) and IPC (0.15±0.05; BF<sub>10</sub>=226.453). IPC was positive compared to CON (BF<sub>10</sub>=3.097e+9). TSI for S2 (Condition: BF<sub>10</sub>=7.977e+15) was steeper for BFR (0.76±0.30; BF<sub>10</sub>=1.495e+7) and IPC (1.06±0.39; BF<sub>10</sub>=3.947e+7) compared to CON (0.0±0.01). BFR was typically flatter than IPC (BF<sub>10</sub>=42.285). **CONCLUSION.** The current data suggests BFR has a lower extraction rate and hyperemic response than IPC. Chronic application of BFR alone may elicit vascular adaptations, but the magnitude may be lower than IPC.

#### TP12: THE INFLUENCE OF PRE-EXERCISE BLOOD FLOW RESTRICTION ON MUSCLE SIZE AND STRENGTH ADAPTATIONS.

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**BACKGROUND:** Blood flow restriction (BFR) has never been examined in combination with a low repetition, high load training protocol. The purpose of the present study is to examine if BFR prior to a low repetition high load training protocol could enhance adaptations in muscle size, strength, or local muscular endurance and compare these adaptations to traditional high load resistance training.

**METHODS:** 40 untrained individuals completed 8-weeks of unilateral elbow flexion resistance training on 2 days/week. Participants had each arm randomized to 1 of 3 unilateral training conditions: 1) traditional high load resistance training (TRAD); 2) low repetition high load training with pre-exercise BFR (preBFR); 3) low repetition high load resistance training (LRTRAD). The TRAD condition performed 4 sets to muscular failure at 70% 1RM with 60s rest periods. The preBFR condition performed 4 sets of 3 repetitions at 70% 1RM with 60s rest periods and BFR applied 3min prior to and during exercise. The LRTRAD condition performed 4 sets of 3 repetitions at 70% 1RM with 60s rest periods. Measures of muscle thickness (MT), 1RM strength, and endurance were taken prior to and following the training period. Data are presented as means (95%CI). **RESULTS:** For the 50% site, the change in MT was greater in the TRAD condition [0.21(0.13-0.28)] compared to LRTRAD [0.06 (-0.001-0.12)cm, *p* = 0.003] but not different compared to preBFR [0.11(0.03-0.20)cm, *p* = 0.09]. For the 60% site, the change in MT was greater in the TRAD condition [0.23(0.16-0.30)] compared to preBFR [0.09(0.03-0.16)cm, *p* = 0.004] and LRTRAD [0.08 (0.004-0.15)cm, *p* = 0.003], with no difference when comparing preBFR to LRTRAD (*p* = 0.27). For the 70% site, the change in MT was greater in the TRAD condition [0.31(0.24-0.37)cm] compared preBFR [0.10(0.03-0.17)cm, *p* < 0.001] and

LRTRAD [0.06 (-0.002-0.13)cm,  $p < 0.001$ ], with no difference when comparing preBFR to LRTRAD ( $p = 0.38$ ). For 1RM strength, there were no differences ( $p > 0.05$ ) in change scores between TRAD [2.15(1.6-2.6)kg], preBFR [2.19(1.8-2.5)kg], and LRTRAD [1.9(1.4-2.3)kg]. For endurance, there were no differences ( $p > 0.05$ ) in change scores between TRAD [7(5-9)reps], preBFR [7(5-9)reps] and LRTRAD [6(4-7)reps]. **CONCLUSIONS:** BFR does not enhance the hypertrophic effects of LRTRAD training. 1RM and endurance adaptations were not different despite differences in exercise volume and proximity to failure.

**TP13: COMPARISON OF RPE AND REPETITIONS COMPLETED DURING BLOOD FLOW RESTRICTED AND TRADITIONAL RESISTANCE EXERCISE**

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**BACKGROUND:** The purpose of this investigation was to examine ratings of perceived exertion/repetitions in reserve (RPE/RIR) and repetitions completed across 4 sets of traditional (TREx) or blood flow restricted (BFR) exercise of the elbow flexors. **METHODS:** Eighteen healthy, resistance-trained subjects (7 females) completed this randomized, counterbalanced trial. Subjects completed one repetition maximum (1RM) testing, as well as two experimental visits, in which they completed 4 sets (1x30, 3x15 repetitions) of elbow flexion exercise at 30% 1RM with (BFR) or without BFR (TREx). 30 seconds of rest was given between each set. All visits were separated by at least 48 hours and took place at the same time of day ( $\pm 1$  hour). For the BFR condition, the cuffs were rapidly inflated to 60% arterial occlusion pressure. Immediately following each set, an RPE/RIR score was assessed. Repetitions completed was also calculated for each set.

**RESULTS:** There was a significant condition (BFR/TREx)  $\times$  set (S1/S2/S3/S4) interaction effect for RPE/RIR score ( $p=0.016$ ) and repetitions completed ( $p<0.001$ ). Post-hoc analyses indicated that in the TREx condition, RPE/RIR non-significantly increased from S1 ( $7.1 \pm 1.5$  au) to S2 ( $7.5 \pm 1.3$  au;  $p=0.095$ ) and significantly increased from S2 to S3 ( $8.1 \pm 1.4$  au;  $p<0.001$ ) and S3 to S4 ( $8.6 \pm 1.5$  au;  $p<0.001$ ). Similarly, RPE progressively increased in the BFR condition and was significantly different at all timepoints (S1:  $7.7 \pm 1.3$  au; S2:  $8.9 \pm 1.0$  au; S3:  $9.6 \pm 0.7$  au; S4:  $9.8 \pm 0.4$  au;  $p<0.001-0.028$ ). During all except S1 ( $p=0.119$ ), RPE/RIR was significantly greater in the BFR condition when compared to the corresponding TREx set ( $p<0.001$  for all). In S1, subjects completed all 30 repetitions in both conditions. Thus, S1 had significantly greater repetitions in both conditions when compared to all other sets ( $p<0.001$  for all). Post-hoc analyses indicated that in the BFR condition, subjects completed significantly more repetitions in S2 ( $14.2 \pm 2.3$  reps) when compared to S3 ( $11.4 \pm 4.6$  reps;  $p=0.009$ ) and S4 ( $10.3 \pm 4.8$  reps;  $p=0.001$ ). There were no significant differences between S2-S4 in the TREx condition ( $p=0.177-0.999$ ) or between S3 and S4 in the BFR condition ( $p=0.251$ ). Significantly more repetitions were completed during TREx in S3 ( $15.0 \pm 0$  reps;  $p=0.004$ ) and S4 ( $14.6 \pm 1.3$  reps;  $p=0.002$ ) when compared to BFR. **CONCLUSIONS:** Our data suggest that the addition of BFR to a low-load exercise bout of the elbow flexors significantly increases RPE/RIR and diminishes the number of repetitions that can be completed in resistance-trained subjects.

**TP15: BLOOD FLOW RESTRICTION DURING ACUTE HIGH LOAD BENCH PRESS DOES NOT INCREASE VELOCITY OR POWER**

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**BACKGROUND:** Previous research has shown that using blood flow restriction (BFR) cuffs can increase mean and peak velocity and power during high load ( $\geq 65\%$ 1RM) bench press exercise. Past investigations, however, used methods that might not reflect a more realistic usage of blood flow restriction such as: using high occlusion pressures, e.g.,  $>80\%$  arterial occlusion pressure (AOP), that may be too uncomfortable for prolonged use on the upper limbs, and or was only applied intermittently during only the sets or the inter-set rest periods. The purpose of this study therefore was to investigate the effects on power and velocity of a more moderate 50%AOP applied continuously during an acute high load bench press exercise.

**METHODS:** 8 resistance trained males (age:  $24.5 \pm 4.9$  yrs., wt.:  $86.3 \pm 10.3$  kg, ht.:  $180.1 \pm 8.3$  cm) completed 4 sets of 4 reps of the barbell bench press with 75%1RM, on two days separated by 7-14 days. One day the exercise was completed with BFR cuffs applied to both arms and inflated to 50%AOP, and a Control session without BFR. Mean and peak velocity (m/s) and power (W) were calculated by a GymAware Power Tool attached to one end of the barbell. The average value of the mean power (MP) and velocity (MV) for each set was recorded, while for peak power (PP) and velocity (PV) the highest value among the four reps was recorded. A series of two-way repeated measures ANOVAs (condition  $\times$  set) with Bonferroni post hoc

corrections were run for each of the four power and velocity variables. **RESULTS:** There were no significant ( $p>0.05$ ) main effects for either 'Condition' ( $\eta_p^2$  range: 0.03-0.45) or 'Set' (partial eta squared ( $\eta_p^2$ ) range: 0.14-0.31), nor were there any significant simple main effects for 'Condition  $\times$  Set' ( $p>0.05$ ) ( $\eta_p^2$  range: 0.06-0.11). However, for MP, PP, and PV although not significantly different, the BFR condition produced greater power and velocity both on average and for each individual set compared to the Control condition, except for set 3 of PP where the control condition was greater. For MV, on the other hand, the Control condition produced higher velocities than the BFR condition. For both conditions power and velocity increased from set to set. **CONCLUSION:** Based on current data it appears that although BFR can increase power and velocity during high load bench press, this increase is not sufficiently large enough to be statistically different from not using BFR.

**TP16: UPPER BODY HIGH LOAD BLOOD FLOW RESTRICTION EXERCISE DOES NOT SIGNIFICANTLY ALTER BLOOD LACTATE CONCENTRATION**

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**BACKGROUND:** Previous research has shown that blood flow restriction (BFR), when used during high load lower body exercise, can increase blood lactate concentration when compared to a control group. Existing research has not, however, investigated the effects of BFR on high load, upper body exercise. Hence, the purpose of this study was to determine the effects of high load continuous BFR bench press on blood lactate concentrations. **METHODS:** 8 resistance trained males ([mean  $\pm$  SD] height:  $180.1 \pm 8.3$  cm, weight:  $86.3 \pm 10.3$  kg, age:  $24.5 \pm 4.9$  years) completed 4 sets of 4 reps, with 2 minutes rest between sets, of the barbell bench press at 75% 1RM during two exercise sessions, separated by 7-14 days. The exercise was completed with BFR cuffs applied to both arms and inflated to 50% arterial occlusion pressure (AOP) as an experimental session, and a control session was completed without BFR. Blood lactate concentration measurements, measured using finger prick lactate samples, were taken. The measurements were taken both prior to beginning the warm-up for each exercise session, and immediately following the completion of the last set of the bench press. Capillary blood samples were drawn from the fingertip and examined using a Nova Biomedical Lactate Plus and corresponding Nova Biomedical Lactate Strips. A two-way repeated measures ANOVA (time  $\times$  condition) with a post hoc Bonferroni correction was used to assess differences in lactate concentrations between conditions. **RESULTS:** There were no significant effects on blood lactate found ( $p > 0.05$ ). Although, the mean change (mean  $\pm$  SD) for the control group ( $1.68 \pm 1.03$ mmol/L) was lower than that of the experimental group ( $2.00 \pm 1.20$ mmol/L). As expected, there was a significant ( $p=0.02$ ) effect for "time," however there were no significant effects for "condition" or "time  $\times$  condition" ( $p > 0.05$ ). Partial eta squared effect sizes for "condition" and the interaction between "time" and "condition" were 0.118 and 0.182 respectively. Estimated marginal means for condition show that BFR condition was  $0.193 \pm 0.2$ mmol/L higher than the non BFR condition, however this value is not significant ( $p>0.05$ ).

**CONCLUSION:** Based on current data, BFR demonstrates a trend towards increasing blood lactate concentrations when compared to non-BFR high load exercise, but the change in lactate concentration is not statistically significant compared to high load exercise without BFR.

**TP17: CHARACTERIZING BODY COMPOSITION AND PERFORMANCE IN DIVISION I FEMALE SOCCER PLAYERS**

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**BACKGROUND:** Fat-free mass index (FFMI,  $\text{kg}/\text{m}^2$ ) and regional muscle characteristics may provide direct insight into athletic performance and injury prevention. Underutilized and often misunderstood, FFMI specifies individual potential to accumulate fat-free mass (FFM; lean mass and bone mineral content) relative to height. FFMI has been shown to be useful for tracking changes in FFM and monitoring return to play from injury, particularly in females. The purpose of this study was to evaluate the relationship between total and regional body composition and muscle characteristics with aerobic capacity, speed, power, and agility performance in Division I female soccer players. **METHODS:** Eighteen female soccer players (mean  $\pm$  SD; Height=  $165.3 \pm 5.1$ cm; Weight=  $63.6 \pm 7.3$ kg; FFMI=  $18.4 \pm 1.2$   $\text{kg}/\text{m}^2$ ; %fat=  $22.9 \pm 4.9$ kg) completed a total body dual-energy x-ray absorptiometry scan to determine total body percent fat (%fat), FFM, and right and left leg lean mass (RLM and LLM, respectively). FFMI was determined as FFM/height ( $\text{m}^2$ ). A panoramic ultrasound scan of the right vastus lateralis muscle was used to determine cross-sectional area (mCSA) and echo intensity (EI) of the vastus lateralis.

Performance testing included vertical jump (VJ; cm), beep test (BT, m), 10m and 30m dash (s), and right and left Illinois agility tests (ILR and ILL, respectively; s). Pearson product moment correlations were utilized to evaluate these relationships. **RESULTS:** FFMI was significantly positively associated with VJ ( $r=0.681$ ;  $p=0.002$ ). EI had a significant positive association with BT ( $r=0.471$ ;  $p=0.048$ ). %fat was significantly negatively associated with VJ ( $r=-0.667$ ;  $p=0.002$ ), BT ( $r=-0.538$ ;  $p=0.021$ ), and positively associated with 30m ( $r=0.491$ ;  $p=0.039$ ), ILR ( $r=0.578$ ;  $p=0.012$ ), and ILL ( $r=0.668$ ;  $p=0.002$ ) tests. mCSA, FFM, RLM, and LLM were not significantly related to any performance metrics. **CONCLUSION:** FFMI and %fat may influence power-based movements where greater FFMI and lower %fat benefited VJ. EI may positively impact aerobic performance, while %fat may negatively affect aerobic capacity. Measuring FFMI, EI, and %fat can inform nutrition and training interventions to achieve body composition goals benefiting performance and return to play.

#### TP19: MATCH RESULT IMPACT ON TEAM AND POSITION GROUP PERFORMANCE VARIABLES IN PROFESSIONAL SOCCER PLAYERS

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**BACKGROUND:** In-game outcomes (Win [W], Lose [L], Draw [D]) in team sports like soccer are influenced by several variables including coaching strategies, opponent quality, game flow, and, theoretically, individual player on-field performance. The use of GPS technology allows for tracking of a myriad of performance variables of interest by sport scientists including Total Distance (TD), Maximum Sprint Speed (MSS), High Metabolic Load Distance (HMLD), Sprint Distance (SD), and Number of Sprints (#S) that may influence or be influenced by match result. The purpose of this study was to determine if match result impacted in-game performance variables in USL1 male soccer players. **METHODS:** 24 players (Defenders [DF] = 10, Midfielders [M] = 11, Forwards [F] = 3) from one USL1 team were equipped with individual GPS bioharnesses and performance variables were recorded over the course of 25 regular season games. A one-way ANOVA was run to determine the difference between match results and all performance variables of interest for the team. Additionally, an ANOVA was run to determine if there were positional variations in these variables based on match outcome. Post-hoc LSD analyses were run on significant main effect differences. Significance of relationships was calculated at  $p \leq 0.05$ . **RESULTS:** No significant differences were noted between any team performance variables and match outcome (TD:  $p = 0.77$ ; MSS:  $p = 0.89$ ; HMLD:  $p = 0.69$ ; SD:  $p = 0.85$ ; #S:  $p = 0.83$ ). When separated by position groups, a significant difference was noted among DF MSS ( $p = 0.01$ ). Post-hoc analyses revealed that MSS was lower in W ( $19.0 \pm 0.7\text{mph}$ ) compared to both D ( $19.8 \pm 0.5\text{mph}$ ;  $p < 0.01$ ) and L ( $19.5 \pm 0.4\text{mph}$ ;  $p = 0.03$ ). No other significant differences existed between any position groups and performance variables of interest (all  $p > 0.05$ ). **CONCLUSIONS:** Except for DF MSS, player performance was similar regardless of match outcome in the tested population. This indicates that player performance does not appear to have a major influence on in-game outcome. This could mean that player fatigue, substitution patterns, or tactic changes potentially impact tested performance variables as games progress, despite the outcome of the match.

#### TP20: THE IMPACT OF WEEKLY SUMMATED TRAINING ON MATCH OUTCOME IN PROFESSIONAL SOCCER PLAYERS

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**BACKGROUND:** Daily training sessions are used to prepare athletes for competition, with the goal of competing for a result. However, weekly accumulated training load may have a negative impact on a team's preparation or match result. GPS data provides coaching staff insight into the load experienced throughout the week. Metrics of interest can include Total Distance (TD), High-Metabolic Load Distance[GR1] (HMLD), Number of Sprints (#S), and Total Loading (TL). HMLD is distance covered at or above 25.5 Watts per Kg. **PURPOSE:** The purpose was to determine how total weekly training load affected match results during a United Soccer League 1 season. **METHODS:** 23 (Center Backs = 6, Fullbacks = 4, Center Midfielders = 4, Wingers = 7, and Forwards = 4) professional male soccer players from one team were fitted with individual GPS units during all training sessions. Performance metrics were summated at the end of each week leading into matchday. Match outcomes for 23 games (7 Wins, 8 Losses, 8 Draws) were included for analysis. A One-Way ANOVA was used to determine the difference between team summated training load and

corresponding match results for the week. Additionally, an ANOVA was run to determine potential positional variations in weekly summated load variables based on match outcome. Significance of all relationships was calculated at  $p \leq 0.05$ . **RESULTS:** No significant differences were found between any GPS metrics and match outcomes: TD (Win:  $183.1 \pm 72.92\text{km}$ , Loss:  $243.9 \pm 63.5\text{km}$ , Draw:  $223.9 \pm 86.5\text{km}$ ;  $F(2,135) = 0.827$ ,  $p=0.439$ ); HMLD (Win:  $21.7 \pm 9.3\text{km}$ , Loss:  $29.7 \pm 8.5\text{km}$ , Draw:  $29.7 \pm 14.4\text{km}$ ;  $F(2,135) = 1.043$ ,  $p=0.355$ ); #S (Win:  $279.6 \pm 147.7\text{sprints}$ , Loss:  $374.0 \pm 128.8\text{sprints}$ , Draw:  $455.3 \pm 273.9\text{sprints}$ ;  $F(2,135) = 1.713$ ,  $p=0.184$ ); and TL (Win:  $3126.1 \pm 1251.7\text{au}$ , Loss:  $4110.0 \pm 1093.0\text{au}$ , Draw:  $3805.1 \pm 1519.5\text{au}$ ;  $F(2,135) = 0.739$ ,  $p=0.480$ ). [GR2] Similar non-significant findings were noted when separated by position groups and GPS metrics of interest (all  $p > 0.05$ ). **CONCLUSIONS:** No significant differences were found between results and weekly summated training load, suggesting that training load was not an impact on match result. This approach utilized full team data without respect for player contribution to the match. Further analyses should be conducted with special regard to match contribution analyses to see if a similar result exists.

#### TP21: EPIDEMIOLOGICAL COMPARISON IN KNEE INJURIES BETWEEN NCAA AND NAIA WOMEN'S SOCCER

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**BACKGROUND:** Knee injuries occur frequently within contact sports like collegiate soccer. The National Collegiate Athletic Association (NCAA) has implemented an Injury Surveillance Program (ISP) for all sports divisions (Division I to Division III) to track injuries and athlete-exposures (AEs) for regular season practices and games. Recent knee injury data from the NCAA ISP compared to one NAIA (National Association of Intercollegiate Athletics) soccer program (Truett McConnell University (TMU)) offered injury rate insight. The purpose of this study was to identify knee injury rates among NCAA and NAIA women's soccer AEs, compare injury trends, and encourage the implementation of knee injury prevention programs among all collegiate levels of play. **METHODS:** An epidemiological study investigated knee injuries on the women's soccer team at TMU from the 2016/17 to 2021/22 regular season. The study identified incidence rate ratio (IRR) and odds ratio (OR); and, compared data to a recent NCAA ISP knee injury literature review from the 2014/15-2018/19 regular seasons. The NCAA and NAIA levels included varying surveillance procedures among the injury trends. IRR was calculated by finding the total number of knee injuries divided by the total number of AEs. OR was calculated by finding the probability of injured to uninjured women's soccer athletes. **RESULTS:** There was a significant difference ( $p < 0.05$ ) between the NAIA soccer program and the NCAA soccer programs. The overall injury rate among NCAA knee injuries was higher (1.44/1,000 AEs) compared to the IRR for NAIA (1.39/1,000 AEs). The overall OR in knee injuries for NCAA was only at 2.36%; yet, an increasingly significant difference was found in the NAIA statistics with an OR of 16.53%. NAIA injury rates had a +14.17% compared to the NCAA. The most prevalent knee injuries in the NAIA program AEs were patellar tendonitis injuries and ACL injuries. **CONCLUSIONS:** Women's collegiate soccer had an elevated risk of knee injuries at both the NCAA and NAIA levels, with NAIA at a higher risk. The results from this study highlight the need for revised injury prevention methods throughout the regular season.

#### TP22: PRE-SEASON COUNTERMOVEMENT JUMP DERIVED NEUROMUSCULAR PERFORMANCE IN FEMALE NCAA DIVISION III SOCCER PLAYERS

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**BACKGROUND:** Over the years, several studies have examined the physiological profile of elite male and female soccer players. However, normative countermovement jump (CMJ) performance data for NCAA Division III female soccer players is limited. Therefore, the purpose of this study was to examine CMJ derived variables in this population. **METHODS:** Nineteen members of a NCAA Division III women's soccer team (mean  $\pm$  SD): age ( $19 \pm 1.0$  y); body weight ( $65.7 \pm 14.4$  kg); height ( $1.64 \pm 6.8$  m); BMI ( $24.08 \pm 4.06$  kg $\times$ m<sup>2</sup>) volunteered to participate in the study. CMJ neuromuscular performance testing included jump height, Reactive Strength Index Modified (RSIm), movement time, peak relative eccentric and concentric force and peak relative eccentric and concentric power. All performance testing occurred prior to the start of the regular season. **RESULTS:** The results of this study suggest that compared to published studies that examined similar performance measure in NCAA DI and professional female athletes, the current cohort performed poorly in respect to

jump height ( $22.79 \pm 4.42$  cm), RSI<sub>m</sub> ( $0.30 \pm 0.07$ ), movement time ( $0.79 \pm 0.15$  s), peak relative eccentric force ( $22.44 \pm 3.48$  N $\times$ kg<sup>-1</sup>), peak relative concentric force ( $24.34 \pm 3.96$  N $\times$ kg<sup>-1</sup>), peak relative eccentric power ( $10.15 \pm 2.00$  W $\times$ kg<sup>-1</sup>) and peak relative concentric power ( $40.91 \pm 5.94$  W $\times$ kg<sup>-1</sup>). **CONCLUSIONS:** This study provides normative data for a group of NCAA Division III female soccer players. In comparison to published descriptive data in the literature, the athletic ability of the athletes observed in this study appears to be lower than other female athletes.

**TP23: HIGH AND LOW PERFORMER DIFFERENCES IN COUNTERMOVEMENT JUMP DERIVED NEUROMUSCULAR PERFORMANCE IN FEMALE NCAA DIVISION III SOCCER PLAYERS**

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**BACKGROUND:** Several studies from our laboratory have demonstrated that NCAA Division III female soccer players under perform anaerobically at the beginning of the playing season. Further examination of the data show that there is a fair amount of performance variability between players. Therefore, the purpose of this study was to examine countermovement jump (CMJ) performance, to provide an insight into neuromuscular function and compare between high and low jump height performance in NCAA Division III women's soccer players. **METHODS:** Nineteen members of a NCAA Division III women's soccer team (mean  $\pm$  SD): age ( $19 \pm 1.0$  y); body weight ( $65.7 \pm 14.4$  kg); height ( $1.64 \pm 6.8$  m); BMI ( $24.08 \pm 4.06$  kg $\times$ m<sup>-2</sup>) volunteered to participate in the study. CMJ neuromuscular performance testing included jump height, peak eccentric and concentric force, peak eccentric and concentric power and eccentric and concentric impulse. All performance testing occurred prior to the start of the regular season. A median split was applied to divide the athletes into low (LP) and high (HP) performing groups based on CMJ heights. **RESULTS:** The median split procedure divided the group to nine LP players (CMJ < 23 cm) and ten HP players (CMJ  $\geq$  23 cm). Significant and large effect size differences were observed between the groups for peak concentric power (HP:  $44.18 \pm 3.98$ ; LP:  $37.27 \pm 5.78$  W $\times$ kg<sup>-1</sup>,  $p < 0.01$ ,  $d = -1.35$ ) and concentric impulse (HP:  $2.27 \pm 0.14$ ; LP:  $1.95 \pm 0.11$  N $\times$ kg<sup>-1</sup> $\cdot$ s,  $p < 0.01$ ,  $d = -2.43$ ). Peak eccentric power, eccentric impulse, peak eccentric force and peak concentric force were not significantly different ( $p > 0.05$ ) and displayed small, median, trivial and small effect size ( $d$ ), respectively between the groups. **CONCLUSIONS:** The results of the study suggest that differences in jump height in this population are more closely related to the concentric phase performance of the CMJ.

**TP24: EFFECT OF CAFFEINE ON PHYSICAL PERFORMANCE IN DIVISION-1 FEMALE SOCCER PLAYERS**

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**Background:** Studies investigating caffeine supplementation on soccer performance have largely focused on males completing soccer-specific drills. Females' responses to caffeine may differ from males and drills may not mimic game play. This study examined caffeine's effects on physical performance and perceptual responses in simulated women's NCAA D1 soccer competition. **METHODS:** Nineteen ( $n = 19$ ) D1 female soccer athletes ( $20 \pm 1.2$  years) completed four 60-min simulated soccer scrimmages. The first two scrimmages were two days apart, followed by the third and the fourth scrimmages a week later also two days apart. Participants were randomly assigned into two teams with regard to positions. Scrimmages one and three were baseline games; whereas, scrimmages two and four were treatment trials (double-blind, counterbalanced), in which teams were randomly assigned caffeine (6 mg/kg) or a matched placebo administered 1-hour prior. Players wore a TITAN GPS system that tracked distance traveled, speed band 1 (1.0-3.0 m/s), speed band 2 (3.0-5.0 m/s), total sprints, load, accelerations, decelerations, top speed, and sprint distance (mean and total). Acute RPE was assessed at the end of each half and session RPE (SRPE) was assessed 15-min post-match. Separate 2 (trials)  $\times$  2 (timepoints) ANOVAs were used to assess differences between trials for GPS variables and acute RPE. Paired t-tests were used to compare SRPE and post questionnaire surveys between trials. **RESULTS:** Main effect for acute RPE for timepoint was significant ( $p \leq 0.05$ ) with the main effect for treatment approaching significance ( $p = 0.08$ ), with post hoc analysis (two-tailed, paired t-test) suggesting the higher RPE ( $7.1 \pm 1.6$  vs.  $6.5 \pm 1.7$ ) in the second half. RPE for caffeine approached significance ( $p = 0.10$ ). There was no significance for distance traveled, load, top speed, speed bands, and sprint distances. Treatment main effect was significant ( $p \leq 0.03$ ) for acceleration and approached significance ( $p = 0.07$ ) for

deceleration with post hoc tests suggesting significantly more acceleration periods ( $5.0 \pm 4.2$  vs.  $3.7 \pm 3.1$ ) within the second half and deceleration periods within the first half ( $11.9 \pm 10.5$  vs.  $8.9 \pm 7.3$ ) for caffeine. SRPE was not significant between caffeine and placebo ( $6.3 \pm 1.5$  vs.  $6.0 \pm 1.3$ ). **CONCLUSION:** The caffeine trial revealed significantly more acceleration periods in the second half, thus suggesting performance improvement during soccer play plausible as acceleration periods likely reflect engagement with the ball. Despite the significantly higher acute RPE measures in the second half, participants felt intensities were similar as suggested by SRPE when participants reflected on the entire scrimmage. Extending the understanding of caffeine on soccer specific performance could benefit overall performance, with the potential to influence game outcome.

**TP25: THE TEST-RETEST RELIABILITY OF BODY COMPOSITION MEASURED USING DIGITAL IMAGES FROM A SMARTPHONE APPLICATION**

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**BACKGROUND:** The ability to measure and track changes in muscle and fat is important for practitioners in the Allied Health and Sports Performance fields. An automated image analysis program was recently developed to measure muscle and fat from a single digital image using a smartphone application. However, the reliability of the application has yet to be assessed. **PURPOSE:** The purpose of this study was to evaluate the test-retest reliability of %Fat estimates from a single digital image when measured on two consecutive days. **METHODS:** A convenience sample of participants were included in the study ( $n=12$ , 83.33% female, 83.33% Caucasian  $31.25 \pm 10.49$  yrs,  $24.82$  kg/m<sup>2</sup>). Data collection occurred on two consecutive days with no more than 36 hours between visits. On Day 1, age, gender, and race were assessed via self-report. A full-body image from the posterior view was taken using an iPad Air 2 (Apple Inc., Cupertino, CA) against a white photography backdrop. A light meter (MT-912, Shenzhen Flus Technology Co., Ltd., Shenzhen, China) was used to measure brightness in Lux and ensure that testing conditions were consistent across both days. Participants returned on Day 2 and performed a second %Fat measurement under similar lighting and backdrop conditions. Images were analyzed using an automated smartphone application (made Health and Fitness LLC, Birmingham, AL, version 1.1.3), which provided estimates of %Fat using a proprietary algorithm. A paired samples t-test was used to assess potential mean differences in %Fat across the two trials. The test-retest reliability across the trials was measured using Pearson's  $r$ , and described as weak, moderate, strong, or near-perfect ( $r=0.2, 0.5, 0.8,$  or  $0.9$ , respectively). Data are presented as mean  $\pm$  standard deviation, with statistical significance set at  $p < 0.05$ . **RESULTS:** No significant mean differences were observed between measurements obtained on Day 1 ( $27.16 \pm 5.08$  %Fat) and Day 2 ( $27.04 \pm 5.49$  %Fat) ( $p=0.65$ ). In addition, a near-perfect correlation was observed between the trials ( $r=0.99$ ,  $p < 0.001$ ). **CONCLUSION:** Given the negligible difference between measures and the near-perfect correlation, an inexpensive and portable technique to measure %Fat in field settings may be a valuable alternative when traditional assessment techniques are not available. Future research should examine the reliability across multiple camera types, image resolutions, lighting conditions, and color backgrounds.

**TP26: RELIABILITY OF BODY COMPOSITION MEASURED USING A SMARTPHONE APPLICATION AND DIFFERENT CAMERA RESOLUTIONS**

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**BACKGROUND:** Many traditional laboratory methods of measuring body fat percentage (%Fat) are inaccessible to healthcare professionals due to the cost, complexity, time, and portability. Recently, a new smartphone application was developed that allows for an accurate estimate of %Fat by analyzing a single 2-dimensional digital image. Although the validity of the application has been previously examined, the reliability across different camera resolutions has not been thoroughly tested. **PURPOSE:** The aim of this study was to evaluate the reliability of %Fat estimates from digital images captured using devices with different megapixel cameras. **METHODS:** A convenience sample of adult participants was recruited for the study ( $n=12$ , 83.33% female, 83.33% Caucasian,  $31.25 \pm 10.49$  yrs.,  $69.44 \pm 11.77$  kg/m<sup>2</sup>). Age, gender, and race/ethnicity were assessed via self-report. Height was measured to the nearest 0.1 cm using a stadiometer (SECA 213, Seca Ltd., Hamburg, Germany). Weight was measured to the nearest 0.1 kg using a calibrated digital scale (Tanita BWB-800, Tanita Corporation, Tokyo, Japan). A full-body digital image

was taken from the posterior view, with participants standing in front of a white background, using a 12-megapixel iPhone 12 (Apple Inc., Cupertino, CA) (%Fat12mp) and an 8-megapixel iPad Air 2 (Apple Inc., Cupertino, CA) (%Fat8mp). %Fat was derived using an automated smartphone application and a proprietary algorithm (made Health and Fitness, LLC, Birmingham, AL). A paired samples t-test was used to examine potential mean differences between %Fat12mp and %Fat8mp. The reliability was also measured using Pearson's  $r$ , and described as weak, moderate, strong, or near-perfect ( $r=0.2, 0.5, 0.8,$  or  $0.9$  respectively). Data are presented as mean±standard deviation, with an alpha level set to  $p<0.05$ . **RESULTS:** No significant mean differences in %Fat were observed between %Fat12mp and %Fat8mp ( $26.92\pm 4.96$  %Fat and  $27.16\pm 3.08$  %Fat, respectively;  $p=0.37$ ). Near-perfect correlations were observed between %Fat12mp and %Fat8mp ( $r=0.99, p<0.001$ ). **DISCUSSION:** Based on the results of this study, the smartphone application provides a reliable estimate of %Fat across devices with different megapixel cameras. Future studies should explore other conditions, including different lighting, different color backgrounds, and other devices, as well as within a larger more diverse sample.

#### TP27: RELIABILITY OF A 2D IMAGE APPLICATION FOR MEASURING BODY COMPOSITION ACROSS DIFFERENT COLOR BACKGROUNDS

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**BACKGROUND:** Recently, a smartphone application has shown promise for its ability to accurately measure metrics of body composition from a 2D full-body image. However, the reliability of this technique has yet to be explored. **PURPOSE:** The aim of this study was to examine the reliability of relative adiposity (%Fat) estimates from a single digital image across five different color backgrounds. **METHODS:** A sample of adults were recruited for this study ( $n=12, 31.25\pm 10.49$  yrs,  $166.86\pm 7.21$  cm,  $69.44\pm 11.77$  kg, 83% women, 83% Caucasian). %Fat was estimated from full-body images taken from the posterior view (iPad Air 2, Apple Inc., Cupertino, CA) in front of different color backgrounds (%Fat<sub>BLACK</sub>, %Fat<sub>ORANGE</sub>, %Fat<sub>GREEN</sub>, %Fat<sub>GREY</sub>, and %Fat<sub>WHITE</sub>). %Fat<sub>WHITE</sub> served as the reference condition. Images were analyzed using an automated smartphone application (made Health and Fitness LLC, Birmingham, AL). Potential differences between conditions were assessed using a repeated measures ANOVA. Reliability across the different conditions was determined using ICC. Data are reported as mean±standard deviation. Statistical significance was assessed using an alpha level of  $p<0.05$ . **RESULTS:** No significant mean difference was observed between %Fat<sub>BLACK</sub> ( $31.02\pm 8.87$  %Fat), %Fat<sub>ORANGE</sub> ( $27.32\pm 5.51$  %Fat), %Fat<sub>GREEN</sub> ( $27.83\pm 5.42$  %Fat), %Fat<sub>GREY</sub> ( $27.90\pm 4.98$  %Fat) and the reference %Fat<sub>WHITE</sub> condition ( $27.15\pm 5.08$  %Fat) (all  $p>.05$ ). A moderate correlation was observed between %Fat<sub>BLACK</sub> and %Fat<sub>WHITE</sub> (ICC=0.45,  $p=0.04$ ), whereas a strong correlation was observed between %Fat<sub>ORANGE</sub>, %Fat<sub>GREEN</sub>, %Fat<sub>GREY</sub> and the reference %Fat<sub>WHITE</sub> condition (ICC=0.99, 0.97, and 0.97, respectively; all  $p<0.001$ ). **DISCUSSION:** Based on the results of this study, the 2D image application displayed acceptable reliability across different color backgrounds. While the ICCs for each condition were statistically significant ( $p < 0.05$ ), the reliability for the black condition was considered moderate compared to strong for the other conditions. Practically, the difference could be due to the types of clothing in conjunction with the color of the background, for example black clothing against a black background. Although, for the most accuracy, it is recommended that users perform the measurements under similar environmental conditions, it appears that images taken in front of various background colors are comparable given the acceptable reliability.

#### TP28: RELIABILITY OF LIGHTING CONDITIONS FOR MEASURING BODY FAT PERCENTAGE VIA IMAGE CAPTURE

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**BACKGROUND:** A smartphone application has been previously validated to estimate metrics of body composition (%Fat) from a full-body digital image. However, the reliability of the automated image analysis program has not been extensively examined under varying lighting conditions.

**PURPOSE:** The aim of this study was to evaluate the reliability of %Fat estimates measured under Low(LL) Ambient(AL), Moderate(ML), and Bright-Light(BL) conditions.

**METHODS:** A convenience sample of participants were included in the study ( $n=12, 83.3\%$  female,  $83.3\%$  Caucasian,  $31.25\pm 10.49$  yrs,  $24.82\pm 2.85$  kg/m<sup>2</sup>). Age, gender, and race were assessed via self-

report. Full-body digital images were taken in front of a white photography backdrop under LL, AL, ML, and BL lighting conditions ( $<50$  Lux, 300-400 Lux, 600-800 Lux, and  $>900$  Lux, respectively). Images were taken from the posterior view and were captured using an iPad Air 2 (Apple Inc., Cupertino, CA). A light meter (MT-912, Shenzhen Flus Technology Co., Ltd., Shenzhen China) was used to measure the level of illuminance in Lux. Images were analyzed using an automated smartphone application (made Health and Fitness LLC, Birmingham AL. version 1.1.3), which provided estimates of %Fat using a proprietary algorithm. A repeated measures ANOVA was used to assess potential mean differences in %Fat across the four lighting conditions, with the reliability assessed using a 2-way ICC with absolute agreement. The strength of the ICC value was considered weak, moderate, strong, or near-perfect ( $r=0.2, 0.5, 0.8,$  and  $0.9$  respectively). Data are presented as mean±standard deviation, with statistical significance set at  $p<.05$ .

**RESULTS:** Significant differences were observed across conditions ( $p=.047$ ), such that %Fat<sub>LL</sub> ( $27.62\pm 4.95$  %Fat) was slightly higher than the %Fat<sub>BL</sub> ( $26.94\pm 5.44$  %Fat) ( $p=.018$ ), but not different than the %Fat<sub>AL</sub> ( $27.16\pm 5.08$  %Fat) or %Fat<sub>ML</sub> ( $27.31\pm 5.23$  %Fat) conditions (both  $p>.05$ ). No other differences were observed between conditions (all  $p>.05$ ). Near-perfect agreement between %Fat<sub>LL</sub> and the %Fat<sub>AL</sub>, %Fat<sub>ML</sub>, and %Fat<sub>BL</sub> conditions (ICC=0.984, 0.985, 0.991, respectively; all  $p<.001$ ) was observed.

**CONCLUSION:** Based on the results of the study, a small difference was observed between %Fat estimates obtained under LL and BL conditions. However, the agreement between all conditions was near-perfect. These results suggest that %Fat can be estimated from a single digital image using a smartphone application across various lighting conditions with acceptable reliability.

#### TP29: THE EFFECTS OF FOOD CONSUMPTION ON DUAL-ENERGY X-RAY ABSORPTIOMETRY BODY COMPOSITION MEASUREMENTS

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**BACKGROUND:** Dual-Energy X-Ray Absorptiometry (DXA) is a valid assessment of body composition and is used in clinical practice and research studies. Currently, the pre-assessment instructions, including food consumption, prior to DXA scans are vague and research is lacking. Thus, the purpose of this study was to examine the effects of food consumption on body composition results recorded through DXA. **METHODS:** Sixteen physically active, college-aged, males were recruited to participate in this study. Subjects completed two visits in a randomized and counterbalanced order that consisted of a fasted DXA scan and another DXA scan 10 minutes after consuming different quantities of food. During one visit, subjects consumed a nutritional bar (80 g) containing 330 kcals with 500 mL of water (SNACK) between the first and second DXA scan. During the next visit, subjects consumed two nutritional bars (160 g) containing 660 kcals and 500 mL of water (MEAL) between first and second DXA scans. Total mass, lean mass, fat mass, and bone mineral content for the total body, trunk, arms, and legs were recorded and analyzed to determine difference between baseline and post-meal DXA scans. A  $2 \times 2$  repeated measures analysis of variance was used to determine differences in tissue mass between conditions for each body segment. **RESULTS:** Total body mass ( $p < 0.001$ ), total fat mass ( $p = 0.019$ ), and total lean mass ( $p < 0.001$ ) increased after consuming the SNACK and MEAL. Trunk mass ( $p < 0.001$ ), trunk fat mass ( $p = 0.007$ ), and trunk lean mass ( $p < 0.001$ ) increased after consuming the SNACK and MEAL. **CONCLUSIONS:** The results of this study suggest that consuming food of small and large quantities prior to a DXA assessment can affect body composition results, primarily in total body measurements and the trunk.

#### TP30: INNOVATIVE CUSTOM REGIONS OF INTEREST TO FURTHER UNDERSTAND LEG ASYMMETRIES AMONG DIVISION I ATHLETES

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**BACKGROUND:** Lean mass (LM) asymmetries are strongly linked to athlete injury risk and recurrence. Although asymmetries are known to be a risk factor for injury, clinically relevant differences in LM are not clear. Dual-energy x-ray absorptiometry (DXA) is the gold standard for identifying limb differences. Custom regions of interest (ROI) can be used to further analyze region specific imbalances. The purpose of this study was to describe the use of an innovative lower limb custom ROI to increase the sensitivity for understanding leg LM asymmetries and identify meaningful thresholds among division I athletes. **METHODS:** Body composition of 16 male and 39 female NCAA Division I athletes (Mean Difference (MD) ± Standard Deviation (SD): Age=19.7±1.3 yrs,

Ht=67.5±6.5 in, Wt=156.4±39.5 lbs, Total LM=118.7±33.9 lbs) were measured using DXA at the start of the fall semester (July-September 2022). Custom ROI of the glute, quad, and calf were created using the polygon function on both limbs. Glute ROI consisted of the tissue between the greater trochanter and iliac crest to the center of the spine. Quad ROI consisted of tissue from the greater trochanter to the tibiofemoral joint. Calf ROI consisted of tissue from the tibiofemoral joint to the talocrural joint. Absolute LM difference from right and left sides were calculated, along with regional percent difference [segment LM difference/total LM) ×100] for glute, quad, and calf, respectively. Means and quartiles were created to understand meaningful differences. RESULTS: Average LM differences between left and right sides for legs were (MD±SD): 0.54±0.40 lbs, glute: 0.09±0.43 lbs, quad: 0.13±0.53 lbs, and calf: 0.05±0.21 lbs. When accounting for total LM of the segments, average thresholds for segment differences were: 1.29±0.99% for legs, 0.17±0.94% for glute, 0.28±1.17% for quad, and 0.13±0.48% for calf. Top quartiles for leg, glute, quad, and calf LM percent differences were 2.09%, 0.61%, 1.10%, and 0.47%, respectively. CONCLUSIONS: Top quartiles may establish a threshold of concern for athletes with regional LM differences. Custom leg ROI may be used to establish significant thresholds for LM asymmetries, but more research is needed to determine injury implications. Future studies should evaluate the relationship with these thresholds with injury occurrence.

### POSTER PRESENTATION SESSIONS (P1-P300)

#### P1: EFFECTIVENESS OF NINTENDO RING FIT IN IMPROVING BALANCE DEFICITS AFTER RECOVERY FROM ACL RECONSTRUCTION

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BACKGROUND: One of the most common knee injuries is to the anterior cruciate ligament (ACL). Tears to the ACL most often require surgical reconstruction and a long recovery journey. Despite rehabilitation, bilateral balance deficits often persist. In efforts to increase overall physical function in therapy settings and at home, virtual reality games such as the Nintendo Fit Balance Board and Nintendo Ring Fit, have become a therapeutic technique to improve function. Research has demonstrated the effectiveness of the Nintendo Fit programming and its Balance Board for patients recovering from neuromuscular diseases, orthopedic surgeries, and knee injuries. While there is less research evaluating its effectiveness, the programming of Nintendo's Ring Fit is like those of the Balance Board and therefore may have potential as a non-clinical therapeutic modality for the prevention and rehabilitation of orthopedic conditions. Nintendo Ring Fit has several balance and strength activities to help patients with relevant therapeutic outcomes while also keeping them engaged and motivated throughout their recovery. The purpose of this study is to evaluate the effectiveness of this new technology to further improve balance and strength in post-ACL reconstruction patients. METHODS: Four participants between the ages of 18-24 will be recruited for this study. Participants must have had ACL reconstruction surgery in the last 1-2 years, been discharged from formal physical therapy, and have a continued history of participating in physical activity at least 3 times a week. Each participant will be asked to complete two in-person data collection days, as well as complete 6 weeks of guided programming on a Nintendo Ring Fit at home. Pre- and post-testing will include various balance (Y balance test & one-leg hop test) and strength assessments (handheld dynamometer), in addition to a basic analysis of current activity level and injury details, participants will be asked to complete a weekly survey indicating their degree of participation during the previous week. Data will be analyzed using repeated measures ANOVAs. ANTICIPATED RESULTS: It is anticipated that the Nintendo Ring Fit programming will reduce asymmetry deficits between involved and uninvolved legs in both strength and balance. Funding received from WKU Mahurin Honors Development Grant and WKU Faculty-Undergraduate Student Engagement Grant.

#### P2: HOW ATHLETIC TRAINERS BUILD RELATIONSHIPS AND TRUST WITH COLLEGIATE ATHLETES

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BACKGROUND: Collegiate athletes are at risk for injury that can disrupt their in season participation. Athletic trainers can provide preventative exercises and protocols for athlete care. There appears to be an important trust factor in the relationship between athletic trainers and collegiate athletes that is implemented for athlete care. Through a series of interviews, a relationship between athletic trainer and athlete will impact athlete's performance and injury prevention. If

an athlete is untrusting to disclose pain with an athletic trainer, then the athlete will not be able to receive care for said pain. The current standard for athletic trainers is the Athletic Trainings Shared Values (ATSV): caring & compassion, integrity, respect, competence and accountability. The current research investigates the practices athletic trainers use to build relationships and trust. METHODS: We hope to recruit 100 collegiate athletic trainers to complete this survey. The first section will focus on the athletic trainer's background and experience (i.e. years in profession, how many teams the trainer is working with at once, etc). The second section will focus on the 5 ATSV. Some sample questions include which values athletic trainers apply most frequently, view most and least important, etc. The data will be analyzed to identify structures and practices that contribute relationship building and trust. ANTICIPATED RESULTS: It is hypothesized that the results of this study will identify certain core values used more frequently and effectively in obtaining trust with an athlete. It is also expected that structural characteristics (i.e. fewer teams to work with at once) will allow the athletic trainer to have more time to build relationships. The implications of this research may highlight how strong relationships and trust building by the athletic trainer will enable an athlete to be more motivated in symptom reporting and following injury prevention and recovery recommendations.

#### P3: TREATMENT OF INTERPHALANGEAL JOINT AND METACARPOPHALANGEAL JOINT INJURIES

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BACKGROUND: Hand injuries occur often in daily life both in athletes and non-athletes. One of the common injuries that many patients experience are ligamentous injuries to the interphalangeal and metacarpophalangeal joints. These joint injuries cause significant joint pain and instability. This may interfere with functions such as catching a ball and twisting and turning activities of the hand including throwing. Long-term sequelae include joint stiffness, pain and residual loss of function. This may include weakening of the hand and result in permanent effect on the performance. If left untreated or poorly managed, these may develop joint contractures. Depending on the grade of tear of the collateral ligaments treatment options may include splinting with occupational therapy or surgical repair/reinsertion of the collateral ligament tear with occupational therapy. The study's main objective is to review the effectiveness of ligament repairs in stabilizing the joint and allowing improved range of motion and function following use of Mitek anchors. METHODS: I plan to conduct a retrospective study to evaluate functional outcomes of patients who underwent collateral ligament repairs using Mitek anchors from February 2017 to April 2021 versus non-operative patients. Two authors will review data obtained from medical records to obtain information regarding the patient's age, gender, affected finger, sport injury, grade level of sprain, surgical procedure, postoperative management including occupational therapy data such as range of motion and strength. Radiographic data will also be reviewed. ANTICIPATED RESULTS: Patients who undergo repair of ligament with Mitek anchors are hypothesized to have improved range of motion in a shorter span of time as compared to non-operative patients treated with splinting and occupational therapy alone. The study will allow for comparison of functional outcomes in the two groups of patients.

#### P4: DIFFERENT CROSS TRAINING MODALITIES ON PERFORMANCE AND INJURY PREVENTION IN COMPETITIVE DISTANCE RUNNERS

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BACKGROUND: Competitive distance running imparts chronic impact loads on the body, leading to an inherent increase in injury risk. Cross training is commonly utilized to help counteract some of the adverse effects and overuse on a runner's body, along with maintaining or improving their running performance. Despite their common use and speculation, the relative merits of different forms of cross-training have yet to be fully elucidated. The purpose of this study is to determine the effects of different modalities of cross training on runner's performance and injury prevention in competitive distance runners. METHODS: 40 male and female competitive distance runners will be recruited. Participants will be randomly divided into four equal groups. Three groups will replace two days of run training with either elliptical bike, cycling, or swimming. The fourth group will continue typical run training. At baseline, each participant will complete a 5k time trial, VO2max test, running economy, HRV, and hip maximal isometric contractions. Participants will then participate in their assigned cross-training for 12 weeks. After the 12 week training protocol is complete, baseline measures will be taken again to test for changes. A repeated measures ANOVA will be utilized to test for significant results. ANTICIPATED RESULTS: It is expected that

performance, as measured by VO<sub>2</sub>max, running economy, and 5k time trial, will be improved across all cross training modalities when compared to the only running group, with the largest effect found in swimming due to the increased demands swimming has on the cardiovascular system. It is also expected that the stabilizing movements involved in swimming and the elliptical bike will improve hip strength greater than running only or cycling.

**P5: NEUROMUSCULAR PERFORMANCE IN CHILDREN AT HIGH VERSUS LOW RISK FOR OBESITY**

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**BACKGROUND:** Childhood obesity affects 19.3% of children and adolescents in the United States and is associated with hypertension, insulin resistance, and persistent obesity into adulthood. Thus, it is important to identify strategies in childhood to prevent obesity or encourage the adoption of lifestyle behaviors that will reduce risk for obesity-related diseases. Physical activity (PA) reduces the risk for obesity in children and adults and can at least partly attenuate the adverse consequences of obesity. The ability to engage in PA depends on having adequate neuromuscular performance (NMP), which is essential for the acquisition of motor control. For example, NMP is necessary for balance, force generation and coordinated movements. Children with obesity have poorer NMP compared to those without obesity. Independent of adiposity, children with poorer NMP engage in reduced PA. It is not clear if children at risk for obesity have poorer NMP prior to the development of obesity, which in turn, could contribute to less engagement in PA compared to those with low risk for obesity. The proposed study aims to compare (a) dynamic balance and (b) lower extremity muscle power among children with normal weight, at high versus low risk for obesity. Risk for obesity is defined by parental weight status. **METHODS:** Using a cross-sectional design, we aim to enroll 52 children, aged 5-13 years, whose BMI is less than the 85<sup>th</sup> percentile, stratified into high versus low risk based on whether the parents have obesity. Body composition will be assessed using dual-energy X-ray absorptiometry. Current and usual PA will be assessed via triaxial accelerometry (current) and questionnaire (usual). Dynamic balance will be assessed using (a) the four-square step test and (b) maximum speed walking test. Muscle power will be assessed using a series of countermovement and squat jumps. Descriptive statistics will be calculated to summarize the characteristics of the sample. Unadjusted and adjusted ANCOVA will be calculated to evaluate whether muscle power and dynamic balance differ by group, and if these differences are independent of PA and other potential covariates. Data will be analyzed using SAS Version 9.4 at  $\alpha=0.05$ . **ANTICIPATED RESULTS:** We hypothesize that children at high risk for obesity will show (a) poorer balance and (b) poorer joint-specific muscle power than those children at low risk, independent of current and usual PA.

**P6: EFFECT OF ON-DUTY RESISTANCE TRAINING ON NEUROMUSCULAR FUNCTION IN STRUCTURAL FIREFIGHTERS**

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**BACKGROUND:** Firefighting requires the completion of rigorous occupational tasks in austere environments that increase the risk of injury. According to the National Fire Protection Association (NFPA), about 65,000 firefighter injuries are reported annually. Specifically, regarding fireground injuries, 21% were the result of a slip/trip/fall and 40% were classified as a strain, sprain, or muscular pain. Fiscally, firefighter injuries cost the United States \$1.6-5.9 billion and approximately \$50,000-200,000 per fire department annually. To complete occupational tasks safely and effectively, NFPA 1583 recommends regular participation in exercise on-duty and pilot data indicate that 62% of firefighters perform resistance training on-duty. Despite the recommendation to perform on-duty exercise to enhance firefighter readiness, it is important to understand how exercise-induced fatigue may impact firefighters' ability to safely perform occupational tasks in as little as 10 min post-exercise, as fatigue is considered a potential risk factor for slip/trip/fall-related injuries. Therefore, the aim of this investigation is to determine the impact of exercise-induced fatigue on firefighters' injury risk. **METHODS:** A convenience sample of 20 apparently healthy career structural firefighters (Age: 18-55 yr) will be recruited from a local fire department. Participants will complete 3 testing sessions, separated by at least 72 hours. During session #1 participants' anthropometrics and familiarization trials will be completed for the Functional Balance Test,

postural sway, single-leg drop jump (SLDJ), and isometric mid-thigh pull (IMTP). In addition, the 30-15 Intermittent Fitness Test and 5 and 10 RM assessments will be conducted. Sessions #2 and #3 will be randomized, where participants will complete a heavy resistance (5RM loads, 2 min passive recovery) or circuit training (10RM loads, 45 s passive recovery) session. Balance, neuromuscular, and IMTP assessments will be conducted pre- and 10 min post-exercise. Repeated measures ANOVA (Time x Training Intervention) will be used to compare performance outcomes over time and between interventions. The level of significance will be set at  $p < 0.05$ . **ANTICIPATED RESULTS:** It is hypothesized that IMTP force parameters will decrease post-exercise, demonstrating a fatigue response and that Functional Balance Test, postural sway, SLDJ outcomes will deteriorate.

**P7: THE IMPACT OF LIFESTYLE FACTORS ON HEART RATE VARIABILITY DURING THE TRANSITION FROM HIGH SCHOOL TO COLLEGE**

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**BACKGROUND:** The average American spends 6.5 hours sitting per day. College students, specifically, sit for long hours during class and leisure, which allows less time for moderate to vigorous physical activity (MVPA). In addition, the increased stress and changes in dietary habits associated with college adjustment can further contribute to changes in heart rate variability (HRV) and cardiovascular disease development. Although research has identified a positive relationship between sedentary behavior (SB) and disease risk, little is known about how changes in SB and other lifestyle behaviors (e.g., physical activity, diet, stress) as healthy adolescents transition to college influences disease risk development. Therefore, the purpose of this study is to evaluate how the changes in the ratio between SB and MVPA, dietary habits, and stress affect HRV as an indicator of cardiovascular health during the transition from high school to college.

**METHODS:** This longitudinal study will recruit high school seniors (n=75, 50% females) aged 17-18 years old. Baseline assessments will occur during their high-school senior year with a follow up one year later during the second semester of college. HRV will be assessed as the root mean square of successive differences in R-R intervals obtained from a 5-minute standard lead II ECG recording (Biopax ECG 100C, BIOPAC Systems Inc.) following 15 minutes of supine rest. ECG data will be analyzed with Kubios software (v3.4: Kubios Oy, Kuopio, Finland). Sedentary behavior and physical activity ratio will be assessed via ActivPal (PAL Technologies Ltd). Dietary habits will be assessed using the Automated Self-Administered 24-hour Dietary Assessment tool (ASA-24-2018). A 10-item Perceived Stress Scale (PSS) and cortisol levels analyzed via ELISA immunoassay will be used to assess stress levels. Relationships between changes in lifestyle behaviors and changes in HRV will be evaluated using a linear regression model. **ANTICIPATED RESULTS:** We anticipate that SB will increase while MVPA will decrease during the transition from high school to college. Dietary habits will change, and cortisol levels will increase. Each of these changes will be associated with decreased HRV independent of other behavioral changes. **FUNDING:** Funding for this project will be provided by the National Heart, Lung, And Blood Institute of the National Institutes of Health under Award Number R15HL159650.

**P8: PHYSIOLOGICAL EFFECTS OF INTERVALS DURATION DURING AEROBIC EXERCISE WITH BLOOD FLOW RESTRICTION**

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**BACKGROUND:** Aerobic exercise with blood flow restriction (BFR) has been shown to elicit positive physiological adaptations. A mechanism of adaptation with BFR is increased local metabolic stress, however, BFR can also increase cardiac work. Metabolic stress and cardiac work could be affected by the work interval duration during BFR but the acute physiological effects of interval duration with BFR are unexplored. This study will examine the effect of work interval duration on the local metabolic stress and cardiac work during low-intensity aerobic exercise with BFR. **METHODS:** Healthy males (18-25 yrs) will complete a graded exercise test to determine WR for experimental conditions. On separate days, participants will complete three experimental interval (INT) exercise protocols with intermittent BFR, in a random order. All protocols will consist of a 4-min warm-up ([20 W] WU), work INTs (35% peak power), and 1-min recovery INTs (20 W) between work INTs. The work INTs in the three protocols will be: 1) six 2-min INTs (2-min INT), 2) twelve 1-min INTs (1-min INT), and 3) three 4-min INTs (4-min INT). During work INTs, BFR cuffs will rapidly inflate to 60% of limb occlusion pressure (LOP) and deflate

during recovery INTs. LOP will be the pressure at which the posterior tibial artery pulse ceases by Doppler auscultation. In each protocol, the duration of work INTs and BFR will be 12 mins. Gas exchange, heart rate (HR), and tissue oxygen saturation (StO<sub>2</sub>) of the vastus lateralis, via near-infrared spectroscopy, will be collected throughout exercise. To quantify local metabolic stress, StO<sub>2</sub> will be averaged over the last 30 sec of the WU and expressed as change from WU. Blood pressure (BP) will be taken manually and rate pressure product (RPP) will be calculated to assess cardiac work. Due to the different protocol durations, data will be compared at 0% (end of WU), 33%, 67%, and 100% of each protocol duration. Differences between protocols will be determined by a 2-way (trial x time) repeated measures ANOVA. Significance will be established if  $p \leq 0.05$ . **ANTICIPATED RESULTS:** It is hypothesized StO<sub>2</sub> will have a greater decrease from WU and RPP will be greater, suggesting greater local metabolic stress and cardiac work in 4-min INT compared to 1-min INT and 2-min INT. If the hypothesis is confirmed, training with longer intervals could elicit greater local adaptations, but cardiac work will be increased during training.

**P9: THE AGREEMENT OF SPHYGMOCOR XCEL AND VICORDER MEASURES OF CENTRAL HEMODYNAMICS**

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**BACKGROUND:** The number one cause of death in the United States is cardiovascular disease (CVD). The risk of CVD in individuals can be predicted by an increase in arterial stiffness. A widely used clinical measure of arterial wave reflection is pulse wave analysis (PWA). PWA estimates central systolic pressure (cSBP) and the augmentation index (AIx, a measure of arterial wave reflection). The SphygmoCor XCEL is the current non-invasive, "gold standard" scientific device used to measure PWA. Another reliable, valid, and potentially more cost-effective device to measure PWA is the VICORDER. However, no study has compared the agreement between the two devices for PWA outcomes. If the two devices are comparable, it would provide clinicians options for PWA measurements. The purpose of this study is to determine the agreement of PWA measurements between the SphygmoCor XCEL and the VICORDER. **METHODS:** We plan to recruit 30 male and female adults between the ages 18 to 45 to participate in this study. We will randomize participants on cuff placement for each device to the left or right side, and order of device use (SphygmoCor XCEL or VICORDER) for PWA. Participants will lay on a three-section table in supine posture after obtaining height and weight. Participants will rest for 20 minutes in supine posture. PWA values will be obtained using both the SphygmoCor XCEL and VICORDER in order based on device randomization generated before testing. After obtaining PWA values, participants will be passively moved to the second posture (25-degrees) and rest for 5 minutes. After resting, PWA measurements will be collected again. The agreement of PWA measurements between the two devices will be determined using the Pearson product-moment correlation ( $r$ ) using the "rmccor" package for R with a repeated measures correlation. Correlation values and 95% CIs will be calculated for each posture (supine and 25-degrees), PWA measures, and across aims using the "rmccor" package for R. The agreement will be considered acceptable if the lower limit of the 95% CI for  $r$  exceeds 0.75 for both cSBP and AIx. **ANTICIPATED RESULTS:** It is hypothesized that the two devices (SphygmoCor XCEL and the VICORDER) will generate similar values for AIx and cSBP.

**P10: PHYSICAL ACTIVITY PATTERNS AND SEDENTARY BEHAVIOR DISPARITIES WITHIN THE LGBTQ+ COMMUNITY**

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**BACKGROUND:** People of sexual orientation and gender identity minorities, or queer individuals, are at greater risk for a multitude of cardiometabolic disorders and other chronic diseases. These disparities are likely engendered in structural discrimination against these groups, mental health issues, and subsequent coping behaviors. What is less studied are the impacts of these harmful experiences unique to queer individuals on health behaviors and physical activity patterns. Limited existing literature notes significant differences in total amounts of physical activity and sedentarism within subgroups of the LGBTQ+ community compared to their heterosexual and cisgendered individuals. For example, transsexual individuals self-report lower levels of daily physical activity against their cisgendered peers. This disparity is also observed within the lesbian community against heterosexual women. The determinants and antecedents to these trends point to unique and significant barriers to healthy physical activity levels experienced by the community. Our understanding of the breadth and magnitude of these challenges necessitate further study to make a healthy, exercise-centric lifestyle more equitable and freely available.

**METHODS:** Three initiatives will be taken to examine the scope of these expected disparities: (i) Secondary analysis of existing datasets to expand the literature of trends in physical activity and sedentary behavior within subgroups of the LGBTQ+ community. (ii) Physiological research on the cardiometabolic profiles of queer young adults. We will perform subgroup analysis within the existing Cardiometabolic Outcome Negation Through Early-adulthood Context-specific Sedentary Behavior reduction (CONTEXT-SB) cohort run within the Cardiometabolic Laboratory. Physical activity profiles along with outcomes of cardiometabolic function will be collected to allow researchers to identify the impact of physical activity disparities on whole-body cardiovascular health. (iii) Qualitative review of young gay cisgendered male's perception on physical activity within the LGBTQ+ community. We will conduct standardized interviews and focus groups within this subpopulation to identify unique aspects on attitudes towards physical activity. **ANTICIPATED RESULTS:** Members of the LGBTQ+ community will have significantly poorer physical activity and sedentary behavior profiles compared to their heterosexual peers.

**P11: IMPACT OF PHYSICAL ACTIVITY INTERVENTIONS ON PULSE WAVE VELOCITY IN CANCER SURVIVORS: A META-ANALYSIS**

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**BACKGROUND:** Cancer survivors are living longer, albeit with a decreased health-span as a function of increased cardiovascular disease (CVD) risk. The increased CVD risk is attributable to not only the anti-cancer therapies, but also poor lifestyle behaviors, including physical inactivity. Establishing population-specific physical activity recommendations could mitigate CVD risk and improve health-span. To help facilitate population-specific physical activity guidelines, the objective of this meta-analysis is to determine which physical activity prescription (aerobic, resistance training, or both) decreases CVD risk in cancer survivors (all types) compared to a control (usual care) group. The outcome measure will be pulse wave velocity (PWV), an established measure of biological vascular aging and CVD risk. **METHODS:** This meta-analysis will be carried out in accordance with PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. Following PROSPERO registration, electronic databases will be used to identify articles that meet the criteria: (i) English language, (ii) human studies, (iii) adults (18 years of age and older), (iv) cancer survivors (any type), (v) inclusion of a physical activity intervention (duration of > 20 minutes/session, any type), (vi) inclusion of PWV (carotid-femoral) measurement, (vii) randomized control trial design (includes a control group or wait-list control group). Data will be pooled using the inverse variance heterogeneity model. **ANTICIPATED RESULTS:** The findings may lead to improvements in physical activity recommendations for cancer survivors that target arterial stiffness and CVD risk. The results of this analysis may also identify gaps in the literature that need to be addressed by further research.

**P12: A META-ANALYSIS OF THE RELATIONSHIP BETWEEN SLEEP QUALITY AND ARTERIAL STIFFNESS**

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**BACKGROUND:** Reduced sleep quality may be associated with an increased risk of cardiovascular disease (CVD). However, there have been mixed results about the nature of the trend in this relationship. To clarify this relationship, we plan to conduct a meta-analysis of the literature surrounding the relationship between sleep quality and CVD risk. Studies that use pulse wave velocity (PWV), the "gold standard" for arterial stiffness measurement and an indicator of CVD risk, will be used to select articles for the meta-analysis.

**METHODS:** Electronic databases (Pubmed and SPORTDiscus) will be referenced from inception to October 2022 with keywords "(sleep) AND (pulse wave velocity OR arterial stiffness)." The search generated 570 results. Studies will be selected from these results based on these criteria: the article must be written in English, the article must contain measures of PWV and sleep quality, pulse wave velocity must be related to sleep quality, and participants must be 18 years or older. Sleep quality measures we expect to find will be taken via subjective methods, such as the Pittsburgh Sleep Quality Index (PSQI) or self-reported questionnaires, or via objective methods, such as actigraphy or polysomnography. Random-effects models will be used to calculate weighted mean differences and confidence intervals.

**EXPECTED RESULTS:** Based on previous literature, we are expecting either a linear or a logistic relationship between sleep quality and PWV. If this relationship is found to have a negatively associated logistic trend, this could aid public officials to write guidelines for sleep quality recommendations. In other words, this could tell us if there is a range

of declining sleep quality that is with decreased risk before a steep increase in PWV, putting people at higher risk of developing CVD, or if there is a linear relationship between these variables where the lower sleep quality one gets decreases PWV in a linear fashion.  
Source of funding: NONE

**P13: IMPACT OF SHORT-TERM CREATINE SUPPLEMENTATION ON MUSCULAR PERFORMANCE AND COGNITIVE FUNCTION IN BREAST CANCER SURVIVORS**

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**BACKGROUND:** Breast cancer (BC) has a high prevalence in the United States, with over 280,000 estimated cases diagnosed in 2021. Advances in the detection and treatment of BC have resulted in an increased survival rate. Unfortunately, this means that there is also an ever-increasing population experiencing declines in physiological and psychological wellbeing that accompany cancer treatments. BC treatment is commonly associated with decreases in muscle mass, strength, and cognitive function. Consequently, there is a critical need for the investigation of strategies to mitigate treatment related impairments in BC. Prior research suggests that creatine supplementation and resistance training have a beneficial effect on muscular performance and cognitive function in healthy, older adults. However, the effects of creatine supplementation have not yet been examined in BC survivors. The purpose of this study is to investigate the effects of short-term creatine supplementation on muscular performance and cognitive function in BC survivors. **METHODS:** Using a double-blind placebo controlled randomized design, 20 BC survivors will be assigned to a creatine (CRE) or dextrose placebo (PLA) group. Prior to supplementation, participants will undergo two familiarization sessions to minimize practice effects. After the first testing session, participants will supplement their regular diet 4 times/day for 7-days with 5g of CRE or PLA. Muscular performance will be assessed using timed up-and-go, short Physical Performance Battery, 10 repetition maximum chest press and leg extension, and sit-to-stand power tests. Cognitive function will be evaluated using visual and auditory reaction time, Erik Flanker, and Corsi block tests. Muscular performance and cognitive function tests will be done pre- and post-supplementation. Data will be evaluated for normality using the Shapiro Wilk test. Descriptive statistics will be expressed as means  $\pm$  standard deviation. The interaction between supplement (CRE vs PLA) and time (Pre vs Post), will be examined using a group  $\times$  time analysis of variance (ANOVA). Statistical significance will be considered at  $p < 0.05$ . Effect sizes for analyses will also be reported. All data will be analyzed using R. **ANTICIPATED RESULTS:** We hypothesize that short-term creatine supplementation will result in significant improvements for both muscular performance and cognitive function relative to the placebo group.

**P14: BLOOD FLOW RESTRICTED EXERCISE DOSAGE FOR CHRONIC KIDNEY DISEASE UNDERGOING HEMODIALYSIS: A META-ANALYSIS PROPOSAL**

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**BACKGROUND:** Chronic kidney disease (CKD) affects millions of adults. To combat CKD, patients will undergo hemodialysis treatment. Exercise prescription is a useful adjuvant therapy. However, as a function of hemodialysis and CKD risk factors, traditional exercise is not feasible for all patients. A potential alternative to standard exercise prescription is blood flow restricted exercise (BFR-E). BFR-E can be completed at lower intensity and duration than conventional exercise. However, the optimal BFR-E dosage (frequency, intensity, duration, and modality) is unknown. The objective of this meta-analysis is to determine which BFR-E optimally improves health outcomes in patients with CKD receiving hemodialysis. **METHODS:** Following PROSPERO registration, a systematic review and meta-analysis will be conducted. Articles will be identified through using electronic databases. Inclusion criteria includes: (i) adult patients (age: 18 years or older) from stage 1 of CKD (Glomerular filtration rate (GFR)  $\geq$  90 mL/min) to stage 5 (GFR  $\leq$  15 mL/min); (ii) patients undergoing home or in-center hemodialysis treatment and; (iii) randomized controlled trials incorporating BFR-E (either aerobic or resistance training) and control groups or cross-sectional study designs will be included. Patients performing BFR-E while undergoing peritoneal dialysis will be excluded. Studies will also be evaluated on their quality using the RoB2 Cochrane risk-of-bias tool. **ANTICIPATED RESULTS:** Investigating dosage of BFR-E will allow us to consolidate existing evidence of variable BFR-E protocols to fill a critical gap in the literature describing recommended intensity, frequency, duration, and modality

of BFR-E. Research into BFR-E will shape recommendations for patients' exercise regimens and help generate a strategic course of action to delay the progression of CKD.

**P15: EXAMINING SPRINT DEMANDS DURING THE COMPETITIVE SEASON IN COLLEGIATE MENS SOCCER PLAYERS**

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**BACKGROUND:** Significant advancements have been made in the field of sport science technology, allowing for methods of tracking objective measures longitudinally across an entire team. The sport of soccer is characterized by short bouts of intense sprints and high-speed distance running. Sprint and workload demand of players such as total sprint volume (TSV) provide implications for athletic personnel to prescribe appropriate, individual-based training loads. **PURPOSE:** The purpose of this study examined TSV differences over a full competitive season (preseason vs in-season) in collegiate male soccer players. TSV was measured by collecting sprint metrics of distance traveled  $\geq 5.14$  m/s for all practices and matches. Sprint count (SPC) was defined by the Titan sensor algorithm as the occurrence of an athlete reaching a minimum speed threshold during a session ( $\geq 5.14$  m/s for  $\geq 1.5$  seconds). **METHODS:** Twenty-one (age:  $19.6 \pm 1.2$  years, height:  $180.7 \pm 8.3$  cm, mass:  $75.6 \pm 7.4$  kg) Division I collegiate male soccer players were monitored using wearable Global Positioning Systems (GPS) using a 10Hz Titan +1 sensor (Houston, Texas, United States). Devices were secured by jerseys and rested between the scapulae of each participant during every training session and match across the competitive season (preseason: 2 weeks, in-season: 10 weeks). Sensors were activated and distributed by the assistant coach fifteen minutes prior to players taking the field to allow for adequate synchronization. Sensors were collected and turned off immediately following completion of a session. To ensure adequate session monitoring over this period, participants were excluded from analysis if  $< 75\%$  of the total number of practice sessions or matches were not recorded ( $n=2$ ). A series of Paired samples t-tests with an alpha level set at  $p < 0.05$  were used to compare differences in sprint outcomes between preseason and in-season time periods. **RESULTS:** Significant differences ( $p < .01$ ) between preseason TSV ( $878.4 \pm 655.9$  m) and in-season TSV ( $1179.6 \pm 737.3$  m) were present. Significant differences in total SPC were also observed between pre-season ( $41.9 \pm 30.2$ ) vs in season ( $54.9 \pm 34.7$ ) ( $p < .01$ ). **CONCLUSION:** This study provides sport coaches and strength and conditioning staff with workload reports that can aid in the development of training programs based on varying demands including an athlete's position and timeline of competitive seasons.

**P16: THE INFLUENCE OF SURFACES ON ACCELERATION AND DECELERATION CAPACITY AND RATING OF PERCEIVED EXERTION**

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**BACKGROUND:** Soccer is a high intensity sport requiring frequent changes in speed and direction. Though the sport is traditionally played on natural grass (NG), it has become more prominent in recent years for artificial turf (AT) to be considered as an acceptable alternative. Consequently, there has been an increase in studies focused on the impact of different playing surfaces on injury rates and player perception. Additional research, however, is needed to better understand how these surfaces influence the mechanical demands observed during performance as well as the perceived physiological demands. Thus, the purpose of this study is to investigate acceleration and deceleration profiles and rating of perceived exertion (RPE) among NCAA Division I women's soccer players on NG vs AT. **METHODS:** Participants between the ages of 18 to 23 years will be recruited from a Division I women's soccer team. Data will be collected across a competitive season using TITAN 1+ GPS wearable sensors and the TITAN Athlete App (Integrated bionics, Houston, TX, USA). Each participant will wear a GPS sensor within a fitted undergarment vest under their jersey during each match, and afterwards, each will report their RPE in the app using their personal smartphone. At each match, the type of playing surface (i.e., NG or AT) will be documented and wet bulb globe temperature (WBGT) will be recorded at 15 minute intervals throughout each 90-minute event to account for the effect of temperature, humidity, and solar radiation on the players. Data collected with the GPS sensors and the app will automatically be compiled in the TITAN Session Explorer software from which the accelerations, decelerations, and RPE collected for each game will be exported for analysis. Data on NG vs AT will be analyzed using repeated measures t-tests. Pearson correlation tests will also be conducted to measure the strength of the relationship between RPE and accelerations, decelerations, and WBGT. **ANTICIPATED RESULTS:**

It is hypothesized that there will be a greater number of accelerations and decelerations on AT than NG, and RPE will be higher on AT than NG. In addition, it is also hypothesized that accelerations, decelerations, and WBGT will be correlated to RPE.

**P17: EFFECTS OF MENSTRUAL CYCLE ON MAXIMAL POWER OUTPUT IN BASKETBALL**

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**BACKGROUND:** The menstrual cycle is known to have a multitude of impacts on women, and more specifically, female athletes. Two variables that could be affected by the different stages of the menstrual cycle (menstruation, follicular phase, ovulation, and luteal phase) are power and velocity. Power is the measure of how quickly an athlete can produce the force to move the loaded barbell and velocity is how quickly the barbell traveled from beginning to end of the rep. **METHODS:** The Anderson University men's (15 athletes) and women's (14) basketball teams will test once a week for a multitude of weeks. During this test, they complete three repetitions of back squat as quickly as they could. Their peak and average Power (W/lbs.) and velocity (m/s) will be recorded using the GymAware tensiometer attached to the barbell. The women will squat with 65 pounds and men, 95 pounds. Before testing, each female will complete a one-time menstrual cycle history questionnaire, then complete a weekly readiness survey that included questions regarding the phase of their cycle, while the men just complete a weekly readiness survey. **RESULTS:** It is hypothesized that the men's average power outputs will steadily increase with time, whereas women's average power will decrease during the menses phase of the menstrual cycle.

**P18: SQUAT DEPTH IMPACTS ON JOINT SPECIFIC VERTICAL JUMP**

Wyatt Baggett, Jarrett Walbolt. *Montreat College, Montreat, NC.*

**BACKGROUND:** Previous studies have investigated the impact of squat depth in training on vertical jump, but study into the use of specific joint angles is still needed. Explosive sports such as basketball and football often require athletes to jump out of shallow joint angles. Understanding training within these shallow joint angles is critical to enhancing athletic performance. The purpose of the proposed study is to see how training squats from different depths impacts vertical jump height and maximal isometric force from different joint angles. **METHODS:** 40 resistance trained athletes will complete a nine week training program. They will be randomly assigned to one of four groups. Each group will consist of their regular training with either full squats, half squats, or quarter squats added in addition. The fourth group will complete a progression consisting of three weeks of full squats, three weeks of half squats, then three weeks of quarter squats. All squats will be front squats. At baseline, vertical jump from specific joint angles via jump mat and maximal isometric force from different joint angles via biodex will be measured. After the nine week training protocol, the tests done at baseline will be repeated to test for changes. A repeated measures ANOVA will be used to detect significant effects of the training. **ANTICIPATED RESULTS:** It is expected that the group that progresses through each squat type will induce the greatest increases in vertical jump height and maximal isometric force, particularly at shallow joint angles. It is hypothesized that deep squats create greater gains in general strength, which translates to strength in more specific joint angles, such as quarter squats.

**P19: ARE CLUSTERED 24-HR ACTIVITY BEHAVIORS ASSOCIATED WITH DEPRESSION?**

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**BACKGROUND:** Among young adults, depression reached crisis levels during the last decade. This crisis is far from over. Depression is linked to the development of other mental health-related disorders and events like eating disorders, sleep disorders, suicide, and substance abuse. There is an urgent need to identify simple, lifestyle-based strategies for managing depression risk. One important strategy about which we know little is the management of 24-hours activity behaviors (24-AB), defined as the distribution of sleep, sedentary behavior, and physical activity throughout the day. The aim of this study is to assess the strength of the association between latent profiles of 24-AB and depression in young adults. **METHODS:** We will analyze data from the 2015-2018 National Health and Nutrition Examination and Survey (NHANES) for individuals 18-30 years old with complete responses to the depression screener, sleep disorder, and physical activity surveys. Estimates will be stratified, clustered, and weighted to account for the

probability-sample design. Depression scores will be estimated using the Patient Health Questionnaire, which describes the frequency of depressive symptoms over the last 2 weeks. Each item is scored from 0-3, and categorized as either "Not at all", "Several days", "More than half the days", and "Nearly every day" with a possible total score ranging from 0-27. Latent profile analysis will be used to identify profiles of 24-AB based on z-scores for sleep hours, minutes of moderate and vigorous physical activity per week, and minutes of sedentary behavior per week. An analysis of variance will be used to test between-profile differences in mean depression scores.

**ANTICIPATED RESULTS:** The latent analysis will identify at least two distinct 24-AB profiles. The findings from this proposal will identify 24-AB profiles associated with fewer depressive symptoms, which could inform public health recommendations. **GRANT OR FUNDING**

**INFORMATION:** PPL is supported by the National Institute on Aging of the National Institutes of Health under award number R01AG062488.

**P20: SEDENTARY BEHAVIOR INTERRUPTION PRESCRIPTION IN MIDDLE- & OLDER-AGED ADULTS: IDENTIFYING THE OPTIMAL DOSE**

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**BACKGROUND:** Middle-aged and older adults reportedly engage in high amounts of prolonged sedentary behavior (SB,  $\leq 1.5$  METs in seated/reclined posture). Prolonged SB is associated with increased arterial stiffness (AS), a measure of cardiovascular disease (CVD) risk. Current U.S. recommendations for SB interruption are broad, and limited to the adage "sit less, move more." Thus, the proposed study aims to identify a suitable (feasible and effective) modality (walking or pedaling) for SB interruption in adults  $\geq 45$  years at risk for CVD. **METHODS:** The proposed randomized controlled cross-over trial will recruit 20 participants (male and female  $\geq 45$ ) with  $\geq 2$  CVD risk factors. Participants will complete three experimental lab visits, an exit interview, and an ecological momentary assessment (EMA). Each experimental condition will include 2.5 hrs sitting with (WALK, PEDAL) or without (CON) interruptions. During experimental visits, sitting will be interrupted at the midpoint of each hour with 5 mins of standing, and at the end of each hour with 5 mins of walking or pedaling (under-desk elliptical). The primary outcome of the study will be global (carotid-femoral, brachial-femoral, femoral-ankle) pulse wave velocity. Compared to segmental measures of PWV, global-PWV allows for more comprehensive evaluation of impacts that prolonged SB and proposed interruptions may have on CVD risk. The aim will be tested using a time (PRE, POST) by condition (CON, WALK, PEDAL) mixed effects model. **ANTICIPATED RESULTS:** Findings from this study will identify whether one or both modalities (walking and/or pedaling) effectively mitigate the increase in AS associated with prolonged sitting.

Participant feedback (exit interview) and real-time movement behavior (EMA) will provide qualitative information to facilitate development of population-specific recommendations for SB interruption in adults at high risk for CVD.

**P21: SEDENTARY BEHAVIOR AND CARDIOVASCULAR DISEASE RISK IN ENDOMETRIAL CANCER SURVIVORS: MODERATION BY PERCEIVED DISCRIMINATION**

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**BACKGROUND:** Endometrial cancer (EC) survivors experience high rates of cardiometabolic comorbidities, such as obesity, and type 2 diabetes that are known risk factors of both EC and cardiovascular disease (CVD). EC survivors are also highly sedentary and engage in very low amounts of physical activity - two major CVD risk factors. EC survivors are 3 times more likely to die of CVD than their cancer. Black endometrial cancer survivors experience a 51% higher risk of overall death are more likely to die of CVD when compared to White women. This racial disparity is multifactorial as it relates to structural racism, endometrial cancer mortality, and long-term survival rates. Investigating sedentary behavior and CVD risk factors in both black and white endometrial cancer survivors may provide insight to the mortality gap impacting these women and indicate potential areas of intervention. **METHODS:** Endometroid Type 1 EC survivors [(n =  $\geq 10$  black, n =  $\geq 10$  white), age 50-80, with a BMI greater than 25 kg/m<sup>2</sup>] will be asked to participate in our cross-sectional study. The primary outcome of this study is carotid-femoral pulse wave velocity (cfPWV) as a measurement of CVD risk. The exposure of interest is sedentary behavior measured via accelerometry and discrimination will be measured as a moderator assessed via the perceived discrimination questionnaire. Participants will also complete the ACT-24, and HRQL. These data will provide insight into social and environmental factors

that may be influencing the overall health of the participants. Statistical procedures will include a linear mixed model with a fixed effect of sedentary behavior and random effects of CVD risk (cfPWV) with race as a moderator. **ANTICIPATED RESULTS:** We hypothesize that Black EC survivors will have increased cfPWV compared with White EC survivors due to increased CVD risk and structural racism. There is a critical need to identify modifiable CVD risk factors in EC survivors leading to the development of future interventions targeting these behaviors. These data will be used to investigate how perceived discrimination may influence CVD risk and EC's subsequent activity behaviors.

**P22: THE EFFECT OF ACUTE SEDENTARY BEHAVIOR ON REACTIVE OXYGEN SPECIES**

Nishad Sai Kosaraju. *UNC Chapel Hill, Chapel Hill, NC.*

The Effect of Acute Sedentary Behavior on Reactive Oxygen Species Nishad Kosaraju<sup>1</sup>, Alexander Pomeroy<sup>1</sup>, Erik Hanson FACSM<sup>1</sup>, Lee Stoner FACSM<sup>1</sup> <sup>1</sup> University of North Carolina at Chapel Hill, NC, USA. **BACKGROUND:** Sedentary behaviors, defined as low-intensity behaviors in a seated, reclined, or supine posture, are strongly associated with cardiovascular disease (CVD). While the mechanisms are mostly unknown, sedentary behaviors (e.g., prolonged sitting) may induce pro-inflammatory and impaired immune responses. This exploratory study will (i) determine the reactive oxygen species response to prolonged sitting, and (ii) determine whether sitting interruptions moderate the ROS response. **METHODS:** A sample size of 56 subjects will be recruited. To be eligible for the study, the participants cannot have any cardiometabolic disorders such as hypertension or hyperlipidemia and must have a BMI under 30 to avoid confounding with obesity. Each subject will complete two conditions, in a random order: CONTROL and MIXED. For CONTROL, the subject will complete 4-hr of uninterrupted sitting. For MIXED, the 4-hr sitting bout will be interrupted with a 15-min standing break or 5-min walking break. A venous blood sample will be collected at the start and end of each condition and used to measure ROS. **EXPECTED RESULTS:** The findings may elucidate a pathological pathway to target with sitting interruption strategies. Source of funding: This study will be funded by NIH R01HL157187-01A1.

**P23: EFFECTS OF A VIRTUAL TRAINER ON INTENSITY SELECTION AND EXERCISE ENJOYMENT**

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**BACKGROUND-** Currently, only 30.4% of the US population meet ACSM recommendations of two or more days per week of resistance training. A potential explanation to this lack of physical activity could be due to common barriers to exercise such as lack of time, enjoyment, or resources. A possible way to eliminate these barriers is through the use of virtual exercise. Previous research has shown significantly higher intensity selections based on heart rate (HR) and VO<sub>2</sub> values resulting in significantly further distances covered when participants cycled with video feedback vs. no feedback for 30 minutes. In addition to physiological responses, video and music-led cycling (vs. without video and music) resulted in a significantly lower RPE, potentially contributing to increased feelings of exercise enjoyment. With the majority of virtual exercise focusing on aerobic activity, the effects of virtual strength training on physiological and perceptual responses is not well understood. The purpose of this study is to determine the effects of virtual exercise on intensity selection and exercise enjoyment with a total body strength session. **METHODS -** Forty participants (18-45 yrs) who do not currently meet ACSM's minimum 2 days per week of resistance training guidelines and have no prior experience with the Mirror home gym will be recruited for this study. The first session will consist of a familiarization trial to assess anthropometric measurements and review exercises in the strength training sessions. Following the familiarization trial, participants will complete two identical 30-min full body strength exercise bouts on two separate occasions. The sessions will consist of a pre-selected workout with one session delivered by a virtual trainer using the Mirror and the other with participants following written instructions of the exercise session. Each session will consist of exercises that use one's body weight or hand weights in which the participant will select their own resistance. At the end of each exercise, participant's HR, weight selection and completed repetitions will be recorded. Participants will also report their acute RPE using the Omni pictorial scale. Following each trial, participants will report session RPE and complete a Physical Activity Enjoyment Scale (PACES) to assess exercise enjoyment. Results will be analyzed using means and standard deviations for descriptive characteristics and separate one-way repeated measures ANOVAs will be used to compare HR, weight selection, completed repetitions, and RPE between the Mirror and written sessions. Paired t tests will be used to compare SRPE values and PACES responses for

each session. **ANTICIPATED RESULTS -** It is hypothesized that the Mirror exercise session will lead to greater intensity selections and feelings of enjoyment vs. the written exercise session.

**P24: DETERMINING THE EFFECT OF CUFF DEFLATION ON POST EXERCISE ARTERIAL OCCLUSION PRESSURE**

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**BACKGROUND:** While it is recommended that blood flow restriction is applied relative to pre-exercise (or resting) arterial occlusion pressure (AOP), there are no guidelines for an initial rest period prior to the measurement. Remeasuring AOP post-exercise can be used to estimate the cardiovascular response. When measuring post-exercise AOP, different methods have been used. Some have increased the cuff pressure from blood flow restriction exercise pressure (without deflation), and others deflate the cuff prior to post-exercise AOP measurement. It is unknown if pre-exercise AOP is affected by initial rest period, or if post-exercise AOP is affected by cuff deflation. Thus, the purpose of this study is to: 1) compare pre-exercise AOP across differing initial rest periods, and 2) compare post-exercise AOP measured either with or without cuff deflation following exercise.

**METHODS:** We plan to recruit 50 participants for a total of three visits. Visit 1 will consist of paperwork and familiarization, followed by measurements of height, weight, and 1 repetition maximum (1RM) bicep curl testing on the upper dominant arm. Visits 2 and 3 will be exercise testing days. Upon entry into the lab on visits 2 and 3, AOP will be measured immediately. Depending on condition, AOP will be measured 5min after initial AOP. On both days, AOP will be measured 10min after initial measurement serving as pre-exercise AOP. Exercise will be performed as three sets of elbow flexion curls at 30% 1RM to failure and 40% of pre-exercise AOP with 30s rest between sets. 10s after the cessation of exercise, post-exercise AOP will be measured. Depending on condition, to assess AOP, the pressure will be increased from 40% AOP, or the cuff will be deflated and reinflated. To determine differences in post-exercise AOP, we will use a Bayesian two-way repeated measures ANOVA. For differences across rest periods, we will use a Bayesian one-way repeated measures ANOVA. **EXPECTED RESULTS:** For comparison of pre-exercise rest periods, we would expect no difference between the immediate, 5min, and 10min AOP measures. Due to the hyperemic response subsequent to the blood pooling effect created by blood flow restriction exercise, we hypothesize that cuff deflation directly post-exercise would have a greater change in AOP pre to post exercise. We would expect to see the number of completed repetitions to be greatest in set one and decrease with each set.

**P25: THE EFFECTS OF THE MENSTRUAL CYCLE AND ORAL CONTRACEPTIVES ON ATHLETIC PERFORMANCE IN COLLEGIATE FEMALE ATHLETES**

Emma Jillian Pilcher, Trinity Hambrick, Riya Patel, Catherine Winstanley, Paul Whitehead, Ryan Connors, FACSM. *The University of Alabama in Huntsville, Huntsville, AL.*

**BACKGROUND:** Hormonal changes during a typical menstrual cycle, such as estrogen and progesterone fluctuations, influence physiological changes. Aerobic performance and reactive strength index (RSI) decrease during the menstrual cycle's mid-luteal phase (LP), which is marked by elevated levels of estrogen and progesterone. The rise in estrogen marks the follicular phase (FP), which precedes ovulation, and through FP, progesterone levels are low. Oral contraceptives (OC), which are known to stabilize these fluctuations in hormone levels as well as mitigate premenstrual symptoms, may cause less variance in aerobic performance and RSI. There is minimal research investigating the impact of the menstrual cycle and OC on these measures of athletic performance, thus contributing to a lack of awareness amongst female athletes about their physiology. The purpose of this study is to determine the effects of menstrual cycles and the use of OC on athletic performance in collegiate athletes. Furthermore, we aim to analyze whether performance differences are more pronounced between menstrual cycles in users versus non-users of OC. The findings of this study may contribute to better understanding the effects of the menstrual cycle on aerobic capacity and RSI, providing practitioners practical information when structuring training sessions for female athletes. **METHODS:** The menstrual cycles and ovulation calendars of participants will be tracked using the mobile app Flo. Participants will self-report their OC use, cycle length, menstruation dates, and ovulation calendar information to researchers for tracking and analysis purposes. Data will be collected for eight consecutive weeks to ensure the collection of data during the FP, LP, and menstruation for each participant. Performance testing will consist of a 300-yard shuttle run, and two countermovement rebound jumps on force plates, allowing for analysis of jump height and RSI. Body composition measures of fat-free mass and body fat percentage will also be analyzed weekly

utilizing a Bod Pod GSX. We will conduct a multifactorial ANOVA to analyze changes across the phases and groups, with significance set at  $p < 0.05$ . **ANTICIPATED RESULTS:** It is hypothesized there will be a decrease in aerobic performance and RSI during the LP, and athletes who are not on OC will see the most significant variation in their performance across their cycle.

**P26: INVESTIGATING THE FEASIBILITY, RELIABILITY, AND VALIDITY OF A HOME-BASED PROTOCOL TO ASSESS PHYSICAL FUNCTION**

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**BACKGROUND:** Low levels of physical function (PF) are associated with increased risk of hospitalization and all-cause mortality and are predictive of poor prognosis for several chronic diseases. Finding novel, effective ways of measuring PF levels is of great importance to both clinicians and researchers when traditional measurement methods are unavailable. The purpose of this study is to determine the feasibility, reliability, and validity of conducting PF testing in a home-based setting without the direct involvement of trained assessors. **METHODS:** This is a 2-arm, randomized order, feasibility, reliability, and validity study. Participants (n=30) will be recruited, consented, and randomized to 1 of 2 groups: completing home-based (HB) testing first or lab-based (LB) testing first. Participants will be stratified into 3 age groups: 18-39, 40-65, and >65 (n=10 per group). Participants will perform 2 HB testing sessions within 24 hours with the help of an assistant (i.e., family member, friend). Prior to HB testing, participants will be asked to record a 6-lead resting ECG and to measure blood pressure and pulse oximetry. Participants will also complete a single LB testing session at Wake Forest University administered by a trained study staff member. PF will be assessed by self-report with PF questionnaires and objective measures of hand grip strength, balance tests, chair stands, 4-meter walk, and 6-minute walk tests. All tests will be filmed or photographed by the assistant (HB) or study staff member (LB) to allow for consistent scoring of the tests. Feasibility will be assessed by adverse events, participant satisfaction and adherence to testing protocols. Reliability will be assessed by examining the intraclass correlation coefficient of the HB test-retest. Validity will be assessed by estimating the limits of agreement between the HB and LB measures. **ANTICIPATED RESULTS:** It is expected that the HB testing protocol will be shown to be feasible, reliable, and valid. This would establish HB PF testing as a viable option for expanding the utility of PF testing and decreasing burden on researchers, clinicians, and participants.

**P27: INFLUENCE OF A LIVE VS. VIRTUAL TRAINER ON INTENSITY SELECTION AND EXERCISE ENJOYMENT**

Kensey E. Hannon, Lauren G. Killen, Takeo Higgins. *University of North Alabama, Florence, AL.*

**BACKGROUND-** The popularity of home exercise equipment has grown, as valued at 10.18 billion in 2020 and projected to reach 14.74 billion by 2028. With smart devices being integrated in home fitness equipment, barriers to exercise such as convenience, resources, and enjoyment can be avoided. While previous research suggests a live personal trainer not only resulted in participants achieving significantly greater intensity selections of a high intensity interval training (HIIT) workout, based on hear rate (HR) and energy expenditure, but also was participants preference vs. an identical DVD workout. Despite the popularity of virtual exercise, the use of a virtual trainer to mimic the instruction of a one-on-one training session in a traditional gym setting is not well understood. The purpose of this study is to compare the effects of a virtual trainer to a live face-to-face trainer on intensity selection and exercise enjoyment during strength training. **METHODS -** Twenty participants (18-45 yrs) who do not currently meet ACSM Guidelines of two or more days per week of resistance training and have no prior experience using the Mirror home gym will be recruited for the current study. Session one will consist anthropometric measurements and familiarization of exercises participants will complete in the upcoming strength sessions. Following the familiarization session, participants will complete two identical, pre-determined 30-min full body strength exercise bouts on two separate occasions. One session will be delivered by a virtual trainer using the Mirror and the other with a live personal trainer. The exercises completed in each session will use either one's body weight or self-selected hand weights. Participant's heart rate (HR), weight selection and completed repetitions will be recorded at the end of each exercise. Participants will also report their acute RPE for each exercise using the Omni pictorial scale. Following each session, participants will report session RPE following a fifteen-minute passive rest and complete a Physical Activity Enjoyment Scale (PACES) to assess exercise

enjoyment. Results will be analyzed using means and standard deviations for descriptive characteristics and separate one-way repeated measures ANOVAs will be used to compare HR, weight selection, completed repetitions, and RPE between the Mirror and live personal trainer sessions. When necessary, paired t tests will be used for post hoc analysis. Additionally, paired t tests will be used to compare SRPE and PACES responses for each session. **ANTICIPATED RESULTS -** It is hypothesized the virtual trainer from the Mirror exercise session will result in greater intensity selections and feelings of enjoyment vs. the written exercise session.

**P28: PATTERN OF STEP ACCUMULATION (CADENCE BANDS) AND RELATIVE HEART RATE INTENSITY DURING FREE-LIVING OBSERVATION**

Austin L. Cooper, FACSM. *University of Alabama, Tuscaloosa, AL.*

**Pattern Of Step Accumulation (Cadence Bands) And Relative Heart Rate Intensity During Free-Living Observation**

Austin Cooper<sup>1</sup>, Peixuan Zheng<sup>2</sup>, Hayley V MacDonald<sup>1</sup>, Michael V Fedewa<sup>1</sup>, Scott W Ducharme<sup>2</sup>, Elroy J Aguiar<sup>1</sup> <sup>1</sup>The University of Alabama, Tuscaloosa, AL <sup>2</sup>University of Illinois Chicago, Chicago, IL <sup>3</sup>California State University Long Beach, Long Beach, CA **BACKGROUND:** Step-based measurement of physical activity (PA) is increasing in popularity. Steps/day provides an indication of daily volume of PA, however, it is often criticized for its inability to capture intensity. Cadence [steps/min] is a valid proxy of PA intensity, however few studies have explored the pattern of step accumulation under free-living conditions. Similarly, relative-intensity is often expressed as a percentage of maximal heart rate (%HR<sub>max</sub>), however, few studies have examined its daily distribution. **Methods:** Healthy adults (n=14, 22.5±3.8 years) wore an ActiGraph GT9X+ accelerometer on their waist (30 Hz sampling rate) and a chest-worn Polar HR monitor for 24 h during free-living observation, resulting in 15,962 pairs of cadence and HR values. Cadence data was compiled into cadence bands (steps/min): non-movement (0), incidental movement (1-19), sporadic movement (20-39), purposeful steps (40-59), slow walking (60-79), medium walking (80-99), brisk walking (100-119), and all faster locomotion (≥120). For %HR<sub>max</sub> (age-predicted using the Tanaka equation), the data was compiled into HR zones: very light (<57%), light (57-63%), moderate (64-76%), and vigorous (77-95%) according to ACSM guidelines. Median [IQR] time spent in cadence bands and relative-intensity HR zones were computed. **Results:** For cadence bands, the highest amount of time spent was in non-movement (805.5 [187.5] min, 69.3% of wear time) and incidental movement (274.5 [139.5] min, 23.6%). Sporadic movement (23 [23.8] min, 2.0%) and brisk walking (25 [34.0] min, 2.2%), were similar/greater, respectively, than purposeful (8 [12.8] min, 0.7%), slow (7.5 [7] min, 0.6%) and medium walking (8 [7] min, 0.7%) combined. Faster locomotion was rare (2 [13.5] min, 0.2%). Analysis of %HR<sub>max</sub> revealed similar trends, but with varying proportions. Participants spent the majority of time at a very light intensity (1188.5 [206.8] min, 98.0%), followed by vigorous (16.0 [53.0] min, 1.3%), moderate (4.5 [4.3] min, 0.4%) and light (4.0 [4.0] min, 0.3%). **Conclusions:** Participants spent a majority of their time in low cadence bands and at very light intensity, and tended to skip straight to higher cadence bands and relative intensities. Future studies should examine patterns of cadence and HR using more rigorous methods (i.e., longer observation, Holter monitor, and a larger demographically diverse sample. **Grant funding:** The University of Alabama Office for Research and Economic Development: #RG14902

**P29: EFFECTS OF LIFESTYLE FACTORS ON TRABECULAR BONE SCORE DURING TRANSITION FROM HIGH SCHOOL TO COLLEGE**

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**BACKGROUND:** Optimization of lifestyle factors known to positively influence peak bone mass and strength are important in the reduction of risk of osteoporosis and low bone mass in the adult populations. Literature suggests that substantial trabecular bone loss occurs in young adulthood, in conditions of sex steroid sufficiency. However, it is unknown why trabecular bone loss occurs during this time. Trabecular Bone Score (TBS) is used to assess bone quality and identify those who are at risk for bone fractures. During the transition from high school to college, young adults make many lifestyle choices including diet, exercise, and sleep. Therefore, these lifestyle-related factors may help account for changes in TBS. The purpose of the study is to evaluate the changes in physical activity, diet, and sleep duration and changes in TBS in young adults during the transition from high school to college. **METHODS:** This is a prospective cohort study that will follow high school seniors (n=75 50% female 50% male), ages 17 to 18, who plan to attend a 4-year college within a year of graduating high school. Participants will not be living with their parents or guardians during their first year of study. Participants will be assessed

approximately 15 months apart: during their senior year of high school and first year of college. TBS will be measured via dual-energy X-ray absorptiometry (DXA) imaging and analyzed using TBS iNsightTM software. Physical activity and sleep duration will be measured via 3-axis accelerometer (GXT9 Link, ActiGraph), and sedentary behavior via physical activity monitor (activPALTM, PAL Technologies). Dietary intake will be measured with the automated self-administered 24-hour (ASA24) dietary assessment tool. Linear regression will be used to determine the relationship between activity, diet, sleep duration, and TBS while controlling for relevant confounders. **ANTICIPATED RESULTS:** We anticipate that changes in physical activity, diet, and sleep duration during the transition will be associated with the changes in TBS. In addition, we anticipate that those who are physically active for at least 30 minutes a day, eat within recommended dietary guidelines, and sleep more than 5 hours a night will have higher TBS than those who do not. **FUNDING:** Funding for this project will be provided by the National Heart, Lung, And Blood Institute of the National Institutes of Health under Award Number R15HL159650.

### **P30: ENERGY AVAILABILITY IN FEMALE COLLEGIATE BEACH VOLLEYBALL ATHLETES**

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**BACKGROUND:** Energy availability (EA) is the amount of energy available for normal physiological processes and is defined as energy intake (kcal) minus exercise energy expenditure (kcal) relative to fat free mass (FFM). Low-energy availability (LEA), energy intake < 30 kcal/kg FFM/d, is the core cause of the Female Athlete Triad and Relative Energy Deficiency in Sport. These conditions result in various negative health and performance outcomes. A recent study reported 81% of the female collegiate athletes examined exhibited LEA. Of the 18-collegiate beach volleyball (BVB) athletes studied, average EA across 7 days was determined to be 12.44 kcal/kg FFM/d, far below the cutoff for LEA. Recently, the training and competitive demands of collegiate BVB were estimated to be 100-110 kcal/kg per week. Mean energy expenditure during competitive matches and corresponding warm-ups was found to be 15 kcal/kg. Given such high energetic demands of BVB and the known presence of LEA in these athletes, recovery across the competitive season becomes paramount. Notably, this is a 7-day snapshot of EA that may not reflect chronic dietary or training patterns. To our knowledge, no study has examined EA across the 10-week competitive season in this population. Therefore, the purpose of this cross-sectional study is two-fold, 1) to establish the current risk of LEA in female collegiate BVB athletes across the competitive season and 2) to correlate EA with measures of nutrition knowledge, psychological skills, health and performance. **METHODS:** We plan to recruit 18 female collegiate BVB athletes. Each subject will complete an initial visit where anthropometrics, resting metabolic rate (RMR), nutrition knowledge, psychological skills and maximal aerobic capacity will be tested. During weeks 1, 5, and 10 of the competitive season, in addition to body composition and RMR, energy intake (ASA 24) and energy expenditure (GT9X-Link) will be assessed to calculate EA. Subjective recovery scores (Total Quality of Recovery Scale) and countermovement vertical jump height, velocity, and power (GymAware) will be used to assess recovery (Weeks 1-10). Results will be analyzed using repeated measures ANOVA and Pearson Correlations. **EXPECTED RESULTS:** It is hypothesized that LEA will be present and EA will decline as the season progresses. Likewise, nutrition knowledge, psychological skills, and performance will be positively correlated with EA.

### **P31: DOES LION'S MANE ENHANCE COGNITIVE FUNCTION IN YOUNG ATHLETIC POPULATIONS?**

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**BACKGROUND:** Lion's Mane (*Hericium erinaceus*) is an edible fungus thought to improve overall cognitive behavior, including enhanced focus, memory, and reaction times. The supplement is widely used and studied in Alzheimer's patients, but little consideration has been given to Lion's Mane as an ergogenic aid in younger athletic populations. The purpose of this study will be to determine whether athletes taking Lion's Mane will show improved cognitive function, memory, and reaction times. **METHODS:** 15 college-aged, physically trained subjects will be recruited. At baseline subjects will undergo the Criteria Cognitive Aptitude Test (CCAT) to quantify cognitive function, the Short-Term Memory Test (STMT) to quantify memory and focus, and the Human Benchmark Reaction Time test (HBRT) to quantify reaction time. Subjects will be given the Lion's Mane supplement to take for 10 days prior to a second testing session, when baseline measures will be repeated. **ANTICIPATED RESULTS:** We anticipate subjects to show

improvement in all three tests after supplementation, as indicated by increased CCAT and STMT scores, and decreased HBRT.

### **P32: THE EFFECT OF ASTAXANTHIN SUPPLEMENTATION ON THE SUBJECTIVE SENSATION OF MUSCLE SORENESS IN RESISTANCE-TRAINED MALES**

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**BACKGROUND:** Skeletal muscle damage resulting in delayed-onset muscle soreness (DOMS) is common following strenuous exercise and dietary supplements are on strategy to mitigate DOMS. Astaxanthin (AX) is a dietary supplement that has been shown to enhance cell membrane stability and suppress inflammation. However, data in humans are limited and therefore, the purpose of this study is to examine the impact of AX supplementation (12 mg/day) for 4-weeks on subjective markers of DOMS following an extensive muscle damage protocol. **METHODS:** Participants will be recreationally active males (age, 18-35 years) with an accumulation of 1-5 hours a week of aerobic and/or resistance-based exercise participation. Two-weeks prior to the study, antioxidant and creatine supplementation will be eliminated. Additionally, no caffeine or alcohol will be consumed 48 hours prior to each testing session. Participants will report to the laboratory on five visits in a double-blinded, between study design. Visit 1 will include completion of an informed consent and the collection of anthropometric data and a daily training/nutrition log. During visit 2, participants will complete an indirect 1-repetition maximum (RM) on the leg press. Participants will then complete 5 sets of 10 reps of at 60% of their 1-RM to induce muscle damage. Subjective rating of DOMS will be recorded at the completion of visit 2, and again at 24, 36, & 48 hours post visit 2. Participants will then be stratified into either a placebo or AX group based on their 48 hour DOMS score. Moreover, participants will return 48 hours later for visit 3 to complete a performance trial at 65, 70, and 75% of their 1-RM to failure. Participants will then supplement for 4-weeks and return for repeat testing (visits 4 and 5). **ANTICIPATED RESULTS:** Due to the anti-inflammatory effects reported from AX ingestion, we anticipate that AX will reduce the subjective reports of DOMS following a muscle damaging protocol and thus, subsequently improve performance as demonstrated by more repetitions to failure on the leg press.

### **P33: INVESTIGATING THE IMPACT OF GLUCOSE LEVELS AND BRIEF EXERCISE BOUT ON ESPORTS PERFORMANCE AND FATIGUE**

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**BACKGROUND:** Following 2.5 hours of continuous esports play, there are seen to be decreased cognitive functions (CF), including accuracy which could result in decreased esports performance. To reset CF, research has investigated the impact of a 6 min walk or 6 min rest halfway through 2 hours of gaming compared to continuous play. The active break improved CF more than the passive break, but performance was greatest in continuous play. However, this study included the break after 1 hour and the continuous session was 2 hours. Research has shown an improvement in CF following high-intensity exercise (EX), but long-duration bouts or EX using equipment would not be advantageous in this population. Very short, but high-intensity EX has shown to have similar adaptations as longer duration, moderate-intensity EX. A lack of research exists investigating the impact of a short active break using high-intensity EX during continuous gaming. Additionally, when compared to a fasting state, gaming while in a postprandial state did not seem to improve performance. This is in opposition to research that has seen an increase in CF with the consumption of foods containing glucose (GLU). However, research investigating GLU in esports looked at only 1 hour of gaming which may not be long enough to induce fatigue in esports athletes. The purpose of this study is to investigate the relationship between GLU level and CF during long-duration play with and without an active EX break. **METHODS:** Twenty males and females, ages 18 to 35, will be recruited to participate in an EX and non-EX trial. Prior to each session, participants will fast for 3 hours before GLU and aiming performance (AIM) are measured and then participants will eat a protein bar. Eye tracking will monitor visual fatigue and EEG will examine brain waves for cognitive load and fatigue during each AIM session. After 2.5 hours of gameplay, GLU and AIM will be measured, and then either 4 mins of EX followed by 5 mins of rest, or a 9 min break in the non-EX condition. The EX includes 8 rounds of 20 sec of burpees with 10 sec of recovery between. After another 2.5 hours of gaming, post-tests of GLU and AIM will be measured. Repeated measures ANOVA will be used to compare AIM, GLU, and fatigue between EX and non-EX pre, mid, and post-trials. **ANTICIPATED RESULTS:** It is hypothesized that the non-EX session will have lower AIM and GLU and higher fatigue than the EX session.

**P34: THE RELATIONSHIP BETWEEN SLEEP BEHAVIORS AND MENTAL HEALTH IN HIGH SCHOOL SENIORS**

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**Background:** Diagnoses of mental health disorders are rising in high school students. Little is known about the relationship between changes in sleep and the development of mental health issues, or whether other lifestyle factors (e.g., alcohol consumption) impact this relationship. Indeed, underage drinking is a significant public health concern with 57.8% of high school students reporting binge drinking. The purpose of this study is to determine the relationship between sleep, alcohol consumption, and stress as an acute marker of mental health among high school seniors. **Methods:** This cross-sectional sample includes 23 high school seniors (56% female, 17.9±.4 years, Body Mass Index 25.1±2.6 kg/m<sup>2</sup>, relative body fat 31.3±8.7%). Characteristics of sleep were measured via the 19-item Pittsburgh Sleep Quality Index (PSQI) and Sleep Hygiene Index (SHI). Stress was assessed using the 10-item perceived stress scale (PSS). The 10-item alcohol use disorders identification test (AUDIT) was used to screen for alcohol consumption. Pearson correlations were used to assess the relationship between sleep behaviors, alcohol consumption, and mental health. **Results:** Underage alcohol consumption was reported by 30% of participants, putting participants at moderate risk for an alcohol use disorder in the future. A nonsignificant correlation was observed between sleep quality and SHI ( $r = 0.31, p = 0.15$ ), AUDIT score ( $r = -0.08, p = 0.68$ ), and perceived stress ( $r = 0.37, p = 0.07$ ). Similarly, nonsignificant correlations were noted between SHI and AUDIT score ( $r = 0.07, p = 0.73$ ), and perceived stress ( $r = 0.28, p = 0.19$ ). **Discussion:** Although, no significant relationship between stress, sleep and alcohol consumption was observed at this time, a trend for better sleep quality and mental health could be observed. As this is part of an ongoing longitudinal study, we anticipate this trend to strengthen as sample size increases. Further research is needed to better understand the effects of lifestyle factors on sleep characteristics and mental health. **Funding:** Funding for this project was provided by the National Heart, Lung, and Blood Institute of the National Institutes of Health under Award Number R15HL159650 and the Undergraduate Research Program at Elon University.

**P35: THE EFFECTS OF ELECTRONIC DANCE MUSIC ON RUNNING**

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**BACKGROUND:** Music has been shown to boost mood and enhance performance when it comes to running. Changes in breathing rate, heart rate, and cadence may also contribute to changes in performance. Benefits are enhanced with higher tempo music. It is still unknown what genre of music has the greatest effects on mood and performance. The purpose of this study is to measure the effects of electronic dance music (EDM) on the performance of a recreationally trained person during a one mile run. **METHODS:** I plan to recruit 20 recreationally trained college students between the ages of 18-30 years old for participation in this study. Participants will be asked to run one mile on a paved multi-use trail under 3 different conditions: no music, pop music, and EDM music. The study design will be a counterbalanced repeated measures design. Each of the conditions that have music playing will be researcher-selected and controlled to 160-180 beats per minute. Music for each condition will be rated using the Brunel Music Rating Inventory-2. During each run, the participant's run time, cadence, heart rate, and breathing rate will be measured. Before and after each run the participant will complete a Physical Activity Affect Scale to gauge fatigue and affect. Results will be analyzed using repeated measures ANOVA to determine significant differences between the three conditions. Alpha will be set at .05. **ANTICIPATED RESULTS:** Based on the previous research on running speed, cadence, and fatigue there will be an impact on the run with both Pop and EDM music playing with improved results from EDM music. Running speed should increase as well as running cadence, heart rate, and breathing rate. Fatigue after running should be lower and mood should improve.

**P36: EFFECT OF ON-DUTY RESISTANCE TRAINING ON COGNITIVE FUNCTION IN STRUCTURAL FIREFIGHTERS**

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**BACKGROUND:** Sufficient analytical processing and timely decision-making during high-stress situations are critical in performing

fireground and emergency tasks safely and effectively. Research indicates that performing training operations decreases firefighters' visual declarative memory and induces working memory impairments. Firefighters are encouraged to perform on-duty exercise to enhance occupational readiness, however, the potential deleterious effect on cognitive function is unknown if responding to an emergency immediately after exercise. Therefore the purpose of this study is to determine the effect of exercise-induced fatigue on cognitive function in firefighters. **METHODS:** A convenience sample of 20 apparently healthy career structural firefighters (Age: 18-55 yr) will be recruited to participate in the study. Inclusion criteria include performing  $\geq 2$  resistance training sessions per week for the past 3 months. Participants will attend 3 testing sessions separated by a minimum of 72 hours. During session #1 participants will perform the 30-15 Intermittent Fitness Test, 5 and 10 repetition maximum (RM) strength assessments (bench press, bent-over row, shoulder press, deadlift, step-up) and cognitive ability assessments focused on sustained attention (Sustained Attention to Response Tasks exam) and cognitive function (paired associates learning and spatial span tests). Sessions #2 and #3 will be randomized, where participants will complete heavy resistance training (5RM loads, 2 min passive recovery) and circuit training (10RM loads, 45 s passive recovery) protocols. Cognitive acuity and muscular force outcomes (via isometric midthigh pull) will be assessed prior to each exercise session and 10 min post-exercise to simulate an emergency response time. Repeated measures ANOVA (Time x Training Intervention) will be used to compare cognitive performance outcomes over time and between interventions. The level of significance will be set at  $p < 0.05$ . **ANTICIPATED RESULTS:** We hypothesize that heavy resistance and circuit training modalities will produce physical fatigue, demonstrated by reduced muscular force outcomes, and reduce cognitive function in firefighters.

**P37: LIFESTYLE INTERVENTIONS FOR VITALITY AND EMPOWERMENT OF SENIORS (LIVES) STUDY**

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**BACKGROUND:** Alzheimer's Disease and related dementia disorders represent a major public health priority. Indeed, Alzheimer's Disease is the 5<sup>th</sup> leading cause of death in the US. Although there is no cure for Alzheimer's Disease or dementia, research has shown that physical activity can improve cognitive functioning in older adults. However, the effects of resistance training on cognition in older adults is not well understood. We seek to test whether High Intensity Interval Resistance Training (HIIRT) can impact cognition in older adults. The present study aims to test the feasibility of conducting a randomized controlled trial to test the impact of HIIRT on cognition in older adults. **METHODS:** We are recruiting 30 adults aged 65 years or older for this study. Participants will be randomized into a 12-week HIIRT ( $n = 15$ ) program or a stretching, balance, and range of motion (SBR;  $n = 15$ ) comparison group. All outcome assessments will be conducted prior to randomization and following the 12-weeks of intervention. The primary outcome is executive cognitive functioning and secondary outcomes include brain-derived-neurotrophic factor (BDNF), physical functioning, and several psychosocial measures of behavior change and quality of life. In the HIIRT intervention, participants will attend two group exercise sessions per week and perform two sets of machine-based leg press, chest press, seated row, and shoulder press. Each set will last 40 seconds, followed by a 20-second rest between sets and 3 minutes between exercises. Participants assigned to the SBR condition will meet twice weekly for 45 minutes each session for 12 weeks to perform a varied rotating routine of stretching exercises and activities to improve balance and range of motion. After completing the 12-week interventions, all participants will be asked to complete the same baseline assessments and have an fMRI scan post-intervention to examine changes in brain activity. Analyses will focus on aspects of feasibility, including recruitment accrual, adherence, retention, and adverse events. To describe the change in the executive function, we will present mean change and variability within each group throughout the study. **ANTICIPATED RESULTS:** This study will provide important data relative to the feasibility of this research as well as study design benchmarks on which to design a full scale trial.

**P38: THE IMPACT OF A 12-WEEK EDUCATION-BASED PROGRAM ON METABOLIC RISK FACTORS AND MENTAL HEALTH MEASURES**

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**BACKGROUND:** Metabolic Syndrome (MetS) is prevalent worldwide and is often associated with a decrease in measures of mental health. MetS is diagnosed when a person presents with at least 3 of the following risk factors: hypertension, hyperglycemia, hyperlipidemia and abdominal obesity. MetS is associated with an increased risk of heart disease, stroke, and diabetes. A group education program coupled with

individual goal setting (HealthEYou) has been found effective in mediating the risk of MetS; however, its impact on mental health has not been explored. The purpose of this study is to evaluate the impact of a 12-week nutrition and physical activity education program on reducing the risk of developing MetS and measures of mental health. **METHODS:** Faculty and staff at a small liberal arts institution will be recruited to participate in a 12-week education-based intervention program. Participants' weight, height, waist circumference, systolic and diastolic blood pressure, triglyceride (TRY), total cholesterol (TC), and fasting blood glucose (FBG) levels will be measured at baseline and upon completion of the 12-week intervention. In addition, participants will complete several questionnaires including 21-item Depression, Anxiety, and Stress Scale (DASS-21) and Quality of Life (QOL). The intervention program will include weekly 60-minute group education sessions and 15-minute individual sessions for goal setting. The program will consist of interactive sessions including mindful eating, meal planning, understanding nutrition labels, stress management, importance of sleep, mindfulness, physical activity, resistance exercise and other relevant content. Repeated measures analysis of variance will be used for statistical analysis. **ANTICIPATED RESULTS:** We anticipate that participants will gain necessary knowledge and motivation to make significant lifestyle changes that could lead to improvements in their overall health (physical and mental) and quality of life. **FUNDING:** Elon University Undergraduate Research Program and Faculty and Staff Wellness Initiative.

**P39: ASSOCIATION BETWEEN COACH BEHAVIORS AND ATHLETES' SELF-, OTHER-, AND COLLECTIVE EFFICACY BELIEFS**

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**BACKGROUND:** An athlete's confidence (i.e., efficacy) plays a pivotal role in sport, whether it is confidence in themselves, in another, or in their collective group. Studies have shown that athletes' self-efficacy, other-efficacy, and collective efficacy beliefs lead to beneficial outcomes, such as performance, effort, and persistence. While research has shown that athletes' perceptions of coach behaviors are associated with their efficacy beliefs, no known research has utilized observed coaching behaviors when examining this relationship. The purpose of this study is to directly observe coaches and explore how their behaviors (i.e., instruction and feedback, positive and negative evaluation, autonomy support, and motivational climate) predict their athletes' self-, other-, and collective efficacy beliefs. **METHODS:** The target sample will include 10 head coaches and their athletes from 10 sports teams at a NCAA Division III institution. The target athlete sample will be between 75% - 80% of each team. Teams to be recruited include football, baseball, basketball, lacrosse, soccer, cross country, golf, swimming, tennis, and track. Because the proposed institution is an all-male college, all athletes will be males. Each coach will be video recorded at a single practice, and their behaviors will be coded using the Assessment of Coaching Tone observational coding system. This system quantifies these key behaviors: instruction and feedback, positive and negative evaluation, autonomy support, and motivational climate. Athletes will complete questionnaires assessing their efficacy beliefs immediately following practice. Self-efficacy will be measured using a scale developed in a prior study; other-efficacy will be assessed using a modified version of the Coaching Efficacy Scale; and collective efficacy will be measured using the Collective Efficacy Scale for Sports. A series of three regression analyses will be used to determine if specific coaching behaviors are predictors of athletes' self-efficacy, other-efficacy, and collective efficacy beliefs. **ANTICIPATED RESULTS:** Based on the literature, it is expected that training and instruction, positive feedback, autonomy-support, and mastery-oriented behaviors will be positively associated with athletes' efficacy beliefs; while negative feedback, controlling behaviors, and outcome-oriented behaviors will be negatively associated with athletes' efficacy beliefs.

**P40: THE EFFECT OF A CYCLING PARTNER ON INTENSITY SELECTION AND PERCEIVED ENJOYMENT IN SEDENTARY ADULTS**

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**BACKGROUND:** Physical inactivity has been identified as the fourth leading cause of death contributing to more than 3 million deaths annually. Despite the well-established benefits of physical activity (PA), only 50.9% of individuals meet the recommended guidelines set forth by the ACSM. The lack of PA is possibly linked to barriers such as perceived time restraints, social support, and enjoyment of activity. To address these barriers, group exercise classes such as Spin offers a low impact class that allows individuals to follow the cues of an instructor while cycling at a self-selected intensity based on one's

current fitness levels. While the use of a virtual Spin class, such as Peloton, offers the instruction of a typical gym-based class with a lower cost and convenience of exercising in one's home, the impact of exercising without other individuals on one's intensity selection is unknown. Therefore, the purpose of this study is to investigate the effect of an exercise partner on intensity selection and perceived enjoyment during a virtual Spin class. **METHODS:** Twenty-four sedentary individuals between the ages of 18 and 45 who do not currently meet the ACSM recommended 150-minutes of PA will be recruited to participate in the study. Each participant will complete a graded cycling test on the Velotron to measure  $VO_{2peak}$ . Following the peak trial, participants will report to the lab on two separate occasions to complete two interactive Spin trials using the Peloton app. One will be completed with a cycling partner and one without a cycling partner. During the class, participants will be allowed to adjust their resistance (wattage) as they deem necessary based on the cues from the instructor and their current fitness status. Following each trial, participants will complete a session RPE, the PACES questionnaire, and report which trial they preferred during exercise. Results will be analyzed using multiple 2 x 6 factorial ANOVA to assess statistical differences in intensity selection (wattage,  $VO_2$ , HR & RPE). Post hoc paired samples t-tests will be used for follow up analysis if differences are detected. To evaluate differences in enjoyment, paired samples t tests will also be used. **ANTICIPATED RESULTS:** It is hypothesized that not only will intensity selection be greater during the partner exercise session, but the session will also be perceived as more enjoyable than the individual session.

**P41: ABSTRACT WITHDRAWN**

**P42: BMI IS A PREDICTOR ON SIT TO STAND POWER IN YOUNG ADULTS**

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**BACKGROUND:** Sarcopenic obesity is the loss of muscle mass with aging with the combined influence of obesity. Sarcopenic obesity has become more prevalent in older adults and can increase an individual's chance of mortality. Partaking in a physically active lifestyle at a young

age to maintain muscle mass while decreasing fat mass is paramount. Evidence has shown that power preferred predictor for functional performance maintenance. The purpose of this study is to identify if BMI is an accurate predictor of peak power in young adults who met the minimum recommendations for the 2018 aerobic Physical Activity Guidelines (PAG). METHODS: Forty-nine college students were recruited for this study (age:  $23.02 \pm 3.88$ y, height:  $168.93 \pm 9.75$ cm, mass:  $78.02 \pm 17.36$ kg, BMI:  $27.34 \pm 5.55$ kg/m<sup>2</sup>). Body mass was measured with a digital scale, while height was measured using a stadiometer to calculate BMI. The Tendo Weightlifting Analyzer was used to assess sit-to-stand peak power of the lower extremities. ActivPAL technology was used to obtain total time spent in moderate and/or vigorous physical activity during a 7-day wear period. An ANCOVA was run to examine group differences of peak power based on meeting the 2018 PAG guidelines ( $\geq 150$  mins) when controlling for BMI. RESULTS: BMI was a significant predictor on relative peak power [ $F_{(1, 45)} = 6.49, p = .014$ ]. Since BMI was a significant predictor, it was categorized based on the CDC guidelines into normal ( $n = 16, M = 15.686$  W/kg), overweight ( $n = 20, M = 17.249$  W/kg) and obese ( $n = 13, M = 13.260$  W/kg) to observe group differences on peak power. A one-way ANOVA revealed that overweight individuals had significantly greater power than obese individuals ( $p = 0.024$ ). There were no significant differences seen between individuals with a normal BMI compared to overweight ( $p = .33$ ) or obese ( $p = .183$ ). CONCLUSION: BMI is a significant predictor of peak power in young adults. Overweight individuals have more peak power than those who are obese. This may be due to overweight individuals having more lean body mass compared to obese individuals. This suggests that young individuals who are obese have larger amounts of fat mass and less peak power. Thus, making obese young adults most susceptible to sarcopenic obesity in later stages of life and stresses the importance of maintaining a physically active lifestyle at a young age.

#### **P43: RELATIONSHIP BETWEEN BODY MASS INDEX AND HEALTH VARIABLES IN LAW ENFORCEMENT**

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BACKGROUND: In law enforcement officers (LEO), lifestyle factors such as long and sedentary shift work, irregular sleep habits, stressful work settings, and poor eating habits increase risk for excess body fat. Obesity is a major risk factor for cardiometabolic disease, which is the leading cause of death in LEO. We investigated the relationship between body composition and cardiometabolic health among southeastern sheriffs LEOs. METHODS: A total of 55 sworn LEO ( $41.8 \pm 11.1$  years) reported to the testing facility during the morning following a 12-hour fast. Participants had their height and body mass measured via a stadiometer and calibrated digital scale, respectively, and body mass index (BMI) was derived. After 10 minutes of seated rest, resting heart rate (RHR) and systolic blood pressure (SBP), and diastolic blood pressure (DBP) were assessed via an oscillometric brachial cuff. Blood lipids and glucose were measured in a fingerstick blood sample using a commercially available point-of-care device. Pearson's correlations were used to determine the examine relations between BMI and cardiometabolic (RHR, SBP, DBP, total cholesterol (TC), low-density lipoproteins (LDL), high-density lipoproteins (HDL), triglycerides (TG), and blood glucose (BG)) variables ( $\alpha = 0.05$ ). RESULTS: Significant, positive, moderate correlations existed between BMI and SBP ( $r = 0.66, p < .01$ ), DBP ( $r = 0.47, p < .01$ ), and TG ( $r = 0.40, p = 0.01$ ). A significant, positive, weak correlation was noted between BMI and BG ( $r = 0.36, p = 0.02$ ). No significant correlation existed between BMI and RHR ( $r = 0.22, p = 0.11$ ), TC ( $r = 0.13, p = 0.42$ ), LDL ( $r = -0.01, p = 0.95$ ), or HDL ( $r = -0.25, p = 0.12$ ). CONCLUSION: We demonstrated a positive association between BMI and cardiometabolic risk factors in LEO. These findings suggest that LEO should be mindful of BMI and should attempt to take actions to mitigate increases in body fat linked to job-related duties.

#### **P44: THE IMPACT OF THE 16-WEEK HEALTHYOU PROGRAM ON THE MITIGATION OF METABOLIC DISEASE RISK FACTORS**

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BACKGROUND: Metabolic syndrome (MetS) is a growing concern in the United States and around the world. MetS is a cluster of disease risk factors including hypertension, hyperlipidemia, hyperglycemia, and obesity increasing the risk of cardiometabolic disease development. The purpose of this study was to design, deliver and assess the efficacy of a 16-week physical activity and nutrition education program (HealthEYou) on mediating metabolic risk factors associated with MetS. METHODS: A survey and focus groups were used to assess the needs of the target population to develop the 16-week education program. Twenty-six participants (age:  $50.1 \pm 9.2$  yrs; Body Mass Index (BMI):  $31.2 \pm 5.3$  kg/m<sup>2</sup>) enrolled in the HealthEYou program. At

baseline, 8- and 16-weeks participants completed assessments including blood pressure, body composition via Dual-energy X-ray absorptiometry (DXA) and waist circumference, 6-minute walk test, handgrip strength test, dietary intake via the Automated Self-Administered 24-hour (ASA-24) dietary assessment tool, and quality of life questionnaire. In addition, blood was drawn to assess metabolic disease risk markers (total cholesterol, glucose and hemoglobin A1c (HbA1c)). The education program consisted of 8-weeks in-person weekly interactive group (60 min) and individual goal setting (15 min) sessions and 8-weeks of weekly newsletters and two individual goal setting sessions. RESULTS: Data was analyzed using repeated measures analysis of variance. 41.7% of participants at the baseline met MetS criteria compared to 18.2% (POST-8) and 15.8% (POST-16). A significant decrease in fat mass at POST-8 ( $35.8 \pm 10.5$  kg,  $p = 0.005$ ) and POST-16 ( $34.4 \pm 10.47$  kg,  $p = 0.003$ ) compared to baseline ( $36.8 \pm 10.5$  kg) and in HbA1c at POST-8 ( $5.14 \pm 0.31\%$ ,  $p = 0.003$ ) and POST-16 ( $5.12 \pm 0.37\%$ ,  $p = 0.001$ ) compared to baseline ( $5.36 \pm 0.40\%$ ) was observed. In addition, significant improvements in distance walked, handgrip strength, caloric intake and quality of life ( $p < 0.05$ ) were observed. However, no significant changes ( $p > 0.05$ ) in total cholesterol, fasting blood glucose or systolic and diastolic blood pressure were observed following the program. CONCLUSION: Participants who completed the 16-week program improved a number of metabolic risk factors contributing to MetS. The physiological improvements coincide with improvement in dietary intake and fitness levels, suggesting positive lifestyle changes were made.

#### **P45: CREATINE SUPPLEMENTATION ON BODY COMPOSITION AND TOTAL BODY WATER MEASURED BY MULTI-FREQUENCY BIOELECTRICAL IMPEDANCE**

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BACKGROUND: Acute fluid ingestion causes an increase in estimated body fat percentage (BF%) measurements by single frequency (SF-BIA) and multi-frequency bioelectrical impedance analyses (MF-BIA). However, it is unknown if MF-BIA accurately measures total body water (TBW) and BF% after chronic fluid retention. Creatine supplementation causes fluid retention, and resultant increases in TBW and body mass. The present study sought to determine if MF-BIA can detect fluid retention secondary to creatine supplementation. METHODS: 13 male and 14 female subjects (18-22 y) completed one week of creatine monohydrate (Creapure) or maltodextrin supplementation at a dose of 0.3 g/kg body weight. Subjects completed pre-supplementation and post-supplementation measurements of body composition including dual-energy x-ray absorptiometry (GE Lunar iDXA), SF-BIA (OMRON Handheld Fat Loss Monitor), and MF-BIA (InBodyUSA 770) to measure BF%, fat free mass (FFM), and fat mass (FM). These dependent measures were analyzed using repeated measures ANOVAs. Additionally, intracellular water (ICW), extracellular water (ECW), and TBW were estimated by MF-BIA and analyzed using repeated measures ANOVAs. Post-hoc testing was performed using contrasts via SPSS statistical software.  $P < 0.05$  was considered statistically significant for all tests. RESULTS: Creatine resulted in a 2% increase ( $p < 0.05$ ) in TBW between pre- and post-supplementation measured by MF-BIA ( $40.4 \pm 9.5$  to  $41.2 \pm 9.6$  kg). FFM increased significantly more in the creatine group compared to the placebo group measured by all body composition modes (1.2 kg, 1.9 kg, and 1.1 kg increase for SF-BIA, MF-BIA, and DEXA respectively). CONCLUSIONS: One week of creatine supplementation caused an increase in TBW that was detected by MF-BIA. Changes in body composition that occurred due to the increase in TBW were detected as an increase in FFM measured by SF-BIA, MF-BIA, and DEXA. These findings support the idea that the use of MF-BIA devices could allow individuals supplementing with creatine to better understand if increases in FFM are due to changes in TBW or muscle mass.

#### **P46: MODERATION AND MEDIATION OF BODY COMPOSITION ON THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND ARTERIAL HEALTH**

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BACKGROUND: Cardiovascular disease is the leading cause of death in the United States. Physical activity (PA) levels and body fat percentage (%BF) contribute to cardiovascular disease risk, through increased arterial stiffness. However, the pathway of this relationship is not known. This study examined whether %BF moderates or mediates the relationships between PA or sedentary behavior levels with arterial stiffness. METHODS: Forty adults (19 men; age  $27 \pm 10$  yrs.) had carotid-femoral pulse wave velocity (CF-PWV) measured by applanation tonometry and %BF by bioelectrical impedance.

Participants then wore a triaxial accelerometer on the non-dominant hip for 7 days to measure PA and sedentary behavior. Accelerometer data were scored with the Freedson cut points (Sedentary:  $\leq 199$  counts/min; Light  $\leq 2690$  counts/min; Moderate-to-vigorous:  $\geq 2691$  counts/min), allowing determination of percentage of time spent in sedentary (%Sedentary), light (%Light), and moderate-to-vigorous (%MVPA) PA levels. RESULTS: Pearson's correlations showed significant associations between age, %BF, CF-PWV, and %Sedentary ( $r = .317-.732, p < .05$ ). However, %Light and %MVPA were not significantly associated with CF-PWV. The mediation analysis showed significant total effects of %Sedentary ( $\beta = .34, p = .034$ ) and age ( $\beta = .73, p < .001$ ) on CF-PWV. %BF partially mediated the relationship between age and CF-PWV ( $\beta = .63, p < .001$ ), and fully mediated the relationship between %Sedentary and CF-PWV ( $\beta = .16, p = .29$ ). Moderation analysis showed that the interaction of %BF and %Sedentary ( $R^2 = .31, p = .004$ ), %Light ( $R^2 = .28, p = .007$ ) and %MVPA ( $R^2 = .36, p = .001$ ) significantly predicted CF-PWV. Furthermore, %BF significantly moderated the effect of %MVPA on CF-PWV ( $\beta = -.26, p = .049$ ), but not %Sedentary or %Light. The effect of %MVPA on CF-PWV was greatest for those who were high (+1 SD) in %BF ( $\beta = -.60, p = .02$ ), and moderate for those at the mean %BF ( $\beta = -.33, p = .04$ ). CONCLUSION: %BF mediates the relationship between PA levels and arterial stiffness. Therefore, limiting sedentary behavior-by engaging in greater amounts of light or moderate-to-vigorous PA-can reduce %BF. Reductions in %BF may lead to decreased arterial stiffness. Funding: Mississippi State University Office of Research and Economic Development and I'm An Athlete Foundation

#### P47: BODY FAT PERCENTAGE AND BACK PAIN IN FIREFIGHTERS

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BACKGROUND: The physically stressful tasks that firefighters are often required to perform for their occupation increase their risk for injury. As a result, many experience pain in regions such as the back. Body mass index (BMI) has been weakly linked to low back pain in firefighters, however, BMI may not be the ideal body composition assessment for this population. Similar to athletes, firefighters may have more lean body mass than the normal population, which would place them at a higher BMI. To assess the relationship between body composition and back pain in firefighters more accurately, body fat percentage should be measured. Therefore, the aim of this study was to determine the relationship between body fat percentage and back pain in firefighters. The relationships between back pain and BMI and back pain and age were also assessed. METHODS: 72 firefighters participated in this correlational study. Age, height, weight, and body fat percentage were measured and recorded. Each participant completed the Oswestry Low Back Pain Disability Questionnaire, which was then scored to measure back pain severity. Pearson product-moment correlation coefficient ( $r$ ) was calculated between back pain score and each of the following variables: body fat percentage, BMI, and age with a predetermined alpha level of .05. RESULTS: Of the 72 firefighters assessed, only 47 reported back pain. Therefore, only 47 were included in the correlational analyses. The relationship between back pain and age was not significant ( $r = 0.058, p = .715$ ). The relationships between back pain and BMI ( $r = 0.298, p = .055$ ) and between back pain and body fat percentage ( $r = 0.304, p = .050$ ) were not significant, but approached statistical significance. CONCLUSION: Within this population of firefighters, there was no significant correlation between age and back pain found. However, both BMI and body fat percentage showed a trend for a positive linear relationship with back pain. Data is still being collected in this population to determine the best indicators of back pain.

#### P48: BODY COMPOSITION CHANGES AMONG COLLEGE STUDENTS ENROLLED IN ACTIVITY CLASSES

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BACKGROUND: College students, on average, experience significant weight and body fat gain throughout their time in higher education. Many universities require physical activity courses, which may be used to influence student lifestyle behaviors and attitudes towards living a physically active lifestyle. Furthermore, increased physical activity and exercise through these courses may aid in relieving some of the weight gain and body composition changes that students experience. Thus, our study is aimed at assessing and comparing body weight and compositional changes among students enrolled in university physical activity courses. METHODS: Height, weight, blood pressure, as well as waist and hip circumferences were measured within the first two weeks of the academic semester (baseline) and final two weeks of the semester (post). Body composition was also measured at these times via Inbody 570 bioelectrical impedance. 18 undergraduate students were recruited from either a control group (C, N=8) which were not

enrolled in any activity courses, weight training (WT, N=7) or jogging (J, N=3) activity courses. Differential changes in body composition measures were assessed via multivariable linear regression. All models were adjusted for age, sex, group, and baseline trait (i.e. body fat change adjusted for baseline body fat) RESULTS: Intervention group was independently associated with changes in multiple outcomes, including systolic blood pressure (SBP), weight, percent body fat, trunk fat mass, and overall body fat. The WT group [(Mean (M)  $\pm$  Standard Deviation (SD));  $7.86 \pm 2.74$  mmHg] decreased their systolic pressure more so than the C group [(M  $\pm$  SD);  $2.71 \pm 4.11$  mmHg;  $p < .01$ ]. The C group gained weight [(M  $\pm$  SD);  $2.36 \pm 0.70$  lbs] while the J [(M  $\pm$  SD);  $-3.43 \pm 3.06$  lbs] and WT groups [(M  $\pm$  SD);  $-2.44 \pm 1.29$  lbs;  $p = 0.02$ ] lost weight. Similarly, percent body fat increased following C [(M  $\pm$  SD);  $1.10 \pm 0.48$ ] and decreased post J [(M  $\pm$  SD);  $-1.23 \pm 0.62$ ] and WT [(M  $\pm$  SD);  $-0.80 \pm 0.33$ ;  $p = 0.02$ ], Trunk fat mass increased post C [(M  $\pm$  SD);  $1.55 \pm 0.38$ ], and decreased post J [(M  $\pm$  SD);  $-1.63 \pm 0.94$ ] and WT [(M  $\pm$  SD);  $-0.93 \pm 0.36$ ;  $p < 0.01$ ] Finally, overall body fat increased post C [(M  $\pm$  SD);  $2.73 \pm 0.92$ ], but decreased post J [(M  $\pm$  SD);  $-2.33 \pm 1.58$ ] and WT [(M  $\pm$  SD);  $-2.31 \pm 0.99$ ;  $p = 0.03$ ]. There were no significant differences in these changes between J and WT. CONCLUSIONS: College students enrolled in weight training and/or jogging activity classes may experience significant beneficial changes to body composition as well as blood pressure metrics during and immediately after their enrollment in these classes.

#### P49: EFFECTS OF WEIGHT LOSS AND WEIGHT MAINTENANCE ON APOB IN OVERWEIGHT AND OBESE ADULTS

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BACKGROUND: Apolipoprotein B (ApoB) is a predictor of cardiovascular disease and may have higher prognostic value compared to traditional lipid risk factors. There is a lack of data on the effects clinically significant weight loss (CWL) ( $\geq 7\%$ ) on ApoB and how weight maintenance after weight loss alters ApoB. The purpose of this study was to examine the effect on ApoB concentrations after CWL and exercise level during weight maintenance in overweight and obese adults. METHODS: Thirty overweight and obese adults (age: 45.7 [10.7] yrs; BMI: 34.4 [3.4] kg/m<sup>2</sup>) underwent a 10-week weight-loss intervention followed by 18 weeks of weight maintenance. During the weight loss phase, participants completed a hypocaloric weight-loss program (OPTIFAST) and supervised aerobic exercise. Exercise began at 300 MET min/week and increased by 50 MET min weekly until 700 MET min/week was reached. Participants that achieved CWL were randomized to weight maintenance (WM-REC; 970 MET min/week) or physical activity (PA-REC; 550 MET min/week) groups. Nuclear magnetic resonance (NMR) of plasma was used to assess blood components at baseline, after weight loss, and at follow-up. RESULTS: During the weight loss phase, participants decreased mass ( $-8.5$  kg,  $p = 0.001$ ) and BMI ( $-3.1$  kg/m<sup>2</sup>,  $p = 0.001$ ). Participants also reduced ApoB ( $-11.6$  mg/dL,  $p = 0.001$ ), low density lipoprotein (LDL) ( $-8.0$  mg/dL,  $p = 0.013$ ), high density lipoprotein (HDL) ( $-3.2$  mg/dL,  $p = 0.013$ ), and TG ( $-27.2$  mg/dL,  $p = 0.001$ ) after weight loss. During the weight maintenance phase, increased ApoB (20.9 mg/dL,  $p = 0.006$ ) and HDL (11.4 mg/dL,  $p = 0.003$ ), while LDL and TG did not change ( $p > 0.05$ ). There were no differences between groups in changes in ApoB (WM-REC: 17.0; PA-REC: 23.8 mg/dL), HDL (WM-REC: 9.0; PA-REC: 13.3 mg/dL), LDL (WM-REC: 11.4; PA-REC: 2.4 mg/dL), and TG (WM-REC: 13.4; PA-REC: 1.0 mg/dL) (all  $ps > 0.05$ ) during weight maintenance. Moreover, ApoB was not correlated with body composition or fitness changes in either phase of the study ( $p > 0.05$ ). CONCLUSIONS: ApoB concentrations decreased following weight loss and exercise in obese adults yet increased during weight maintenance. These results indicate that high levels of aerobic exercise did not prevent regression in ApoB after clinically significant weight loss. Future lifestyle-based interventions should investigate nutritional approaches to maintain improvements in ApoB during weight maintenance.

#### P50: HEALTHY AND OBESE CLASSIFICATIONS: INFLUENCE ON CONSTANT LOAD TREADMILL BOUTS RESULTS

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BACKGROUND: It has been previously reported that obese individuals have greater absolute and lower relative oxygen consumption measures compared to their healthy-weight counterparts during constant load exercise. However, the method of determining obesity status may significantly influence the results and conclusions of group

comparisons. The purpose of this study was to compare the influence of classification methodology by using body mass index (BMI  $\text{kg} \cdot \text{m}^{-2}$ ) and body fat percentage (%Fat) to assess oxygen consumption rates ( $\text{VO}_2$ ) during submaximal, constant load exercise. **METHODS:** Seventeen participants (F:8, Age  $23.4 \pm 2.7$  yrs) completed a 30-minute walking task on a treadmill at a constant self-selected speed while wearing a portable metabolic system to measure relative  $\text{VO}_2$  ( $\text{mL} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$ ). All participants underwent a total body DXA scan to assess %Fat. Participants were categorized as healthy (H) or obese (O) using two methods: 1) %Fat (World Health Organization; WHO) and 2) BMI. WHO guidelines indicate healthy %fat for females and males as 21-32% and 8-19%, respectively, with obese classified as those that exceed these sex specific ranges. A BMI of  $<30 \text{ kg} \cdot \text{m}^{-2}$  and  $>30 \text{ kg} \cdot \text{m}^{-2}$  were used to categorize participants as healthy and obese, respectively. Unpaired t-tests ( $p < 0.05$ ) were used to assess between group differences as a function of categorization (WHO vs. BMI). Dependent variables included: walking speed ( $\text{m} \cdot \text{s}^{-1}$ ),  $\text{VO}_2$  at the start (T0), end (T30), the change of  $\text{VO}_2$  ( $\Delta\text{VO}_2$ ; T30-T0) and total  $\text{VO}_2$ . **RESULTS:** When using BMI as classification criteria (H:11, O:6), obese participants had significantly lower  $\text{VO}_2$  at T0 ( $p < 0.01$ ) and T30 ( $p = 0.01$ ), leading to a significantly lower total  $\text{VO}_2$  ( $p = 0.01$ ). Additionally, the obese participants walked at a 17.5% slower speed ( $p = 0.04$ ). When classified using the %Fat (H:8, O:9), healthy and obese participants walked at similar speeds ( $p = 0.20$ ) yet the obese group displayed trends of lower  $\text{VO}_2$  at T0 ( $p = 0.07$ ) and T30 ( $p = 0.07$ ) as well trends of lower total  $\text{VO}_2$  ( $p = 0.07$ ). The  $\Delta\text{VO}_2$  was similar between groups regardless of using the %Fat ( $p = 0.44$ ) or BMI ( $p = 0.42$ ) criterion. **CONCLUSION:** These results concur with previous results that in obese individuals, relative  $\text{VO}_2$  is lower when compared to healthy weight individuals during constant load exercise, despite criterion used. Future research will explore additional ways to classify participants for group comparative purposes.

#### **P51: RELATIONSHIPS OF BODY COMPOSITION FACTORS WITH COMPONENTS OF PHYSICAL ACTIVITY AND MUSCULAR FITNESS**

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**BACKGROUND:** It is commonly accepted that body composition is related to physical activity (PA) and muscular fitness (MF). However, it is not as well understood if metrics of PA and MF can explain the variance in both fat mass (FM) and fat-free mass (FFM). **PURPOSE:** The purpose of this investigation was to determine the extent of variation in FM and FFM that can be explained by specific components of PA and MF. **METHODS:** A convenience sample of participants was recruited for this study ( $n=37$ , 27.03% Female,  $22.35 \pm 3.76$  yrs.). All metrics were assessed during a single visit to the Exercise Physiology Lab. Body mass (BM) was measured to the nearest 0.1 kg with a calibrated digital scale (Tanita BWB-800, Tanita Corporation, Tokyo, Japan). Results from the International Physical Activity Questionnaire (IPAQ) Short-Form were converted to calculate the intensity and amount of weekly PA in MET-minutes per week (MET-min/wk). Intensities were categorized into vigorous, moderate, and walking based on IPAQ standards. FM was estimated using brightness-mode ultrasound (Philips iU22, Philips Medical Systems, Andover, MA, USA) across seven standardized sites. FFM was derived from subtracting FM from BM. Handgrip strength (HGS) was assessed on dominant hand via a hydraulic hand dynamometer (Alphamed Inc., Lakewood, NJ, USA) as a metric of muscular strength, and a maximum-rep push-up test was administered to quantify muscular endurance. The correlations between PA, MF, FM, and FFM were assessed using Pearson's  $r$ , and described as weak, moderate, or strong ( $r = 0.2, 0.5, \text{ or } 0.8$ , respectively). Data are presented as mean  $\pm$  standard deviation, with an alpha level set to  $p < 0.05$ . **RESULTS:** There were no significant correlations found between FM and any of the PA or MF measures, ( $r = -0.28$  to  $0.24$ , all  $p > 0.05$ ). FFM was moderately correlated with vigorous MET-min/wk ( $r = 0.34$ ,  $p = 0.04$ ) and walking MET-min/wk, ( $r = -0.37$ ,  $p = 0.02$ ), and strongly correlated with and HGS ( $r = 0.80$ ,  $p < 0.001$ ). Stepwise regression analysis showed that only HGS and vigorous MET-min/wk were included in the model that explained the variance in FFM ( $R^2 = 0.74$ ,  $p < 0.001$ ). **DISCUSSION:** The results indicate that muscular strength and vigorous PA have stronger relationships with FFM than muscular endurance or other, lower-intensity metrics of PA. FM does not appear to be related to either MF parameters or IPAQ-derived PA.

#### **P52: EFFECTS OF LATERAL COSTOCHONDRAL RIB DEFORMITY ON POSTERIOR MUSCLE CHAIN: A CASE STUDY**

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**BACKGROUND:** The lower extremity posterior chain (PC), including the trunk and lower extremities, is an interconnected system of muscles and fascia that work together during movement and posture. Muscular imbalances of the PC can cause the pelvis to anteriorly tilt, often resulting in low back pain and limited lumbar movement. Occurring when the iliopsoas, erector spinae, rectus femoris, and quadratus lumborum shorten, bringing the attachment sites closer together. A 24-year-old female student, with a left costochondral rib deformity, presented with low back (rated 5/10) pain after standing for  $> 2$  hours at her job or sitting in class. She presents with anterior pelvic tilt, lumbar lordosis, and thoracic kyphosis with 4.2cm of lumbar flexion with the (normal female average 5.8cm). The patient expressed concern with partaking in intense physical activity due to the risk of a collision injury. The costochondral deformity was a birth defect, resulting in the patient's body dysmorphism at a young age. Using the International Classification of Functioning, Disability and Health (ICF) disablement model, a holistic care plan was constructed to target multiple aspects of the patient's life. The differential diagnosis included: costochondritis, anterior trunk weakness, poor postural control, and tight hamstrings. **METHODS:** A conservative stretching plan, designed to lengthen the PC muscles over a 45-day period, was chosen due to the patient's concerns for high-intensity exercise. The protocol required the patient to perform PC stretches, targeting lumbar erector spinae and hamstring groups (9 stretches 5 times per day). **RESULTS:** Lumbar flexion increased to 5.2 cm (+1.0 cm) and right-side trunk lateral flexion and rotation increased by  $5^\circ$  each at the end of stretching protocol. The patient reduced her low back pain rating from a 5/10 to a 2/10. The patient is now able to sustain 5-6 hours of standing at work before the onset of pain. The ICF disablement model improved quality of life in work and school by constructing a treatment plan that prioritized the patient's values in her care. **CONCLUSION:** Treating a patient with pain needs to have a holistic approach to care plans, not just the pain itself. This case shows the value of applying the ICF disablement model to expand the patient's views in the eyes of healthcare providers. Complex, interesting, and one-of-a-kind cases need to be seen from every angle of the person.

#### **P53: THE INFLUENCE OF RESTROOM ACCESSIBILITY ON FLUID CONSUMPTION HABITS AND CARDIOVASCULAR HEALTH MEASURES IN TEACHERS**

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**BACKGROUND:** Previous literature suggests that many elementary classroom teachers have very limited access to the restroom during the workday, and consequentially, tend to consume an inadequate amount of water or other fluids during the day. The purpose of this study is to determine if perceived ease of restroom access alters fluid consumption habits in elementary classroom teachers and how that affects measures of cardiovascular health. **METHODS:** Eighteen elementary school teachers were included in the study and divided into two groups, Easy Restroom Access (ERA) or Difficult Restroom Access (DRA), based on their perception of difficulty taking a restroom break. Pre- and post-school day vital assessments were taken, with pre-testing occurring before student arrival and post-testing once students had left. Resting blood pressure, heart rate, height, weight, and body composition were determined at each time point. Urine Samples were collected at both times for analysis of urine-specific gravity (USG). Data was analyzed using independent samples t-test for time (pre-post) or between-group comparisons at an  $\alpha$  of  $p \leq 0.05$ . **RESULTS:** The mean age of ERA teachers ( $39.0 \pm 11.4$  yrs.) was significantly higher than the mean age for DRA teachers ( $28.9 \pm 5.5$  yrs.) ( $p = 0.034$ ). Significantly 57.1% of the ERA teachers ranked in the very poor category for age-stratified body composition, while 100% of the DRA teachers had very poor body composition. No significant changes within groups from pre- to post-measures or between groups were observed for systolic blood pressure, heart rate, body water%, or fluids consumed. However, there was a general trend for decreased USG in the ERA group from pre- to post-measures ( $p = .0627$ ). **CONCLUSION:** Our results provide a characterization of how discrepancies in restroom accessibility affect these measures. It appears that those who perceive difficulty accessing the restroom have a higher rate of obesity and tend to be younger than those who perceive restroom access to be easy, though these factors could be unrelated. Additional research is clearly needed in this population.

#### **P54: RELATIONSHIP BETWEEN STEP COUNTS AND BODY COMPOSITION IN MIDDLE-AGED ADULTS**

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**Background:** A previously published study reported a regression model for predicting body composition expressed as body fat percentage (BF%) from relative step counts (REL Steps = steps  $\cdot$  kg fat

mass<sup>-1</sup>, day<sup>-1</sup>) in young adults (19-40 years). The purpose of this study was to determine the strength of the relationship between step counts (measured by pedometer) and (BF%) in middle-aged adults (40-60 years). **Methods:** Thirteen healthy middle-aged adult females (age=50.23±7.88 years, height = 164.12 ± 8.85 cm, weight = 75.40 ± 13.97 kg, BF% = 35.49 ± 8.66 %) volunteered for this study. Participants visited the lab on two separate occasions approximately three-weeks apart. For each visit the participants arrived in a fasted condition and a 4-compartment body composition model was constructed by measuring height and weight via stadiometer, bioelectrical impedance analysis, and DEXA scan. During visit one participants were provided a pedometer, instructed on its use and advised to wear the device for all waking hours (except when bathing, swimming, showering) for the next three weeks. During visit two, step count data from pedometers were recorded. Energy balance was confirmed by assessing change in body weight and composition across the three weeks of carrying the pedometer. Daily step counts and BF% were used to determine REL Steps. Descriptive statistics, correlations, and regression analysis were performed using SPSS Version 28.0. **Results:** Average daily step count was 6,176.46 ± 3241.78 steps·day<sup>-1</sup>, and REL Steps was 297.44 ± 246.40. The coefficient of determination (R<sup>2</sup>) in the regression analysis indicates a strong relationship between REL Steps and BF% among middle-aged females (Adjusted R<sup>2</sup> = 0.77, p < 0.001). The resulting regression model was: BF% = REL Steps · (-0.31) + 44.78 (S<sub>EE</sub> = 4.14). **Conclusion:** The primary finding of this pilot study suggests step counts expressed relative to fat mass are strongly predictive of body composition in middle-aged females.

#### P55: PHYSICAL ACTIVITY AND BODY COMPOSITION ASSOCIATIONS DURING THE FIRST YEAR POSTPARTUM

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**Background:** Many women do not return to their pre-pregnancy weight within the first year postpartum, which can increase risk for obesity in the future. Physical activity is commonly used as a weight management tool. However, few studies have examined how sedentary time, light physical activity (LPA), and moderate-to-vigorous physical activity (MVPA) affect body weight and body composition changes during the first year postpartum. **Methods:** Participants were Black (n=48) and White (n=82) women who gave birth to a singleton infant at ≥37 weeks gestation. Visits took place at 6-8 weeks, 6 months, and 12 months postpartum. Weight was measured using a calibrated scale. An Actigraph GT3X+ was worn on the hip for 7 days to measure physical activity. The Troiano cut points were used to determine ST, LPA, MVPA, and counts per minute. A dual-energy x-ray absorptiometry scan was used to determine fat mass, lean mass, and percent body fat. Spearman's rank correlation, adjusted for wear-time, was used to examine associations. **Results:** LPA and MVPA at 6-8 weeks postpartum were significantly associated with change in lean mass from 6-8 weeks to 6 months postpartum (r=-0.24, p=0.0228; r=-0.23, p=0.0235, respectively). These associations remained significant when adjusted for race (r=-0.25, p=0.0184; r=-0.25, p=0.0171, respectively). Longer time engaging in LPA and MVPA was associated with more lean mass loss from 6-8 weeks to 6 months postpartum. Sedentary time or physical activity measures at 6-8 weeks were not associated with changes in body weight, fat mass, or percent body fat from 6-8 weeks to 6 months postpartum. Sedentary time or physical activity measures at 6 months postpartum were not associated with changes in body composition from 6 months to 12 months postpartum. **Conclusions:** Those with higher levels of physical activity at 6-8 weeks postpartum had greater loss in lean mass from 6-8 weeks to 6 months postpartum. These findings were unexpected, but other behavioral factors, such as sleep and diet, may play an important role in body composition changes during early postpartum. Funding: NIH Grant R21MD012740

#### P56: BODY COMPOSITION CHANGES AFTER NINE WEEKS OF HIGH- OR LOW- LOAD RESISTANCE TRAINING

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**BACKGROUND:** Favorable alterations in body composition have been shown to positively impact athletic performance. Varying loading intensities of resistance training may influence the magnitude of body composition changes. The purpose of this study was to assess and determine changes in body composition and muscle thickness following nine weeks of high- or low-load whole-body resistance training.

**METHODS:** Seventeen recreationally trained males (M<sub>age</sub> = 20.4 ± 2.7

years) were recruited for this study. Participants were randomly assigned to one of two training groups: 30% (n=9) or 85% (n=8) of predicted 1-repetition maximum (1-RM). Participants completed three sessions per week of a whole-body workout (back squat, deadlift, bench press, T-row, bicep curls, skullcrushers) over nine weeks. Sessions consisted of three working sets to failure for each exercise at the prescribed percentage. Bioelectrical impedance analysis was used pre- and post-training program to assess body mass (BM), body fat percentage (%BF), and skeletal muscle mass (SMM). Ultrasound was used to assess muscle thickness at five locations: biceps, triceps, chest, quadriceps, and hamstrings. A paired T-Test was used to assess changes in each body composition measure from pre- to post-training. Significance was set a-priori at P<0.05. **RESULTS:** There were significant differences between groups with greater increases in the 85% group for SMM (2.6±1.6 vs 0.24±2.58 kg; P=0.041) and triceps thickness (0.44±0.34 vs 0.08±0.36 cm; P=0.035), with no significant group differences in any other measure. When collapsed across groups, there were additional significant changes in muscle thickness for biceps (P<0.001) and hamstrings (P=0.031). **CONCLUSIONS:** The difference in loading of resistance training in this study had a significant effect on SMM, with the 85% group showing greater increases. The training overall produced hypertrophy in a majority of the muscles measured, although it should be noted the 85% group demonstrated greater increases in muscle thickness overall with the only exception being the quadriceps. The results of this study indicate training at either lower or higher loads are both beneficial for increasing SMM and hypertrophy. Despite these findings, %BF was not significantly altered. Future research should incorporate other testing variables that may further favorably impact body composition and distinguish any additional loading differences.

#### P57: ASSESSING THE IMPACT OF BODY COMPOSITION ON SKIING ERGOMETER PERFORMANCE IN COLLEGIATE FEMALES

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**BACKGROUND:** The Concept2 SkiErg is utilized in fitness centers and is a popular and relatively inexpensive aerobic training mode that provides a low impact total body workout. Understanding the relationship between body composition and skiing ergometry performance may assist in the development of future VO<sub>2</sub>peak skiing ergometer protocols, yet only a few prior studies focused on the obtainment of VO<sub>2</sub>peak values during skiing ergometry and no study has evaluated the relationship between body fat percentage (BF), body mass index (BMI), height (HT), and weight (WT), on skiing ergometry VO<sub>2</sub>peak values. Therefore, the purpose of the study was to evaluate the relationship between BF%, BMI, HT, and WT on VO<sub>2</sub>peak values in no less than averagely fit collegiate females during a skiing ergometer graded exercise test (GXT). **METHODS:** Twenty-two collegiate females had their BF%, BMI, HT, and WT assessed and age was recorded. Subjects then completed a skiing ergometer GXT protocol to the point of volitional exhaustion. Pearson Correlations were then performed between BF, BMI, HT, WT, and VO<sub>2</sub>peak with significance differences determined at p ≤ 0.05. **RESULTS:** Mean values were 33.97 ± 5.01 ml/kg/min (VO<sub>2</sub>peak), 24.47 ± 6.14 (BF%), 165.39 ± 6.50 cm (HT), 64.64 ± 7.13 kg (WT), and 23.67 ± 2.54 (BMI). A non-significant low negative correlation existed between VO<sub>2</sub>peak and 1) BF (r = -0.262, p = 0.239), 2) HT (r = -0.371, p = 0.089), and 3) WT (r = -0.281, p = 0.206). No relationship occurred between VO<sub>2</sub>peak and BMI (r = -0.021, p = 0.926). **CONCLUSIONS:** BF%, HT, and WT appear to have a low negative relationship with VO<sub>2</sub>peak values during a skiing ergometer GXT in collegiate females, while BMI had no relationship with skiing ergometry VO<sub>2</sub>peak values. Having a lower BF% may not necessarily predict higher aerobic performance in no less than above averagely fit collegiate females during skiing ergometry. Further research may be required to determine if gender, fitness level, or a different type of BF% measurement technique may play a factor when considering if BF%, BMI, HT, and WT have a relationship with skiing ergometer aerobic performance. Also, future studies may need to evaluate the potential relationship between body composition and skiing ergometer performance in cardiovascular athletes.

#### P58: ENERGY AND MACRONUTRIENT INTAKE FOLLOWING SLEEP IN TEMPERATE AND HOT CONDITIONS

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**BACKGROUND:** Sleep quality and quantity may be impacted by environmental conditions. Disruptions in sleep quality and quantity have also been shown to impact energy intake (EI). However, the effect of room temperature on sleep outcomes and next morning EI

has not been examined. This study examined the impact of sleeping in a temperate ( $T_{TEMP}$ ) or hot ( $T_{HOT}$ ) condition on objective measures of sleep quality and quantity, and ad-libitum EI and macronutrient intake the next morning. **METHODS:** Ten healthy adults (female,  $n = 1$ ; age,  $25 \pm 4$  y; height,  $177.9 \pm 7.4$  cm; body mass,  $75.8 \pm 13.8$  kg; body fat,  $13.5 \pm 7.1\%$ ) completed two overnight trials in an environmental chamber set to  $25^\circ\text{C}$ , 30% RH ( $T_{TEMP}$ ) and  $30^\circ\text{C}$ , 30% RH ( $T_{HOT}$ ). Sleep outcomes were measured with polysomnography. Participants self-selected food items to consume ad libitum during breakfast. Paired samples *t*-tests evaluated the between-condition differences in sleep outcomes and EI. Linear mixed models examined the effects of trial and sleep architecture on breakfast EI and macronutrient intake. Delta values between conditions ( $T_{HOT} - T_{TEMP}$ ) were calculated. Spearman correlations were used to explore the strength of associations between delta sleep architecture with delta EI and macronutrient intake. **RESULTS:** Percent of time spent in stage 3 sleep was significantly lower in  $T_{HOT}$  than  $T_{TEMP}$  (MD:  $-2.51\%$  [95%CI;  $-4.84, -0.18$ ],  $p=0.04$ ). There were no differences in total sleep time, sleep efficiency, wake after sleep onset, or other sleep stage durations (REM, stage 1, and stage 2) between conditions ( $p>0.05$ ). There was no significant difference in ad-libitum EI or macronutrient intake between conditions ( $p>0.05$ ). No sleep outcomes were significantly associated with EI and macronutrient intake between trials, nor were delta sleep stage durations significantly associated with delta EI and macronutrient intake ( $p>0.05$ ). **CONCLUSIONS:** The relative time spent in stage 3 sleep was significantly lower when sleeping in  $T_{HOT}$  than in  $T_{TEMP}$ . However, this difference in relative stage 3 sleep, or other sleep outcomes, was not associated with energy and macronutrient intake the next morning, which were also similar between conditions. **Grant or Funding Information:** This study was funded in part by Bedgear, LLC.

#### **P60: EFFECT OF ENERGY INTAKE AND NUTRITION BEHAVIORS ON BODY COMPOSITION ACROSS A COLLEGIATE WRESTLING SEASON**

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**BACKGROUND:** Collegiate wrestlers have historically utilized unvalidated rapid weight loss (RWL) methods to reach a specific weight class for competition. The purpose of this study was to investigate wrestler body composition changes across a season and identify nutrition behaviors used to achieve these changes. **METHODS:** Body composition data were collected from collegiate wrestlers at Appalachian State ( $n=34$ ) at 4 time points across a season: pre-season, weight certification, mid-season, and post-season. Full body mass (FBM), fat-free mass (FFM), and fat mass (FM) were measured by dual-energy X-ray absorptiometry (DXA). Nutrition behaviors were recorded using 3-day food diaries and questionnaires. Repeated measures ANOVA was used to evaluate body composition changes across time points, and paired *t*-tests were used for dietary intake comparison. **RESULTS:** 34 wrestlers completed DXA testing at least once (11 lightweight, 14 middleweight, and 9 heavyweight). 17 wrestlers completed all 4 measurements. Wrestlers' racial identity was predominantly white (72.7%) with a mean age of  $20 \pm 1.5$  years. Collegiate wrestlers demonstrated changes in FBM, FFM, and FM across the season ( $p<0.05$ ). FBM decreases were observed from pre- to mid-season ( $-0.98 \pm 3.0$  kg,  $p<0.05$ ), along with decreases in FFM from weight certification to mid-season ( $-0.96 \pm 1.41$  kg;  $p<0.05$ ), and FM decreases from pre- to mid-season ( $-0.64 \pm 0.82$  kg,  $p<0.05$ ). Protein intake decreased from pre- to mid-season ( $-7.5 \pm 14.8$  g;  $p<0.05$ ). Energy intake assessed at weight certification and midseason did not differ significantly but were below recommendations for age and activity level. The most common reported RWL methods were active sweating (76.5%;  $n=26/32$ ) and energy restriction (61.8%;  $n=21/32$ ). **CONCLUSION:** Significant changes were found in FBM, FFM, and FM across a collegiate wrestling season. FFM decreases suggest that wrestler RWL methods may be ineffective in preserving muscle while reducing fat. Decreased protein intake across the season as shown by food records may be linked to FFM decline. Questionnaires show self-reported energy restriction, supported by dietary records that showed energy restriction at weight certification and in-season. Future research should investigate performance outcomes related to decreased in-season FFM and focus on manipulating protein to match training periodization.

#### **P61: NOTCH INHIBITION AFFECTS WNT AND PROTEIN SYNTHESIS IN EXERCISED SKELETAL MUSCLE**

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**PURPOSE:** Notch, Wnt, and mTOR affect the repair of injured skeletal muscle. Notch is important for the early stages of muscle repair while

mechanistic target of rapamycin (mTOR) and Wnt affect muscle differentiation. Notch's role in protein synthesis during muscle repair is not well studied. In addition, little is known if Notch, mTOR, and Wnt signaling interact during myogenesis and protein synthesis. The purpose of this study is to determine the effect of Notch inhibition on protein synthesis, and markers of mTOR and Wnt signaling following exercise in mice. **METHODS:** Young (2-4 months) male C57BL/6 mice were injected with 100,000 TUs of shRNA Notch1 inhibitor into the left gastrocnemius (Control vector in right) for five consecutive days. Mice were exposed to an injurious bout of downhill running. Mice were euthanized at 1D, 2D, 3D, and 4D post-exercise and gastrocnemius were collected. For immunofluorescence, tissues were sectioned, and labelled for Green Fluorescent Protein (GFP). For western blots, tissues were homogenized and markers of protein synthesis, mTOR and Wnt signaling were measured (mTOR (pmTORSer 2448, Total mTOR, phospho- and total-4eBP1, phospho- and total-p70S6k1) and Wnt signaling (phospho- and total-Gsk3BetaSer9). The SUNSET method and puromycin incorporation were used to measure protein synthesis. One-way analysis of variance (ANOVA) tests were performed to determine differences between experimental groups and post-hoc comparisons were accomplished via a Tukey's test, with statistical significance set a priori at  $p < 0.05$ . **RESULTS:** There was increased muscle protein synthesis in the vector leg relative to the control leg ( $p<0.05$ ). Markers of mTOR were also increased in the shRNA leg relative to control ( $p < 0.05$ ), and Wnt signaling increased in shRNA leg at 4 days post exercise relative to empty vector. Relative to control ( $p =$  CONCLUSION. Notch inhibits protein synthesis, mTOR, and Wnt signaling suggesting that Notch needs to be turned off in order for muscle repair to complete. Supported by UNC Charlotte's Faculty Research Grant to STA.

#### **P62: HIGH-INTENSITY INTERVAL TRAINING FOLLOWING SEVEN WEEKS OF RESISTANCE TRAINING ALTERS MUSCLE CALPAIN AND AUTOPHAGY MARKERS**

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**BACKGROUND:** While the dynamics of muscle protein balance have been explored in the context of many exercise modalities, they have not been studied in a resistance training followed by endurance training (ET) paradigm. Our laboratory recently determined that seven weeks of resistance training (RT) increases vastus lateralis (VL) muscle thickness, and seven weeks of treadmill high-intensity interval training (HIIT) following the RT period reduces VL muscle thickness. Thus, the purpose of this study was to examine calpain and autophagy activity markers after the 7-week RT and HIIT periods. **METHODS:** Vastus lateralis biopsies and muscle thickness (MT) measures were collected from 11 untrained college-aged males at baseline (PRE), after 7 weeks of RT (MID) and after a subsequent 7 weeks of HIIT (POST). Proteins associated with autophagy and calpain activities were assessed via immunoblotting, and calpain activity was assessed via a commercially available plate-based assay. Data were checked for normality using Shapiro-Wilk tests and analyzed via one-way ANOVAs. **RESULTS:** Tukey's Multiple comparisons test showed a significant increase in MT from PRE to MID [2.3 mm, CI<sub>95%</sub> = (1.1 mm, 3.5 mm),  $p=0.001$ ], a significant decrease from MID to POST [1.2 mm, CI<sub>95%</sub> = (0.30 mm, 2.1 mm),  $p=0.012$ ], and a non-significant increase from PRE to POST [1.1 mm, CI<sub>95%</sub> = (2.1 mm, 2.9 mm),  $p=0.213$ ]. Microtubule-associated proteins 1A/1B light chain 3B (LC3 II/I), phosphorylated AMP-kinase (p-AMPK $\alpha$ , Thr172) / pan-AMPK $\alpha$ , and calpain-1 protein abundance did not reach overall ANOVA significance with respective *p*-values of 0.854, 0.330, 0.365. Phosphorylated-Unc-51 like autophagy activating kinase 1 (p-ULK, Ser555) / pan-ULK protein abundance was not significant between time points. Beclin-1 protein abundance increased from PRE to MID ( $p=0.012$ ) and PRE to POST ( $p=0.005$ ). Calpain-2 increased from PRE to MID ( $p=0.001$ ) and PRE to POST ( $p=0.003$ ). Finally, calpain-activity normalized to Calpain-1/2 protein content decreased from PRE to MID ( $p=0.001$ ), albeit with no significant differences from PRE to POST and MID to POST. **CONCLUSION:** These data suggest that an elevation in calpain activity markers (rather than autophagy markers) during seven weeks of HIIT may have been partially responsible for mid-thigh muscle size decreases following a seven-week period of RT.

#### **P63: VITAMIN D IS ASSOCIATED WITH SLEEP DURATION VARIABILITY BUT NOT SLEEP DURATION IN YOUNG ADULTS**

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**BACKGROUND:** Vitamin D receptors are in areas of the brain that regulate the sleep-wake cycle. Low vitamin D status has been linked to poorer sleep quality and shorter sleep duration, but less is known regarding the influence of vitamin D on sleep duration variability (SDV). Thus, we sought to determine whether vitamin D status was associated with SDV, in addition to self-reported and objective measures of sleep quality, in young adults (18 - 35 years old).

**METHODS:** Sixty five adults (33 females, age  $22.7 \pm 3.3$  years, BMI  $25.5 \pm 4.0$  kg/m<sup>2</sup>) participated in this study. Objective sleep efficiency, duration, and SDV (standard deviation in each participant's nightly sleep duration) were assessed using a wrist-worn Philips Actiwatch Spectrum PLUS accelerometer (observation period:  $8.2 \pm 1.9$  days). Participants also completed the Pittsburgh Sleep Quality Index (PSQI). We assessed plasma concentrations of 25(OH)D, the primary circulating metabolite of vitamin D using an enzyme-linked immunosorbent assay kit. Normality was assessed using the Shapiro-Wilk test. One-way ANOVAs and nonparametric Kruskal Wallis tests were used to compare sleep measures in participants characterized as vitamin D deficient (< 20 ng/mL), insufficient (21 - 29 ng/mL), and sufficient (> 30 ng/mL). We also used linear regression models controlled for BMI, sex, and race to assess associations between vitamin D status and sleep metrics **RESULTS:** There was a significant effect of vitamin D status on SDV (ANOVA,  $p = 0.002$ ) with *post hoc* differences between sufficient vs. deficient ( $p = 0.013$ ) and sufficient vs. insufficient ( $p = 0.010$ ) groups. The overall regression was statistically significant ( $R^2 = 0.258$ ,  $p = 0.002$ ). Furthermore, vitamin D status significantly predicted SDV (e.g., sufficient-deficient,  $\beta = -0.433$ ,  $p = 0.022$ , 95% CI [-0.803 - -0.064]). However, there was no effect of vitamin D status on objective sleep efficiency or sleep duration, or PSQI scores ( $ps > 0.05$ ). **CONCLUSION:** In our cohort of young adults, individuals who had insufficient or deficient vitamin D exhibited more sleep variability. Further evidence is needed to assess these associations within the context of cardiometabolic risk factors, given the strong associations between sleep patterns and cardiometabolic disease.

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#### **P64: THE EFFECTS OF CALCIUM DEFICIENCY ON HIGH BLOOD PRESSURE IN DIVISION I COLLEGIATE ATHLETES**

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Calcium is vital to cardiovascular function and necessary for cardiovascular muscle contraction, which helps regulate blood pressure (BP). Therefore, calcium deficiency (CD) can play a role in high blood pressure (HBP). The purpose of this study is to investigate the relationship between CD and HBP in athletes. Thirteen male and ten female D1 African American athletes (HT:  $197.5 \pm 12.4$ cm, mass  $79.4 \pm 19.6$ kg, body fat  $19.0 \pm 8.9\%$ ) from various sports participated. Height, mass and body composition were measured using a stadiometer and bioelectrical impedance respectively. BP was measured with a sphygmomanometer after resting for five minutes. HBP was defined as (>120 - <130 mmHg systolic BP and <80 mmHg Diastolic BP). Total energy intake (TEI) was measured using a 3-day food recall and reviewed by sports dietitians. Total Energy Expenditure (TEE) was estimated using the Shofield formula and a physical activity level of 1.8 relevant to pre-season. Energy balance was assessed as Energy Balance = (TEI-TEE). Statistical analysis included Spearman correlation coefficients, standardized mean difference, independent T tests and Cohen's D to evaluate relationships between calcium, energy balance, and HBP with two binary variables P1=caloric deficiency (yes/no) and P2=HBP (yes/no). P-value was evaluated using Fisher's exact test ( $p < 0.05$ ). A weak relationship was observed ( $r = 0.18$ ; CI = -0.55, 0.25) between athletes with HBP and CD ( $p = 0.60$ ). A moderate relationship with caloric deficiency and HBP ( $r = 0.56$ ) was observed where 87% who were calorie deficient were hypertensive. CD was not a reliable indicator of HBP while energy deficiency may inform cardiovascular dysfunction in African American D1 athletes.

#### **P65: IRON DEFICIENCY AND HIGH BLOOD PRESSURE IN DIVISION I AFRICAN AMERICAN ATHLETES**

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**BACKGROUND:** Iron plays a role in cardiovascular (CVD) function and iron deficiency (ID) can lead to increased cardiac activity. The purpose of this study is to investigate the relationship between ID and high blood pressure (HBP) in African American (AA) Division I athletes. **METHODS:** 23 athletes were sampled (Height  $197.5 \pm 12.4$ cm, mass  $79.4 \pm 19.6$ kg, fat percentage  $19.0 \pm 8.9\%$ ). Athletes sat for >5 min

before taking BP with HBP defined (>120 - <130mmHg systolic and <80mmHg diastolic). Participants completed a three-day food recall that was reviewed by a dietician. Total energy intake (TEI) and total energy expenditure (TEE) were assessed to evaluate energy balance = (TEI-TEE). Spearman correlation coefficients and standardized mean difference with a 95% confidence interval (CI) used two binary variables: P1 = ID (Yes,No) and P2 = HBP (Yes,No). T-tests and Cohens D evaluated HBP and ID with objective limits of low (0.2-0.4), moderate (0.4-0.6), and high (>0.8). **RESULTS:** Athletes with HBP were 54% ID despite not being significantly different ( $p = 0.6$ ) and a weak relationship between athletes with HBP and ID ( $R = -0.30$ , CI = [-0.63, 0.13]). A moderate relationship between ID and HBP where 0.13% of those who were HTN were also ID. **CONCLUSION:** ID does not seem to show a direct relationship to HTN in athletes which is known to influence the heart to work harder to move oxygen-rich blood through one's body increasing cardiovascular disease risk. Oral iron supplements and iron-rich foods along with educating athletes and sports staff about ID while increasing nutritional awareness may reduce the negative effects of having an unbalanced diet and improve an athlete's performance.

#### **P66: MICRONUTRIENTS AS PREDICTORS FOR MARKERS OF BONE HEALTH IN ATHLETES**

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**BACKGROUND:** Micronutrient deficiencies have implications on bone health, and athletes may be at risk. The purpose of our cross-sectional study was to identify specific micronutrients that influence bone health in female and male endurance and non-endurance athletes, among three age groups, 18 to 29, 30 to 39, and above 40 years of age.

**METHODS:** Female and male athletes, 18 years of age and older, were recruited. Body weight (kg), height (m), and body mass index (BMI) (kg/m<sup>2</sup>) were assessed. Lean body mass (LBM) (kg), total (TBMD) (g/cm<sup>3</sup>), lumbar (LBMD), and dual femur (FBMD) bone mineral density were measured using dual-energy X-ray absorptiometry. Dietary intake was measured using the 2005 Block Food Frequency Questionnaire. A univariate analysis of variance was used to report differences in BMD between female and male endurance and non-endurance athletes, and among age groups. Pearson's correlation coefficients were used to identify micronutrients that influence BMD. Multiple linear regression was then used to analyze intakes of micronutrients and BMD, with age, sex, and LBM as covariates. Significance level was set at *a priori* at  $p < 0.05$ . **RESULTS:** A total of 262 athletes (130 women and 132 men) were included. Participants were  $35.8 \pm 11.3$  years of age, and had a BMI of  $24.5 \pm 3.3$  kg/m<sup>2</sup>. For all athletes, endurance athletes had significantly lower TBMD ( $p = 0.018$ ), LBMD ( $p = 0.001$ ), and FBMD ( $p = 0.003$ ) compared to non-endurance athletes. Dietary zinc was positively associated ( $p = 0.011$ ) with FBMD in all athletes. Iron had a positive association ( $p = 0.036$ ) with FBMD in all athletes, 18 to 29 years of age. Iron was positively associated ( $p = 0.038$ ) with LBMD in non-endurance athletes, 18 to 29 years of age. Conversely, dietary iron intake was negatively correlated ( $p = 0.024$ ) with LBMD in non-endurance athletes, 30 to 39 years of age. Vitamin C intake was negatively correlated ( $p = 0.041$ ) with LBMD in non-endurance athletes, 40 years of age and older. Phosphorus intake was negatively associated ( $p = 0.005$ ) with LBMD in endurance athletes 40 years of age and older. **CONCLUSIONS:** In our study, we found that dietary zinc and iron were most associated with FBMD and LBMD in athletes 18 to 29 and 30 to 39 years of age. Vitamin C and phosphorus were negatively correlated with LBMD in athletes 40 years of age and older. More prospective longitudinal research is required to further evaluate micronutrient intake and BMD among athletes.

#### **P67: THE EFFECTS OF WATER OR AN ELECTROLYTE SPORTS DRINK ON ROWING PERFORMANCE AND REHYDRATION FOLLOWING FLUID RESTRICTION**

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Many sports, including rowing, set standard body weight requirements for competition with only a deviation of 0.5 kg being acceptable. To facilitate attainment of weight requirements, many athletes fluid restrict and/or intentionally induce fluid loss in order to meet weight criteria. Fluid restriction/loss has been shown to be determinantal to exercise performance, but optimal rehydration strategies following fluid restriction have yet to be identified. The purpose of this study was to investigate the effects of rehydrating with water or electrolyte consumption on rowing maximal performance. Physically active females participated in two counterbalanced repeated rowing time trials each with a different condition: 1) Water (700 mL), or 2) Electrolyte sports drink (700 mL). For each trial, participants

completed a 1000m rowing time trial following 12hr of fluid restriction. After the first rowing bout, participants consumed the corresponding condition, rested for 30 minutes, and then completed another 1000m row. Power output, HR, perceived thirst, and urine specific gravity (USG) were measured for each condition. USG was not different between conditions ( $p = 0.784$ ) establishing similar baseline hydration status. Power output ( $p=0.046$ ) and thirst ( $p=0.003$ ) were significantly worse for the first rowing bout with fluid restriction regardless of treatment. Between treatments, no changes in power output ( $p = 0.573$ ), HR ( $p = 0.357$ ), or thirst perceptions ( $p = 0.284$ ) were observed. These data reinforce previous findings of decrements in performance with fluid restriction, but do not suggest superiority of water or electrolyte sports drinks as rehydration strategies.

**P68: THE EFFECTS OF FLUID RESTRICTION ON REACTION TIME IN HEALTHY FEMALES AND MALES**

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Hydration impacts all aspects of life including exercise performance, short term memory, psychomotor skills, perceptual discrimination, and even visuomotor tracking. Studies deploying cognitive-motor tasks to measure perceptual discrimination target accuracy, visual tracking, choice reaction time, attentional focus, concentration, and fatigue perception concur that the effects of mild hypohydration result in cognitive-motor dysfunction. The mechanisms for these outcomes are not fully understood and few studies have examined females while controlling for the phase of the menstrual cycle. Therefore, the purpose of this study was to examine the impact fluid restriction on various components of reaction time in females in the mid-follicular phase of the menstrual cycle and males. Healthy females ( $n = 9$ ; age =  $21 \pm 1$  y) and males ( $n = 9$ ; age =  $21 \pm 2$  y) participated in this randomized, counter-balanced, cross-over study. Participants completed two trials. One trial took place following 12-hours of fluid restriction (FR) and the other took place following a prescribed fluid (PF) intake protocol in which participants consumed 500 mL of water the night before the trial and 500 mL of water the morning of the trial. Females completed both trials in the mid-follicular phase of the menstrual cycle. Peripheral and central reaction times were assessed using the DynaVision. Central A reaction time was significantly slower following FR compared to PF ( $p = 0.003$ ), in both males and females. Central B reaction time was significantly slower following FR compared to PF ( $p = 0.04$ ). Results from this study demonstrate the impact fluid intake has on various components of reaction time. When females are in the mid-follicular phase of the menstrual cycle, the reaction time of males and females are not different, even in a FR state.

**P69: THE EFFECTS OF ACUTE BEETROOT JUICE INGESTION ON DIURNAL VARIATION IN MAXIMAL ISOMETRIC AND VERTICAL JUMP PERFORMANCE**

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BACKGROUND: Diurnal fluctuations in exercise ability may confound training and competition performance during morning hours. Beetroot juice (BRJ) is a rich source of dietary nitrate which has been reported to increase muscle force production and blood flow to skeletal muscle. Our lab has recently shown that BRJ attenuates morning-associated decrements in sprint performance, but it remains unknown if this translates to short explosive movements. Therefore, the purpose of this study was to investigate the effects of BRJ on time-of-day changes in isometric mid-thigh pull (IMTP) and countermovement vertical jump (CMJ) performance. METHODS: Physically active males participated in three counterbalanced exercise trials under the following conditions: 1) Morning-Placebo (AM-PL), 2) Morning-BRJ (70 mL; 400 mg NO<sub>3</sub>), and 3) Afternoon-Control (PM). For each AM trial, participants consumed their respective treatment 2 hours before exercise while no treatment was given for PM. Participants completed 3 × isometric mid-thigh pull tests maximally using an IMTP rig equipped with an immovable bar and ground force plates. For each IMTP attempt, participants maximally pulled for 3 seconds. Following this, participants completed 3 × CMJ without arm swing on ground force plates. All attempts for IMTP and CMJ were separated by 2 minutes of recovery. Trials were separated by a minimum of 48 hours. RESULTS: Findings for IMTP showed no differences for net peak force ( $p = 0.651$ ) or rate of force development ( $p = 0.438$ ) between treatments. Furthermore, jump height ( $p = 0.894$ ), peak propulsive force ( $p = 0.780$ ), and take off velocity ( $p = 0.884$ ) were not altered by treatment. CONCLUSION: These results suggest that BRJ does influence time-of-day performance for short explosive movements.

**P70: THE EFFECTS OF ACUTE BEETROOT JUICE INGESTION ON DIURNAL VARIATION IN REPEATED JUMP ABILITY**

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BACKGROUND: Time of day fluctuations in exercise capability may hinder training and competition performance during morning hours. Beetroot juice (BRJ) is a natural source of dietary nitrate which has been shown to increase force output of muscle and induce skeletal muscle hyperemia. BRJ has been shown to prevent morning-associated decrements in repeated sprint ability, but it remains unknown if this translates to repetitive and short explosive movements. Therefore, the purpose of this study was to investigate the effects of BRJ on time-of-day changes on repeated jump ability and blood lactate. METHODS: Physically active males participated in three counterbalanced exercise trials under the following conditions: 1) Morning-Placebo (AM-PL), 2) Morning-BRJ (AM-BRJ; 70 mL; 400 mg NO<sub>3</sub>), and 3) Afternoon-Control (PM). For each morning trial, participants ingested their respective treatment 2 hours before exercise while no treatment was given for the afternoon. Participants completed 3 sets × 10 multi-rebound jumps while atop ground force plates. Participants were instructed to jump as high as possible for all repetitions. Each set was separated by 1 minutes of rest. Jumps were averaged for analysis. Blood lactate [La] was measured pre- and post- exercise. Trials were separated by a minimum of 48 hours. RESULTS: Findings showed that peak jump height ( $p = 0.266$ ), force ( $p=0.625$ ), and peak force ( $p = 0.497$ ) were not different between treatments. While [La] increased pre- to post-exercise ( $p=0.048$ ), no differences were observed between treatments ( $p=0.387$ ). CONCLUSION: These results suggest that BRJ does influence time-of-day performance for repetitive and short explosive movements.

**P71: ENERGY INTAKE OVER MULTIPLE DAYS OF HIGH INTENSITY BIKE RACING: A PILOT STUDY**

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BACKGROUND: Many endurance athletes are undernourished and do not consume the proper amounts of macro and micronutrients necessary for physiological processes, overall health, and athletic performance. Importantly, this puts endurance athletes at risk for low energy availability, which can lead to severe health consequences. Criterion racers complete multiple consecutive high intensity races, yet they are rarely included in research, so little is known about their energy intake patterns. METHODS: Competitive amateur criterion racers ( $n=8$ , 6 females/2 males; age= $33 \pm 8.53$ , weight (kg)= $66.67 \pm 9.38$ , body fat %= $20.39 \pm 6.45$ ) recorded energy intake via food logs as instructed by a registered dietitian the first day of racing. Energy intake was recorded starting the morning of the second day of racing through the end of the fourth day of racing and was analyzed by one researcher with nutrition software. RESULTS: Relative total caloric intake ( $41.32 \pm 9.87$  kcal/kg) did not vary by day ( $p=.949$ ) but did by participant ( $p=.013$ ), ranging from 22.64-60.60 kcal/kg/day. Based off sports nutrition recommendations for endurance athletes, racers demonstrated low carbohydrate ( $5.37 \pm 1.33$  g/kg/day) with adequate fat intake ( $1.46 \pm .38$  g/kg/day) and protein intake ( $1.75 \pm .39$  g/kg/day), albeit on the higher end of the recommendations. Only 13% met the calcium recommended dietary allowance (RDA) ( $m=724.10 \pm 197.71$ ,  $f=1062.92 \pm 535.04$ ) while 38% met the RDA for iron ( $m=13.51 \pm 3.29$ ,  $f=14.39 \pm 5.17$ ) and magnesium (Mg) ( $m=216.15 \pm 131.21$ ,  $f=307.69 \pm 193.22$ ). Additionally, 50% met the recommended adequate intake (AI) for fiber ( $m=22.29 \pm 4.19$ ,  $f=29.10 \pm 7.01$ ). Only one racer met the RDA for iron, Mg, and calcium and AI for fiber. CONCLUSIONS: Within a given racer, 4 days of criterion racing did not influence daily energy intake. Yet, large interindividual variability in total energy intake was observed. Additionally, carbohydrate intake was lower than the recommended 7-10 g/kg/day during competition and micronutrient intake was rarely met. Given the well-documented association between low carbohydrate intake with low energy availability, overtraining, and micronutrient deficiencies, balancing macronutrients and increasing carbohydrate intake is important for this group of racers. These findings indicate further investigation with a larger sample that also evaluates energy availability and symptoms associated with low energy availability is warranted.

**P72: CANNABIDIOL (CBD), ECCENTRIC EXERCISE, AND INFLAMMATION**

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BACKGROUND: Cannabidiol (CBD) is a non-psychoactive cannabinoid purported to reduce symptoms of discomfort. Individuals are now

using CBD to treat symptoms of multiple sclerosis, seizures, and chronic pain. Animal models indicate that CBD may be effective at reducing inflammation post fatiguing exercise. However, little evidence is available to evaluate these findings in humans. Therefore, the purpose of this investigation was to evaluate the impact of two doses of CBD oil on inflammation (IL-6) after an eccentric loading protocol. **METHODS:** Participants ( $n = 4$ ) participated in three conditions (placebo, low dose, and high dose), in this randomized, counterbalanced design. Each condition took 72 hours to complete, with a 1 week washout period between conditions. At the beginning of each week, participants were subjected to a loading protocol of six sets of ten eccentric only repetitions in the single-arm bicep curl. Participants consumed capsules of either a placebo, low dose (2mg/kg) or high dose (10mg/kg) of CBD oil immediately following the session and continued every twelve hours for 48 hours. Venipunctures were taken before exercise and repeated at 24, 48, and 72 hours post exercise. Blood samples were centrifuged for 15 minutes in gel and lithium heparin vacutainers. Plasma was separated from cells and stored at  $-80^{\circ}$  until analysis. Samples were analyzed using an immunometric assay for IL-6 (ELISA). Data were analyzed using a three (condition) by four (time) repeated measure ANOVA. **RESULTS:** There were no differences in inflammation between conditions ( $F(2,6)=0.726$ ,  $p = 0.522$ ,  $\eta_p^2 = 0.195$ ) or across time ( $F(3,9)= 0.752$ ,  $p = 0.548$ ,  $\eta_p^2 = 0.200$ ). There was no interaction between condition and time ( $F(6,18)=0.599$ ,  $p = 0.727$ ,  $\eta_p^2 = 0.166$ ). **CONCLUSIONS:** Although there was no statistical significance between conditions (likely due to the low sample size), there was a visible increase in IL-6 48 ( $4.88 \pm 6.53$ ) and 72 hours ( $3.12 \pm 4.26$ ) post exercise in the placebo condition which was not observed in the low ( $48: 0.35 \pm 2.22$ ;  $72: 1.34 \pm 5.6$ ) and high dose condition ( $48: 1.34 \pm 1.34$ ;  $72: -0.79 \pm 5.34$ ). Future investigations should consider implementing eccentric resistance training across a larger portion of the body to improve ecological validity of the exercise. A larger sample would reduce risk of researchers committing a type II statistical error and give strength to detecting differences between conditions.

#### **P73: THE EFFECTS OF PREFERRED AND NON-PREFERRED TASTE ON REPEATED SPRINT ABILITY**

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Various tastes including sweet, bitter, and sour have been shown to differentially influence responses to exercise. Furthermore, ingestion of bitter and sweet solutions has been shown to acutely enhance exercise performance. However, taste is highly individualized, and it is unclear if taste preference influences performance. The purpose of this study was to investigate the effects of preferred and non-preferred taste on repeated sprint ability. Physically active females participated in two counterbalanced repeated sprint trials each with a different condition: 1) Non-preferred taste, 2) Preferred taste. Participants self-reported taste preferences, ingested the tastes, and completed 2 x 15 second Wingate Tests while anaerobic capacity, heart rate (HR), rate of perceived exertion (RPE), motivation, and exercise enjoyment were measured. No differences existed between taste conditions for anaerobic capacity ( $p = 0.271$ ) or HR ( $p = 0.081$ ). RPE was significantly lower with preferred versus non-preferred taste ( $p = 0.046$ ). Exercise enjoyment ( $p = 0.022$ ) and motivation ( $p = 0.045$ ) were higher with preferred taste. These findings suggest that preferred drink taste may not enhance performance but improves psychological responses which may have implications for improving exercise training and adherence.

#### **P74: IMPACT OF WORKLOAD AND STRESS ON HEALTH-RELATED BEHAVIORS IN COLLEGE STUDENTS**

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**Background:** College students have demanding workloads and stress that may impact their health-related behaviors. This study investigated the effects of college students' workload and stress on diet, moderate-to-vigorous physical activity (MVPA), and BMI. **Methods:** Full time (12-credit hr) college students were recruited to complete an anonymous online survey. Participants completed the Three Factor Eating Questionnaire (TFEQ-r18), the International Physical Activity Questionnaire Short Form, and reported fruit and vegetable intake, credit hours, employment and athletic time demands and anthropometrics. A modified NASA Task Load Index (TLX) was completed to determine the demands of the previous week, as measures of workload and stress. Independent sample T or Mann Whitney U tests compared diet, MVPA, and BMI between those with high workloads (18+ credit hours, employed  $\geq 20$  hr/wk, or sports  $\geq 10$  hr/wk) and those with lower workloads, and those with high scores on the frustration/ stress scale of the TLX ( $\geq 8$  out of 10) and those with lower scores. **Results:** Participants ( $n=67$ ) were  $20.5 \pm 2.0$  years old, white (82%), female (82%) and overweight or obese (61%). 16% of

students took 18+ credit hours, 15% worked  $> 20$  hr/wk, 10% played sport  $> 10$  hr/wk, and 57% had high frustration/stress. On average, fruit and vegetable intake ( $3.3 \pm 1.8$  servings/wk) was 25% less than the recommendation and MVPA ( $67.7 \pm 100.4$  min/wk) was 50% below the recommendations. Data from the TFEQ-r18 suggests that most of the participants had relatively high cognitive restraint ( $49.6 \pm 20.7$ ), uncontrolled eating ( $36.0 \pm 19.3$ ) and emotional eating behaviors ( $41.8 \pm 27.0$ ). There were no significant differences between diet, MVPA, or BMI based on workload (high vs. low for credit, work, or sport). Those high on the frustration scale scored significantly higher on the cognitive restraint scale ( $54.7 \pm 20.0$ ) compared to those with lower frustration scores ( $42.9 \pm 19.9$ ;  $P = 0.02$ ). Those with high levels of frustration trended towards less MVPA ( $47.9 \pm 85.1$  min/wk) than those who reported less frustration ( $93.7 \pm 113.8$  min/wk;  $p = 0.06$ ). **Conclusion:** Workload was not associated with diet, MVPA, or BMI in this sample. Highly frustrated or stressed students may engage in restrained eating and participate in less MVPA. Strategies to improve fruit and vegetable intake and MVPA and may help students cope with the demands of college.

#### **P75: THE EFFECTS OF OXYGEN NANOBUBBLE CONSUMPTION REPEATED BENCH PRESS PERFORMANCE**

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**BACKGROUND:** Oxygen nanobubbles (ONB) have been linked to the augmentation of oxygen delivery to a variety of tissues. Commercially, ONBs have become available in drink form and are marketed for use before exercise to boost performance. As phosphocreatine resynthesis is generally limited by oxidative ATP production, enhanced oxygen delivery via ONBs may serve as a means to improve recovery during fatiguing bouts of resistance exercise. The purpose of this study was to explicate the effects of ONB consumption on explosive and repeated bench press performance. **METHODS:** Resistance-trained males participated in two counterbalanced repeated bench press trials each with a different treatment: 1) Placebo, and 2) ONB solution. For each trial, participants consumed their respective treatment 10 minutes before exercise. Following a brief warm-up, participants completed 1 set x 2 repetitions at 75% of 1-Repetition Maximum (1-RM) as explosively as possible while a linear position transducer observed the mean power and velocity of the barbell. Participants then completed 3 sets x Repetitions to failure (RTF) at 75% of 1-Repetition Maximum (1-RM) separated by 2 minutes of rest. Trials were separated by a minimum of 48 hours. **RESULTS:** Findings showed no differences between treatments for mean barbell velocity ( $p = 0.881$ ) or mean power ( $p = 0.704$ ). Total RTF was also not significantly different between ONB and PL ( $p = 0.749$ ). **CONCLUSION:** These findings suggest that ONBs may not be a worthwhile ergogenic aid for resistance exercise.

#### **P76: A DIVERSE SET OF VARIABLES PREDICTS GASTROINTESTINAL SYMPTOMS DURING ENDURANCE RUNNING RACES**

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**BACKGROUND:** Although age, sex, training experience, anthropometrics, race duration, and nutritional intake have all been identified as potential predictors of gastrointestinal (GI) symptoms during endurance races, few studies have examined all these factors simultaneously. The goal of this observational study was to examine the extent to which the severity of GI symptoms during endurance running races could be predicted from a combination of variables. **METHODS:** 140 participants (81 women, 59 men; age =  $40.6 \pm 13.3$  yr) completed a series of questionnaires within 72 hours of finishing endurance running races. Questionnaires inquired about demographics, running history, race finishing time and distance, GI-symptom history, trait anxiety, visceral sensitivity, anthropometrics, and nutritional intake before and during the events. Stepwise linear regression was used to identify significant predictors of upper and lower GI symptoms, respectively. Cases that were identified as outliers based on inspecting residual plots were removed from the analyses. **RESULTS:** For upper GI symptoms during races, the following variables made it into the final model and explained 33% of the variability in severity scores: pre-race fat intake (standardized beta [SB] = 0.32), resting upper GI symptoms (SB = 0.30), during-race fluid intake rate (SB = 0.14), visceral sensitivity (SB = -0.24), trait anxiety (SB = 0.21), and during-race carbohydrate intake rate (SB = 0.18). For lower GI symptoms during races, resting lower GI symptoms (SB = 0.41), during-race carbohydrate intake rate (SB = 0.21), age (SB = -0.22), and race distance (SB = 0.19) made it into the final model, explaining 29% of the variability in severity scores. **CONCLUSIONS:** Several variables

predict GI symptoms during races, yet a substantial amount of variability in severity scores remains unaccounted for. In addition, predictors differ somewhat for upper and lower GI symptoms.

#### **P77: DIETARY NITRATE SUPPLEMENTATION ENHANCES HEAVY LOAD CARRIAGE PERFORMANCE IN MILITARY CADETS**

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**BACKGROUND:** Soldiers are commonly required to carry heavy loads (> 35 kg) that increase metabolic rates and exercise intensity, which can negatively impact performance. The purpose of this study was to determine the effects of dietary nitrate (NO<sub>3</sub><sup>-</sup>) supplementation on physiological responses, cognitive function, and performance during heavy load carriage in military cadets. **METHODS:** Ten healthy males (81.0 ± 6.5 kg; 180.0 ± 4.5 cm; 56.2 ± 3.7 ml·kg<sup>-1</sup>·VO<sub>2max</sub>) consumed 140 mL·d<sup>-1</sup> of beetroot juice (BRJ; 12.8 mmol NO<sub>3</sub><sup>-</sup>) or placebo (PL) for six days preceding an exercise trial consisting of 45 min of load carriage (55% body mass) at 4.83 km·h<sup>-1</sup> and 1.5% grade, followed by a 1.6-km time-trial (TT) at 4% grade. Gas exchange, heart rate, and perceptual responses were assessed at during constant-load exercise and the TT. Cognitive function was assessed immediately prior to, during, and post-exercise via the psychomotor vigilance test. **RESULTS:** There were no effects of BRJ on constant-load gas exchange or perceptual responses, and cognitive function was unchanged at all time points. However, there were small effect sizes (Cohen's *d*) for response times and lapses, respectively, during-exercise (PL vs. BRJ: +15.2 ms and +2.3; *d* = 0.26 and 0.28) and in the change from rest to exercise (PL vs. BRJ: +18.2 ms and +3.2; *d* = 0.49 and 0.48). Additionally, post-TT HR (188 ± 7.1 vs. 185 ± 7.4; *p* = 0.40; *p* = 0.03), mean tidal volume (2.15 ± 0.27 vs. 2.04 ± 0.23; *p* = 0.02; *d* = 0.47), and performance over 1.6 km (770.9 ± 78.2 s vs. 809.8 ± 61.4 s; *p* = 0.03; *d* = 0.63) were increased/enhanced during the TT with BRJ versus PL. **CONCLUSIONS:** BRJ supplementation improves heavy load carriage performance in military cadets possibly as a result of attenuated respiratory muscle fatigue, rather than enhanced exercise economy.

#### **P78: THE IMPACT OF STRUCTURE ON PHYSICAL ACTIVITY OF PRESCHOOL-AGED CHILDREN**

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**BACKGROUND:** Higher levels of physical activity (PA), are associated with positive health outcomes among children. Structured environments, such as daycare/preschool, may be a potential mechanism for promoting healthy behaviors and limiting discretionary time when children may engage in unhealthy behaviors; however, the literature examining the relationship between daycare/preschool and children engaging in PA has been mixed and limited in examination at the day-level. Understanding the potential role structure may have as a mechanism to improve movement behaviors of preschool-aged children may guide the development of effective intervention strategies. The current study used intensive longitudinal data to examine the within- and between-person effects of hours spent in daycare/preschool (i.e., structure) on children's physical activity. **METHODS:** Children (N=67, 4.5±0.8 yrs, 49.3% female, 65.7% White) wore an Axivity AX3 accelerometer on their wrist 24 hours/day for 14 days. Data were processed with GGIR (v2.6-4) with the Roscoe et al. (2017) intensity thresholds for preschoolers. Caregivers reported the number of hours their child attended daycare/preschool each day. We ran linear mixed-effects models predicting day-level moderate-to-vigorous physical activity (MVPA) and light physical activity (LPA) from hours spent in daycare. We included child age, sex, and wear-time as covariates. Weekends were excluded from analysis. **RESULTS:** Children wore accelerometers for an average of 9.3±1.2 (range = 1-11) days and 59 children attended daycare/preschool on at least one day. Children spent an average of 4.6±3.9 hrs/day in daycare/preschool and had an average of 120.7±30.0 min of MVPA/day and an average of 118.0±33.8 min of LPA/day. Mixed models indicated that for every 1-hour extra children spent in daycare/preschool above their own average daycare/preschool time, children had 1.1 min (95%CI = 0.25, 1.93) more MVPA/day and 1.4 min (95%CI = 0.65, 2.19) more LPA/day. **CONCLUSION:** On days when children attend more hours of daycare/preschool, beyond their typical daycare/preschool time, they have more minutes of MVPA and LPA. Daycare/preschool, as a source of structure, may be a day-level contextual factor to help improve movement behaviors in children.

Future studies should examine the impact of structure from daycare/preschool on other movement behaviors such as sleep and sedentary behavior.

#### **P79: DETERMINING CORRELATION BETWEEN AGE AT FIRST CONCUSSION AND SUBSEQUENT MENTAL HEALTH SYMPTOM EXACERBATIONS**

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**Purpose:** Concussion is one of the most researched topics in sports medicine and there has been much research done on the correlation between concussions in sports and mental health conditions. Going through the literature on concussion, there is little research on age of athletes first experiencing a concussion and mental health conditions later in life. The goal of our research was to determine if age at first concussion correlates with a higher likelihood of being diagnosed with a new mental health condition or exacerbation of a previous mental health condition. **Methods:** In order to determine this, we surveyed 94 college athletes, asking them questions about their concussion history as well as their personal and family history of mental health. Some important survey questions included: "How many concussions have you had?" "How old were you when you experienced your first concussion?" "Have you ever been diagnosed with a mental health condition?" "Did you experience mental health symptoms following your concussion?" **Results:** Of the 94 participants, 32.9% had experienced a concussion in the past. The ages of first concussion of those 31 participants ranged from 12-18 years of age. Of those 31 participants who experienced a concussion, 25.8% reported experiencing a mental health symptom following the concussion such as mood changes, anxiety, sadness or irritability. The age of first concussion for those 8 students ranged from 11-17 years of age. None of those participants had been previously diagnosed with a mental health condition. Of those who experienced a mental health symptom following a concussion, 50% have had a family member diagnosed with a mental health condition. **Significance:** Based on this data, there does seem to be a correlation between experiencing a concussion early in life and subsequent mental health symptoms. This could mean that there is an increased risk of developing mental health symptoms following a concussion at a young age. More research should be done on those who have experienced concussions as we were limited to the responses of about 1/3 of our participants.

#### **P80: FAMILY DIETARY CHARACTERISTICS AND EATING HABITS IN HIGH SCHOOL SENIORS**

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**BACKGROUND:** Literature suggests that weight gain is associated with increased lifetime risk of obesity and heart disease. Characteristics of the family environment, such as how often the family eats per day, whether those meals are home cooked, and family food choices play a significant role in the development of eating habits. Thus, the purpose of the study was to establish the association between characteristics of the family environment, eating habits, and cardiovascular disease risk factors during youth. **METHODS:** 23 high school seniors (65% females), 17.9±0.4 years of age, height of 174.3±5.9 cm, weight of 76.4±8.9 kg and body mass index (BMI) 25.1±2.6 kg/m<sup>2</sup>, with no history of eating disorders were recruited for this cross-sectional study. Family dietary environment was assessed using modified Family Eating and Activity Habits Questionnaire (FEAHQ) with lower score indicating better family dietary environment. Dietary intake was assessed using automated self-administered 24-hour (ASA24) dietary assessment tool and Healthy Eating Index (HEI-2015) score was calculated. In addition, levels of glucose, total cholesterol, low-density lipoprotein (LDL), and high-density lipoprotein (HDL) were assessed. Pearson Correlations were used to evaluate the associations between the variables. **RESULTS:** The modified FEAHQ score was negatively correlated with HEI score (*r* = -0.46, *p* = 0.03), consumption of whole grains (*r* = -0.46, *p* = 0.03), non-citrus fruits (*r* = -0.43, *p* = 0.04), and legumes (*r* = -0.49, *p* = 0.02). In addition, FEAHQ score was positively correlated with total cholesterol (*r* = 0.45, *p* = 0.03), but not glucose (*r* = -0.30, *p* = 0.17), HDL (*r* = 0.22, *p* = 0.32), or LDL (*r* = 0.25, *p* = 0.26). Lastly, there was no significant correlation between the FEAHQ score to the total calories (*r* = -0.20, *p* = 0.37), carbohydrates (*r* = -0.17, *p* = 0.44), protein (*r* = -0.29, *p* = 0.18), and fats (*r* = -0.19, *p* = 0.39). **DISCUSSION:** In conclusion, family units with a better dietary environment eat better overall, consume more non-citrus fruits, whole grains, legumes, fiber and have lower total cholesterol levels. While more longitudinal research needs to be done, creating a better dietary environment at home may lead to better dietary habits and overall health. **FUNDING:** Funding for this

project was provided by the National Heart, Lung, And Blood Institute of the National Institutes of Health under Award Number R15HL159650.

**P81: WELLNESS FOLLOWING WINS & LOSSES BASED ON PSYCHOLOGICAL HARDINESS IN DIVISION I WOMEN'S LACROSSE**

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**BACKGROUND:** Psychological hardiness encompasses three components: commitment, control, and challenge. Those with high levels of psychological hardiness are more adaptable, more coachable, and better able to respond to stressors than those with low hardiness. The purpose of this study was to examine post-game wellness scores based on level of psychological hardiness following wins and losses in collegiate female lacrosse athletes. It was hypothesized that hardy athletes would have higher wellness scores after both a win and loss compared to athletes with low hardiness. **METHODS:** Athletes completed the Dispositional Resilience Scale-15 (DRS-15) at the beginning of the training year to analyze psychological hardiness level. Players were grouped according to hardiness level: above average (AH, n = 9) and below average (BA, n = 8). Players also completed subjective daily wellness surveys that described overall wellness, muscle soreness, sleep quality, stress level, and energy level in arbitrary units (AU). Repeated measures of ANOVA (RM-ANOVA) evaluated differences of wellness scores by hardiness group and by game outcome. **RESULTS:** A difference was shown in total hardiness scores ( $p < 0.001$ ) with AH ( $31.0 \pm 1.4$ ) scoring higher than BA ( $23.6 \pm 3.5$ ). No difference was found between hardiness groups for post-game wellness (AH:  $71.0 \pm 13.4$  AU, BA:  $65.4 \pm 12.2$  AU,  $p = .426$ ). There was a difference by game outcome for overall wellness (win:  $70.5 \pm 12.6$ , loss:  $66.2 \pm 13.1$ ,  $p = .015$ ) and energy levels (win:  $78.0 \pm 17.8$ , loss:  $72.8 \pm 17.4$ ,  $p = .024$ ), but no group differences were noted. **CONCLUSION:** These analyses indicate the importance of analyzing the psychological impact of a win and a loss because all scores decreased after a loss. This wellness decline may be associated with a reduction in performance the following day. This information assists coaches and staff in showing athletes' wellness is affected after a loss and should be taken into consideration when formulating practices to maximize performance.

**P82: THE EFFECT OF LOWER-LIMB VENOUS POOLING ON EXECUTIVE FUNCTIONING**

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**PURPOSE:** Vascular dementia (VaD) impacts approximately 4% of Americans age 65+ and 15% of those 80+. A notable risk factor for VaD is alterations in cerebral hemodynamic processes. Venous pooling in the legs reduces cardiac output and subsequently decreases blood delivery to the brain. Decreased brain blood flow would be expected to reduce cognitive outcomes, including executive function. This study aims to determine the effect of venous pooling on executive function. **METHODS:** 15 participants (n = 15,  $25.1 \pm 6.2$  years, 60% male, 40% female) completed separate three testing sessions: (i) BASE: measurement of baseline executive function [completion time (sec) for Trail Making Test, (TMT)]; (ii) CUFF: TMT administered following 2-hr uninterrupted sitting with venous occlusion (using cuffs placed above both knees); and (iii) NON-CUFF: TMT administered two-hours following 2-hr uninterrupted sitting without venous occlusion (cuff placed above knees but not inflated). Repeated measures analysis of variance was used to compare the three conditions. **RESULTS:** The TMT completion was non-significantly lower (superior) for CUFF versus BASE (mean difference =  $-6.61$  sec,  $p = 0.148$ ) and significantly lower for NON-CUFF versus BASE (mean difference =  $-10.28$  sec,  $p = 0.027$ ). **CONCLUSIONS:** Contrary to expected, venous pooling did not impair executive function. Source of funding: NONE

**P83: PERCEPTIONS OF PERSONALIZED READINESS-TO-EXERCISE PROFILES DETERMINED USING 21-DAY ECOLOGICAL MOMENTARY ASSESSMENT DATA**

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**BACKGROUND:** Readiness-to-exercise is a multidimensional concept (e.g., physical, psychological, motivational states) that - when regularly monitored in resistance training programs- has potential in guiding person-specific adjustments on a session-by-session basis. Currently, it is unknown which dimension(s) of readiness should be most heavily weighted to guide decision-making. Prior research

demonstrated between-person differences regarding which dimension is mathematically most important, but further insight on social validity of personalized readiness profiles is needed. The purpose was to explore individuals' perceptions and utility of their person-specific profile of readiness-to-exercise. **METHODS:** Thirteen resistance-trained individuals underwent 21 days of ecological momentary assessment (4 surveys per day). In each survey, participants provided "right now" ratings from constructs (51 items) determined to influence readiness-to-exercise. Eleven participants (64% F,  $32 \pm 7$  y, Race= 100% White,  $9 \pm 6$  years of resistance training experience) completed at least the minimum number of surveys (50/84;  $73 \pm 9$ ) to construct a profile and participate in a qualitative interview. Readiness profiles were constructed utilizing P-technique factor analysis and presented to gauge initial perceptions during a one-on-one, semi-structured interviews, which were transcribed and analyzed using thematic analysis. **RESULTS:** Three themes emerged. *Accuracy*, encompassed mixed perceptions of relevance ("description of my personality", "kinda accurate"). *Facilitators of Skepticism*, was comprised of two subthemes: 'atypical circumstances' ("spent a week [of the assessment period] in the hospital, heavily medicated"), 'interaction between perceptions and data feedback' ("[if] that machine says I'm feeling like [expletive], like I am going to feel like [expletive]. I don't want to know that"). *Resilience Overruling Readiness* emerged as participants noted the importance of recognizing readiness but overcoming unfavorable states ("overcoming the mental side of things", "value in not wanting to do this, but I have to if I want to get stronger"). **CONCLUSION:** While profiling readiness based on time-series data offers insight into individualized mathematical importance within multi-dimensional data, the results demonstrate mixed perceptions towards relevance and utility of this information. To refine the operationalization of readiness-to-exercise, further research is needed to understand both the social and criterion validity of mathematically-determined profiles.

**P84: ABSTRACT WITHDRAWN**

**P86: EXERCISE PREFERENCES AND MOTIVATORS IN YOUNG ADULT WOMEN WHO EXERCISE REGULARLY**

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**BACKGROUND:** Young adult women are less active than young adult men and have increased chances for weight gain during their 20s and 30s. In an effort to increase activity, preferable modes of exercise in young women should be explored. Therefore, the purpose of this study was to explore exercise preferences and motivators in young women who exercise regularly. **METHODS:** Young women who exercised regularly identified their preferred mode of exercise and their motivators to exercise using the Exercise Motivations Inventory-2

(EMI-2). Preferred mode of exercise and volume were examined, and MANOVA tests were conducted to explore differences in motivators amongst the group. RESULTS: The women ( $n = 269$ ;  $M = 27.04 \pm 4.70$ y) identified weightlifting as their preferred mode of exercise (32.3%). A MANOVA was used to determine if motivators for exercised differed based upon volume of muscle-strengthening (MS) training (low= 0-1days; moderate= 2-3days; high=  $\geq 4$  days). Significant differences were found amongst the three groups ( $F = 0.800$ ,  $F [30, 488] = 1.924$ ,  $p = 0.003$ ). Women who engaged in a high volume versus low volume of MS activities had higher levels of motivation from revitalization ( $p = 0.035$ ), enjoyment ( $p = 0.004$ ), challenge ( $p = 0.002$ ), social recognition ( $p = 0.009$ ), appearance ( $p = 0.028$ ), and strength and endurance ( $p < 0.001$ ). CONCLUSION: Future exercise intervention studies should examine the perception of weightlifting as a primary mode of exercise amongst young, inactive women. Additionally, both intrinsic (mental) and extrinsic (physical) motivators for exercise should be conveyed to inactive women as results suggest both are used to maintain regular exercise amongst this sample.

**P87: MUSCLE-STRENGTHENING ACTIVITY AMONG COLLEGE STUDENTS: DIFFERENCES BY SEX AND ASSOCIATIONS WITH FEELINGS OF FATIGUE**

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**BACKGROUND:** Feelings of low mental energy (ME) and physical energy (PE) and feelings of mental fatigue (MF) and physical fatigue (PF) are more prevalent among college females than males. Aerobic physical activity (PA) has reportedly been positively related to feelings of energy and negatively related to fatigue. Little is known about the characteristics of muscle-strengthening activity (MSA) among college students, or the associations with feelings of energy and fatigue. In samples of male and female college students, this study aimed to 1) examine characteristics of MSA, and 2) explore associations between MSA and feelings of energy and fatigue. **METHODS:** Students ( $n = 648$ ; 79% female;  $20.3 \pm 1.3$  yrs) reported days per week of MSA, muscle groups used, modes, and locations of MSA. ME, MF, PE, and PF were assessed via Mental and Physical State and Trait Energy and Fatigue Scales (scale 0 - 300; more intense feelings = higher scores). Multivariate linear regression assessed associations between days of MSA and ME, MF, PE, PF, controlling for depression, sleep quality, and overall PA. Separate analyses were conducted for males and females. **RESULTS:** Half of participants reported  $\geq 2$  days of MSA with males more likely to meet recommendations than females (66.9% and 48.8%, respectively;  $p < 0.001$ ). Males participated in more MSA ( $2.6 \pm 1.9$  days/wk) and used more muscle groups ( $5.3 \pm 1.5$  groups) than females ( $1.7 \pm 1.7$  days/wk and  $4.3 \pm 1.8$  groups; all  $p < 0.001$ ). Males were more likely to use machines ( $p < 0.001$ ) and free-weights ( $p = 0.005$ ). Females were more likely to perform Yoga or Tai-Chi ( $p < 0.001$ ). For males, more days of MSA significantly predicted lower MF ( $B = -8.5$ ;  $p = 0.031$ ) and PF ( $B = -7.2$ ;  $p = 0.049$ ). For females, MSA did not predict any of the energy and fatigue outcomes (all  $p > 0.05$ ). **CONCLUSIONS:** Levels and characteristics of MSA differ between male and female college students. Findings suggest that there may be relationships between MSA and feelings of fatigue, specifically for male students. This important information can be used to develop larger randomized controlled trials among college students to elucidate the potential for causal relationships between MSA and feelings of energy and fatigue. The long-term goal of such research would be to understand whether increasing MSA can improve feelings of fatigue and low energy among college students.

**P88: CADETS' PERCEPTION OF MENTAL RESILIENCE TRAINING IN STATEWIDE POLICE ACADEMY: A PILOT STUDY**

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**BACKGROUND:** Law enforcement officers (LEOs) need both physical and mental resilience to perform occupational duties. Despite this expectation, LEOs have some of the poorest health measures including high rates of obesity and musculoskeletal injuries, and poor mental health. Although mental health and resilience have received recent focus in law enforcement literature, additional research is required in exploring how to build the mental resilience needed to reduce cumulative mental health strain over LEOs' careers. Police academies build foundational skills in LEOs, but generally emphasize physical training over other domains. The present study seeks to evaluate the perceived effectiveness of mental health resilience training infused within a statewide physical training program revision for LEO cadets. **METHODS:** A cross sectional design was utilized with a convenience sample of 128 graduating LEO cadets. An online survey was

administered investigating the reported amount of resilience training performed during academy and whether cadets intended to utilize resilience skills after academy graduation. RESULTS: As part of formal training in the academy, 64.8% of cadets reported practicing resilience exercises (i.e., mindfulness intervention) 4 or 5 out of 5 days of training per week. Outside of formal training, the majority (57.8%) of cadets reported only 0 to 2 days of resilience training out of 7 days per week exercised of their own accord. An ANOVA analysis revealed no statistically significant differences between the exposure of resiliency training during the academy to their intentions to practice after academy completion ( $p = .642$ ). However, secondary ANOVA analyses revealed cadets who practiced resilience skills outside formal training were significantly more likely to continue after the academy ( $p = .008$ ). Evaluating the Mindfulness-Based Tactical Instruction (MBTI) intervention, cadets rated each aspect of the program, on a Likert scale of 1-5, as follows: Combat Breathing ( $3.63 \pm 1.14$ ), Progressive Muscle Relaxation ( $3.47 \pm 1.24$ ) and Body Scan ( $3.22 \pm 1.30$ ). **CONCLUSIONS:** Exposure to mindfulness or resilience skills during the academy may be helpful, but additional research is required to evaluate techniques that further encourage continued practice after academy completion. Additional off-duty techniques may be an opportunity to increase one's self efficacy to continue these preventative mental health practices across the LEO's career.

**P89: USING THE MILITARY TRAINING MENTAL TOUGHNESS INVENTORY ON FIREFIGHTERS: PRELIMINARY EVIDENCE ON INTER-RATER RELIABILITY**

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**BACKGROUND:** Mental toughness (MT) research is predominantly cross-sectional and based on self-assessment. MT has been consistently positively associated with performance metrics when investigated in stressful and demanding environments, such as sports and tactical. The Military Training Mental Toughness Inventory (MTMTI) is used to measure MT from a tactical athlete perspective. Like military personnel, firefighting action requires firefighters to perform under intense pressure in highly stressful environments, characterized by fear, fatigue, and anxiety caused mainly by risk to one's life. MT in firefighting research is scarce. There is no firefighting-specific MT instrument. This study examined the inter-rater reliability of MTMTI in firefighters via a repeated-measure design. **METHODS:** Fourteen male firefighters (Age:  $29.0 \pm 7.0$ ; BMI:  $26.3 \pm 2.7$ ) were recruited from two fire departments. Data collection took place over two days (one administration per day). The level of the MT of the participants was assessed via the MTMTI, which was administered to two of their officers (peer-rating). The MTMTI includes six items rating on a 7-point Likert scale (1: Never; 7: Always) how well an individual can maintain a high level of performance when confronted with stressful situations in their tactical occupation (e.g., "when the conditions are difficult", "when he has been reprimanded or punished"). Inter-rater reliability was assessed by Cohen's  $\kappa$ , Cronbach's  $\alpha$ , McDonald's  $\omega$ , and interclass correlation coefficient (ICC) using R statistical packages in Jamovi version 2.3 ( $p < .05$ ). **RESULTS:** Kappa coefficient of inter-rater reliability was none to slight ( $.04$ ,  $p = .38$ ) with 7% of agreement between the two raters. Alpha, omega, and inter-rater coefficients of inter-rater reliability were poor ( $.51$ ,  $.53$ ,  $.51$ ,  $p = .1$ , 95%CI  $[-.24, .81]$ , respectively). Inter-rater correlation was  $.36$ ,  $p > .05$ . **CONCLUSION:** Our results do not indicate agreement between the two raters. Therefore, the inferences of the MT scores of these two different raters are not in agreement, either. Reasons could include the unsuitability of MTMTI for firefighters and/or raters having a different perception of what constitutes MT. Regardless, practitioners should be cautious when interpreting the scores of the MTMTI on this specific tactical population.

**P90: CHARACTERIZING HORMONAL CONTRACEPTION USE AND ASSOCIATED SIDE EFFECTS IN ACTIVE WOMEN**

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**BACKGROUND:** Hormonal contraceptive (HC) use is often associated with positive and negative side effects, which may impact exercise performance. The purpose of this study was to characterize HC use, and the associated perceived side effects in active adult females. **METHODS:** 304 healthy, active adult females using HC between the ages 18-52 years living in the United States (Age= $29.3 \pm 7.6$  yrs; Ht= $166.5 \pm 7.2$  cm; Wt= $67.7 \pm 13.4$  kg; BMI= $24.4 \pm 4.7$  kg/m<sup>2</sup>; age of menarche= $13.0 \pm 1.7$  yrs) completed an online questionnaire based on previously validated assessments to characterize menstrual cycle, prevalence of HC use, perceived side effects, and physical activity. Physical activity was reported in minutes over seven days and was converted into METminutes/week (METmin/wk). Total METmin/wk was

classified using the International Physical Activity Questionnaire categorical scores as high (HIGH;  $\geq 3,000$  METmin/wk;  $n=60$ ) and moderate (MOD;  $\geq 600$  METmin/wk;  $n=244$ ). Data are reported as descriptive statistics and proportions; Pearson's chi-squared analyses were used to examine the relationships between categorical variables. **RESULTS:** Combined oral contraceptives were the most used (50.7%) followed by progestin-only contraceptives (hormonal intrauterine devices=39.1%; implants=5.9%; vaginal rings=4.1%). There were no significant differences between HIGH and MOD for incidences of premenstrual syndrome (56.7% vs. 51.2%,  $p=0.450$ ), reports of painful periods (50.0% vs. 41.8%,  $p=0.450$ ), perceived positive side effects (68% vs. 65.6%,  $p=0.686$ ), or perceived negative side effects (53.3% vs. 56.1%,  $p=0.694$ ). In the total sample, reduced bleeding (36.8%), cessation/less frequent periods (33.9%), and reduced cramps (30.3%) were the most common perceived positive side effects for HC use, while mood changes/swings (19.4%), weight gain (16.4%), and tiredness/fatigue/lethargy (12.8%) were the most reported perceived negative side effects. The highest reported positive side effects did not change when stratified for activity level. For negative side effects, MOD reported a higher incidence of weight gain (16.8%) and bloating (14.3%), while HIGH reported greater incidence of irregular periods (16.7%). **CONCLUSION:** HC use may have more benefits for exercise performance by reducing negative menstrual side effects, particularly in MOD active females. Practitioners and coaches should be aware of HC use as perceived symptoms may vary across activity level.

#### **P91: TEST-RETEST RELIABILITY AND MEASUREMENT ERROR OF UNCONTROLLED MANIFOLD ANALYSIS IN FINGER PRESSING TASK**

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**BACKGROUND:** The central nervous system organizes motor elements (e.g. muscles, joints, fingers) into task-specific synergies to stabilize motor task performance. The Uncontrolled Manifold (UCM) hypothesis quantifies synergies using analysis of covariation between motor elements. Recently, the UCM has been proposed as a biomarker of movement quality to investigate sensorimotor impairments. However, methodological limitations, including unknown measurement properties, hinder the practical application of UCM in clinical practice. This study aimed to investigate the reliability (i.e., test-retest and measurement error) of UCM parameters in healthy young adults. **METHODS:** 15 subjects (24.8  $\pm$  1.2 yrs old) used both hands index and middle fingers to press on four force sensors. At four experimental sessions separated by 1 hour, one day, and one week, subjects performed three 2-minute trials of cyclic total force production at 20% of maximal voluntary contraction (MVC). Each trial consisted of 2-second force production separated by 2-seconds rest intervals, with visual feedback on the target force. We computed the synergy index ( $\Delta V$ ) for all testing sessions to quantify between-hand synergies stabilizing the target force. We averaged  $\Delta V$  values from trials within each session. We investigated the test-retest reliability of  $\Delta V$  with the Intraclass Correlation Coefficient (ICC<sub>3,k</sub>) with 95% confidence intervals (95% CI). Standard Error of Measurement (SEM) and Minimal Detectable Change (MDC) were determined. **RESULTS:** The mean number of force cycles was 29 in all testing sessions. The average  $\Delta V$  for all subjects across all sessions was  $0.87 \pm 0.29$ . The test-retest reliability reported an ICC<sub>3,k</sub> = 0.88 (95%CI: 0.72, 0.95;  $F(14,42)=7.91$ ,  $p<0.001$ ), with SEM = 0.10, and MDC = 0.28. **CONCLUSIONS:** The test-retest reliability was excellent, with a value close to acceptable for clinical measures (i.e., ICC > 0.9). The findings show that  $\Delta V$  values were consistent across 1-hour, 1-day, and 1-week testing sessions. Our study supports using UCM-based biomarkers of movement quality in healthy young adults. Our results may advance the incorporation of UCM into clinical assessment of movement quality and for tracking recovery over time. This will help bridge neuroscience with the study of movement quality for a variety of populations and impairments.

#### **P92: DO COMPRESSION GARMENTS INFLUENCE OXYGEN CONSUMPTION AND HEART RATE DURING A SUBMAXIMAL ENDURANCE RUN?**

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**BACKGROUND.** Running has gained popularity over the years increasing techniques to peak performance with minimal injury. A popular ergogenic aid today are compression garments which have been perceived to enhance recovery and improve performance. Compression pants decrease the amplitude of muscle oscillation and therefore may have an effect on oxygen consumption as well. If

muscles are not working as hard to mitigate soft tissue movement, it is also possible that fatigue may be reduced during long distance running. Thus, the purpose of this study was to examine the effect of compression garments on oxygen consumption (VO<sub>2</sub>) and heart rate (HR) during a 40-minute submaximal run. **METHODS.** 7 injury-free runners (33.43 $\pm$ 9.98 yrs; 69.60 $\pm$ 10.22kg; 1.72 $\pm$ 0.06m; 4M, 3F) participated in the study. Participants ran in full-leg compression garments (COMP) and loose-fitting control garments (CON). The participants ran each condition for 40-minutes on a treadmill at their preferred speed. Preferred speed was determined by taking the average speed from 3 blinded trials. Each participant was instructed to increase pace until they were comfortable for a 60-minute training run. This average speed was used for the CON and COMP conditions while collecting all dependent variables. Oxygen consumption was recorded continuously via a metabolic cart. HR was measured continuously using a telemetric heart rate monitor placed just below the sternum. Average VO<sub>2</sub> was calculated beginning at the onset of steady state until the end of each 40-minute condition. Average VO<sub>2</sub> drift was calculated subtracting the average VO<sub>2</sub> of the last 3 minutes of each run from the first 3 minutes of steady state. HR was recorded continuously throughout the entirety of each condition and HR was averaged across the condition for analysis. Dependent variables (avg VO<sub>2</sub>, VO<sub>2</sub> drift, and HR) were analyzed using paired sample t-tests ( $\alpha=0.05$ ). **RESULTS.** Average VO<sub>2</sub> was not different ( $p>0.05$ ) between conditions (CON: 31.39 $\pm$ 9.37 ml/kg/min, COMP: 32.33 $\pm$ 7.86ml/kg/min). VO<sub>2</sub> drift was not different ( $p>0.05$ ) between conditions with COMP increasing 1.91+ 3.02ml/kg/min and CON increasing 2.07+4.25 ml/kg/min over the 40-minute run. Additionally, HR was not different ( $p>0.05$ ) between conditions (CON: 142.57 $\pm$ 17.36 bpm, COMP 143.77 $\pm$ 19.32 bpm). **CONCLUSION.** Based on our findings compression garments had no effect on oxygen consumption or heart rate.

#### **P93: THE EFFECTS OF ORAL APPLIANCE USE ON RESPIRATORY OUTCOMES DURING MAXIMAL EXERCISE**

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**BACKGROUND:** Recently, studies have focused on the use of oral appliances to improve anaerobic and aerobic physical performance. Within our laboratory we have sought to delineate if these improvements are physiological by measuring respiratory parameters during steady state exercise. The results of these studies have generally supported prior studies, citing lowered respiratory rate (approximately 8%-10% lower) with the use of an oral appliance. The purpose of this pilot study was to assess the effects of a lower oral appliance on respiratory parameters during a maximal exercise protocol. **METHODS:** Data from six male subjects between the ages of 18-21 was used for this pilot study. Subjects were fitted with a lower oral appliance, which has two bite pads and a tongue bar to encourage the subjects to place their tongue on the floor of their mouth. Using a crossover design, subjects completed two trials of a maximal modified Bruce treadmill protocol on two separate days with a minimum of five days between tests. Subjects were randomly assigned the use of the oral appliance/mouthpiece (MP) or no oral appliance/mouthpiece (No MP) control condition during the maximal tests. VO<sub>2</sub> max, ventilatory efficiency (i.e., VE/VCO<sub>2</sub>), and respiratory rate were continuously assessed with a ParvoMedics indirect calorimeter. In addition, rate of perceived exertion (RPE) was obtained at the end of the test. Paired samples t-tests were used to evaluate differences between MP versus No MP conditions. **RESULTS:** No differences in VO<sub>2</sub> max (52.63 ml/kg/min MP vs. 53.4 ml/kg/min No MP) nor RPE (7.5 RPE MP vs. 7.8 RPE No MP) were found. The slope of VE/VCO<sub>2</sub> data within the first five minutes of the test cited a lowered rate of change in the MP condition as compared to the No MP condition. Respiratory rate did not differ between conditions across the total time of the test but was lower in the first five minutes during the MP condition (14.84 BPM MP vs. 16.60 BPM No MP). There were no significant differences between conditions across overall time, yet the first five minutes of the testing provided interesting findings as it relates to VE/VCO<sub>2</sub> and respiratory rate differences. Additionally, the use of the oral appliance did not impair the performance in any of the subjects except for one subject. **CONCLUSIONS:** Further testing with a variety of runners and experience is warranted to determine if any of these trends continue.

#### **P94: EFFECTS OF TRAINING AND SEX ON EXPIRATORY FLOW LIMITATION PREVALENCE AND SEVERITY IN YOUTH CYCLISTS**

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**BACKGROUND:** Expiratory flow limitation (EFL) poses a potential mechanical limitation of the pulmonary system during maximal

exercise in endurance-trained athletes, but the prevalence in females and males of pubertal age is not well understood. The purpose of this investigation was to assess EFL presence in endurance-trained (ET) youth males and females compared to a recreationally active (RA) control group. METHODS: Youth ET male ( $n=12$ ,  $16.3 \pm 1.0$  y), RA male ( $n=12$ ,  $17.6 \pm 2.2$  y), ET female ( $n=9$ ,  $15.8 \pm 1.1$  y), and RA female ( $n=10$ ,  $16.8 \pm 1.6$  y) subjects completed an incremental exercise test to exhaustion on a cycle ergometer to determine peak oxygen consumption ( $VO_{2peak}$ ). Maximal flow volume loops (MFVL) were performed pre- and post-exercise to assess forced vital capacity (FVC), forced expiratory volume in 1 second ( $FEV_1$ ),  $FEV_1/FVC$ , forced expiratory flow between 25% and 75% of FVC ( $FEF_{25-75\%}$ ) of FVC and peak expiratory flow (PEF). Inspiratory capacity (IC) maneuvers were performed the last 20 seconds of every stage. EFL was quantified as the percentage of the expiratory tidal volume that overlapped with the MFVL. RESULTS: EFL prevalence was higher in ET males and females at  $VO_{2peak}$  (18/21 subjects; 11/12 males, 7/9 females) compared to RA male and female subjects (7/22 subjects; 5/12 males, 2/10 females) ( $p < 0.05$ ). ET females had significantly greater EFL severity than RA females at maximal exercise ( $57.0 \pm 36.4\%$ ,  $13.3 \pm 32.2\%$ , respectively,  $p = 0.013$ ), while there was no difference in EFL severity between ET and RA males ( $p = 0.473$ ). ET males also had significantly greater EFL severity at maximal exercise compared to RA males ( $75.0 \pm 32.9\%$ ,  $29.7 \pm 40.4\%$ ,  $p = 0.007$ ). There was no difference in the prevalence and severity of flow-limitation between ET males and females or between RA males and females ( $p$ 's  $> 0.05$ ). CONCLUSIONS: Both ET male and ET female cyclists demonstrated greater prevalence and severity of EFL at maximal exercise than respective same-sex RA subjects of similar age, height, and lung size. Further research should be conducted to determine whether EFL may limit exercise performance in this population and whether EFL exists into adulthood.

**P95: SNIFF TEST FOR INSPIRATORY STRENGTH: REPRODUCIBILITY AND VALIDITY IN YOUNG, HEALTHY PEOPLE**  
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**BACKGROUND:** The diaphragm is the main inspiratory muscle of the body and plays a critical role in breathing. A short explosive inhalation (sniff) has been proposed as a measure of inspiratory strength. This study measured the reproducibility and validity of the sniff test compared to other measures of respiratory function: forced expiratory volume in one second ( $FEV_1$ ), forced inspiratory volume in one second ( $FIV_1$ ), and diaphragm endurance ( $EI_{dpm}$ ). **METHODS:** Young, healthy individuals ( $n=11$ , age= $19 \pm 1.08$ ) were tested on two separate days. The sniff test consisted of two maximal explosive inhalations, with acceleration magnitudes measured by a tri-axial accelerometer on the abdomen.  $FEV_1$  and  $FIV_1$  were measured according to clinical and manufacturer recommendations using a commercial spirometer (Easy-On PC Spirometer, NDD, Zurich, Switzerland). Diaphragm endurance was measured by electrically stimulating the phrenic nerve for 5 minutes at 5 hertz and using a tri-axial accelerometer placed on the abdomen to record declines in acceleration magnitude. **RESULTS:** Sniff acceleration was  $0.93 \pm 0.45$  g on day one and  $0.96 \pm 0.37$  g on day two. Day one and day two averages were not different for each of the respiratory measurements ( $p > 0.05$ ). The ICC for the sniff test was 0.627, for the  $FEV_1$  test 0.992, and for the  $FIV_1$  test 0.915. All were significant ( $p < 0.05$ ). We were unable to calculate an ICC for the  $EI_{dpm}$ . When compared to gold standard spirometry tests, the sniff was negligibly correlated to  $FEV_1$  ( $r=0.20$ ) and  $FIV_1$  ( $r=0.21$ ). **CONCLUSION:** There was no order effect between days for the sniff test; however, the sniff test exhibited lower reproducibility and lacked validity compared to standard spirometry tests. We recommend using  $FIV_1$  as a measure of inspiratory strength rather than the sniff test.

**P96: POSITIVE RELATIONSHIP OF UNLIMITED ONLINE QUIZZES ON SUBSEQUENT EXAM SCORES IN A HUMAN PHYSIOLOGY COURSE**

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**BACKGROUND:** Long-term retention has shown to be enhanced through testing (Roediger & Karpicke, 2006) vs. study. Multiple-choice quizzes have been shown to enhance retention during subsequent exams (Bjork, Little & Storm, 2014). This study examined this relationship in a Human Physiology course (HP). **METHODS:** Students enrolled in an undergraduate HP were provided 10 online quizzes utilizing Blackboard Learning Management Systems (LMS). Students were allowed unlimited attempts, but were required to wait 2 hours or more between attempts on a quiz. Quizzes contained 10 random questions selected by LMS each time from large pools in random answer order. Students also took 4 in-class exams on content presented in the quizzes and a cumulative final exam (Final) at the end of the course.

Two quizzes covered material in each Exam 1-4. The Final covered material from all 10 quizzes. Quizzes were scored on a 20-point scale, exams 1-4 scored on a 50-point scale and the Final was scored on a 100-point scale. Pearson correlation was used to compare the number of quiz attempts to quiz scores for each. Separately, quiz attempts and scores on the two quizzes for each exam were summed then compared to the subsequent exam grade. Total quiz attempts and average quiz scores were compared to the Final score. **RESULTS:** Subjects were 12 female and 46 male students. Mean number of attempts on quizzes ranged from 2.16 to 3.97 and mean scores ranged from 13.00 to 18.54 (65% to 92.7%). Mean exam scores ranged from 29.66 to 34.24 (59.31% to 68.48%) while the Final score mean was 66.327. Number of attempts were significantly correlated to the scores on quizzes 2 through 10 ( $r = 0.61$  to  $0.63$ ,  $p < 0.007$  or lower) but not quiz 1 ( $p = 0.91$ ). The average quiz score was significantly related to total attempts ( $r = 0.61$ ,  $p < 0.001$ ). Scores on quizzes were positively related to scores on subsequent exams for Exams 1 and 2 ( $p < 0.012$ ) and the cumulative final ( $r = 0.37$ ,  $p = 0.005$ ) but not on Exams 3 or 4 ( $p > 0.05$ ). Attempts on quizzes were only significantly correlated to exam scores for the final cumulative exam ( $r = 0.61$ ,  $p < 0.001$ ). **CONCLUSIONS:** The number of attempts on online low-stakes quizzes were positively related to quiz scores which, subsequently were often positively related to exam scores. Therefore, online quizzes may be an effective learning tool to include in an undergraduate HP course.

**P97: THE EFFECTS OF AN 8-WEEK ACTIVE PLAY INTERVENTION ON PRESCHOOLERS FMS**

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**BACKGROUND:** Although fundamental motor skills (FMS) are considered the building blocks of movement and contribute to a child's physical, cognitive, and social development, optimal interventions for promoting FMS in young children remain unclear. As young children learn and develop skills through play, an active play intervention is of particular interest. **PURPOSE:** The purpose of this study was to examine the effects of an 8-week active play intervention on preschoolers' FMS. **METHODS:** Two local preschools participated in the study. One school was randomly assigned to the intervention ( $n=25$ ) and the other served as a comparison group ( $n=25$ ). Peabody Developmental Motor Scales (PDMS-2) subscale scores was used to assess FMS in terms of stationary (SS), locomotion (LMS), object manipulation skills (OMS) and gross motor quartile (GMQ). FMS were assessed at baseline (week 0), post-intervention (week 8), and at follow-up (week 23). The 8-week intervention consisted of two daily teacher-guided play opportunities designed to provide children in the intervention group an additional 15 minutes inside and 15 minutes outside of active play per day. Teachers in the intervention group were provided a binder with active play activities and a small activity kit containing play equipment. **RESULTS:** A two-way mixed-ANOVA indicated that there was a significant interaction for GMQ from baseline to post-intervention ( $F(1,46) = 5.037$ ,  $p = .030$ ,  $\eta_p^2 = .099$ ). Additionally, there were significant effects for time for SS ( $F(1,46) = 40.89$ ,  $p < .001$ ,  $\eta_p^2 = .471$ ), LMS ( $F(1,46) = 18.994$ ,  $p < .001$ ,  $\eta_p^2 = .292$ ), and OMS ( $F(1,46) = 33.736$ ,  $p < .001$ ,  $\eta_p^2 = .423$ ) from baseline to post-intervention. A secondary two-way mixed ANOVA examined differences between groups at baseline, post-intervention, and follow-up. Results indicated no significant interactions, but there were significant effect for time for SS ( $F(1,627,60.204) = 45.577$ ,  $p < .001$ ,  $\eta_p^2 = .552$ ), LMS ( $F(1,339,49.559) = 11.493$ ,  $p < .001$ ,  $\eta_p^2 = .237$ ), OMS ( $F(2,74) = 24.257$ ,  $p < .001$ ,  $\eta_p^2 = .396$ ), and GMQ ( $F(2,74) = 23.669$ ,  $p < .001$ ,  $\eta_p^2 = .390$ ). **CONCLUSION:** Results of this study indicate that an 8-week teacher guided active play intervention improved FMS acutely; however teachers were unsuccessful at maintaining implementation at follow-up. The results highlight the need to develop preschool curriculum that incorporates active play designed to reinforce FMS instruction across the school year.

**P98: PANDEMIC-RELATED CHANGES IN CHILD WEIGHT STATUS AND GRADE-LEVEL READING ATTAINMENT**

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**BACKGROUND:** The relationship between childhood obesity and learning outcomes is unclear but suggestive of an association, particularly in early childhood. COVID-19 created an environment contributing to rapid weight gain and reductions in grade-level reading (GLR) attainment in youth, with the greatest increase in obesity and learning loss occurring in elementary school children. **PURPOSE:** To document the impact of COVID-19 on youth weight status and GLR attainment in elementary school children across a mid-sized city and to explore the association between weight gain and reductions in GLR within this cohort. **METHODS:** Child weight status and school-level GLR attainment scores were collected from Roanoke city public elementary schools in 2019 ( $n = 5,196$ ) and 2021 ( $n = 5,064$ ).

Objective measures of BMI-for-age were assessed via the FitnessGram Test Battery; GLR attainment was evaluated as a function of "Standards of Learning" pass rates by school. Descriptive analyses were used to document change in local prevalence rates of child weight status and GLR attainment. Correlation was used to explore the relationship between change scores in child weight status and GLR attainment across elementary schools from 2019 to 2021. **RESULTS:** As a result of the pandemic, the prevalence of child obesity increased from 23% (2019) to 28% (2021) and GLR attainment declined from 65% (2019) to 50% (2021). No relationship was observed between change scores in child weight status and GLR attainment from 2019 to 2021, ( $r(15) = -0.16, p = .54$ ). **CONCLUSION:** As the first-known study to document pandemic-related changes in child weight status and GLR attainment across an entire mid-sized city, unfavorable trends were observed in both indicators. While the association between learning attainment and child weight status was not significant, findings suggest a need for targeted interventions to address the negative consequences of the pandemic on elementary school children.

**P99: METABOLIC SYNDROME SEVERITY SCORES INCREASE ACROSS ADOLESCENCE: LONGITUDINAL DATA FROM THE RIGHT TRACK HEALTH STUDY**

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**BACKGROUND:** Metabolic syndrome (MetS) occurs at increasingly younger ages, but there are no standardized definitions or cut points for MetS diagnosis in adolescents. To alleviate this issue, sex and race-specific MetS severity scores (MetS-SS) were developed to provide a single score that encompasses the unique contribution of individual MetS components for future risk of cardiovascular disease (CVD) (scores; -1-0=low risk, 0-1=some risk, 1-2=high risk). Longitudinal data on MetS-SS across adolescence is lacking; thus, we investigated the change in MetS-SS from age 16-19 (mid- to late adolescence).

**METHODS:** Adolescents (59.2% female; 66.7% White) were assessed at 3 time points; individuals with serum biomarkers were included in analyses (T1=16.6 yrs, N=133; T2=17.6 yrs, N=118; YA=19.4 yrs, N=211). Fasted blood samples were collected, and serum analyzed using either multiplex or commercially available ELISAs. MetS-SS were calculated as outlined by Gurka *et al.* (2012), using appropriate sex and race/ethnicity specific equations. Descriptive and correlational analyses were completed in SPSS, with significance set at  $p < .05$ .

**RESULTS:** Across late adolescence, mean height changed little ( $\sim 170 \pm 10$  cm), but mean weight (T1=69.5 $\pm$ 19; T2=71.2 $\pm$ 16.3; YA=76.6 $\pm$ 21.8 kg) and BMI (T1=23.7 $\pm$ 5.6; T2=24.5 $\pm$ 5.1; YA=25.9 $\pm$ 6.5 kg/m<sup>2</sup>) increased steadily. MetS-SS ranged from -2.25 to 3.15 across ages, with the mean score increasing across time (T1=-.33 $\pm$ .72; T2=-.25 $\pm$ .81; YA=-.07 $\pm$ .83). At age 16, 70% of participants were at low risk, 26.3% at some risk, and 3.8% at high risk of early CVD, respectively. At T2, 62.7% of participants were low risk, 29.7% had some risk and 7.6% had high risk. By YA, only 55.9% of participants were at low risk, 32.2% had some risk, and 11.8% were at high risk. MetS-SS were positively correlated with CRP ( $r = .24-.41, p < .01$ ) and uric acid ( $r = .23-.38, p < .01$ ), but negatively correlated with VO2max (ml/kg/min;  $r = -.25$  to  $-.29, p < .05$ ). **CONCLUSIONS:** Within our longitudinal cohort, participants show increasing levels of MetS-SS across adolescence, indicating progressively higher cardiometabolic risk burden and increasing risk for poor cardiovascular health outcomes.

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**P100: CHANGE IN DAILY STEPS IN A REMOTE DELIVERED PROGRAM IN OLDER ADULTS WITH CHRONIC PAIN.**

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The experience of chronic pain is both a cause and consequence of excess sitting and insufficient volume of physical activity (PA). The Mobile Intervention to Reduce Chronic Pain and Improve Health-II (MORPH-II) trial aimed to develop a remote PA intervention focused on moving more, more often to meet the unique needs of older adults with chronic pain. The purpose of this study was to identify trajectories of change in daily Fitbit-measured steps among MORPH-II intervention participants. **METHODS:** Men and women from across North Carolina were randomly assigned to a 12-week remote group-mediated physical activity intervention (MORPH) or a minimal contact control. The MORPH condition received an iPad equipped with Zoom and a study-specific mHealth app, a Fitbit, and wireless scale. Participants engaged in weekly small group meetings led by a professional behavioral coach via Zoom. Real-time Fitbit and scale data were integrated into a set of mHealth tools based in social cognitive theory designed to enhance social connection and to promote movement throughout the day.

Participants completed the PROMIS 8-item pain interference scale at week 0 and week 12 via phone. We fit a series of multilevel models to investigate trajectories of change in steps among those in the MORPH condition and whether these trajectories are affected by pain interference. **RESULTS:** Participants (N=21) were 68.62  $\pm$  8.21 years of age on average, 81% white, and 76.2% female. The best fitting model explained 39.0% variance between participants and 3.1% variance within participants. This model was adjusted for age and included a three-way interaction between quadratic day in the study, baseline pain interference, and change in pain interference ( $B = -0.031, p = 0.002$ ). Plotting of predicted values indicated that lower baseline pain interference was associated with greater steps overall and that individuals tended to increase steps over time in response to the program, except for those with low baseline pain interference that improved. **CONCLUSIONS:** These results underscore that an intervention focused on using movement to manage pain symptoms appears effective for increasing steps among those challenged by pain interference, and alternative techniques are required for those for whom pain does not interfere with daily life.

**P102: EXERCISE, BUT NOT WINE, IMPROVES GLYCEMIC CONTROL IN INSULIN-RESISTANT PARTICIPANTS**

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**Background:** Alcohol increases insulin secretion in response to ingested glucose and exercise enhances insulin sensitivity; therefore, we tested the hypothesis that the combination of wine and exercise would enhance glycemic control in insulin-resistant participants. **Methods:** Eight participants (6 female, 2 male; 4 with type 2 diabetes, 4 with pre-diabetes) completed four different 1-week treatment periods consisting of no alcohol and no exercise (CON), daily red wine (14 g ethanol) with dinner and no exercise (WINE), no alcohol and daily exercise (60 min at 55% heart rate reserve; EX), or daily wine with dinner and daily exercise (WINE + EX). During the last three days of each treatment period, each participant wore a continuous glucose monitor to record blood glucose data. **Results:** Average blood glucose levels over each 3-day period were 140  $\pm$  5.9, 139  $\pm$  5.1, 128  $\pm$  5.3, 130  $\pm$  7.4 mg/dl for CON, WINE, EX, and WINE + EX treatments, respectively. Exercise lowered average glucose level ( $p = 0.01$ ). The percentage of time with blood glucose higher than 130 mg/dl was 62  $\pm$  8.6% for CON, 58  $\pm$  9.8% for WINE, 39  $\pm$  8.6% for EX, and 45  $\pm$  9.2% for WINE + EX, indicating a significant effect of exercise ( $p < 0.01$ ). **Conclusions:** These results suggest that one week of exercise lowers both average blood glucose levels and the fraction of time spent above 130 mg/dl in this group of insulin-resistant participants. Daily wine consumption did not affect glycemic control. Supported by Transylvania University

**P103: EVIDENCE-BASED CLASSIFICATION: VALID MEASURES OF IMPAIRMENT IN POWER SOCCER**

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**BACKGROUND:** The International Paralympic Committee (IPC) encourages participation in sport by ensuring athletes with varied impairments are selected and grouped appropriately to minimize the effect of impairment on sport outcomes. To accomplish this goal, all sport governing bodies within the IPC must have a classification system that is evidence-based to determine an athlete's eligibility and grouping for sport competition. The purpose of this study was to identify and examine the measurement properties of prospective classification assessments for the sport of Power Soccer. **METHODS:** Thirty-six power soccer athletes ( $M_{Age} = 25 \pm 15$  yrs,  $M_{Experience} = 7 \pm 7$  yrs) with severe physical impairments (i.e., cerebral palsy, muscular dystrophy, spinal cord injury, spinal muscular atrophy) completed multiple tests of impairment and performance selected from previously identified domains. IRB and informed consent were obtained prior to the study. **RESULTS:** Acceptable inter-rater reliability (via ICC) was demonstrated on multiple tests of impairment, including functional dexterity (1.0), opposite pinch (0.78), lateral pinch (0.87), cervical range of motion (0.92), cervical extension force (0.84), lateral force (0.89), and total force (0.89). Performance tests (reverse slalom, spider, Figure 8) also demonstrated acceptable inter-rater reliability (0.97 to 0.99) with good test-retest reliability for some items (reverse slalom, Figure 8, total time). **DISCUSSION:** Test items selected from previously identified domains (determinants) were a good first step to meet the IPC recommendations of developing/identifying valid, objective, ratio-scaled measures of impairment and performance. These data support Step 3 (of 5) in the IPC process of developing an evidence-based classification system for the sport of power soccer, a game designed for individuals with impairment severity that mandates the use of a power wheelchair (or electric wheelchair) for sport.

**P104: ABSTRACT WITHDRAWN****P105: FEASIBILITY OF A HYBRID DELIVERY OF HOME-BASED RESISTANCE TRAINING IN LUNG CANCER**

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**BACKGROUND:** Individuals with non-small cell lung cancer (NSCLC) are burdened by long-lasting symptoms post-treatment. These symptoms often reduce physical activity levels and increase the risk of functional decline and development of comorbidities such as cardiovascular disease. Symptom-generated reductions in exercise capacity can lead to exercise avoidance, ultimately resulting in accelerated deconditioning and a poor overall prognosis following treatment. Exercise interventions tailored towards lung cancer survivors should therefore aim to mitigate symptoms impacting exercise capacity (e.g., dyspnea and fatigue). The purpose of this study was to investigate the feasibility and acceptability of a hybrid-delivery home-based cluster-set resistance training program in individuals with NSCLC. **METHODS:** This study aimed to recruit individuals with NSCLC stage I-III following primary treatments to participate in 8-weeks of home-based resistance training, 3 days per week. The program included supervised sessions in the participants' home and virtual supervision via video conferencing. The primary outcome measure of feasibility was evaluated through retention and intervention fidelity (proportion of exercise completed, relative to what was prescribed). Intervention acceptability was assessed using a 4-point Likert-type scale from "Strongly disagree" to "Strongly agree" to rate the acceptability of intervention components. **RESULTS:** Fourteen participants were recruited over a 6-month period, with 11 completing the intervention (2 withdrew due to unrelated illness, 1 withdrew due to being on active treatment), yielding a retention rate of 79%. Characteristics of the participants who completed the intervention (n=11) were: 71 ± 10 years; mean BMI 29.1 ± 6.5. Average time (months) since diagnosis was 62 ± 51. Of completers, 27% were male, and 36% were Black, 10 were stage I (91%) and one was stage

II (9%). Mean session attendance was 86.4 ± 9.5%. Mean intervention fidelity was 83.1 ± 13.1%. With regards to acceptability, > 90% of participants highly rated all aspects of the intervention delivery (i.e., ease and quality of virtual delivery, level of difficulty, and home-based approach). No adverse events related to exercise were recorded. **CONCLUSIONS:** The hybrid delivery of a home-based resistance exercise program for individuals previously treated for NSCLC was found to be safe and feasible. Adaptations to the program for future interventions are required, particularly surrounding resistance exercise programming, and intervention delivery with home visits.

**P106: A PILOT STUDY: ACCELEROMETER AND RPE DATA REDUCTION METHODS MEASURING MUSCLE OSCILLATION WITH COMPRESSION GARMENTS?**

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**BACKGROUND.** Compression garments have been increasing in popularity in several activities including running. These garments are used to compress the muscles to enhance recovery and performance by reducing muscle oscillations when striking the ground. Due to this nature of the benefits gained from garments it has been tied to enhancing performance in several activities. The purpose of this study was to explore data reduction methods of muscle oscillation (MO) and the rate of perceived exertion (RPE) during a 40-minute submaximal run. **METHODS.** A pilot study was conducted to assess feasibility of collecting acceleration data to analyze MO during running with compression garment. One female participant ran for 40 minutes while wearing compression garments (COMP) or loose-fitting shorts (CON). The participant selected a pace to run at for the trials by blindly increasing speed until they reached a comfortable training pace. She was equipped with accelerometers to track muscle oscillation on the anterior and posterior of thigh and shank. Data was recorded every 5 minutes throughout the 40-minute run. RPE was measured using Borg's Rating of Perceived Exertion Scale and was collected at the same time as acceleration. Accelerometer data was reduced in two separate ways. Method 1 averaged the peak acceleration recorded during 5 strides for each data set collected. Method 2 performed an FFT and averaged amplitude across 0-60Hz for each data set. Both variables were averaged across all collections and compared between CON and COMP. Averages and percent reduction were assessed for feasibility of technique. **RESULTS.** Average MO of method 1 was reduced from 4.71g during CON to 4.03g during COMP, which is a total decrease of 14.4%. Average MO of method 2 was reduced from 39.9g during CON to 15.32g during COMP, which is a total decrease of 61.6%. Similarly, RPE was reduced from CON (10.5) and COMP (10.13). **CONCLUSION.** Upon assessing the results of the two methods of data reduction, it appears that using the FFT to assess a reduction in MO may overestimate the average amplitude. Using the maximal acceleration recorded of 5 strides seems more reliable data and produces a more reasonable difference in conditions. It also appears RPE can safely be collected and averaged across all timepoints to represent each 40-minute run.

**P107: ACTIVATION PATTERNS OF GLUTEAL AND THIGH MUSCLES IN CLASSICALLY TRAINED BALLET DANCERS**

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**BACKGROUND:** Ballet dancers are prone to fatigue-related hip injuries. They complete most of their training following a strenuous 30-minute barre warm-up. A lack of literature exists in evaluating the effects of the barre's fatigue and changes in peak muscle activation patterns in movements that increase pressure within the hip joint. **METHODS:** Five participants (20.2±1.3 yrs; 165.4±7.3 cm; 58.8±7.9 kg) with prior ballet training were recruited through a collegiate dance company, with exclusion criteria being any other prior hip injury or surgery. Muscle activation was measured bilaterally on gluteus maximus, gluteus medius, sartorius, and biceps femoris via surface electromyography (EMG). A percentage of voluntary muscle contraction (%MVIC) on both the dominant and nondominant sides during two ballet movements, a grand ronde jambe en l'air (RJ) and a grand battement en croix (GB) were recorded both before and following a standardized 30-minute barre. Video recording was used to identify the phases of each movement. **RESULTS:** The movements were analyzed using a repeated measures factorial ANOVA with Tukey post hoc analysis of statistically significant results. Muscle activation was significantly greater pre- vs. post-testing in the GB (F(1,2519)=5.69, p=0.02), but not in the RJ (F(1,623)=0.83, p=0.36). Muscle activation of the gluteus medius was significantly greater than gluteus maximus in both the RJ (t= -9.20, p<0.001) and the GB (t= -16.31, p<0.001). Planned comparisons in muscle

activation between similar phases in the GB were not statistically significant ( $t = -0.80-0.13$ , all  $p = 1.00$ ). **CONCLUSIONS:** There was an increase in muscle activation in GB movements before the barre but not in the RJ movement regardless of being before or after the barre. Repetitive external rotation of the leg within movements performed may account for the differences in the activation of gluteus medius and maximus. A lack of statistical significance within phases of nearly identical movement in the GB supports the theory that internal cues and coaching for completing the movement are different depending on the phase. There is no difference in the resulting peak muscle activation experienced thus, this would support current practices in how the instruction of this movement occurs. Further research with a larger participant count and including other similar movements can further evaluate how fatigue impacts these movements.

**P108: GAIT MECHANICS IN PEOPLE WITH CLINICALLY DIAGNOSED HYPERMOBILITY EHLERS DANLOS SYNDROME**

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**BACKGROUND:** Hypermobile Ehlers Danlos Syndrome (hEDS) is a heritable connective tissue disorder that affects muscle function yet the impact of hEDS on gait mechanics is not well understood. Therefore, the purpose of this study was to assess gait mechanics in people with and without hEDS. **METHODS:** Eleven people with hEDS were matched to 11 asymptomatic controls (CONT). Participants underwent a 3D gait analysis while walking on an instrumented treadmill at a self-selected speed. Between-group differences in sagittal plane hip, knee and ankle joint kinematics and internal moments were evaluated using independent t-tests (Microsoft Excel;  $p < 0.05$ ). **RESULTS:** The hEDS ( $0.89 \pm 0.27 \text{ m}\cdot\text{s}^{-1}$ ) and CONT ( $0.89 \pm 0.21 \text{ m}\cdot\text{s}^{-1}$ ) groups walked at similar speeds ( $p = 1.0$ ). Despite a lack of between-group differences in joint kinematics ( $p > 0.05$ ), the hEDS group walked with lower peak hip extensor moments (CONT:  $-0.98 \pm 0.46 \text{ Nm}\cdot\text{kg}^{-1}$ , hEDS:  $-0.52 \pm 0.28 \text{ Nm}\cdot\text{kg}^{-1}$ ,  $p = 0.01$ ) and knee flexor moments (CONT:  $-0.60 \pm 0.38 \text{ Nm}\cdot\text{kg}^{-1}$ , hEDS:  $-0.32 \pm 0.17 \text{ Nm}\cdot\text{kg}^{-1}$ ,  $p = 0.04$ ) during loading response as well as lower ankle plantarflexor moments (CONT:  $-1.85 \pm 0.65 \text{ Nm}\cdot\text{kg}^{-1}$ , hEDS:  $-1.34 \pm 0.25 \text{ Nm}\cdot\text{kg}^{-1}$ ,  $p = 0.03$ ) during terminal stance. Also, 73% of the hEDS participants self-reported a high incidence of hip joint subluxations as well as a moderate level of hip pain (4/10) during walking. **CONCLUSIONS:** People with hEDS ambulate with similar walking speeds and joint kinematics as healthy controls yet people with hEDS walk lower peak hip extensor, knee flexor, and ankle plantarflexor moments. Our data may indicate an altered gait strategy in hEDS to prevent incidence of hip subluxations and hip pain. Lower peak hip extensor and knee flexor moments during loading response may suggest a compensatory strategy to offload the hip joint in order to prevent hip subluxations and hip pain. Prior work demonstrated that walking with higher foot push-off (i.e. higher plantarflexor force) reduces the anterior hip joint contact force. Reduced plantarflexor moment during terminal stance in the hEDS group may result in higher anterior hip joint contact forces leading to the moderate hip pain reported by the hEDS group during walking (Lewis & Garibay, 2015). Our study results suggest that a rehabilitation program encompassing posterior chain strengthening and gait retraining may lead to optimized gait mechanics and help to reduce incidence of hip subluxation and hip pain during walking in people with hEDS. This research was supported in part by the University of Department of Kinesiology and Health Promotion Graduate Student Research Funding and NIH - K01AG073698-01 (Samaan)

**P109: LOWER EXTREMITY JOINT LOADING IS ALTERED IN PEOPLE WITH MARFAN SYNDROME DURING A SIT-TO-STAND TASK**

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**BACKGROUND:** Marfan syndrome (MFS) is an autosomal dominant connective tissue disorder that negatively impacts the musculoskeletal system. Previous work has shown decreased quadriceps/hamstring strength in people with MFS compared to healthy individuals. However, the impact of MFS on activities of daily living such as a sit-to-stand (STS) are not well understood. The purpose of this study was to evaluate joint loading in people with MFS during a STS task. We hypothesize that people with MFS will perform the STS task with abnormal knee joint loading. **METHODS:** Ten people with MFS (20 limbs, 9F, age:  $36.5 \pm 7.54$  yrs) were age, sex and BMI-matched to 10 healthy asymptomatic individuals (20 limbs, 9F, age:  $29.5 \pm 7.34$  yrs). Participants were asked to perform 5 repetitions of the STS task at a self-selected pace starting from a seated position. Peak internal hip, knee and ankle joint extensor moments ( $\text{Nm}\cdot\text{kg}^{-1}$ ), the total support moment (TSM;  $\text{Nm}\cdot\text{kg}^{-1}$ ) and the hip, knee and ankle joint percent contributions to the TSM during the STS task were assessed. In order

to account for the correlation between right and left limbs (bilateral samples), a linear mixed model was used to assess group differences in lower extremity joint loading parameters ( $p < 0.05$ ). **RESULTS:** Compared to healthy individuals, people with MFS exhibit 1.12x higher peak ankle plantarflexor moment ( $p = 0.002$ ), 1.34x higher TSM ( $p = 0.002$ ), 6.3% less hip contribution to TSM, and 9.6% higher ankle contribution to TSM ( $p = 0.007$ ). No differences were observed in hip and knee joint moments or the percent knee joint contribution to the TSM ( $p > 0.05$ ). **CONCLUSIONS:** People with MFS perform the STS task utilizing altered joint loading patterns compared to healthy individuals. The overall increase in TSM in people with MFS indicates a higher lower extremity muscular demand to successfully perform the STS task. In order to successfully perform the STS task, the MFS group utilized a larger ankle joint contribution to the TSM and higher plantarflexor moment to compensate for the lower hip joint contribution to the TSM. Our study results suggest altered lower extremity mechanics during a STS task in people with MFS that may be associated with abnormal hip and ankle muscle function. Future work will focus on understanding the role of the hip and ankle joint musculature on lower extremity joint loading patterns in people with MFS.

**P110: LIMITS OF POSTURAL STABILITY IN VARIOUS OCCUPATIONAL FOOTWEAR**

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**BACKGROUND:** Falls are one of the leading causes of both fatal and non-fatal injuries in the occupational population. While footwear is well known to impact postural stability, occupational footwear is designed for safety and can have design features that limit postural stability. The purpose of this study was to examine the effects of various occupational footwear on limits of postural stability. **METHODS:** Twenty healthy males and females [age:  $21 \pm 1.2$  years, height:  $178 \pm 8.3$  cm, mass:  $84 \pm 14.9$  kg] performed the limits of stability (LOS) test on the BTrackS™ balance plate in eight different footwear conditions [barefoot, steel-toed work boot, tactical work boot, slip resistant shoes, standard military boot, minimalist military boot, firefighter's boot and participant's shoes]. The barefoot condition was performed first while the remaining seven were counterbalanced among participants. A one-way repeated measures ANOVA was performed with footwear conditions as independent variables and LOS score as the dependent variable with alpha level set at 0.05. **RESULTS:** A significant main effect difference between footwear types was present ( $p < 0.001$ ) for the LOS score. Pairwise comparisons revealed that barefoot demonstrated greater LOS scores than the rest of the footwear, with significantly greater LOS scores than the tactical work boot, minimalist military boot, and firefighters' boot. The tactical work boot demonstrated significantly lower LOS scores than barefoot, steel-toed work boot, slip resistant shoes & standard military boots. The firefighters' boot demonstrated significantly lower scores than all other footwear conditions. **CONCLUSION:** Results revealed that footwear type influenced participant's limits of postural stability, during the volitional unconstrained postural sway exploration of the LOS test, with greater LOS scores indicating greater limits of postural stability. Findings also suggest greater limits of postural stability in barefoot compared to other footwear conditions, which can be attributed to the availability of greater proprioceptive feedback and the decreased restriction from footwear allowing greater range of motion at the ankle. Among the occupational footwear, the firefighter and tactical work boot's design features of an elevated boot shaft and softer midsole design features might have contributed to the lower limits of postural stability. Findings offer suggestions for occupational footwear design.

**P111: LOWER EXTREMITY SAGITTAL PLANE KINEMATICS IN NON-SLIP SOCK DURING GAIT**

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**BACKGROUND:** Lower extremity kinematic patterns are vital for locomotive and balancing tasks. Deviations within sagittal plane kinematics can induce falls in at-risks population. Podiatric devices, such as non-slip socks, have been used as an alternative method to reduce the likelihood of falls on floors. Thus, this study examined ankle and knee kinematics during self-selected walking pace. **METHODS:** 13 participants walked under three randomized footwear conditions, barefoot (BF), traditional non-slip socks (HS), and compressed non-slip socks with an arch band (ANS). Sagittal plane ankle and knee kinematics were averaged amongst three successful trials under each condition. A series of repeated measures ANOVA was conducted to

investigate the magnitude of sagittal plane ankle kinematics at foot contact, midstance, and toe off. RESULTS: The results displayed significance at toe-off amongst the footwear conditions ( $F(2,22) = 5.202$ ;  $p = .011$ ;  $\eta^2 = .321$ ). Follow-up comparisons displayed a main effect between ANS and HS ( $p = .006$ ) and no significant difference between ANS and BF ( $p = .162$ ) nor BF and HS ( $p = .149$ ). CONCLUSIONS: The significant difference at toe off between ANS and HS suggests that the participants showed a higher confidence in the ability of the ANS for propulsion. Further studies will investigate the influence of AHS on various other lower extremity kinematic and kinetic gait patterns, in addition to the potential of reducing falls in at-risk populations.

#### **P112: SHOE COLLAR HEIGHT AFFECTS GROUND REACTION FORCES AND ANKLE LANDING BIOMECHANICS IN COLLEGIATE VOLLEYBALL PLAYERS**

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BACKGROUND: Shoe collar height has been shown to influence ankle biomechanics during dynamic sport movements. In volleyball specifically, the effect of shoe collar height on ankle biomechanics are not well understood. Additionally, the magnitude to which volleyball shoe collar height affects inter-limb mechanics is inconclusive. The purpose of this research was to compare ground reaction forces (GRF) and ankle biomechanics during unilateral landing with different shoe collar heights in both limbs. It was hypothesized that participants would exhibit reduced initial contact, peak dorsiflexion and eversion angles and peak plantarflexion and inversion moments while wearing mid-cut (MC) shoes in the non-dominant limb (NDL). It was also hypothesized that vertical and posterior directed GRF would be greater while wearing MC shoes in the NDL. METHODS: Seventeen female collegiate volleyball players ( $20.12 \pm 1.32$  years) performed unilateral landings on each limb in both MC and low-top (LT) versions of the same shoe (Crazyflight, Adidas AG, Herzogenaurach, Germany). Participants landed from a 30 cm high box placed 40% of the participants height from the leading edge of a force plate. GRF were collected using AMTI force plates (2400 Hz) and ankle joint kinematics with a Qualisys motion capture system (240 Hz), and ankle joint kinetics were computed. A two-way repeated measures ANOVA with Bonferroni corrections was performed to compare shoe and limb conditions. RESULTS: An interaction was found for peak lateral GRF ( $p = 0.012$ ), and post-hoc analysis revealed greater medial GRF for the NDL in the MC shoe compared to the LT ( $p = 0.003$ ). A significant shoe main effect was found for peak medial GRF ( $p = 0.017$ ), peak dorsiflexion angles ( $p = 0.038$ ), and peak plantar flexion moments ( $p = 0.019$ ). A main effect of limb was found for peak inversion and eversion angles ( $p = 0.001$ ,  $p = 0.008$ ). CONCLUSIONS: Participants landed with greater medially directed GRF, reduced dorsiflexion angle, and greater plantarflexion moment in the MC shoes. In the NDL, participants landed with greater peak eversion angle and smaller inversion angles. Previous literature has associated reduced dorsiflexion range of motion (ROM) to ACL injury risk. These results suggest MC shoes reduce dorsiflexion ROM and alter frontal plane GRF while the NDL experienced laterally directed frontal plane ROM which may have implications for loading and injury risks at more proximal joints.

#### **P113: EXAMINATION OF GAIT PARAMETERS IN VARIOUS NON-SLIP SOCKS**

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BACKGROUND: Non-slip socks are often used to combat falls within clinical settings. However, these socks are often ill-fitting and result in poor foot-to-sock interface. Thus, the purpose of this project was to compare gait measures between barefoot (BF), typical non-slip socks (HS), and non-clip socks with a compressive arch (ANS). It was hypothesized that the ANS gait would present better Center of Pressure Path Efficiency (CoPPE), less stance time (ST) and walking velocity ( $v$ ) indicating better balance during gait. METHODS: Twenty participants volunteered to complete an IRB approved study. Participants walked under three randomized footwear conditions, BF, HS, and ANS at a self-selected speed across an instrumented walkway (Protokinetics LLC, Havertown, PA, USA). Three repeated measures ANOVAS were conducted to examine the difference of CoPPE, ST, and  $v$  under the footwear conditions. RESULTS: The results revealed no significant differences in CoPPE ( $F(1,015, 19.291) = 1.312$ ,  $p = .281$ ,  $\eta^2 = .065$ ), stance time ( $F(1,997, 37.941) = .565$ ,  $p = .556$ ,  $\eta^2 = .03$ ) nor  $v$  ( $F(1,551, 29.476) = 2.423$ ,  $p = .102$ ,  $\eta^2 = .113$ ). CONCLUSIONS: Although no significant differences were found between footwear conditions, CoPPE and  $v$  were largest during the ANS condition, suggesting that the arch support may positively influence gait. Future research will investigate the influence of socks with complex,

supportive components on individuals that have decrements in balance or have sustained a recent lower extremity injury.

#### **P114: TACTICAL BOOTS MODIFIED WITH ENERGY RETURN PLATES REDUCE WALKING GAIT ASYMMETRIES**

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BACKGROUND: Energy return plate (ERP) technology has been implemented in a variety of footwear to improve human locomotion, with a recent research interest in utilizing ERPs in tactical boots to improve gait and reduce injuries. However, inter-limb asymmetries when using these modified boots are overlooked; thus, this study aimed to evaluate the inter-limb walking gait of participants wearing modified tactical boots with different ERPs. METHODS: Eleven healthy males college students were recruited to complete six successful walking trials (three over AMTI force platforms; three over an instrumented gait mat: Protokinetics LLC, Havertown, PA, USA) under four conditions: barefoot (BF); stock army boot (SB); modified army boot with 0.19mm ERP (ERP19); modified army boot with 0.30mm ERP (ERP30). Participants were provided a 5-minute acclimatization period between each condition. Repeated measures ANOVA with significance  $p < 0.05$  was executed using SPSS (Version 27, IBM, Armonk, NY) to determine the differences in walking peak vertical force, stride velocity (SV), and stride length (SL) where each side's SL had that respective foot contact twice. RESULTS: Results showed no significant differences in peak vertical force between boot conditions. There were significant differences in both legs' (system) SV between boot conditions (SB and ERP19:  $F_{(1,10)} = 8.795$ ,  $p = 0.014$ ; SB and ERP30:  $F_{(1,10)} = 5.672$ ,  $p = 0.039$ ; ERP19 and ERP30:  $F_{(1,10)} = 12.919$ ,  $p = 0.005$ ), but not when comparing each leg's SV across boot conditions. There were no significant differences between system's SL of SB and either ERP19 or ERP30 conditions. When comparing left and right leg's SLs for each condition, there were significant differences in the SB ( $F_{(1,10)} = 5.22$ ,  $p = 0.045$ ) and ERP19 ( $F_{(1,10)} = 6.021$ ,  $p = 0.034$ ), but not in BF and ERP30. Inter-legs' SL asymmetry difference reduced with ERP30 ( $0.201 \pm 1.246$  cm), while it increased with SB ( $0.453 \pm 0.657$  cm) and ERP19 ( $0.667 \pm 0.901$  cm) compared to BF ( $0.446 \pm 0.810$  cm). CONCLUSION: Inter-legs' SV remained the same while SLs were different, suggesting time in a walking stride must also be different. ERP30 properties appear to reduce inter-leg's SL asymmetries while walking, which can be useful for evaluating patterns of injuries related to lower-limb gait. Further research is warranted to specify the reason for these asymmetries and if there is a positive or negative impact on the motion.

#### **P115: INFLUENCE OF A PRE-COUNTERMOVEMENT ARM SWING ON HORIZONTAL AND VERTICAL JUMPING**

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BACKGROUND: Research has demonstrated the latissimus dorsi has a pivotal role in engaging passive components for increase force production. Therefore, the purpose of this project was to evaluate the role of a pre-counter movement arm swing on force production. METHODS: Forty (20 males, 20 females) recreationally active individuals (Age =  $21 \pm 2.0$  years) were recruited to participate in this study. Kinetic data was recorded using two AMTI force plates, sampling at 1000 Hz. Participants performed a self-selected warm-up in preparation for twelve maximum effort jumps. Participants performed 6 total maximal vertical jumps and 6 maximum horizontal jumps with randomly assigned arm swing conditions. Condition 1 required the participant to perform a usual counter movement jump without a pre counter movement arm swing and with both feet on each force plate. Condition 2 required the participant to perform multiple typical arm swings prior to the initiation of the counter movement and the subsequent jump. Kinetic data were imported into Visual3D for the reduction of peak ground reaction force during the propulsive phase of the jump. Analyses included 1 (peak force) x 2 repeated measures (arm swing condition) ANOVA's. RESULTS: The results indicated significant differences in peak anterior ground reaction force between the pre-counter movement arm swing and no pre-counter movement arm swing conditions for horizontal jumping ( $294.7 \pm 105.5$  vs.  $303.1 \pm 108.1$  N,  $p = .023$ ). No significant differences between the pre-counter movement arm swing and no pre-counter movement arm swing conditions in peak vertical ground reaction forces for either vertical ( $850.4 \pm 226.7$  vs.  $861.9 \pm 215.9$  N,  $p = .488$ ) nor horizontal ( $757.5 \pm 171.9$  vs.  $771.8 \pm 172.0$  N,  $p = .063$ ) jumping. CONCLUSIONS: In summary, this study reveals an influence of preparatory latissimus dorsi activation on jumping performance kinetics potentially through increased pelvic stability. This pre-counter movement arm swing technique may provide practical benefits in sprinting activities, such as

baserunning, that prioritize ground reaction force generation in the anterior direction.

**P116: HIPS DON'T LIE: HIP POTENTIATION CONTRIBUTES TO JUMP HEIGHT ENHANCEMENT IN CHILDREN**

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**BACKGROUND:** Achievement of an optimal stretch shortening cycle (SSC) potentiation leads to greater sport performance. During jump test, a quick countermovement-initiated jump (CMJ) or drop jump (DJ), which is a jump preceded by a drop off from a height, is compared to a jump where a static squat is held for 2-3 seconds before the jump occurs (SJ). It is unknown which potentiation of specific lower extremity joint lends greatest to enhanced jump height (JHt) in children. Such information can yield insight into joint-specific rehabilitation to improve JHt as well as increased accuracy in clinical decision making for risk and return to sport assessment. Thus, we examined the relationship between JHt potentiation and lower extremity joint-specific potentiation using a) extensor moment and b) propulsive power. **METHODS:** A rigid body model with 36 reflective markers and floor-embedded force plates was used to collect jump data in typically developing children (N=20; age = 8-14 years). Participants performed 3 trials of CMJ and DJ after familiarization. JHt from each trial was calculated from the greater trochanter marker data. JHt and joint-specific propulsive power potentiation and extensor moment as the ration of a) CMJ/SJ and b) DJ/SJ at the hip, knee, and ankle. All the moments and powers were normalized for body weight for analyses. **RESULTS:** Positive relationships between CMJ/SJ JHt and a) CMJ/SJ hip moment ( $r = 0.548$ ;  $p = 0.012$ ), and b) CMJ/SJ hip power ( $r = 0.547$ ;  $p = 0.013$ ) were noted. Positive relationship between DJ/SJ JHt and CMJ/SJ hip power ( $r = 0.525$ ;  $p = 0.021$ ) was found. No other relationships were noted. **CONCLUSIONS:** Greater potentiation of power and moment at the hip is associated with an enhanced JHt performance for different types of jump such as CMJ and DJ. Our data shows that the hip joint during different types of jumps has greater significance than that of knee or ankle. Whether increased contribution of hip potentiation toward enhanced jump performance occurs due to its greater involvement for balance and trunk control in prepubescent children remains to be examined.

**P117: HIP BUT NOT KNEE AND ANKLE STRATEGIES IMPROVE JUMP HEIGHT DURING INCREASINGLY CHALLENGING JUMP CONDITIONS**

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**BACKGROUND:** Stretch shortening cycle (SSC) potentiation is critical for greater sports performance. During jump test, a quick countermovement-initiated jump (CMJ) or drop jump (DJ) (jump preceded by a drop off from a height) is compared with a jump where a static squat of 2-3 seconds is maintained before the jump occurs (SJ). It is unknown if scaling of jump height (JHt) with increasing level of SSC potentiation is achieved by differential lower extremity joint-specific strategy. Thus, we examined the relationships of JHt potentiation with lower extremity joint-specific potentiation of a) extensor moment and b) propulsive power. **METHODS:** We used a rigid body model, using 36 reflective markers, and floor-embedded force plates to collect jump data in typically developing children ( $n = 20$ ; age = 8 - 14 years). After familiarization, participants performed 3 trials of 3 jump types: CMJ, SJ, and DJ. JHt was calculated from the greater trochanter marker data. JHt, and joint-specific extensor moment and propulsive power potentiation were calculated as the ratio of a) DJ/CMJ, b) CMJ/SJ, and c) DJ/SJ at the hip, knee, and ankle. Scaling relationship was examined via spearman correlation coefficients between increasing level of SSC potentiation conditions and a) JHt and b) joint-specific potentiation of extensor moment and propulsive power. **RESULTS:** Positive scaling of potentiation of JHt ( $r = 0.629$ ;  $p < 0.001$ ), hip moment ( $r = 0.437$ ;  $p = 0.001$ ) and hip power ( $r = 0.495$ ;  $p < 0.001$ ) and a negative scaling of potentiation of knee power ( $r = -0.276$ ;  $p = 0.041$ ) occurred. Scaled potentiated JHt was positively correlated with scaled hip moment ( $r = 0.502$ ;  $p < 0.001$ ) and hip power ( $r = 0.696$ ;  $p < 0.001$ ), and negatively correlated with scaled ankle moment ( $r = -0.293$ ;  $p = 0.03$ ), knee moment ( $r = -0.348$ ;  $p = 0.009$ ), and knee power ( $r = -0.340$ ;  $p = 0.011$ ). Negative correlation existed between CMJ/SJ knee power and hip power ( $r = -0.456$ ;  $p = 0.05$ ) while positive correlation was found between CMJ/SJ ankle power and knee power ( $r = 0.668$ ;  $p = 0.002$ ). Separate linear regression analysis showed that scaled hip moment and power were the only predictors of scaled potentiated JHt ( $r = 0.533-0.661$ ;  $p < 0.001$ ). **CONCLUSIONS:** Scaling of extensor moment and propulsive power of only the hip potentiation predicted scaled JHt enhancement

**P118: EFFECTS OF AUDITORY AND VISUAL STIMULI ON REACTION AND RESPONSE TIME DURING COUNTERMOVEMENT JUMPS**

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**BACKGROUND:** The countermovement jump (CMJ) is commonly used to assess athletic performance and/or athlete readiness. Since many sports require athletes to react and respond to external visual and auditory stimuli, it stands to reason that examining reaction and response time during a CMJ may provide a unique indicator of the underlying neural mechanisms preceding muscular contraction during athletic endeavors. The purpose of this study was to examine the effects of an auditory (AUD) vs. visual (VIS) stimulus on reaction time (REACT) of the tibialis anterior (TA), medial gastrocnemius (GM), vastus lateralis (VL), and biceps femoris (BF), and response time (RT) during the CMJ. **METHODS:** Ten college-aged males and females participated (age=23±4yrs., height=176±11cm, body mass=72±13kgs). Bipolar surface electromyographic (EMG) signals were collected from the TA, GM, VL, and BF. Subjects completed six CMJs on force plates, three with an AUD stimulus and three with a VIS stimulus, in random order. The AUD stimulus was a beep noise, the VIS stimulus was a light appearing on a screen in front of the subjects. Subjects performed a maximal CMJ immediately upon hearing or seeing the stimulus. REACT for each muscle was taken as the time between the receiving the stimulus and the point at which the EMG signal for the muscle rose 3 standard deviations above the EMG signal during the 1-second preceding the stimulus. RT was taken as the time between receiving the stimulus and the point at which the force signal decreased 5 standard deviations below the force signal during the 1-second preceding the stimulus. Two-way repeated measures ANOVAs examined differences between stimuli and among muscles for REACT, while a dependent samples t-test to examined differences between stimuli for RT. **RESULTS:** For REACT, there was a main effect for muscle such that VL,BF < TA,GM ( $p \leq 0.007$ ), with no other differences ( $p \geq 0.104$ ). RT was significantly different such that AUD < VIS ( $p = 0.007$ ). **CONCLUSION:** The present study suggests that muscle activation patterns as assessed by REACT may be similar regardless of stimuli. However, it does appear that RT occurs faster for a VIS compared to AUD. The lack of stimulus-related differences for REACT that were present for RT may suggest that neuromuscular differences emerge when the external stimulus is changed.

**P119: ADIPOSITY NEGATIVELY AFFECTS JOINT-SPECIFIC ECCENTRIC-TO-CONCENTRIC TRANSITION TIME AND JUMP PERFORMANCE IN CHILDREN**

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**BACKGROUND:** Jump training improves bone health, body composition, postural stability, balance, muscle strength, and muscle power in children and adolescents. Children with increased adiposity show lower net jump power, the exact biomechanical mechanisms of which are still unknown. Transition time, which is the time between eccentric-to-concentric phase during a jump, plays a critical role in utilizing the stored eccentric torque toward a greater concentric output resulting in greater jump height (JHt). It is unknown if adiposity affects lower extremity joint-specific transition time for different types of jump. Further, we do not know if adiposity affects jump height for different types of jump. Such information can provide insight into the mechanistic factors explaining jump performance in children with adiposity. Thus, we examined the relationship of jump height (JHt) for different types of jump with lower extremity joint-specific transition times and % total body fat. **METHODS:** We used a rigid body model, using 36 reflective markers, and floor-embedded force plates to collect jump data for countermovement (CMJ; jump preceded by a quick countermovement) and drop (DJ; jump off of a 0.015 m raised platform) jump in typically developing children (N = 20; age = 8 - 14 years). After familiarization, participants performed 3 trials of CMJ and DJ. JHt was calculated from the greater trochanter marker data. Transition time was calculated as the time period between the last data point of negative (eccentric) acceleration to the first data point of positive (concentric) acceleration. **RESULTS:** Transition time at the ankle was negatively related to CMJ JHt ( $r = -0.454$ ;  $p = 0.045$ ) while transition time at the hip tended to be negatively related to DJ JHt ( $r = -0.453$ ;  $p = 0.052$ ). % total fat was positively related to transition time at the ankle ( $r_{\text{spearman}} = 0.469$ ;  $p = 0.037$ ) and hip ( $r_{\text{spearman}} = 0.488$ ;  $p = 0.034$ ) for CMJ and DJ, respectively. % total fat was negatively related to CMJ JHt ( $r_{\text{spearman}} = -0.498$ ;  $p = 0.007$ ) and DJ JHt ( $r_{\text{spearman}} = -0.672$ ;  $p = 0.002$ ). **CONCLUSIONS:** Joint-specific greater transition time associated with adiposity, in part, explains lower JHt during CMJ and DJ.

**P120: DOES LOWER BODY FATIGUE INFLUENCE BIOMECHANICAL FACTORS DURING LANDING?**

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**BACKGROUND:** Landing is an important part of many physical activities in today's modern culture. Repetitive loading and high impact forces during landing often place an athlete at risk for musculoskeletal injury. Understanding the effect of fatigue on landing kinetics is an important step in potentially reducing future risk of injury. The purpose of this study was to compare muscle activation and ground reaction forces during landing before and after fatigue. **METHODS:** Five participants completed a series of single leg drop landings before and after a fatiguing protocol. After collecting biometric data from participants, each participant was equipped with an electromyographic (EMG) sensor on the rectus femoris (RF) and tibialis anterior (TA) of their dominant leg. The participants then performed 5 drop landings from a height of 30.48cm to act as the control condition. All participants were given time before these trials to familiarize themselves with dropping technique. Following the control condition, the participants were seated on a cycle ergometer and instructed to cycle until voluntary exhaustion. The cycle ergometer began with 0W resistance and increased 50W every minute until the participant ended the exercise. Participants were then immediately placed back onto the dropping platform and instructed to complete another 5 single leg drop landings. During all trials, the participants dropped onto their dominant leg and were barefoot. During each landing, EMG and ground reaction forces (GRF) were collected for analysis. Vertical and mediolateral GRF was processed to select peak force and loading rate for each trial. The resulting variables were averaged across condition and the average was used for analysis. Each variable was analyzed for differences using a paired t-test ( $\alpha=0.05$ ). **RESULTS:** Peak vertical GRF during landing was  $2182.20 \pm 457.2N$  which was significantly greater ( $p=0.005$ ) than peak GRF after fatigue ( $1673.75 \pm 415.19$ ). Average mediolateral GRF were not different before and after fatigue ( $p>0.05$ ). Average EMG for both RF and TA were not different before and after fatigue ( $p>0.05$ ). Average RF EMG increased from  $30.85 \pm 14.4 \mu V$  to  $45.06 \pm 25.5 \mu V$  and TA EMG stayed relatively stable at  $397.57 \pm 313.9 \mu V$  before exercise and  $388.59 \pm 316.46 \mu V$  after exercise. **CONCLUSION:** We conclude that vertical GRF is reduced after a fatiguing exercise, but horizontal GRF, RF EMG, and TA EMG remain unchanged.

**P121: A METHOD FOR FLEXION EXTENSION IMAGING OF THE LUMBAR SPINE IN TREATING LOW BACK PAIN**

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**BACKGROUND:** While low back pain (LBP) is one of the most prevalent causes for visits to a physician's office and patients with LBP often cannot be given a definitive diagnosis. The purpose of the study was to provide a bending protocol that could be used in both imaging and non-imaging protocols to deduce patient bending variability. **METHODS:** 16 subjects ( $21.4 \pm 3.3$  years; BMI  $24.8 \pm 2.6$ ) participated in this study. Subjects completed randomized bending trials (untrained, trained, and bolstered). Full-body motion was captured using the Vicon 460 motion measurement system and a Noraxon Axion 8 channel electromyographic system. Analyses were performed to determine the significance between the three conditions in kinematic and EMG parameters. One-way analysis of variance and univariate analyses were conducted to determine the differences between the three testing conditions with significance set at  $p \leq 0.01$ . **RESULTS:** There were significant differences between the three conditions. The bolstered condition provided optimal results when compared to the untrained and trained protocols. Peak lumbar flexion was significantly higher in the bolstered condition ( $61^\circ \pm 13^\circ$ ) and the trained condition ( $54^\circ \pm 11^\circ$ ) than the untrained condition ( $42^\circ \pm 19^\circ$ ). When comparing the bolstered bending to the trained and untrained bending differences in lumbar flexion, the bolstered bending resulted in significantly greater flexion of ( $7^\circ \pm 5^\circ$ ,  $p=0.006$ ) and ( $19^\circ \pm 9^\circ$ ,  $p=0.003$ ) respectively. Peak pelvic flexion was significantly lower in the bolstered condition ( $.3^\circ \pm .6^\circ$ ) compared to untrained and trained bending ( $43^\circ \pm 11^\circ$  and  $41^\circ \pm 13^\circ$ ) respectively. The univariate analyses revealed significant differences between the bolstered bending and the untrained and trained conditions when considering the lumbo-pelvic coordination of ( $17\% \pm 6\%$ ,  $p=0.001$ ) and ( $30\% \pm 11\%$ ,  $p=0.002$ ) respectively. **CONCLUSIONS:** The bolstered condition offered optimal bending results to elicit lumbar bending. The trained condition produced greater isolation and more lumbar movement when compared to the untrained bend, while the bolstered bending produced the most repeatable bending profile. The bolstering system is expensive and increases the treatment time. The results of the study offer support for the implementation of the trained bending protocol to

elicit more effective lumbar flexion/extension testing methodologies when bolstering is not feasible.

**P122: A FEASIBILITY STUDY USING ACTION SPORT CAMERAS FOR 3D MOTION ANALYSIS**

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The purpose of this study was to assess the practicality and validity of using consumer-based action sport cameras (ASC) for three-dimensional motion analysis. Three different tests were conducted under two different data collection settings where research studies are routinely performed. The investigation compared different types and number of cameras, different calibration protocols, and different types of motion analysis systems with different biomechanical models. The mechanical tests evaluated the accuracy ( $r = .99$ ,  $p = 0.001$ ) of the motion capture system and the strength of the biomechanical model used to calculate rotational kinematics ( $M = 69.1$ ,  $p = 0.001$ ). Results of motion capture system accuracy tests using sport cameras showed that, for both settings, the error between the measured and calculated distances between markers was less than 1mm and 1 degree for marker separations which ranged from 52mm to 228mm. Finally, errors across settings (indoor vs outdoor) for single joint rotations and for combined rotations at the shoulder and elbow were less than 1 degree, respectively. These results demonstrate that system accuracy and reliability can be obtained allowing the collection of comparable data across different motion analysis settings with varying configurations and equipment. This assessment was particularly important when considering budget, portability, without sacrificing accuracy.

**P123: THE EFFECTS OF EDUCATION OR CORRECTIVE EXERCISE ON FORWARD HEAD POSTURE- A RANDOMIZED CONTROLLED TRIAL**

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**BACKGROUND:** If forward head posture (FHP) is not addressed during young adulthood, it may persist throughout life as a result of spinal remodeling and degenerative musculoskeletal pathology. As optimal programming to improve FHP in individuals without pathology is unclear, the purpose of this study was to compare the effects of three different intervention strategies, postural education (PE) and two corrective exercise programs (CEPs), on the craniocervical angle (CVA) in healthy young adults with FHP. **METHODS:** A prospective four-arm parallel randomized controlled trial with repeated measures was performed. Seventy-nine healthy young adults (55 women, 24 men; mean age:  $20.08 \pm 2.19$  y) with FHP were randomized into four groups: PE group, self-myofascial release + stretching group (SMRS), self-myofascial release + stretching + strengthening group (SMRSS), and a control group (CG). Participant CVA ( $^\circ$ ) was assessed before and after a 4-week intervention. **RESULTS:** Seventy-two participants completed the trial. Within-group comparisons of pre- vs. post-intervention CVA outcomes revealed a significantly greater post-intervention CVA in the PE ( $45.1 \pm 5.9^\circ$  vs.  $48.1 \pm 5.9^\circ$ ,  $p<0.001$ ), SMRS ( $47.4 \pm 5.2^\circ$  vs. Post:  $51.2 \pm 4.0^\circ$ ,  $p<0.001$ ), SMRSS ( $47.1 \pm 3.9^\circ$  vs.  $51.4 \pm 5.4^\circ$ ,  $p<0.001$ ), and CG ( $46.9 \pm 4.4^\circ$  vs.  $47.8 \pm 5.0^\circ$ ,  $p=0.04$ ). Post-hoc comparisons indicated post-intervention mean CVA change in the SMRS group ( $3.8 \pm 3.3^\circ$ ); and the SMRSS group ( $4.4 \pm 3.1^\circ$ ); was significantly greater ( $p=0.003$ ) than the CG ( $0.8 \pm 1.7^\circ$ ). **CONCLUSIONS:** All three interventions appear to be effective techniques for improving FHP in healthy young adults, however CEPs may provide superior outcomes than PE alone. A 4-week CEP consisting of self-myofascial release + stretching may yield similar CVA enhancements as a CEP consisting of self-myofascial release + stretching + strengthening. Study findings can assist fitness professionals in designing evidence-based FHP intervention programs for young adults without musculoskeletal pathology. Funding: This study was funded by the National Academy of Sports Medicine and Liberty University Center for Research & Scholarship.

**P124: EFFECT OF SURFACE STABILITY DURING DUAL TASKING ON MEMORY AND COGNITION**

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Dual tasking, or performing two tasks simultaneously, may result in decreased performance in one or both tasks compared to performing the task on its own. Some research suggests that during dual tasking, completing a task requiring postural control may result in improved rather than worsened performance on a cognitive task. Thus the

purpose of this study was to determine the effect of surface stability on performance of memory-related cognitive tasks. College-age male and female participants were recruited via convenience sampling and visited the laboratory for a single visit. During the lab session, participants completed three cognitive tests: the Stroop Color and Word Test (SCWT), the Sternberg Test of Working Memory (STWM), and the Paced Serial Addition Test (PASAT). Each test was completed in a counterbalanced order while the participant stood on each of three surfaces: a flat surface (floor), the rounded side of a BOSU ball, and the flat side of a BOSU ball. Surface order was also counterbalanced, and a balance score was assigned during each test by use of a modified balance error scoring system (BESS) score. ANOVA was used to compare cognitive test errors and BESS errors among the three groups. There was no significant difference in performance on any of the three cognitive tests regardless of the surface the participant stood upon ( $p > 0.05$ ). However, balance was significantly worse (higher BESS score) during all three cognitive tests when standing on the flat and round sides of the BOSU compared to on the ground ( $p = 0.023$  for SCWT,  $0.011$  for STWM, and  $0.002$  for PASAT). These data indicate that during dual tasking involving balance demands, cognitive performance takes priority over balance, which may increase fall risk.

#### **P125: NETWORK PHYSIOLOGY OF INTER-MUSCULAR INTERACTIONS**

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**BACKGROUND:** Skeletal muscles continuously coordinate to facilitate a wide range of movements. Muscle fiber composition and timing of activation account for distinct muscle functions and dynamics necessary to fine tune muscle coordination, generate movements, and adapt to fatigue. Here we investigate how distinct muscle fiber types dynamically synchronize and integrate as a network across muscles in response to fatigue. **METHODS:** Fourteen healthy adults performed three maximal body weight squat tests until exhaustion. Electromyography (EMG) signals from the following muscles were recorded simultaneously during the entire protocol: left and right vastus lateralis (LegL and LegR); left and right erector spinae (BackL and BackR). We first obtained 10 time series of EMG band power for each muscle, representing the dynamics of different muscle fiber types. To investigate cross-frequency interactions among EMG frequency bands that occur as a result of synchronous modulation of their spectral amplitudes, we calculated the bivariate equal-time Pearson's cross-correlation for each pair of EMG band power time series across all Leg and Back muscles. **RESULTS:** Different muscle fiber types dynamically synchronize their activity across muscles following distinct patterns of cross-frequency communication. Specifically, with progression of fatigue, same-type muscle subnetworks (LegL-LegR and BackL-BackR) exhibit statically significant (i) global decline in links strength ( $p < 0.05$ ) and (ii) increase in links strength stratification ( $p < 0.03$ ), while (iii) preserving the general functional form of the network profile. In contrast, sub-networks of different-type muscles (Leg-Back) exhibit significant (i) global increase in links strength ( $p < 0.05$ ) and (ii) decline in links strength stratification ( $p < 0.02$ ), while (iii) changing the functional form of the network profile. **CONCLUSION:** This work addresses inter-muscular interactions among rhythms of myoelectrical activation, corresponding to the activity of different type muscle fibers, across muscles in response to fatigue. This dynamic network approach can lead to the development of network-based markers that will break new ground in the study of multilevel inter-muscular interactions, and will provide new understanding of diverse exercise-related phenomena such as performance, fatigue or muscle injuries.

#### **P126: ASSESSMENT OF GAIT HARMONY IN PRIMARY SCHOOL-AGED CHILDREN USING A GOLDEN RATIO-CENTERED APPROACH**

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**BACKGROUND:** The mature walking gait of healthy adults is well known to exhibit proper timing of gait events, and more recent research has found that a self-similar harmonic structure is also present wherein the temporal proportions of repetitive gait phases coincide with the golden ratio, an irrational number also known as phi ( $\phi = 1.618034\dots$ ). However, this phi-proportionality feature was not observed in the gait of individuals with decreased motor ability or altered anthropometric proportions. The purpose of this study was to

assess whether the gait of primary school-aged children, a sub-set of humans undergoing motor ability development and physical growth, demonstrates this harmonic phi-proportionality feature. **METHODS:** Spatiotemporal gait parameters of 21 primary school-aged children between grades 1 and 5 (15 females, 6 males; height  $1.48 \pm 0.23$  m; mass  $40.9 \pm 18.3$  kg) were analyzed using a 2.55 m pressure-sensing mat where the participants walked across barefoot at a self-selected pace. Three one-sample t-tests ( $\alpha = .05$ ) were carried out to separately compare the gait cycle to stance ratio (Ratio 1:  $1.615 \pm 0.034$ ), stance to swing ratio (Ratio 2:  $1.640 \pm 0.090$ ), and swing to total double support ratio (Ratio 3:  $1.612 \pm 0.195$ ) to the golden ratio. A within-subjects repeated measures ANOVA ( $\alpha = .05$ ) was also conducted to assess for symmetry amongst the three ratios. **RESULTS:** No statistically significant difference was found between the golden ratio and Ratio 1 ( $t(20) = -.361, p = .722$ ), Ratio 2 ( $t(20) = 1.166, p = .257$ ), or Ratio 3 ( $t(20) = -.139, p = .891$ ). In addition, no statistically significant differences were found between any of the phase ratios,  $F(2,19) = 1.526, p = .243$ . **CONCLUSIONS:** Previous research has found that artificially altering the body segment proportions of healthy adults affects the harmonic organization of gait phases. However, our findings lend support to a more recent longitudinal study which discovered that the gait phase ratios of children throughout early childhood converged towards the golden ratio as they gained more locomotor experience and transitioned from supported to independent walking. Thus, this project provides further evidence suggesting that the typical phi-proportionality of anthropometric parameters has less of an influence on gait harmony than other factors like balance, walking speed, and pathophysiology.

#### **P127: INFLUENCE OF NATURAL GRASS AND ARTIFICIAL TURF SURFACES ON ATHLETE PERFORMANCE AND PERCEIVED PERFORMANCE SATISFACTION**

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**BACKGROUND:** Examination of athlete performance and perceptions across different playing surfaces has provided useful information to better understand athlete preferences, tactical alterations, and focus areas for industry/material science developers. However, much of the previous research on natural grass (NG) and artificial turf (AT) surfaces has been limited in scope to comparisons of only performance measures or only perceptual ratings. Additionally, fewer studies have assessed both performance and perception across multiple AT surfaces and NG within the same project. Thus, the purpose of this study was to investigate the influence of NG and different AT playing surfaces on athlete performance and perceived performance satisfaction. **METHODS:** Seventeen male participants (age:  $23.1 \pm 2.9$  years; height:  $1.81 \pm 0.06$  m; mass:  $77.8 \pm 9.9$  kg) completed three 20-yard sprint trials and three change of direction (CoD) trials (i.e., 5-10-5 agility) on four playing surfaces-one NG surface and three AT surfaces with varying structural components. After completion of all performance tests, each participant then responded to a visual analogue scale (VAS) questionnaire for each surface regarding their satisfaction with the surface's grip/traction and softness/compliance as well as their ability to change direction and accelerate. Friedman tests were conducted to compare sprint time, CoD time, CoD deficit, and the VAS scores across all surfaces. **RESULTS:** There were statistically significant differences detected for CoD deficit ( $\chi^2(3) = 9.071, p = 0.028$ ), acceleration VAS score ( $\chi^2(3) = 10.089, p = 0.018$ ), and softness/compliance VAS score ( $\chi^2(3) = 10.804, p = 0.013$ ). Post hoc Wilcoxon signed-rank tests with a Bonferroni correction ( $\alpha = .0125$ ) revealed that CoD deficit on the third AT surface was larger than on NG ( $p = .008$ ), the third AT was ranked higher for acceleration VAS score than the second AT ( $p = .003$ ), and the third AT was ranked lower than NG for softness/compliance VAS score ( $p = .002$ ). **CONCLUSION:** Interestingly, the participants in this study perceived the third AT to be a harder surface that they could accelerate better on, and yet CoD deficit, a measure that is improved by enhanced acceleration ability, was compromised on this surface compared to NG. These findings suggest that perceptions of the performance-related characteristics of AT and actual performance are not always congruent. **KEYWORDS:** Perception, Performance, Artificial turf, Natural Grass

#### **P128: RETURN TO DUTY RATES IN ACTIVE-DUTY MILITARY FOLLOWING MINIMALLY INVASIVE CERVICAL SPINE SURGERY**

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**BACKGROUND:** Military medical readiness plays a significant role in operational readiness. While the severity of combat-related trauma is evident, musculoskeletal injuries (MSK's), are the largest medical threat deployment readiness, accounted for more than 60% of limited

duty days in 2019. Across MSK's, the spine (lumbosacral: 30%; cervical: 22%; thoracic: 10%) accounts for 62% of MSKs. While these statistics are undeniable, in the military population, there a tremendous economic impact in training, retaining, and deploying a service member. Return-to-duty (RTD) rates and length of time for the treatment protocols for spine surgery vary significantly in published research. Research suggests RTD rates between 3-17 months following elective traditional open lumbar and cervical spine surgery, with a RTD rate of 64% within 1 year. When examining minimally invasive lumbar spine surgery (MIS), 100% of military personal had a RTD within 3-months. Research has yet to examine the impact of MIS of the cervical spine on the RTD rates of active-duty military. **METHODS:** The current study prospectively examined surgical outcomes, return to duty, and patient-centric outcomes among 79 active duty or reserve military patients who underwent an outpatient minimally invasive cervical spine surgery (Laminotomy/Foraminotomy/Decompression) for the treatment of cervical spinal stenosis. **RESULTS:** Significant reductions in visual analog scale (VAS) ( $6.67 \pm 1.69$  to  $3.36 \pm 2.03$ ) and neck disability index (NDI) ( $29.63 \pm 10.58$  to  $13.62 \pm 8.64$ ) were observed from preoperative to postoperative time points. 77% (61 of 79 service members) RTD in less than 1 month. 19% (15 of 79 service members) RTD in 1-2 months and 4% (3 of 79 service members) RTD between 2-3 months. There was a significant difference between preoperative and postoperative VAS of 3.31 ( $p=0.003$ ). NDI scores report a statistically significant difference of 16.01 ( $p=0.003$ ) from preoperative to postoperative. **CONCLUSIONS:** MIS has been shown to reduce tissue trauma and patient complications. MIS procedures have resulted in reducing postoperative stress responses and improving the recovery process following surgery. In the active-duty military population this plays an important role in return to duty quickness. Our findings suggest that MIS procedures on the cervical spine result in improved patient outcomes and reduced RTD time in active-duty military personnel.

**P129: CAN 4-WEEKS OF BACKWARD EXERCISE STRATEGY EFFECT MOBILITY AND GAIT OUTCOMES IN THE AGING? - A DESCRIPTIVE CASE SERIES**

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Albeit limited, emerging evidence has supported the using of backwards walking. However, whether the intervention can be mimicked by recumbent exercise is less known. We aimed to describe longitudinal changes in mobility and gait outcomes using a seated NuStep cross trainer (NCT) and treadmill (TM) in aging participants. **METHODS:** Four older adults (2M/2F; 72 ± 3 yrs; 26.8 ± 2.3 kg/m<sup>2</sup>; Means ± SD) participated in a supervised 4-week (2x per week) exercise program utilizing a backward exercise strategy. Participants were randomized to either NCT or TM. Gait outcomes were obtained with the GAITRite system. Mobility was assessed with the 6 Minute Walk Test (6MWT) and Timed Up and Go (TUG). The initial exercise pace was guided by the participant's rating of perceived exertion (RPE) and progressed 5-10% each week as tolerated. Targeted and externally focused verbal instructions were utilized to optimize the transfer to gait. **RESULTS:** All participants completed the 4-week intervention without complication. Regardless of modality, time (seconds) to complete TUG did not seem to change across all participants ( $\Delta M = 0.02$  seconds,  $SD = 1.42$  seconds). 6MWT distances improved in all participants ( $M = 57.74$  m,  $SD = 55.16$  m). NCT improved 6MWT ( $M = 67.55$  m,  $SD = 80.26$ ). TM improved 6MWT ( $M = 47.93$ ,  $SD = 47.98$ ). FW gait velocity slightly increased in NCT participants ( $M = 6.73$  cm/s,  $SD = 11.34$  cm/s), but seemed unchanged in TM participants ( $M = -3.85$  cm/s,  $SD = 12.45$  cm/s). NCT saw changes in FW Swing% (Left:  $M = 0.50\%$ ,  $SD = 1.56\%$ ; Right:  $M = 1.23\%$ ,  $SD = 1.10\%$ ) and Stance% (Left:  $M = -0.55\%$ ,  $SD = 1.56\%$ ; Right:  $M = -1.20\%$ ,  $SD = 1.06\%$ ). TM saw minimal changes in FW Swing% (Left:  $M = -2.15\%$ ,  $SD = 0.42\%$ ; Right:  $M = -0.48\%$ ,  $Std = 0.74\%$ ) and Stance% (Left:  $M = 1.47\%$ ,  $SD = 0.43\%$ ; Right:  $M = 0.83\%$ ,  $SD = 1.03\%$ ). BW gait velocity increased in the NCT group ( $M = 13.25$  cm/s,  $SD = 13.08$  cm/s) but remained unchanged in TM participants ( $M = -1.10$  cm/s,  $SD = 1.27$  cm/s). NCT saw changes in BW Swing% (Left:  $M = 1.13\%$ ,  $SD = 0.11\%$ ; Right:  $M = -1.48\%$ ,  $SD = 0.25\%$ ) and Stance% (Left:  $M = -1.05\%$ ,  $SD = 0.07\%$ ; Right:  $M = -1.53\%$ ,  $SD = 1.45\%$ ). However, BW Swing% (Left:  $M = 0.02\%$ ,  $Std = 0.54\%$ ; Right:  $M = -1.48\%$ ,  $SD = 0.25\%$ ) and Stance% (Left:  $M = 0.53\%$ ,  $SD = 0.88\%$ ; Right:  $M = 0.83\%$ ,  $SD = 0.93\%$ ) remained unchanged in TM. **CONCLUSION:** These findings provide preliminary support for the longitudinal use of recumbent NCT exercise for gait retraining.

**P130: COMPARING TRAJECTORIES AND PERFORMANCE OF THE STANDARD, SWISS, AND CAMBERED SWISS BARBELL BENCH PRESS IN RESISTANCE TRAINED INDIVIDUALS**

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**Background:** Although previous studies have examined overhand and underhand grip variations for the standard barbell, fewer studies have examined the neutral grip (NG) kinematic and kinetic technique differences between the standard Olympic (STB), Swiss (SWB), and Cambered Swiss barbells (CAB). Currently, there is a void of research examining how the SWB and CAB NG strategy may influence barbell trajectory (BBT) and performance of the bench press (BP) exercise. **Purpose:** To compare barbell BP performance in resistance trained (RT) individuals using a STB, SWB, and CAB. **Methods:** Twenty-three participants (12 women, 23.2±1.9 yrs, 1.63±.01 m, 71.3±4.2 kg; 11 men, 22.6±2.5 yrs, 1.76±.02 m, 89.6±5.6 kg) with ≥ one year of barbell BP experience completed a counterbalanced study design. The first session familiarized participants with each bar. A data collection session measured barbell BP velocity using a linear position transducer. Participants performed progressively heavier single repetitions with maximal propulsive intent until achieving a .32 m/s velocity, corresponding to ~90%1RM. Once the velocity was achieved, 3 same-tempo repetitions were recorded. The same protocol was completed with each bar. Vertical displacement (VD), mean concentric velocity (MV) and work were computed from three-dimensional barbell position recordings and averaged across trials. **Results:** 90%1RM was significantly ( $P < .001$ ,  $d = 2.5$ ) greater in men (81.6±6.1kg) compared to women (41.4±1.7kg). In addition, work was significantly ( $P < .001$ ,  $d = 2.7$ ) greater in men compared to women; there were no other sex related differences ( $P > .05$ ). 90%1RM was significantly lower ( $P = .005$ ,  $d = .14$ ) for CAB (56.8±25.4 kg) compared to STB (60.6±24.9 kg); there was no difference between SWB (58.8±25.7 kg) and either CAB ( $P = .063$ ,  $d = .09$ ) or STB ( $P = .258$ ,  $d = .07$ ). CAB (.50±.06 m) VD was significantly greater (STB:  $P < .001$ ,  $d = 1.1$ ; SWB:  $P < .001$ ,  $d = .78$ ) than both STB (.44±.04 m) and SWB (.45±.05 m). There were no significant differences between the barbells for work ( $P = .584$ , STB=262.2±113.4 J, CAB=263.3±129.3 J SWB=253.3±117.9 J) or MV ( $P = .125$ , STB=.32±.07 m/s, CAB=.34±.07 m/s SWB=.31±.07 m/s). **Conclusion:** This data suggests that a CAB can achieve similar work at lighter loads compared to a STB through an increase of VD during the concentric phase of a BP regardless of sex. As 90%1RM and work were similar between the SWB and STB, the NG BP may serve as an effective alternative BP modality with a reduced risk of BP-related injury.

**P131: RELATIONSHIP BETWEEN FRONTAL PLANE KINEMATICS DURING THE SINGLE-LEG SQUAT: A PILOT STUDY**

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**Background:** Identifying the relationships between various frontal plane kinematics during a multi-segmental motion assessment may help clinicians determine the best path of treatment. Specifically, the single-leg squat is a low-cost kinetic chain assessment that has been determined to be clinically useful. **Purpose:** The purpose of this project was to determine the relationship between various frontal plane kinematics during the single-leg squat amongst a group of collegiate softball players. **Methods:** Eight female softball athletes (age, 20.85 ± 2.05 years; height, 167.8 ± 4.7 cm; weight, 74.3 ± 7.8 kg) agreed to participate and performed three single-leg squats with their non-dominant leg on a force plate. Center of pressure excursion was collected in the mediolateral direction. Peak values for knee valgus, hip adduction, lateral pelvic tilt, and lateral trunk tilt were obtained between 45° of knee flexion during the descent and 45° of knee flexion during the ascent using an electromagnetic tracking system. Data for all three trials were averaged and analyzed with JASP 0.10.2. **Results:** Pearson product moment correlations revealed a strong relationship between mediolateral center of pressure excursion and knee varus/valgus ( $r[8] = 0.91$ ,  $p < 0.01$ ). Greater mediolateral center of pressure excursion was strongly related to increased knee valgus. Additionally, a strong relationship between lateral pelvic tilt and hip adduction ( $r[8] = -0.79$ ,  $p = 0.02$ ) was observed. Greater lateral pelvic tilt was strongly related to increased contralateral hip adduction. **Conclusion:** The results partially confirmed our hypothesis that strong relationships exist between various frontal plane kinematics during the single leg squat. Increased center of pressure excursion and knee valgus have been used as clinical measures of lower extremity instability. When observing knee valgus in dynamic assessments, awareness of the strong link with base of support instability may help treatment decisions. Additionally, pelvic lateral tilt is another clinical measure of stability. The relationship between lateral pelvic tilt and contralateral hip adduction implies that frontal plane hip motion during a single-leg squat is due to muscular weakness around the lumbopelvic hip complex. Further research should examine muscle activity during the single-leg squat to further understand the observed break between knee valgus and hip adduction.

**P132: ASSOCIATION BETWEEN ECCENTRIC ISOTONIC MUSCLE PERFORMANCE AND KNEE FLEXION MUSCLE KINETICS DURING SUBMAXIMAL RUNNING**

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**BACKGROUND:** Previous hamstring injury (HSI) remains a predictor for future HSI. With many HSI occurring with eccentric loading during late swing phase of sprinting, safe and controlled eccentric training prior to initiating a return to submaximal running may play a critical role in HSI rehabilitation. **PURPOSE:** To examine the relationship between isotonic knee flexion (KF) eccentric work and peak torque and generalized eccentric knee muscle torque and work during the swing phase of submaximal running. **METHODS:** Recreationally ( $n=17$ , 7 men) active and healthy participants ( $23.1\pm 1.6$  yrs,  $75.7\pm 13.8$  kg,  $1.71\pm .80$  m) completed base line testing for maximal  $30^\circ$  isometric hamstring strength (MVIC) and spring velocity (40m). At least 48hrs later, in a prone position, participants completed a fixed dynamometer isotonic (25% MVIC) eccentric ( $180^\circ/s$ ) to concentric KF assessment and 45s treadmill running at 80% maximal running velocity while kinematics of the dominant limb foot, shank, thigh, and pelvis were collected. During the KF isotonic trials, the torque applied by the participants was computed by taking into the account mass moments of inertia of the foot-shank and dynamometer attachment, along with gravity and the isotonic load to identify the peak torque and eccentric work ( $30^\circ$  flexion to extension). KF muscle torque was computed during the swing phase of running by subtracting the gravitational and motion-dependent torques from the net joint torque. Following a review of scatterplots, separate simple linear regression models between the isotonic and running KF peak torques and work were conducted, followed by paired t-tests. **RESULTS:** The regression diagnostics supported the validity of both models. Isotonic KF peak torque ( $-124.8\pm 27.7$  Nm) was significantly associated ( $R^2=.499$ ,  $P=.002$ ) with running KF muscle peak torque ( $-97.3\pm 39.9$  Nm). Isotonic work ( $-29.6\pm 5.5$  J) was significantly associated ( $R^2=.286$ ,  $P=.027$ ) with running KF muscle work ( $-21.9\pm 18.9$  J). While KF peak torque ( $P<.001$ ,  $d=.74$ ) was significantly higher for the running compared to the isotonic assessment, there was no significant difference for work ( $P=.073$ ,  $d=.45$ ). **CONCLUSIONS:** These results quantify the relationship between eccentric isotonic KF muscle testing and submaximal KF running mechanics, which may be relevant for possible prevention and rehabilitation interventions. Future research should consider associations during higher velocity running.

**P133: COORDINATION COUPLING: THE EVALUATION OF WALKING COORDINATION IN AUTISTIC SIBLINGS**

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**BACKGROUND:** Autism is a neurodevelopmental disorder characterized by a variety of behavioral and/or physiological features. While studies have investigated walking coordination variability in autistic individuals, research has not explored coordination patterns among autistic siblings. Mirroring behaviors can be seen in autistic individuals particularly around friends and family. The purpose of our study was to investigate the walking coordination of autistic siblings compared to aged-matched autistic and control individuals. **METHODS:** Four sets of autistic siblings (ASDS) (aged  $15.3\pm 1.9$  yrs, BMI  $22.3\pm 7.3$  kg/m<sup>2</sup>), eight autistic non-siblings (ASD) (aged  $14.0\pm 1.2$  yrs, BMI  $20.8\pm 1.6$  kg/m<sup>2</sup>), and eight controls (CON) (aged  $14.8\pm 1.6$  yrs, BMI  $21.0\pm 4.9$  kg/m<sup>2</sup>) walked at self-selected speeds ( $1.33\pm 0.11$  m/s,  $1.39\pm 0.26$  m/s &  $1.39\pm 0.21$  m/s, respectively). Three-dimensional kinematics were collected and analyzed using Visual3D. Modified vector coding was used to determine the frequency of hip-knee and knee-ankle coordination patterns during weight acceptance (WA), midstance (MS), and terminal stance (TS) phases of the gait cycle. Non-parametric Kruskal-Wallis tests ( $\alpha = 0.01$ ) were used to compare the median frequencies between groups. **RESULTS:** No statistically significant differences were found for any coordination pattern for any phase (all  $p>.01$ ). For the hip-knee coordination patterns, all groups exhibited dominant knee flexion during WA, anti-phase hip flexion-knee flexion during MS, and antiphase hip extension and knee flexion during TS. For the knee-ankle coordination patterns, all groups exhibited a dominant knee flexion pattern during WA and in-phase knee extension-ankle dorsiflexion during MS. During TS, the ASDS and CON groups exhibited dominant knee extension pattern, while the ASD group demonstrated anti-phase ankle dorsiflexion-knee extension. **CONCLUSION:** Considering the lack of group differences, walking appears to require a robust set of coordination patterns that supersede behavioral disorders. Future work in siblings' research should consider including other health-related measures and additional

coordinative (e.g., goal oriented) and/or variability tests to determine if cohabitation influences movement patterns in autistic persons.

**P134: CERVICAL ERECTOR SPINAE INTERMUSCULAR COORDINATION WHILE USING NOISE CANCELLATION HEADPHONES DURING WALKING**

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**BACKGROUND:** People that want to "zone-out" may use noise cancellation headphones. Balance between primary and secondary stabilizing muscles ensures proper body posture free of musculoskeletal problems. Headphones use may be a neck stressor placing increased weight on cervical spine muscles altering their stabilizing effect. The intermuscular coordination of the cervical erector spinae using headphones while walking is unexplored. **METHODS:** Participants ( $M = 13$ ,  $F = 13$ , age =  $21 \pm 6$  yrs) asked to walk (20-meter track for 30 minutes), while wearing noise cancellation headphones. Electromyographic (EMG) activity from right and left cervical erector (CER, CEL) was collected. For each muscle and at a 5-min interval, we obtained 10 time series of EMG band power. For each pair of EMG frequency bands between CER and CEL, cross-frequency interactions among EMG frequency bands were examined by bivariate equal-time Pearson's cross-correlations. Hierarchical structure of the network's links strength was dissected into separate network modules for low (F1, F2, F3), intermediate (F4, F5, F6, F7), and high (F8, F9, F10) EMG frequency bands, representing the activation of different muscle fiber types. **RESULTS:** The CER-CEL network showed a hierarchical organization with a clear stratification profile, with corresponding dominant links strength interactions to low-low ([F1-F2]—[F1-F2]), intermediate-high ([F3-F7]—[F8-F10]) and high-high ([F8-F10]—[F8-F10]) EMG frequency bands. While this hierarchical organization is preserved across the six 5-min intervals, the average link strength of the CER-CEL network is significantly reduced for all network modules ( $p < 0.05$ ). **CONCLUSION:** The CER-CEL network shows overexpressed/excessive inter-muscular connectivity at the beginning of the trial, reflecting reduced efficiency and lower degree of adaptability (i.e., rigidity) due to headphones' use. As participants get adapted to the walking and the headphones, the CER-CEL network becomes sparser, indicating improved intermuscular network functionality. Neck musculature needs approximately 10 minutes to acclimate to the weight of the headphones. Clinicians working with people, who have vestibular issues, may place a weight in the form of headphones (or comparable apparatus/weight) while performing walking activities to facilitate neural activity of the cervical extensors through the process of vestibular adaptation and/or habituation.

**P135: ASSOCIATIONS BETWEEN GROUND CONTACT TIME AND BODY MASS COMPONENTS IN FIREFIGHTERS WEARING FULL TURNOUT GEAR**

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**BACKGROUND** Firefighters (FF) require strength, power, and stamina to safely perform physically challenging occupational tasks. Load carriage in full turnout gear is a primary source of exhaustion during operations; this work requires high anaerobic and aerobic capacities that have been shown to be affected by body composition. Ground contact time (GCT), the time between initial foot contact and toe-off for the same foot, is a measure indicative of running speed and economy with shorter contact times being faster. Information about the relationship between body composition and GCT in tactical athletes may be important for testing, evaluation, and training purposes. Yet, it is unclear if any such relationships exist. Thus, the aim of this study was to determine the association between body mass components and GCT in FF wearing full turnout gear during physical agility skills test events. **METHODS:** 33 male firefighters participated and were measured for lean body mass (LBM), total body weight (TBW), and fat mass (FM) prior to performing a physical agility skills testing battery. All events in the test were performed in full turnout gear that weighs 49 lb. The events were video recorded and included a staircase climb with a 40 lb hose, a 99 lb tire drag, and a 178 lb victim drag; GCT was then measured via Dartfish. For all three events, Pearson's product-moment correlation coefficients ( $r$ ) were calculated between GC and each of the following variables: LBM, TBW, and FM. A predetermined alpha level of .05 was used for all correlation analyses. **RESULTS:** Two correlation coefficients yielded significant relationships. In the stair climb event, there was a moderate positive relationship between GCT

and FM ( $r = 0.407, p = .019$ ). In the tire drag event, there was a moderate negative relationship between GCT and LBM ( $r = -0.359, p = .040$ ). All other relationships were not significant ( $p > .05$ ).

**CONCLUSION:** According to the NSCA, LBM and adipose tissue content are primary contributing factors for load carriage performance. This was demonstrated in the stair climb and tire drag; the stair climb demonstrated longer GCT with more FM and the tire drag demonstrated shorter GCT with greater LBM. Therefore, optimal body composition may translate to a key component for optimal occupational performance in firefighters. Further data collection in this ongoing study will provide a better understanding of these issues.

**P136: DYNAMIC BALANCE FOLLOWING SIX MINUTES OF BRISK WALKING IN FEMALES: PRELIMINARY FINDINGS**

Esther Steingold, Lacy Harper, Melanie Antonio, William Reed, Valentina Taddia, Breanna McDonald, Micah Poisal, Kaden Buford, Garrett Hester. *Kennesaw State University, Kennesaw, GA.*

**BACKGROUND:** Research examining balance after fatigue tends to employ strenuous or sustained exercise. Albeit informative, we felt it important to examine responses to activity more closely resembling acts of daily living. In addition, it is critical yet less prevalent to assess dynamic balance as it better represents challenges to postural stability encountered in daily life. The purpose of our ongoing study is to determine the differences, if any, for responses in dynamic balance after brisk walking in young and middle-aged females. Here, we report on preliminary findings based on participants completed to date. **METHODS:** Four untrained, females ( $31.5 \pm 17.7$  yrs) completed a testing visit 3-7 days following a familiarization session. Dynamic balance testing was conducted using a Biodex Balance System before and 2, 6, and 10-min after a 6-min brisk walking task. Balance testing was 30-sec in duration and involved a progressively unstable platform. Postural stability index, indicative of changes in center of gravity, and the standard deviation for this measurement were calculated for multiple planes of movement. The instructions of the walking task were to "cover as much distance as possible". Friedman's test and relative changes were computed to examine responses across time. **RESULTS:** No significant changes were noted for any measures ( $p=0.091 - 0.380$ ), though the 65% increase in anterior/posterior postural stability index (i.e., more postural sway) was notable. **CONCLUSIONS:** These preliminary findings suggest that dynamic balance is not negatively affected after a brisk 6-min walk, but interpretation is limited due to our small sample size which resulted in underpowered analyses. Nonetheless, as our sample size increases and age-related comparisons are feasible, it will be of particular interest to determine if these preliminary findings remain consistent in females 45-60 yrs of age.

**P137: EFFECTS OF A BRISK 6-MINUTE WALK ON MAXIMAL AND RAPID TORQUE PRODUCTION IN FEMALES: PRELIMINARY FINDINGS**

William Reed, Lacey Harper, Melanie Antonio, Valentina Taddia, Breanna McDonald, Micah Poisal, Kaden Buford, Esther Steingold, Garrett Hester. *Kennesaw State University, Kennesaw, GA.*

**BACKGROUND:** Research examining balance after fatigue tends to employ exercise that is strenuous or specific to an isolated joint. Albeit informative, we felt it important to examine responses to activity more closely resembling acts of daily living. The plantar flexors are particularly susceptible to fatigue derived from walking due to their relatively large contribution compared to more commonly studied muscles of the thigh. In addition, rate of torque development (RTD) is thought to be more sensitive to fatigue than peak torque (PT). The purpose of our ongoing study is to determine the differences, if any, for responses in maximal and rapid torque production after brisk walking in young and middle-aged females. Here, we report on preliminary findings based on participants completed to date. **METHODS:** Four untrained females ( $31.5 \pm 17.7$  yrs) completed a testing visit 3-7 days following a familiarization session. Subjects performed rapid, maximal voluntary isometric contractions of the plantar flexors before and 2.5, 6.5, and 10.5 min after a 6-min brisk walking task. The instructions for the walking task were to "cover as much distance as possible." PT and rate of torque development at peak ( $RTD_{pk}$ ), early (0-50 ms and 0-100 ms ( $RTD_{0-100}$ )), and late (0-200 ms) time phases were calculated from the torque-time curve. Friedman's test and relative changes were computed to examine responses across time. **RESULTS:** Notable, but non-significant, relative decreases were found for  $RTD_{0-100}$  (-41%;  $p=0.068$ ) and  $RTD_{pk}$  (-29%;  $p=0.058$ ), whereas PT (+5%;  $p=0.682$ ) and other RTD measures ( $p>0.05$ ) were unaffected. **CONCLUSIONS:** These preliminary findings suggest early RTD is more sensitive than later RTD and PT to walking-induced fatigue, but interpretation is limited due to our small sample size which resulted in underpowered analyses. An impaired rate of muscle activation by the central nervous system is one possible

explanation for the fatigue-related decrease in early RTD. Nonetheless, as our sample size increases and age-related comparisons are feasible, a primary aim is to determine if these preliminary findings remain consistent in females 45-60 yrs of age. Information gained from the future analysis will elucidate the importance of maintaining rapid torque production in middle-age.

**P138: EFFECTS OF A LAW ENFORCEMENT DUTY BELT AND VEST ON MUSCULAR ACTIVITY WHILE WALKING**

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**INTRODUCTION:** Load carriage of equipment is an occupational requirement of Law Enforcement Officers (LEO). LEO have a high prevalence of lower back pain (LBP) and previous studies have reported lower ratings of exertion when LEOs wear a vest versus a belt. Loaded vests and belts have both been shown to alter gait kinematics with no clear support for either. The effects of LEO duty belts on muscular activity during walking, a common movement performed by LEO, has not been reported in the existing literature. The purpose of this study is to analyze the effect of the LEO duty belts and vests on muscular activity while walking. **METHODS:** Twenty-four participants volunteered for the study ( $m=13, f=11$ ,  $age=24.5yrs \pm 6.0$ ,  $height=1.69m \pm 0.09$ ,  $mass=73.0kg \pm 11.1$ ). Surface electromyography (sEMG) sensors were placed bilaterally on rectus abdominus (RA), multifidus (MF), biceps femoris (BF), and rectus femoris (RF). Participants walked on a treadmill for 30s at 1.34 m/s and 1.5% incline wearing no belt, tactical belt (7.2kg), and tactical vest (7.2kg) in a randomized order. sEMG data was collected at 2000Hz and bandpass (10-450Hz) and notch (60Hz) filtered. Root mean squared sEMG data for each condition were normalized to the control. Friedman's tests and post-hoc Wilcoxon signed ranks test with Bonferroni corrections were utilized. All analyses were conducted in the R environment with significance set at  $p<0.05$ . **RESULTS:** The belt resulted in significantly more muscular activity than the control condition in the left RF ( $W=38, z=-3.2, p=0.004, rg=0.653$ ), right RF ( $W=49, z=-2.88, p=0.012, rg=0.589$ ), and left MF ( $W=44, z=-3.03, p=0.007, rg=0.618$ ). The vest resulted in significantly more muscular activity than the control condition in the left RF ( $W=25, z=-3.57, p=0.001, rg=0.729$ ), right RF ( $W=66, z=-2.4, p=0.049, rg=0.490$ ), left MF ( $W=64, z=-2.46, p=0.042, rg=0.502$ ), and right MF ( $W=23, z=-3.63, p<0.001, rg=0.741$ ). Belt and vest conditions were not significantly different from one another. **CONCLUSION:** The increased muscle activity in some, but not all muscles, indicates altered recruitment patterns compared to unloaded walking. The present findings are interesting considering the prevalence of LBP in LEO. Important to note, a limitation of the study was the short trial duration. Future studies should analyze longer experimental sessions to more accurately simulate shifts LEO typically work.

**P139: BAREFOOT VERSUS SHOD COMPARISONS ON BIPEDAL POSTUROGRAPHY USING BALANCE TRACKING SYSTEM (BTRACKS)**

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**BACKGROUND:** Footwear that serves as the interface between the human body and the environment have previously been reported to influence postural stability and balance performance. The balance tracking system (BTrackS) is an affordable low-cost force platform that has been validated against gold standard force plates, to provide accurate and reliable balance testing with testing normally performed in an unshod condition. The purpose of the study was compare shod versus barefoot conditions during bipedal posturography using the BTrackS. **METHODS:** Twenty healthy males and females [ $age: 21 \pm 1.2$  years,  $height: 178 \pm 8.3$  cm,  $mass: 84 \pm 14.9$  kg] completed the balance and fall risk (BFR) and the modified clinical test of sensory integration of balance (mCTSIB) [eyes open (EO), eyes closed (EC), eyes open foam (EOF), eyes closed foam (ECF)] on the BTrackS in both barefoot and shod conditions (participant's own habitual athletic footwear). Center of pressure postural sway path length (cm) from both BFR and mCTSIB were analyzed independently using a one-way repeated measures ANOVA to compare barefoot versus shod conditions at an alpha level of 0.05. **RESULTS:** A significant difference between barefoot and shod conditions were evident in EC ( $p=0.04$ ), EOF ( $p=0.03$ ), and ECF ( $p<0.001$ ) of the mCTSIB. Pairwise comparisons revealed that during EC greater postural stability was seen with barefoot, whereas for EOF and ECF, greater postural stability was demonstrated in shod compared to barefoot. No significant differences were found during BFR and EO condition of the mCTSIB. **CONCLUSION:** Based on the current findings, barefoot elicited greater postural stability only in the EC which can be attributed to the readily

available proprioceptive and somatosensory feedback in barefoot especially with absent visual feedback. However, when standing on a foam surface with distorted proprioceptive and somatosensory feedback, greater postural stability was evident in shod compared to barefoot, which may be attributed to the larger base of support in shod. Footwear must be taken into account when testing for posturography using BTrackS, especially in conditions that test the role of visual, proprioceptive/somatosensory and vestibular feedback in postural stability.

**P140: THE ACCURACY OF THE APPLE HEALTH APPLICATION MOBILITY DATA DURING OVERGROUND AND TREADMILL WALKING**

Caroline Kaylor, Grace Lehman, Christopher G. Ballmann, FACSM, Patrick Marsh, Rebecca R. Rogers. *Samford University, Birmingham, AL.*

**BACKGROUND:** Previous research has shown varying levels of accuracy of gait metrics from third-party applications (apps) downloaded to a mobile phone compared to lab-based measurement tools. The Apple Health app comes automatically installed on all iPhones with the recent addition of "Mobility" data after a software update. According to Apple, when walking with an iPhone in a pocket, the Mobility feature will measure the gait variables of step length, double support time, walking speed, and walking asymmetry. However, the accuracy of these measurements is unknown. Therefore, the purpose of this study is to investigate the accuracy of the mobility metrics during overground and treadmill walking compared to the OptoGait and GAITrite which have been previously validated for gait variables. **METHODS:** College-aged males (21.0±0.8 yrs, 196.4±38.2 lbs, 73.0±2.4 in) and females (20.7± 1.3 yrs, 132.4±18.4 lbs, 64.9±2.0 in) who reported no abnormal gait patterns or lower extremity injuries were recruited into the study. The study was approved by the university Institutional Review Board and all participants provided informed consent. Participants completed two walking conditions: overground walking at a self-selected walking speed for five laps using the GAITrite to measure gait variables and treadmill walking at 3.0 mph for 10 mins using the OptoGait to measure gait variables. For both walking conditions, an iPhone 13 was placed in a fanny pack-like pouch and secured to the participants waists in a standardized position at the level of their navel and in line with the midline of their dominant leg to simulate a pocket. **RESULTS:** The gait variables of step length for overground (p=0.07) or treadmill (p=0.13) walking and walking speed for overground (p=0.27) or treadmill (p=0.16) walking were not significantly different between the iPhone Apple Health Mobility app and the GAITrite or OptoGait. However, iPhone Apple Health Mobility app significantly underestimated total double support time during overground walking with the GAITRITE (p=0.00) and treadmill walking with the OptoGait (p=0.04). Furthermore, walking asymmetry was also significantly underreported by the iPhone Apple Health Mobility app compared to GAITrite (p=0.00) and OptoGait (p=0.00). **CONCLUSION:** The iPhone Apple Health Mobility app can accurately measure step length and walking speed during different walking conditions but may underestimate the gait variables of double support time and walking asymmetry compared to validated equipment.

**P141: STRIDE LENGTH VS. CENTER OF MASS LOCATION: AN EXPLORATORY EXAMINATION OF GAIT PATTERNS**

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**BACKGROUND:** Stride length is considered a valuable measure of gait efficiency and has been utilized to evaluate the influence interventions have on walking and running parameters. An advantage in utilizing stride length surrounds the relative ease of determination and inclusion of a complete gait cycle. Yet, stride length does not consider how far away the foot strikes the ground relative to the body. Therefore, the purpose of this study was to compare the variability of the stride length (SL) to a novel variable that considers the distance of the foot strike to the center of mass (CoML). **METHODS:** A modified lower extremity Plug-in Gait model and instrumented walking (ProtoKinetics LLC, Havertown, PA) analyzed gait parameters in 10 participants (height 1.79 m ± 0.08; mass: 81.68 kg ± 15.93). Each participant completed barefoot walking at a self-selected pace. SL was extracted from the instrumented walkway software and normalized to body height. CoML was assessed by normalizing a vector created amongst a centroid of the pelvis markers and location of foot contact. A repeated measures ANOVA was utilized to determine if the standard deviations of both measures were significantly different. **RESULTS:** The results indicate that there was no significant difference between the standard deviations of the SL and CoML (F(8,1) = 1.882 and

p=0.207). **CONCLUSIONS:** While the results of this project failed to reach significance, the trend of the data seems to indicate that the CoML is less variable than the SL and may prove a more robust measure of gait health. In particular, the measure of foot to center of mass may well be valuable in assessing degradation in propulsive mechanics and balance.

**P142: DISTANCE RUNNING PELVIS MOTION AND STRIDE TO STRIDE VARIABILITY DURING STANCE**

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**BACKGROUND:** In distance running, pelvis kinematics are thought to be relevant to injury and performance. To date, pelvic anterior/posterior tilt has received considerable attention. However, the overall motion of the pelvis, in all three planes, remains poorly understood. Further, minimal studies have assessed the stride-to-stride variability of the pelvis. In this study, we analyze competitive runners to better understand overall pelvis kinematics. **PURPOSE:** Analyze stance phase pelvis motion and stride-to-stride variability for all three planes (sagittal, frontal, transverse) and determine if there are significant differences (among the planes). **METHODS:** Twelve higher mileage recreational runners participated (8 Division I cross-country and 4 competitive recreational runners, 22.1±4.9 years; 50+ miles per week). Participants completed their preferred warm-up and then ran 3 minutes at an 8-minute/mile pace. Six Vicon Bonita cameras and 3DGAIT software were used to collect kinematic data (200 Hz). Ten strides were used to generate average plots (normalized to 101 data points) for the pelvis motion in the three planes. The 10 plots were averaged to generate an overall waveform for the pelvis in each plane. The pelvis motion was determined by calculating the range of the waveform. Stride-to-stride variability was determined by calculating the standard deviation across the 10 strides. One-way ANOVAS were used to test for significant differences among the three planes (p=0.05). Bonferroni post-hoc analysis was used for follow-up testing. **RESULTS:** For total motion in stance, the transverse plane had significantly more (p<0.01) total motion (14.0°±4.8°) than the sagittal plane (6.1°±2.0°) and frontal plane (5.8°±1.8°). There was no significant difference between the sagittal and frontal plane. For SSV in stance, the transverse plane had significantly greater (p<0.05) SSV (0.97°±0.29°) than the sagittal plane (0.81°±0.18°) and frontal plane (0.53°±0.18°). **CONCLUSION:** During stance, pelvis motion was by far the greatest in the transverse plane. Interestingly, the SSV was also greatest in the transverse plane. Future studies should strive to determine the relevance of these pelvis kinematic measures to running injuries and performance.

**P143: DISTANCE RUNNING PELVIS MOTION AND STRIDE TO STRIDE VARIABILITY DURING SWING**

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**BACKGROUND:** In distance running, pelvis kinematics have received little attention compared to the ankle, knee, and hip. Also, few studies have reported pelvis data for the swing phase. Pelvis kinematics are important to study since they are likely to impact overall running biomechanics. In this study, we analyze pelvis motion and stride-to-stride variability (SSV) in college runners to better understand the overall pelvis motion used by competitive runners. **PURPOSE:** Analyze swing phase pelvis motion and SSV for all three planes (sagittal, frontal, transverse) and determine if there are significant differences (among the planes). **METHODS:** The participants were 8 Division I cross-country runners (19.5±1.2 years; 50+ miles per week). For the data collection, participants ran 3 minutes on the laboratory treadmill at an 8-minute/mile pace (data collected at 3-minutes). The motion-capture data was collected at 200Hz using 6 Vicon Bonita motion-capture cameras and 3DGAIT software. Ten strides were used to generate average plots (normalized to 101 data points) for the pelvis motion in all three planes. The 10 plots were averaged to generate an overall waveform for the pelvis in each plane. The pelvis motion, in each plane, was determined by calculating the range of each waveform. SSV was determined, in each plane, by calculating the standard deviation across the 10 strides. One-way ANOVAS were used to test for significant differences among the three planes (p=0.05). Bonferroni post-hoc analysis was used for follow-up testing. **RESULTS:** For the swing phase, the pelvis had significantly more total motion (p<0.01) in the frontal plane (16.0°±5.6°) compared to both the sagittal plane (6.2°±2.0°) and transverse plane (5.6°±1.8°). There was no significant difference between the sagittal and transverse plane. For the swing phase SSV, the frontal plane (0.99°±0.31°) was significantly greater (p<0.01) than the transverse plane (0.55°±0.20°) and significance was approached (p=0.04) when compared to the sagittal plane (0.69°±0.18°). There was no significant difference

between the sagittal and transverse plane SSV ( $p=0.15$ ).  
**CONCLUSION:** During swing, pelvic motion was by far the greatest in the frontal plane; the frontal plane motion was more than double that of the other two planes. The frontal plane also had the greatest SSV.

**P144: EFFECTS OF 15 MINUTES OF DORSIFLEXION STRETCH ON RANGE OF MOTION, STIFFNESS, AND HYSTERESIS AREA**

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**BACKGROUND:** Stretching effects on the human body have been studied by many. However, studies related to the hysteresis area (Area) are few. Hysteresis depicts the differential loading-unloading curves of the viscoelastic material (1). The relationship between stress and strain is not constant but depends on the history of the loading process. There are three major characteristics of a viscoelastic material of ligaments and tendons: creep, stress relaxation, and hysteresis or energy dissipation (1). This study aimed to investigate the effect of 15 minutes of static stretching on range of motion (ROM), stiffness, and Area. **METHODS:** 16 healthy college students participated in the experiment. The study consisted of a 15-minute ankle dorsiflexion stretch while standing on an elevated surface. Angle (degrees) and force (Newton) was recorded throughout the maximal pre- and post-tests of the ankle dorsiflexion to determine ROM, stiffness, and Area. In this study, stiffness was estimated by (MaxF-MinF)/(MaxA-MinA), ROM was the greatest angle value recorded, and the Area was calculated by the difference of areas under the loading and unloading curves. A paired student t-test was performed to examine the potential difference before and after the stretch. **RESULTS:** Significant Area differences between the pre- and post-tests were detected (pre:  $1018.16 \pm 394.92$ , post:  $1044.63 \pm 410.40$ ,  $p=0.00002$ ). In contrast, no significant difference was observed from Stiffness (pre:  $0.9969 \pm 0.2012$ , post:  $0.9977 \pm 0.2034$ ) and ROM (pre:  $18.25 \pm 4.79$ , post:  $19.01 \pm 5.03$ ), although increasing trends were seen in both after the 15 minutes stretching. **CONCLUSION:** Increase trends observed in ROM and stiffness, although not statistically significant. The hysteresis area was increased significantly, which suggests that the Area was more sensitive to stretch-induced change than the other two variables. Increased hysteresis area represents more energy that has been dissipated or lost during the loading/unloading process. Reference: Robi, K., Jakob, N., Matevz, K., & Matjaz, V. (2013). The physiology of sports injuries and repair processes. *Current issues in sports and exercise medicine*, 43-86.

**P145: ROTATION SEQUENCES FOR SHOULDER KINEMATICS IN THE VOLLEYBALL ATTACK**

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**BACKGROUND:** The ideal rotation sequence for the definition of shoulder kinematics has been disputed in the literature. The ISB recommends the ZYZ rotation sequence, while recent literature supports the application of an individualized sequence based on the primary movements within the task. However, only a limited set of movements have been previously analyzed: single-planar/clinical tasks, tennis serves, and baseball pitching. Despite the popularity of volleyball in people of all ages, research regarding shoulder kinematics in the volleyball attack is sparse. Furthermore, an ideal rotation sequence to describe this movement has not been reported. Therefore, the purpose of this study was to assess the efficacy of three rotation sequences in describing the motion of the humerus relative to the thorax when performing an overhead volleyball attack. **METHODS:** Ten experienced volleyball players (women=6, mean  $10.7 \pm 3.74$  years of experience) performed five overhead attacks aimed straight ahead. A 12-camera motion capture system recorded reflective markers placed on the humerus and upper trunk. Shoulder angles were calculated in Visual3D software using the most implemented rotation sequences: XYZ (Lateral-Anterior-Superior), ZYZ, and YXZ. Angles were assessed beginning at 'takeoff' (when the participant left the ground) and ended at the completion of the follow through. Angle coherence (agreement) with known flexion/extension (X: 210 deg), abduction (Y: 230 deg), and rotation (Z: 190 deg) ranges of motion was evaluated for each sequence. In addition, instances of gimbal lock were calculated and recorded. **RESULTS:** The XYZ rotation sequence was the only method with no instance of GL in any participant. Four participants presented with gimbal lock using the ZYZ rotation sequence. Gimbal lock occurred in all participants using the YXZ sequence. For angle amplitude coherence, each sequence exceeded the limit for one rotation: Z for one subject using ZYZ, X for two subjects using XYZ, and Z for one subject using YXZ. **CONCLUSION:** In agreement with previous research, we found that the ISB recommendation was not the best-fit sequence for 3D kinematics. We recommend using the XYZ sequence to characterize shoulder kinematics in volleyball attacks as XYZ is the most relevant (widespread in lower extremity biomechanics), anatomically valid, and least affected with gimbal lock.

**P146: METABOLIC HEALTH CHANGES: CLEAN KETOGENIC DIET VS. A CLEAN KETOGENIC DIET WITH INTERMITTENT FASTING**

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**Background:** Research on carbohydrate restrictive diets and intermittent fasting show promising results towards improvements in gut and metabolic health, however, many of these studies don't control for the effects of processed foods on metabolic health. A clean keto diet greatly reduces oxalates, glutens, fiber, alcohol, and refined sugars and oils, which have all been linked back to gut dysbiosis. The purpose of this study was to compare metabolic health changes between eating clean ketogenic diet (CKD) and a clean ketogenic diet with intermittent fasting (CKD + IF) for 30-days. **Methods:** Participants were randomly assigned to either eat a clean ketogenic diet (CKD) or eat a clean ketogenic diet with intermittent fasting (CKD + IF) for 30 days. Pre-and post-testing included several measures of metabolic health, including, triglycerides and HDL through blood draws and fat mass %, measured using the BODPOD. Differences were compared after eating approximately 20 grams of clean carbohydrates for 30 days. There were no significant differences in the metabolic changes between the CKD and CKD + IF, in terms improvements, so a series of paired samples t-tests were performed between the pre-post scores separately by the group. **Results:** Both groups had significant improvements in a number of metabolic factors, but the CKD + IF had a significant decrease in the TG/HDL ratio,  $t(24) = 2.37, p = .013$ , whereas the CKD group improved, but not significantly,  $t(21) = .660, p > .05$ . Having a TG/HDL ratio closer to 1 is desired for enhanced metabolism and health. Body fat % significantly decreased for both groups, CKD  $t(21) = 2.76, p = .006$ . CKD + IF,  $t(24) = 5.84, p < .001$ . **Conclusions:** Eating a clean ketogenic diet can significantly improve one's health and wellness but eating within an 8-hour window and then fasting for 16 hours can enhance these metabolic benefits. These improvements demonstrate beneficial outcomes into many areas of health, including physical and psychological symptoms.

**P147: THE IMPACT OF AN ACUTE EXERCISE AND NUTRITION INTERVENTION ON ADVERSE POSTPRANDIAL METABOLIC OUTCOMES**

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**Background:** Postprandial metabolic responses have been shown to be a better predictor of myocardial infarction and cardiovascular disease risk compared to fasting levels alone. Even a single high-fat, high-carbohydrate meal (HFHCM) results in adverse triglyceride (TRG), glucose (GLU), and metabolic load index (MLI; summation of TRG and GLU) in older adults (OA). Existing research suggests that either acute postprandial exercise (EX) or a high-polyphenol nutritional intervention may attenuate the adverse postprandial responses, however there is no study assessing the combined effect of a minimally processed, high-polyphenol and EX intervention in OA. Therefore, the purpose of this study was to determine whether a nutrition intervention in combination with acute exercise alters postprandial TRG, GLU and MLI more than either intervention alone. **Methods:** In a randomized crossover design, OA ( $n=10$ , 4 M/6 F,  $57 \pm 6.9$  years) completed the following 4 conditions: (1) traditional HFHCM (T-HFHCM) alone, (2) T-HFHCM + EX, (3) a HFHCM with polyphenols (P-HFHCM) alone, (4) a P-HFHCM + EX. Participants consumed 12 kcal/kg BW in all HFHCM conditions. The P-HFHCM was created by a dietitian to be matched in fat and CHO content to the T-HFHCM (~58% saturated fat, ~38% CHO, ~33g added sugar). EX was performed 30 mins after the pie was consumed and consisted of walking at a self-selected speed and grade to expend 25% of the kcals consumed from the HFHCM (~30 mins EX/participant). Blood GLU and TRG were measured at baseline, 30, 60, 90 mins, and every hour for 6 hours post-prandially. **Results:** There was a significant increase in TRG, GLU and MLI post-HFHCM ( $p's > 0.05$ ), which was attenuated by EX similarly in the T-HFHCM + EX and P-HFHCM + EX conditions ( $p < 0.001$ ) without any impact of the meal intervention alone ( $p = 0.180$ ). Interestingly, there was a time\*condition interaction for TRG and MLI, where the P-HFHCM + EX and T-HFHCM + EX all had a significant and similar attenuation of TRG compared to the T-HFHCM alone ( $p < 0.001$ ). **Conclusions:** A HFHCM intervention combined with EX lowers postprandial GLU and TRG more than a T-HFHCM, however increasing polyphenol content elicits similar TRG reductions as completing postprandial EX alone. Still, because GLU reductions were not seen in the P-HFHCM alone, there is justification to encourage OA to consume high polyphenol meals and engage in postprandial EX.

**P148: THE RELATIONSHIP BETWEEN BODY COMPOSITION AND TWO-HOUR GLUCOSE FOLLOWING OGTT**

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**Background:** Body Composition is a known indicator of overall health and strongly related to metabolic function. Fat mass has been shown to influence glucose metabolism. However, less is known about lean mass. The purpose of this study was to evaluate several markers of body composition to an oral glucose tolerance test (OGTT). **Methods:** Ten (6 males, 4 females) healthy participants (ages 23±2 yrs), visited the lab on three separate occasions across 10 days. During each visit, body composition (BF%) via Bioelectrical Impedance Analysis (BIA), and hydration status via urine specific gravity (USG) were collected upon arrival. Next, participants underwent a two-hour OGTT consuming a 75g glucose (GLU) beverage. GLU measurements were taken via finger stick at baseline (PRE,) 30-min post, 1-hr post, and 2-hr post. Analyses were conducted with SPSS and alpha was set to 0.05. A repeated measures analysis of variance (RM ANOVA) and subsequent paired samples t-test were used to determine differences between time points. A two-tail Pearson correlation was used to determine relationships between our markers of interest. **Results:** Average body mass (77 ± 15 kg), BF% (22 ± 11%), and USG (1.023 ± 0.02). USG was correlated to PRE GLU ( $r = .491, p = .006$ ). At 2-hr several indicators of body composition significantly correlated with glucose levels; dry lean mass ( $r = -.488, p = .007$ ), fat mass ( $r = .493, p = .007$ ), total body water ( $r = -.479, p = .009$ ), and BF % ( $r = .541, p = .002$ ). A Post Hoc Partial correlation controlling for FM and dry lean mass revealed that significance was not lost for either variable. **Conclusions:** The primary finding of this study suggest that both fat mass and lean mass are independently influential on rebounding GLU. These findings indicate that maintenance or increase of lean mass is just as important as reduction in fat mass for GLU regulation.

**P149: THE RELATIONSHIP BETWEEN RESTING HEART RATE VARIABILITY AND FASTING GLUCOSE**

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**Background:** Resting heart rate variability (HRV) is a non-invasive indicator of autonomic nervous system (ANS) function which translates to many physiological regulations. One regulation may be resting metabolism, though this relationship is not fully understood. The purpose of this study was to quantify the relationship between resting markers of HRV and oral glucose tolerance test (OGTT) response. **Methods:** Ten healthy individuals (6 males, 4 females, ages 23±2 years) volunteered in this study. Participants were asked to visit the lab 3 times in a 10-day span. On each visit, participants' body composition and resting heart rate via electrocardiogram (ECG) were collected (Finapres, NOVA). Participants were then placed in a supine position in a dimly lit room for a 10-minute HRV recording. The final five minutes of the tracing was transferred to the online software Kubios HRV Standard (version 3.5.1) for analysis of HRV metrics: root mean square of successive differences (RMSSD), standard deviation of normal-to-normal sinus beats (SDNN), high frequency (HF), and low frequency (LF). Immediately following, participants underwent a 2-hour OGTT, consuming a 75-gram glucose (GLU) beverage. GLU measures were obtained via finger stick before, 30-minutes post, 1-hour post, and 2-hours post OGTT. SPSS (version 28.0.1.1) was used, and alpha was set to 0.05. **Results:** A two-tailed bivariate Pearson's correlation was used to determine relationships between our markers of interest. The Pearson correlation showed that when compared to fasting GLU, the following were correlated to HRV: RMSSD ( $r=0.515, p=0.008$ ), SDNN ( $r=.429, p=0.007$ ), HF ( $r=.563, p=0.003$ ), LF ( $r=0.410, p=0.042$ ). At 30 minutes post, SDNN ( $r=0.397, p=0.033$ ), LF ( $r=0.415, p=0.039$ ). **Conclusions:** All metrics of resting HRV correlated strongest with fasting glucose. This relationship was not apparent at subsequent time points. Higher ANS activity equated to higher fasting GLU levels. These findings may indicate that higher acting ANS function may better keep fasting GLU to normal levels, i.e. between 80-100 mg·dl<sup>-1</sup>.

**P150: DOES ACUTE RESISTANCE EXERCISE ATTENUATE POST-PRANDIAL METABOLIC RESPONSES POST-HIGH FAT MEAL IN ADULTS OVER 50?**

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**BACKGROUND:** Many adults experience chronic hyperlipemia and hyperglycemia due to postprandial responses following the regular consumption of high fat meals. Recently, the summation of postprandial triglyceride (PPTG) and postprandial glucose (PPG) responses, termed the metabolic load index (MLI), has been proposed as a way to quantify the combined metabolic impact of these responses. The ability of resistance exercise (RE) to attenuate these responses requires further study, and postprandial responses in those older than 50 y are particularly understudied. In addition, there remain questions regarding the optimal timing of exercise to mitigate PPTG and PPG responses. Therefore, this study examined the effects of an acute bout of moderate RE performed before and after a high fat meal (HFM) on MLI, PPTG, PPG in adults > 50 y. **METHODS:** Eleven adults (50-80 y) completed three experimental trials, in randomly counterbalanced order: an HFM with no exercise (HMF), exercise directly before HFM consumption (HFM+ EX BEF), and exercise directly after HFM consumption (HFM + EX AFT). RE was a true-to-life bout consisting of 14 exercises with a resistance band, designed to keep RPE at or below 14. Fasting and postprandial (minute 30, 60, 90, 120, 180, 240) lipid and glucose samples were obtained. Changes in dependent measures over time and between-conditions were assessed using repeated measures ANOVAs (time\*condition), with an alpha value of  $p < 0.05$ . **RESULTS:** There was a significant time x condition interaction ( $p < 0.05$ ) in MLI response, however no significant interaction was seen for PPTG or PPG individually. No differences in MLI were observed between groups at any individual time points. The HFM alone group exhibited a higher change in MLI from baseline to minute 240 when compared to the EX AFT group. **CONCLUSION:** A moderate bout of resistance band exercise appears to have a small, measurable effect on MLI. This provides evidence that true-to-life bouts of resistance exercise may be useful in improving the overall metabolic responses following an HFM.

**P151: TRUNK-TO-LEG-VOLUME RATIO IS NEUTRALLY ASSOCIATED WITH BONE DENSITY RELATIVE TO BMI AND WAIST CIRCUMFERENCE**

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**BACKGROUND:** Poor bone mineral density (BMD), an indicator of overall bone health, is common in the United States and can lead to negative health outcomes. Body mass index (BMI) and waist circumference (WC) are commonly utilized anthropometric measures to predict BMD at the population level. Trunk-to-leg-volume ratio is a more reliable predictor of diabetes and mortality risk than BMI or WC. The goal of this analysis was to determine if trunk-to-leg-volume is a more accurate predictor of BMD, osteopenia/osteoporosis risk, or fracture risk than BMI or WC. **METHODS:** A secondary analysis of publicly available NHANES data including the years 2013-2014 and 2017-2018 was conducted. Utilizing available Dual-Energy X-Ray Absorptiometry (DXA) data, linear and logistic regression models were constructed to assess the outcomes of BMD at the femoral neck and the lumbar spine, risk of osteopenia or osteoporosis at those sites, and fracture history at the hip, wrist, and spine. Trunk-to-leg volume ratio was calculated from available DXA data, and subgroups were created while considering control variables such as smoking, age, and physical activity. Unadjusted models were run and followed with constructed adjusted models that controlled for possible confounding variables. **RESULTS:** BMI, WC, and trunk-to-leg volume ratio were ineffective at predicting previous wrist, hip, or spine fractures. In select cases, such as the unadjusted female model predicting osteopenia/osteoporosis at the lumbar spine ( $n = 1,277$ ), trunk-to-leg-volume ratio significantly correlated with osteopenia/osteoporosis; OR = 1.09 (95% CI: [1.02, 1.16]),  $p < .01$ . At the femoral neck, across all male ( $n = 942$ ) and female ( $n = 975$ ) models, BMI and WC positively correlate with BMD ( $p < .001$ ) and a lower risk of osteopenia/osteoporosis. Trunk-to-leg-volume ratio does not consistently associate with BMD at the hip. **CONCLUSIONS:** BMI and WC have a protective effect with respect to BMD at the femoral neck while trunk-to-leg-volume ratio has a more neutral association. Trunk-to-leg-volume ratio offers promise in predicting osteopenia or osteoporosis in certain cases. Additionally, trunk-to-leg volume ratio appears to be at least as good as WC or BMI in predicting fracture history at the wrist, hip, or spine.

**P152: QUANTIFYING SKELETAL MUSCLE MASS USING THE D3-CREATINE METHOD IN THE INVEST IN BONE HEALTH TRIAL**

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**BACKGROUND:** Increasingly, the novel D3-Creatine (D3Cr) dilution method is used to directly measure total body muscle mass via stable isotope tracer technology; however, this method has yet to be applied in the context of a geriatric weight loss intervention. The purpose of

this preliminary analysis is to derive D3Cr muscle mass estimates of change and variability within the INVEST in Bone Health trial (NCT04076618) to inform future work in this area. **METHODS:** The parent study is a 3-armed, 12-month randomized, controlled trial designed to determine the effect of weighted vest use or resistance training during weight loss on musculoskeletal health outcomes in 192 older adults. A convenience sample of 24 trial participants are included in this analysis. At baseline and six-months, participants were weighed and ingested a 30 mg D3Cr tracer dose and provided a fasted urine sample 3-6 days post-dose. D3-Creatinine enrichment ratios were measured in stored urine samples using mass spectrometry and total body muscle mass estimates were derived using a published algorithm. Data are presented using descriptive statistics, paired t-tests, and Pearson correlations. **RESULTS:** Participants were older (68.0±4.4 years), mostly white (75.0%), women (66.7%) who were living with obesity (BMI: 33.8±2.7 kg/m<sup>2</sup>). Over six months of follow up, participants experienced a decrease in body weight (95.0±11.2 vs 84.9±10.6 kg;  $p < 0.01$ ) with no change in D3Cr muscle mass (25.7±8.3 vs 26.2±7.2 kg;  $p = 0.70$ ), and significant increases in percent muscle mass by body weight (27.0±6.7 vs 30.7±6.2 %;  $p < 0.01$ ). Although a significant positive correlation was observed between body weight and D3Cr muscle mass ( $r = 0.49$ ,  $p < 0.01$ ), change in body weight was not significantly correlated with change in D3Cr muscle mass ( $r = 0.27$ ;  $p = 0.21$ ). **CONCLUSIONS:** Data presented here begin to describe D3Cr muscle mass estimates in the context of an intentional geriatric weight loss intervention and suggest muscle mass can be preserved, despite significant body weight reduction. Future work in this area will examine trial treatment effects and correlate change in D3Cr muscle mass with DXA/CT bioimaging methods as well as physical function. This work was supported by the National Institute on Aging [Grant No. R01AG059186 (KMB)]. Jason Pharmaceuticals, a wholly owned subsidiary of Medifast, Inc. made an in-kind product donation for the meal replacements used in this study.

#### **P153: A CONSERVATIVE APPROACH TO POSTURE RELATED NECK AND SHOULDER PAIN: A CASE STUDY**

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**Background:** Postural related injuries from prolonged periods of sedentary positions may cause muscle and joint imbalances resulting in pain. Postural related impairments such as forward head, rounded shoulders and excessive thoracic kyphosis can occur from prolonged technology use. Posture related neck pain has doubled since the COVID-19 pandemic due to excessive use of virtual communication. Conservative treatments demonstrated promise in the treatment of cervical and shoulder pain. **Purpose:** The purpose of this study was to demonstrate the benefits of conservative rehabilitation to improve sitting posture, decrease pain, improve function, and improve quality of life in persons with neck and shoulder pain. **Case Description/Interventions:** A 46-year-old female administrative assistant presented with bilateral neck pain, shoulder pain, and occipital headaches. Twelve sessions occurred over a 10-week period which consisted of self-soft tissue mobilization (STM), joint mobilization, postural related exercises, posture education, electrical stimulation, and a home exercise program. **Outcomes:** After 12 sessions the individual demonstrated increased cervical range of motion by 15 degrees, alleviated neck and shoulder pain, improved Neck Disability Index score from 15 to 5 disability, increased upper thoracic mobility, and reported improved sleep. **Discussion:** This study aims to present a conservative approach to decrease posture related neck and shoulder pain. STM improved tissue extensibility prior to cervical and thoracic joint mobilization which is in-line with previous research. Postural related exercises addressed the muscle imbalances: pectoralis muscle tightness, bilateral rhomboid and rotator cuff weakness, and limited cervical and shoulder range of motion. Posture education promoted compliance with home exercise program. **Conclusion:** Conservative treatment including self-soft tissue mobilization, posture related exercises, and posture education may be an effective approach to treating individuals with neck and shoulder pain.

#### **P154: A COMPARISON OF TECHNIQUES ASSESSING THE MORPHOLOGICAL CHARACTERISTICS OF SKELETAL MUSCLE FIBERS**

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**Background:** Two-dimensional cross-sectional analysis is a technique that is widely used to assess skeletal muscle fiber morphology in response to resistance training. While this technique affords some

advantages in assessing fiber cross-sectional area (fCSA), fiber typing and other variables, it may not be representative of the whole fiber. A more dimensional analysis is needed to render greater accuracy and insight into the morphological characteristics of a three-dimensional fiber. The purpose of this study was to evaluate single fiber analysis as a valid and comparable technique in analyzing fiber morphology. **Methods:** Vastus lateralis muscle biopsies from 11 untrained males were collected at pre- and post- of a 7-week total body resistance training protocol. Using two-dimensional cross-sectional analysis and single fiber analysis techniques, we measured fCSA, myonuclear number (MNN), and myonuclear domain (MND). T-tests and correlations were performed with the data to determine any significant changes and relationships between techniques. **Results:** Two-dimensional cross-sectional analysis revealed a significant increase in myonuclear number (35.51%,  $p = 0.031$ ) and fCSA (19.81%,  $p = 0.010$ ), but not in MND (1.15%,  $p = 0.413$ ). In comparison, single fiber analysis also demonstrated a significant increase in myonuclear number (13.52%,  $p = 0.011$ ), fCSA (32.55%,  $p = 0.009$ ), and MND (17.35%,  $p = 0.118$ ). There was no significant correlation between two-dimensional analysis and single fiber analysis in fCSA ( $r = -0.074$ ,  $p = 0.828$ ), myonuclear number ( $r = 0.326$ ,  $p = 0.327$ ), or myonuclear domain ( $r = -0.264$ ,  $p = 0.435$ ) percent change. **Conclusion:** In conclusion, the measurements taken with two-dimensional cross-sectional analysis and single fiber analysis did not agree, and statistical analysis showed no correlations between the two measurements. However, these results may have been impacted by our limited sample size. Additional investigation utilizing a greater sample size may provide more promising results. Therefore, future investigation of the longitudinal view provided by single fiber analysis may yet yield an advantage in the morphological assessment of the skeletal muscle fiber. **Funding:** Participant compensation as well as select reagents related to analyses presented herein were funded by a grant awarded by National Strength and Conditioning Association Foundation to Paulo H.C. Mesquita.

#### **P155: THE UBIQUITIN-PROTEASOME SYSTEM: IMPLICATED IN HIIT INDUCED MUSCLE ATROPHY FOLLOWING SEVEN WEEKS OF RESISTANCE TRAINING**

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**BACKGROUND:** Skeletal muscle is a highly plastic tissue that uniquely responds to different external stimuli. While resistance training (RT) induces skeletal muscle hypertrophy, the effects of high-intensity interval training (HIIT) are less clear, with certain evidence indicating mild hypertrophy and other evidence suggesting no change in measurable outcomes. Our laboratory recently observed an increase in vastus lateralis thickness after seven weeks of RT (2 d/wk), with values returning to pre-training levels following seven weeks of treadmill HIIT (3 d/wk). Given that proteolytic mechanisms were not previously investigated, the purpose of this study was to examine the effects of the aforementioned exercise paradigm on markers of the ubiquitin-proteasome system (UPS). **METHODS:** Vastus lateralis biopsies were collected from 11 untrained college-aged males at baseline (PRE), after seven weeks of RT (MID) and after a subsequent seven weeks of HIIT (POST). Tissue was analyzed for atrogenic mRNA expression, proteins associated with the UPS, and 20S proteasome activity. Data were checked for normality using Shapiro-Wilk tests and analyzed via one-way ANOVAs. **RESULTS:** Muscle really interesting new gene (RING) finger 1 (MuRF1), Atrogin-1, and forkhead box O3a (FOXO3a) all achieved significance at the overall ANOVA level ( $p \leq 0.0129$ ). These mRNAs were all significantly upregulated at POST as compared to both PRE ( $p \leq 0.0315$ ), and MID ( $p \leq 0.0315$ ). Poly-ubiquitinated proteins achieved overall ANOVA significance ( $p = 0.0185$ ) and trended toward a significant increase at both MID ( $p = 0.0694$ ) and POST ( $p = 0.0529$ ). Protein abundance of the 20S proteasome core demonstrated overall ANOVA significance ( $p = 0.0096$ ) and showed increases at POST as compared to both PRE ( $p = 0.0311$ ) and MID ( $p = 0.0485$ ). Finally, 20S proteasome activity demonstrated overall ANOVA significance ( $p = 0.0031$ ) and showed increases from PRE at both MID ( $p = 0.0011$ ) and POST ( $p = 0.0040$ ). **CONCLUSIONS:** Markers of the UPS were upregulated at POST at the mRNA, protein, and activity level suggesting that the UPS played a role in the HIIT-induced atrophy that occurred following a prior seven-week RT program.

**P156: THE EFFECTS OF NEAR VOLITIONAL FATIGUE RESISTANCE TRAINING ON STRENGTH & HYPERTROPHY IN TRAINED INDIVIDUALS**

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**Introduction:** An emerging topic in the resistance training literature are the outcomes between low repetitions in reserve (low-RIR) and high repetitions in reserve (high-RIR). Therefore, we wanted to measure muscular strength and skeletal muscle hypertrophic adaptations associated with low-RIR and high-RIR resistance training. **Methods:** Resistance-trained college-aged males (n=11) and females (n=8) participated in the study (24±3 years old, 173.4±10.9 cm, 79.0±22.7 kg, 1.60±0.33 squat: body mass ratio). Prior to the study, panoramic images of the vastus lateralis (VL) were obtained at 33% (proximal), 50% (mid), and 67% (distal) of the total femur length, and VL muscle cross-sectional area (VL mCSA) was assessed. Participants' muscle strength was then assessed with a one-repetition maximum (1RM) test on the bench press, deadlift, and back squat exercises. Participants were then randomly assigned (based off Wilks score) into either low repetitions in reserve (low-RIR) or high-RIR groups. Both groups performed six weeks of resistance training (3 d/weekly). The low-RIR group was instructed to execute barbell squat, barbell bench press, and barbell deadlift loads that elicited a RIR of 0-1 at the conclusion of each set during the six-week period. The high-RIR group was instructed to execute this same paradigm for an RIR of 4-6 of the six-week period. **Results:** To account for potential sex differences, strength metrics were normalized by body mass. There were significant main effects of time for squat, bench press, and deadlift (p<0.001, p=0.002, p=0.001, respectively), but no condition x time (CxT) interactions for these variables (Squat: p=0.129,  $\eta^2=0.130$ ; Bench Press: p=0.794,  $\eta^2=0.004$ ; Deadlift: p=0.591,  $\eta^2=0.018$ ). No significant main effects of time or CxT interactions existed for changes in proximal VL mCSA or mid-thigh VL mCSA. However, there was a significant main effect of time for changes in distal VL mCSA (p=0.005), but there was no CxT interaction (p=0.061,  $\eta^2=0.203$ ). **Conclusion:** Our findings suggest low-RIR and high-RIR training elicit similar increases in strength and VL hypertrophy adaptations to all lifts. The distal VL mCSA decrease with training is unexpected and warrants further investigation.

**P157: FATIGUE-RELATED RESPONSES FOR EXPLOSIVE NEUROMUSCULAR FUNCTION AND PERIPHERAL FATIGUE FOLLOWING RAPID AND RAMP ISOMETRIC CONTRACTIONS**

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**BACKGROUND:** Neuromuscular fatigue following maximal voluntary isometric contractions (MVIC) dampens both rate of torque development (RTD) and rate of muscle activation (RMA), but the influence of contraction speed (i.e., rapid vs. slow) is less clear. The purpose of this study was to determine responses in explosive neuromuscular function and peripheral fatigue after fatiguing, rapid and ramp maximal isometric contractions. **METHODS:** Following a familiarization visit, twelve recreationally active, young males (22.8 ± 2.5 yrs) performed either rapid (FAST; as rapid as possible) or ramp (SLOW; 2 sec ramp-up) maximal voluntary isometric knee extensions. Protocol order was randomized and both protocols were stopped upon a 50% reduction in peak torque. Before and after each protocol, a rapid MVIC was performed and early (0-50 ms and 0-100 ms) and late (0-200 ms) RTD were calculated from the torque-time curve. RMA was assessed for the vastus lateralis using electromyography and was calculated as the root mean square from 0-50 ms relative to maximum root mean square. Following the MVICs, a series of electrically evoked singlets and doublets (10 Hz and 100 Hz) were delivered to assess indices of peripheral fatigue such as twitch amplitude and half relaxation time. Two-way (condition x time) repeated measures ANOVAs were used to identify differences between conditions across time. **RESULTS:** RTD from 0-50 ms (-56% vs -27%; p=0.020) and RMA (-64% vs +6%; p=0.026) were reduced more after SLOW compared to FAST, whereas similar reductions were found for other RTD time phases. Indices of peripheral fatigue were decreased similarly between conditions, but the larger effect size and relative increase for half relaxation time after SLOW (+43% vs +31%; p = 0.062) was noteworthy. **CONCLUSIONS:** These results suggest that early rapid torque production and RMA is reduced more after slow fatiguing contractions than fast. Though the physiological underpinnings cannot be completely elucidated, the impairment in RMA after slow contractions may be due to greater inhibitory feedback resulting from peripheral fatigue. Despite a similar total time under

tension between protocols, the longer ramp-up during SLOW contractions likely allowed for greater peripheral disturbance.

**P158: THE EFFECTS OF SLEEP RESTRICTION ON MUSCLE STRENGTH AND VOLUNTARY ACTIVATION**

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**BACKGROUND:** Sleep restriction (<7.0 h per night) afflicts more than one-third of Americans and is known to induce muscle weakness (dynapenia), but the mechanistic cause of sleep restriction-induced dynapenia (SRID) is unclear. The purpose of this study was to investigate how sleep restriction affects voluntary activation and muscle strength of the knee extensors. **METHODS:** Seven (2M, 5F; age 24.1±2.1y) presumably healthy, physically active subjects completed an interpolated twitch (ITT) knee extension protocol at three time points: habitual sleep (HS, 7.95±0.49h), sleep restricted (SR, 5.03±0.04h, per night for three consecutive nights), and after a seven-day washout period of habitual sleep (WO, 8.09±0.42h). Maximal strength and ITT testing were conducted the morning (9-11a local time) following the last night of sleep intervention. Subjects sat upright on an isokinetic dynamometer (Biodex 53) with the dominant leg secured at 60° of knee flexion to maximize quadriceps torque. Subjects completed maximal voluntary isometric contractions (MVICs) of knee extensors. During the ITT, a constant voltage (400V) electrical stimulus (120% of current need to elicit a maximal twitch response) was delivered to the femoral nerve, before, during, and after knee extensor MVIC. We have compared MVIC and voluntary activation values by repeated measures ANOVA. **Results:** MVIC was not significantly different between SA and SR (192.3±39.2 vs. 181.5±35.3 Nm, p=0.370). However, MVIC was greater in WO (204.3±41.86 Nm) compared to SR (p=0.008), but not SA (p=0.390). Voluntary activation of the quadriceps was not significantly different among the three time points (SA: 89.9±6.6, SR: 93.6±2.7, and WO: 87.4±12.5%, p=0.359). **Conclusions:** Three nights of sleep restriction did not significantly alter knee extension MVIC, however, seven nights of sleep extension significantly increased MVIC following a short bout of SR which was not explained by changes in voluntary activation.

**P159: CHANGES IN BLOOD PRESSURE ACROSS THE LIFESPAN AMONG INSUFFICIENTLY ACTIVE ADULTS IN THE AMERICAN SOUTHWEST**

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**Purpose:** Hypertension is one of the leading risk factors for cardiovascular disease (CVD) and is strongly associated with increased mortality risk. Increasing physical activity (PA) has been shown to reduce the risk of hypertension and CVD, however roughly 90% of US adults don't meet PA guidelines. Therefore, the purpose of this study was to cross-sectionally assess blood pressure across the lifespan in adults *a priori* selected for being insufficiently active. **Methods:** Data from this cross sectional, secondary analysis came from a larger clinical trial that included insufficiently active, mostly overweight/obese (93%) adults from the Phoenix region. Subjects had anthropometric and blood pressure testing performed on them at baseline. Multiple regression was used to describe the relationships between age and systolic (SBP) and diastolic blood pressure (DBP). Additionally, sex differences across adult age-groups and differences between obesity classifications were examined. Data are presented as mean ± SD and  $\alpha$  was set at 0.05. **Results:** Five hundred and sixteen subjects were analyzed (Age: 44.8±9.2 (range 19-60), BMI: 33.8±7.2, SBP: 121±13, DBP: 81±10, M/F: 184/332). Regression models revealed a linear increase in SBP across the lifespan. SBP increased by 0.4 mmHg per year with mean SBP in males being 5 mmHg greater than females. DBP had a curvilinear increase with the greatest increase seen between 19-40 years old and a plateau between 40-60. When dividing the cohort by decades of life, individuals 51-60 years old had SBP ~10 mmHg greater than 19-29 years old and 6 mmHg greater than 30-40 years old (124±13 vs 115±12, p = 0.001; and 124±13 vs 118±13, p < 0.001, respectively). In addition, obese inactive individuals had an SBP 6 mmHg greater than normal weight (122±13 vs. 116±11, p = 0.02) and ~4 mmHg greater than those who were overweight (122±13 vs 119±14, p = 0.03) respectively. **Conclusion:** Our cross-sectional analyses of insufficiently active adults suggests that there is a linear increase in SBP with age. Males on average have SBP 5 mmHg greater than females. Additionally, obese subjects had greater SBP than those in either the normal or overweight BMI groups. Implications for CVD risk reduction in inactive obese populations will be discussed. Supported by R01CA198915

**P160: BASELINE CARDIORESPIRATORY AS A PREDICTOR OF BP STATUS IN INSUFFICIENTLY ACTIVE ADULTS**

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**Background:** Blood pressure and peak oxygen uptake ( $VO_{2peak}$ ) are strong independent predictors of all-cause and cardiovascular mortality. Individuals with a  $VO_{2peak}$  of 8 METs or greater have decreased risk of cardiovascular disease compared to those with a  $VO_{2peak}$  less than 8 METs. Increasing physical activity in insufficiently active adults is associated with improvements in both cardiorespiratory fitness (CRF) and blood pressure (BP), however approximately 90% of adults in the United States do not meet current physical activity guidelines. Additionally, the relationship between CRF and the odds of having an elevated blood pressure (SBP  $\geq$  120 and/or DBP  $\geq$  80) or hypertension (SBP  $\geq$  140 and/or DBP  $\geq$  90) are unknown. Therefore, we determined the odds of having elevated blood pressure or hypertension in individuals stratified based on  $VO_{2peak}$  ( $<$  8 METs or  $\geq$  8 METs). **Methods:** Insufficiently active (as determined by accelerometry) individuals (N=518) underwent blood pressure and anthropometric testing followed by a treadmill-based graded exercise test (modified Balke protocol) with ventilatory gas exchange assessment to determine  $VO_{2peak}$ . Only valid  $VO_{2peak}$  tests (defined as achieving  $\geq$ 90% age-predicted heart rate max and RER  $>$  1.05) were used for analyses. Adjusted Logistic Regression examined the role of CRF in whether subjects would have normal (SBP  $<$  120 and DBP  $<$  80), elevated BP or hypertension. Data are presented as means  $\pm$  SD or odds ratios with  $\alpha$  was set at 0.05. **Results:** Three hundred and seventy five individuals had BP measured and met the criteria for a valid  $VO_{2peak}$  test (age = 44.8  $\pm$  9.1 years; BMI = 32.9  $\pm$  6.6;  $VO_{2peak}$  = 24.5  $\pm$  4.8 mL/kg/min; SBP = 121  $\pm$  13; DBP = 81  $\pm$  10 mmHg; Males/Females = 124/251). One-hundred and twenty-seven individuals had normal BP, 164 had elevated BP, and 84 individuals were hypertensive. After adjusting for age and sex, those with a  $VO_{2peak}$  less than 8 METs did not have significantly different odds of having elevated BP (OR = 1.3, 95% CI: 0.7 - 2.4,  $p$  = 0.33). However, those with a  $VO_{2peak}$  less than 8 METs were more likely to be hypertensive compared to individuals with a  $VO_{2peak}$  greater than 8 METs (OR = 2.5, 95% CI: 1.2 - 5.2,  $p$  = 0.01). **Conclusions:** Approximately 33.9% of our cohort had a BP that was in the normotensive range, 43.7% had elevated BP, and 22.4% were hypertensive. Importantly, the present study found that low CRF in inactive adults was associated with an increased odds of being hypertensive. This underscores the high CVD burden in this population and the need for targeted interventions to optimize outcomes. Supported by R01CA198915

**P161: RELATIONSHIP BETWEEN BMI, PHYSICAL ACTIVITY AND OTHER HEALTH COVARIABLES, AND DEPRESSION IN ADULTS**

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**BACKGROUND:** The National Health and Nutritional Examination Survey (NHANES) shows an increase of 11.4% in adult obesity prevalence from 1999-2017 (Akinbami et al., 2022) and an increase in depressive disorders in adults as well (Greenberg et al., 2021). Previous research suggests a modest relationship between obesity and depression (DEP) with recommendations for analysis of more robust covariates for more accurate inferences (Atlantis & Baker, 2008). Physical activity (PA) provides mental health benefits for depressed people, even at levels lower than that of current PA recommendations for health. (Pearce et al., 2022). **PURPOSE:** This study examines the relationship between body mass index (BMI) and DEP and the potential moderation of PA on this relationship. **METHODS:** NHANES (2017-2018) data was used. Descriptive statistics were calculated for all variables. Multiple linear regression analysis was used to examine the relationship between BMI and DEP and to determine if PA plays a potential moderating effect on the BMI-DEP relation. Covariates included smoking status, sex, and socioeconomic status via monthly poverty index. Significance was set at  $p=0.05$ . **RESULTS:** 5,856 participants (51.5% female) were included in the analysis. Mean BMI was 29.72 ( $\pm$ 7.44 kg/m<sup>2</sup>). Mean PA was 130.41 ( $\pm$ 179.61 min/week<sup>-1</sup>) and mean family monthly poverty index was 2.79 ( $\pm$ 1.54). Smoking status was categorized as smoker, occasional smoker and non-smoker, which represented 34.1%, 9.2%, and 56.7% of participants, respectively. Mean score on the DEP screening tool was 3.37 ( $\pm$ 4.58). A significant model ( $R^2=0.112$ ,  $F=63.4$ ,  $p<0.0001$ ) emerged with main effects of BMI ( $\beta=0.008$ ,  $p=0.0008$ ), PA ( $\beta=-0.002$ ,  $p=0.0027$ ), family monthly poverty index ( $\beta=-0.316$ ,  $p=0.0112$ ), sex ( $\beta=1.187$ ,  $p=0.0001$ ), and smoking status ( $\beta=-0.874$ ,  $p<0.0001$ ) contributing to the overall model. The interaction between PA and BMI was non-significant. **CONCLUSION:** The modest association between BMI and depression suggests BMI plays a small, but significant role in

depressive symptoms. Practitioners working with individuals with obesity may find it beneficial to screen for DEP and collaborate with mental health professionals when developing intervention strategies.

**P162: PHYSICAL ACTIVITY, COGNITIVE FUNCTION STATUS, AND ALL-CAUSE MORTALITY RISK IN STROKE SURVIVORS: 1999-2002 NHANES**

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**BACKGROUND:** The evidence examining the joint effect of leisure-time physical activity (LTPA) participation and cognitive function status on all-cause mortality risk in stroke survivors is limited. This study examines the joint effect of LTPA participation and cognitive function status on all-cause mortality risk in a nationally representative sample of U.S. adult stroke survivors. **METHODS:** Study sample ( $N = 139$ ) included older adult ( $\geq 60$  years of age) participants in the 1999-2002 National Health and Nutrition Examination Survey. Cognitive function status was assessed using Digit Symbol Substitution Test scores (high  $> 36$  correct and low  $\leq 36$  correct). Participation in any volume of moderate-to-vigorous LTPA during the previous month (yes/ no or unable) was assessed via questionnaire. **RESULTS:** Analysis of stroke survivors with high cognitive function reporting monthly participation in moderate-to-vigorous LTPA revealed a statistically significant decrease in risk of all-cause mortality when compared to a referent group of stroke survivors with low cognitive function reporting no LTPA (Hazard Ratio [HR] 0.39; 95% Confidence Interval [CI] 0.16-0.92;  $P = 0.0337$ ). A similar statistically significant beneficial relationship was not revealed in those reporting LTPA participation with low cognitive function or in those reporting no LTPA with high cognitive function. **CONCLUSIONS:** In a nationally representative sample of U.S. older adult stroke survivors, the joint effect of high cognitive function and participation in LTPA was associated with a statistically significant protective effect against all-cause mortality risk.

**P163: PHYSICAL ACTIVITY AND SEDENTARY TIME IN U.S. ADULTS WITH AND WITHOUT HEART FAILURE: 2007-2018 NHANES**

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**BACKGROUND:** Current evidence describing physical activity (PA) and sedentary time (ST) in people with and without heart failure (HF) is limited. This study examines PA participation and ST in a nationally representative sample of U.S. adults with and without self-reported HF. **METHODS:** Study sample ( $N=21,646$ ) included U.S. adult ( $\geq 40$  years of age) participants from the 2007-2018 National Health and Nutrition Examination Survey. PA participation (meeting or not meeting PA recommendations), ST ( $\leq 4.5$  hours/day or  $> 4.5$  hours/day), and HF status (yes/no) were assessed via questionnaire. **RESULTS:** Compared to participants without HF (68%), 84% of participants with HF reported not meeting PA recommendations ( $P<0.01$ ). Compared to participants without HF (63%), 75% of participants with HF reported  $> 4.5$  hours/day of ST ( $P<0.01$ ). Unadjusted analysis suggests that participants with HF had 60% ( $P < 0.05$ ) lower odds of reporting meeting PA recommendations when compared to a referent group without HF. In a fully adjusted model, these odds were attenuated (Odds Ratio 0.64 [ $P < 0.05$ ]). Similar unadjusted analysis illustrated those individuals with HF had 42% ( $P < 0.05$ ) lower odds of reporting  $\leq 4.5$  hours/day of ST. In a fully adjusted model, these odds were also attenuated (Odds Ratio 0.67 [ $P < 0.05$ ]). **CONCLUSIONS:** Our findings suggest that U.S. adults with HF report significantly less PA and greater amounts of ST than those without HF.

**P164: 24-HOUR ACTIVITY BEHAVIORS IN LUNG CANCER PATIENTS AND SURVIVORS**

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**Background:** Lung cancer is the second most common cancer with the American Cancer Society estimating 236,740 new cancer cases this year. The number of lung cancer deaths are declining annually due to advancements in screening and treatment. However, there is limited literature regarding 24-hour activity behaviors including sedentary behavior (SB), moderate to vigorous physical activity (MVPA), and sleep. Healthy 24-hour activity behaviors contribute to secondary disease prevention and could be important potential intervention targets to improve lifestyle and quality of life in lung cancer patients and survivors. Therefore, the primary aim of the study was to investigate 24-hour activity behaviors in lung cancer patients and survivors.

**Methods:** From 2020-2022, we recruited an online convenience sample of 14 participants with patients (49  $\pm$  14 years, 82% non-Hispanic,

91% White, 91% college degree, 45% household income <\$50,000, 36% full-time employment) and 3 survivors (71 ± 7 years, 100% non-Hispanic, 100% White, 33% college degree, 100% household income <\$50,000, 67% full-time employment). Participants self-reported 24-hour activity behaviors including weekday SB (WD-SB), weekend SB (WE-SB), moderate-to-vigorous physical activity (MVPA), and sleep. An independent samples t-test was used to compare 24-hour movement behaviors between lung cancer patients and survivors. Significance was set at  $p=0.05$  and mean differences are reported. Results: Lung cancer participants (combined patients and survivors) report on average 13 ± 5 hours WD-SB, 15 ± 10 hours WE-SB, 57 ± 83 MVPA, and 7 ± 2 hours of sleep. Lung cancer survivors reported significantly more MVPA compared to patients (109 minutes,  $p=0.038$ ) despite survivors being 22 years older than patients ( $p=0.028$ ). There were no significant differences in WD-SB, WE-SB, or sleep (all  $p>0.05$ ). Conclusion: Although none of these participants are meeting the guidelines for MVPA set by the American College of Sports Medicine, the stark contrast in MVPA between patients and survivors suggest that treatment intensity may contribute to reduced MVPA. There are no differences in high levels of SB and participants are achieving recommended sleep. These preliminary data suggest survivorship interventions targeting SB reduction are needed for lung cancer patients and survivors. Funding: The University of North Carolina's University Cancer Research Fund provided funding for data collection.

**P165: SEDENTARY BEHAVIOR CONTEXTS CLUSTER IN US ADULTS WITH AND WITHOUT CANCER: IMPLICATIONS FOR FUTURE INTERVENTION TARGETS**

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**BACKGROUND:** The average U.S adult spends most of the waking day engaging in sedentary behavior (SB), which is concerning considering the strong positive association between SB and chronic disease risk. Cancer survivors are particularly susceptible to the negative consequences of SB, considering they already have elevated chronic disease risk. To develop effective SB reduction interventions, we first need to understand the behavior. One challenge is that SB occurs in a variety of contexts, including occupational (O), transport (T), television viewing (TV), leisure time screen/computer (C), or other. The objective of this study was to investigate SB context and clustering in U.S. adults with and without cancer. **METHODS:** We surveyed a convenience sample of 1,588 adults (aged  $\geq 18$  years) residing in the US from 2020-2022. Participants self-reported cancer history and SB context including O, T, TV, C, and other in hours per day for weekdays (WD-SB) and weekends (WE-SB). Z-scores were calculated for SB. Cluster analysis was conducted using a two-step method including agglomerative hierarchical clustering with squared Euclidean distance and visual inspection to identify the number of clusters followed by K-means clustering. Clusters were labeled via distinguishing SB contexts (high  $\geq 0.5$ , low:  $\leq -0.5$ ). Partial eta-squared ( $\eta^2$ ) measured effect size (small: 0.01, medium: 0.06, large: 0.14 respectively) and ANOVA was used to compare group by cluster. **RESULTS:** 233 cancer survivors (48 ± 19 yr., 52% female, 73% employed, 15+ cancer types) and 1,355 individuals without cancer (45 ± 18 yr., 64% female, 57% employed) completed the survey. Cancer participants engaged in 11.4 ± 6.3 WD-SB and 10.9 ± 5.6 WE-SB. Non-cancer individuals engaged in 10.6 ± 6.3 WD-SB and WE-SB. Cluster analysis identified 4 SB-context clusters with a small effect ( $\eta^2$ : 0.01,  $p=0.03$ ). Cluster 1 served as the reference group and was characterized by the least amount of SB in all contexts (34% cancer). Cluster 2 included the most cancer survivors, exhibited high O, T, TV, C and moderate other for WD-SB and WE-SB (39% cancer,  $p=0.03$ ). Cluster 3 exhibited low O, moderate T, TV, C, and high other WD-SB/WE-SB (6% cancer,  $p=0.03$ ). Cluster 4 exhibited moderate O and TV and very low T, C, or other WD-SB/WE-SB (21% cancer,  $p=0.01$ ). **CONCLUSIONS:** The largest number of cancer survivors were in the highest SB cluster across all contexts (cluster 2). However, the lowest SB cluster (cluster 1) had the second largest population of cancer survivors, suggesting some report low amounts of SB. SB context did not vary from WD to WE and cancer survivors are highly sedentary amongst all contexts. Objective accelerometry data are needed to confirm these findings. Future interventions should potentially target SB contexts most amenable to change such as TV or C because these contexts have fewer barriers to change.

**P166: 24-HOUR ACTIVITY BEHAVIOR INVESTIGATION IN WHITE AND BLACK ENDOMETRIAL CANCER POPULATIONS**

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**Background:** Endometrial cancer (EC) is the most common cancer of the female reproductive organs affecting over 66,000 US women annually. EC is more common in White women, but mortality is higher in Black women. EC survivors experience a 3-6-fold greater risk for cardiovascular disease (CVD) compared to the general population. Poor 24-hour activity behaviors including sedentary behavior, physical inactivity, and sleep, contribute to CVD risk. The primary aim of the study was to investigate 24-hour activity behaviors in Black and White EC. A secondary aim was to explore differences between 2020 and subsequent years due to restrictions associated with the COVID-19 pandemic. **Methods:** From 2020-2022, we recruited an online convenience sample of 14 EC with 9 self-identifying as White (43 ± 22 years, 55% college degree, 78% household income <\$50,000, 89% full-time employment) and 5 as Black (28 ± 8 years, 100% college degree, 80% household income <\$50,000, 60% full-time employment). Participants self-reported 24-hour activity behaviors including weekday SB (WD-SB), weekend SB (WE-SB), moderate-to-vigorous physical activity (MVPA), and sleep. An independent samples t-test was used to compare 24-hour movement behaviors between Black and White EC and between 2020 and subsequent years. Significance was set at  $p=0.05$  and mean differences are reported. **Results:** White EC survivors reported significantly more WD-SB (13 hours,  $p=0.002$ ) and WE-SB (14 hours,  $p=0.005$ ). White EC survivors reported more MVPA (44 minutes,  $p=0.012$ ). There were no racial differences in sleep ( $p=0.534$ ). More WD-SB (10 hours,  $p=0.015$ ) was reported in 2020 compared to 2021/2022, however there were no differences between years between WE-SB, MVPA, and sleep (all  $p>0.05$ ). **Conclusions:** EC survivors reportedly spend the majority of their day in SB and are not meeting the recommended ACSM MVPA guidelines. Lifestyle interventions aimed at promoting healthy 24-hour activity behaviors should start by targeting one activity behavior at a time and may need to be individualized to start with SB reduction or PA promotion.

**P167: 24-HOUR ACTIVITY BEHAVIORS AMONG CANCER SURVIVORS DURING AND FOLLOWING COVID-19**

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**BACKGROUND:** The COVID-19 pandemic in 2020 caused widespread social restrictions in an attempt to mitigate transmission. These restrictions impacted 24-hour activity behaviors (24-AB), including moderate to vigorous physical activity (MVPA), sedentary behavior (SB), and sleep. The objective of this study was to determine change in 24-AB from during- (2020) to post- (2021 and 2022) pandemic among breast- (BC) and mixed type-cancer survivors. **METHODS:** From 2020-2022, we recruited a U.S. nationwide convenience sample of 46 BC (52 ± 21, 87% non-Hispanic, 78% white) and 238 mixed type cancer survivors (45 ± 18, 81% non-Hispanic, 76% white). Participants self-reported weekday SB (WD-SB), weekend SB (WE-SB), MVPA, and sleep in hours (hr.) or minutes (min) per day. A repeated measures ANOVA was used to determine the time effect and to compare 24-AB between BC and mixed type cancer survivors. Significance was set at  $p=0.05$  and mean differences are reported. **RESULTS:** Overall, when comparing 24-AB by year between BC and mixed type cancer survivors, there were statistically significant differences in WD-SB, WE-SB, MVPA, and sleep (all  $p<0.001$ ). From 2020 to 2022, WD-SB (5.1 ± 18.3 hr.) and WE-SB (4.2 ± 16.8 hr.) decreased while MVPA (144 ± 269 min) and sleep (0.4 ± 1.4 hr.) increased in BC and mixed type cancer survivors with no group differences. **CONCLUSION:** Among cancer survivors, 24-AB have improved from 2020 to 2022 with reduction in WD-SB and WE-SB and increases in MVPA and sleep. Furthermore, there were no significant differences in 24-hour activity behaviors in BC compared to mixed type cancer survivors. Further research is needed to confirm these data with objective accelerometry data. However, cancer survivors would benefit from continued improvements in 24-AB especially targeting the high amounts of WD-SB and WE-SB. Interventions targeting 24-AB should also be robust enough to withstand potential future pandemics and associated social restrictions or at least consider alternative approaches such as virtual delivery to avoid the significantly worse 24-AB reported in 2020 at the onset of the COVID-19 pandemic.

**P168: 24-HOUR ACTIVITY BEHAVIORS IN KIDNEY CANCER PATIENTS AND SURVIVORS**

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**BACKGROUND:** Kidney cancer (KC) is the 10th most common cancer in the US, but given its 93% 5-year survival rate, there needs to be more emphasis on reducing chronic disease risk (i.e., cardiometabolic health) in the surviving population. Chronic disease risk may be mitigated through prescribing healthy 24-hour activity behaviors (24-AB), defined as sedentary (SB), moderate to vigorous physical activity (MVPA), and sleep behaviors over 24-hr. The objective of this study is to investigate 24-AB in KC survivors compared to survivors of other cancer types to identify future intervention targets specific to KC survivors. **METHODS:** From 2020-2022, we recruited an online convenience sample of 15 KC survivors (42 ± 18 years, 74% non-Hispanic, 87% white, 87% college degree, 47% income <\$50,000) and 186 mixed-type cancer survivors (48 ± 19 years, 87% non-Hispanic, 74% white, 72% college degree, 83% income <\$50,000). Participants self-reported 24-AB, including weekday SB (WD-SB), weekend SB (WE-SB), moderate-to-vigorous physical activity (MVPA), and sleep. A one-way ANOVA was used to compare 24-hour movement behaviors between KC survivors and mixed type survivors. Significance was set at p=0.05 and mean differences are reported. Cohen's d was calculated to determine effect size determined as small (0.2), medium (0.5), and large (0.8). **RESULTS:** KC survivors reported significantly more WD-SB (3 hours, d=0.56, p = 0.02) and WE-SB (3 hours, d=0.69, p = 0.01) with medium effect sizes compared to mixed-type cancer survivors. There were no significant differences in MVPA (d=0.01) or sleep (d=0.44) between KC survivors and mixed type survivors (p ≥ 0.05) with small and medium effect sizes respectively. **CONCLUSIONS:** KC survivors spend most of their time sitting and spend very minimal time being physically active, as they are not meeting recommended ACSM guidelines for MVPA, thus increasing their chronic disease risk. Compared to mixed-type cancer survivors, KC survivors engage in significantly more WD-SB and WE-SB. Therefore, future interventions aiming to improve 24-AB for KC survivors should target SB, however further research is needed to confirm these data with objective accelerometry data.

**P169: PARENTAL CORRELATES OF SELF-REPORTED PHYSICAL LITERACY AMONG GIRLS**

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Overweight and obese youth are at an increased risk of developing chronic health diseases. Physical literacy, a holistic construct, includes one's knowledge, motivation, confidence, and competence to be physically active. It has been associated with positive health behaviors among children. Understanding the relationship between parent beliefs and child physical literacy may lead to more effective interventions that combat childhood obesity. The purpose of this study was to examine relationships among family obesogenic environments, parent perception of their child's physical literacy, and child's self-reported physical literacy. Parents (N=52) from one Kentucky elementary school completed surveys through REDCap regarding demographics, health behaviors, parent perception of child physical literacy (PLAYparent), and parent evaluation of obesogenic environments (Family Nutrition and Physical Activity Screening Tool). Children completed a physical literacy survey (PLAYself) during school hours with aid from the research team. Parent-child dyads with completed data (N=34) were included. Relationships among PLAYparent, PLAYself, and family obesogenic environments were examined using Pearson's Correlation Coefficient. Parent participants were aged 36.9±5.5 years, while children were aged 6.4±1.0 years. Parents were primarily mothers (91.2%), married (73%), college-educated (85%), Caucasian (67%), employed (79%), with an annual household income of \$75,000 or more (56%). There was a statistically significant relationship between family obesogenic environment and parent-perceived child physical literacy (r=0.35, p=0.049). There was no significant relationship between family obesogenic environments and child-perceived physical literacy (r=0.04, p=0.84) or between child and parent-perceived physical literacy (r = -0.21, p=0.23). Findings suggest that parents' perception of their child's physical literacy is related to their understanding of the family's overall obesogenic environment. However, the child's self-reported physical literacy was not associated with parental perceptions of the family's obesogenic environment or parent perceptions of the child's ability, confidence, and motivation to be physically active. Children may not have an

accurate impression of their own physical literacy, while parents may not understand their child's literacy. Future research should utilize objective measures of physical literacy.

**P170: EXERCISE HABITS AND RESOURCES FOR SOUTHEASTERN UNITED STATES FIREFIGHTERS**

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**BACKGROUND:** Insufficient fitness can impair performance and increase injury risk in firefighters. It is important that firefighters engage in regular exercise to remain occupationally ready. However, firefighters face multiple barriers to exercise; including irregular shift schedules, frequently working overtime, and physically and mentally exhaustive job demands. The purpose of this study was to assess exercise habits, facility resources, and other barriers to fitness for firefighters in the southeastern United States. **METHODS:** This cross-sectional study consisted of a 41-item online Qualtrics questionnaire with six sections: demographics, work demands, physical activity and exercise, cardiovascular exercise, resistance exercise, and facility resources. Participants were recruited using a snowball method, through social media posts and flyers, in addition to emails sent to fire departments across 7 states in the southeast United States.

**RESULTS:** Approximately 65% (N = 271) engage in 30+ min/day of exercise. More firefighters engaged in exercise when more on-site equipment options were available (p = 0.001). Average calls/shift was not related to exercise days/week or minutes/day (p > 0.40). On-shift exercise did not differ based on a positive/negative perception of on-shift exercise (p = 0.17). On-shift exercise perception was not related to exercise days/week or minutes/day (p > .60). **CONCLUSIONS:** The self-reported survey responses suggest southeastern United States firefighters meet exercise guidelines. Most report having exercise time/access to a variety of equipment options on-shift. Exercise habits may be impacted by equipment options, but not call volume or perception of on-shift exercise. This perception did not deter firefighters from exercising on-shift but may impact exercise intensity. It is worth noting that there is possible self-report and sampling bias that could have led to an overestimate of exercise habits.

**P171: SHORT-TERM, HIGH-INTENSITY EXERCISE, BUT NOT HISTAMINE BLOCKADE, ALTERS INTERARM BLOOD PRESSURE.**

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**BACKGROUND:** Large differences in systolic blood pressure (BP) between arms (IAD; ≥10mmHg absolute difference) have been linked to an increased risk for cardiovascular disease and premature mortality. Further, light- and moderate-intensity aerobic exercise alters IAD and a differential response has been observed based upon resting IAD status. To date, there have not been any investigations into the effect of short-term, maximal-intensity exercise on IAD. Further, post-exercise hypotension is not fully understood, but there is evidence to suggest that the activation of histamine (i.e., H<sub>1</sub> and H<sub>2</sub>) receptors contributes to increased vasodilation. Therefore, histamine-receptor blockade results in suppressed vasodilation and increased BP, and therefore may exacerbate IAD during recovery following acute maximal-intensity exercise. The purpose of this study was to examine the effect of a histamine-receptor blockade on IAD and sustained post-exercise hypotension following an acute bout of high-intensity exercise. **METHODS:** Apparently healthy individuals were studied in a control condition and following the blockade of histamine H<sub>1</sub> (fexofenadine 120mg) or H<sub>2</sub> (famotidine 40mg), respectively. BP was simultaneously measured using two automated, auscultatory monitors (SunTech Tango) at rest, immediately following a Wingate test, and at one-, five-, and ten-minute recovery time points. Additionally, continuous hemodynamic monitoring (Physioflow) was performed using a non-invasive device. A two-way, repeated measures ANOVA was used to determine condition and time differences. **RESULTS:** A significant increase in IAD and systolic BP, and alterations in the hemodynamic response, from rest to immediate post-exercise and into recovery were observed (P<0.05), however, these responses were not different under conditions of histamine blockade (P>0.05). **CONCLUSIONS:** In apparently healthy individuals, short-term, high-intensity exercise altered the IAD response. The effect of histamine blockade on IAD remains unclear.

**P172: INFLUENCE OF ABSOLUTE FORCE ON AUGMENTED EXERCISE BLOOD PRESSURE DURING ISOMETRIC HAND-GRIPPING WITH FEMALE AGING**

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**PURPOSE:** Post-menopausal females exhibit the highest exercising blood pressure (BP) of any age and sex group. Such responses are associated with elevated risk for adverse cardiovascular events. Recent work indicates that absolute handgrip (HG) force influences exercise BP responses. However, the role of absolute handgrip (HG) force on BP responses in female aging has yet to be addressed. Therefore, we sought to determine whether there would be differential relations between absolute HG load and BP in younger and older female participants. **METHODS:** We analyzed data from older (OF; n=9; age: 66±6 years, body mass index (BMI): 23±3 kg/m<sup>2</sup>) and younger (YF; n=14; age: 24±5 years, BMI: 22±3 kg/m<sup>2</sup>) females. We measured beat-to-beat BP (photoplethysmography; Finometer) while participants lay supine. Participants performed isometric HG exercise at 30% of their maximal voluntary contraction for two minutes. We employed a mixed-effects model to assess the effects of HG and age on systolic (SBP) and diastolic (DBP) BP. We also used linear regression to evaluate the impact of age and absolute HG loads on BP responses. **RESULTS:** Across baseline and minute 2 of HG exercise we found a significant effect of age on BP (SBP p<0.001, DBP p=0.048). OF had higher SBP at baseline (OF: 146±22 vs. YF: 107±7 mmHg, p<0.001) and during minute two of HG exercise (OF: 168±32 vs. YF: 125±9 mmHg, p<0.001) compared with YF. OF had an exaggerated delta SBP during HG exercise (OF: delta 27±12 vs. YF: delta 18±7 mmHg, p=0.026), but there was no age difference for exercising delta DBP (p=0.885). HG load was not related to BP responses in OF (R<sup>2</sup>=0.28, p=0.1746) or YF (R<sup>2</sup>=0.05, p=0.4372) and there was no between group difference in the relation between HG load and BP responses (p=0.1615). **CONCLUSION:** In line with previous findings, we found that older females had augmented BP during HG exercise. However, BP responses were not related to HG load in either age group of female participants. Future investigations are needed to elucidate the relations between absolute load and BP responses among females across the lifespan.

**P173: INFLUENCE OF DIETARY SODIUM AND FIBER ON BLOOD PRESSURE AND VASCULAR FUNCTION IN YOUNG ADULTS**

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**Background:** High dietary sodium (Na<sup>+</sup>) increases blood pressure (BP) and decreases vascular function, whereas high dietary fiber is associated with reduced BP. However, the combined effect of dietary Na<sup>+</sup> and fiber on BP and vascular function is unclear. Therefore, we assessed dietary Na<sup>+</sup> indexed to fiber (Na<sup>+</sup>/Fiber) and soluble fiber (Na<sup>+</sup>/Sol Fiber) intake in healthy young adults. **Methods:** Forty-six young adults (24 Male/22 Female, 21.0 ± 0.7 years, body mass index: 25 ± 3 kg/m<sup>2</sup>, BP 117 ± 9/69 ± 9 mmHg, mean ± SD) were included in this analysis. We assessed brachial BP and carotid-femoral pulse wave velocity (cf-PWV; an index of arterial stiffness) using SphygmoCor XCEL. In a subset of 40 participants, we assessed brachial artery flow-mediated dilation (FMD; Arietta 70 vascular ultrasound). Participants completed a food and fluid log for ≥2 weekdays and ≥1 weekend day. We used Nutrition Data System for Research to quantify average daily dietary Na<sup>+</sup>, total fiber, and soluble fiber. We analyzed the association between variables using simple linear regression and ANOVA (to compare tertiles of Na<sup>+</sup>/Fiber or Na<sup>+</sup>/Sol Fiber). **Results:** There was not an association between BP and Na<sup>+</sup>/Fiber (systolic BP: R<sup>2</sup> = 0.046, p = 0.150, diastolic BP: R<sup>2</sup> = 0.061, p = 0.097), but there was between BP and Na<sup>+</sup>/Sol Fiber (systolic BP: R<sup>2</sup> = 0.080, p = 0.056, diastolic BP: R<sup>2</sup> = 0.113, p = 0.022). When participants were split into tertiles by Na<sup>+</sup>/Fiber and Na<sup>+</sup>/Sol Fiber, we detected differences in diastolic BP (ps < 0.043) but not systolic BP (ps ≥ 0.097). Participants' cf-PWV was associated with Na<sup>+</sup>/Fiber (R<sup>2</sup> = 0.152, p = 0.001) and Na<sup>+</sup>/Sol Fiber (R<sup>2</sup> = 0.116, p = 0.007), but we did not detect tertile differences in cf-PWV for either Na<sup>+</sup>/Fiber or Na<sup>+</sup>/Sol Fiber (ps ≥ 0.128). Neither Na<sup>+</sup>/Fiber nor Na<sup>+</sup>/Sol Fiber were associated with FMD and there were no differences in FMD among tertile groups (ps ≥ 0.149). **Conclusion:** While additional data are needed, our data in healthy young adults indicate that dietary sodium indexed to soluble fiber is associated with increased blood

pressure and arterial stiffness but is not related to peripheral vascular endothelial function.

**P174: ACUTE EFFECT OF SMARTPHONE APPLICATION GUIDED BREATHING ON BLOOD PRESSURE, BAROREFLEX SENSITIVITY, AND AORTIC STIFFNESS**

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**BACKGROUND:** Blood pressure (BP), baroreflex sensitivity (BRS), and central arterial stiffness (carotid-femoral pulse wave velocity, cf-PWV) are health markers associated with cardiovascular disease risk, and cost-effective methods for optimizing these metrics are desirable. Previously, device-guided paced breathing improved BP, BRS, and cf-PWV, but there may be a cost barrier for some consumers. Free smartphone applications (app) with breathing guidance are widely available and may be a cost-effective means to improve BP, BRS, and cf-PWV. Therefore, we evaluated the acute cardiovascular effects of paced breathing using a cost-free app. **METHODS:** Twenty-one apparently healthy young adults (13M:9F; Age: 23.1 ± 3.7 yrs; body mass index: 23.5 ± 2.0 kg/m<sup>2</sup>) performed 10 min of spontaneous breathing (CTRL) and 10 min of app-guided paced (PACE) breathing (supine, 6 breaths·min<sup>-1</sup>; 5-s inhale, 5-s exhale) in a counterbalanced order. Ten min of stabilization preceded both conditions, and 3 min of standing served as a washout period between conditions. BP and cf-PWV were measured immediately before and after each condition using a SphygmoCor XCEL. During each condition, R-R intervals were recorded via electrocardiography and beat-to-beat BP via a continuous non-invasive arterial pressure monitor. Cardiovascular BRS was determined using the sequence method (≥ 3 cycles, ± 4 ms, ± 1 mmHg, R<sup>2</sup> ≥ 0.85). Two-way repeated measures analysis of variance was used to assess pre- and post-condition measures (BP, cf-PWV), and a paired t-test was used to compare BRS between conditions. **RESULTS:** There were no time×condition interactions for systolic or diastolic BP (P > 0.05). There was a time×condition interaction for cf-PWV (P = 0.02). Cf-PWV increased (P = 0.018, d = 0.25) from pre-PACE (5.8 ± 0.8 m/s) to post-PACE (6.0 ± 0.7 m/s), whereas no change (P > 0.05, d = 0.00) occurred from pre-CTRL (5.7 ± 0.7 m/s) to post-CTRL (5.7 ± 0.7 m/s). A total of 14/22 participants met criteria for BRS, which was higher (P = 0.02, d = 0.94) during PACE (26.4 ± 10.8 ms/mmHg) vs. CTRL (19.3 ± 7.5 ms/mmHg). **CONCLUSIONS:** In young adults, paced breathing guided by a free app promoted acute increases in BRS while minimally affecting BP. Arterial stiffness statistically increased during PACE, but the magnitude of change was well below previously reported clinical meaningfulness (± 0.5 m/s) or minimal detectable change thresholds (± 0.411 m/s).

**P175: ACUTE TRUNK STRETCHING EFFECTS ON CENTRAL AND PERIPHERAL BLOOD PRESSURE IN MIDDLE-AGED TO OLDER ADULTS**

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**BACKGROUND:** Approximately 75% of Americans ≥60 years have hypertension, which is the leading modifiable risk factor for cardiovascular disease and all-cause mortality. Chronic aerobic exercise reduces blood pressure (BP), and even a single bout of aerobic exercise can yield a sustained reduction in BP (i.e., postexercise hypotension). There is mounting evidence that chronic stretching may also reduce BP, but whether a single bout of stretching can acutely lower BP, as is seen with aerobic exercise, is less clear. Therefore, the purpose of this study was to examine the effects of acute trunk stretching using an exercise ball on central and peripheral BP in middle-aged to older adults. **METHODS:** We measured central and peripheral BP using a SphygmoCor XCEL device in 13 middle-aged to older adults (6M/7F; 70 ± 9 yrs; 31.1 ± 4.4 kg/m<sup>2</sup>; Means ± SD) before and 10-min after partner-assisted passive trunk stretching and a time-matched control visit, the order of which was randomized. The passive stretching visit consisted of six trunk stretches (flexion, extension, and bi-directional lateral flexion and standing rotation). For each participant, the first stretch was randomized. Each stretch was held for 30 seconds, followed by 30 seconds of relaxation, and this sequence was repeated 5 times in rotational order for a total of 30 minutes. The time-matched control visit consisted of 30 minutes of quiet seated upright rest. Visits were separated by a minimum of 48 hours (average separation = 7 ± 9 days). A repeated measures linear mixed model was used to compare changes (Δ; post - pre) in BP between visits. **RESULTS:** Average resting central BP was 120 ± 9 / 76 ± 10 mmHg and brachial BP was 128 ± 10 / 75 ± 9 mmHg during the two visits. Changes in brachial systolic (stretch: -4 ± 7 mmHg vs. control: 6 ± 6 mmHg; p = 0.002) and diastolic (stretch: -3 ± 4 mmHg

vs. control:  $2 \pm 4$  mmHg;  $p = 0.009$ ) BP, as well as central systolic (stretch:  $-4 \pm 6$  mmHg vs. control:  $6 \pm 6$  mmHg;  $p < 0.001$ ) and diastolic (stretch:  $-3 \pm 6$  mmHg vs. control:  $3 \pm 5$  mmHg;  $p = 0.014$ ) BP measurements differed between visits. **CONCLUSION:** These preliminary findings indicate that acute passive assisted trunk stretching with an exercise ball reduces central and peripheral blood pressure in middle-aged to older adults.

**P176: HABITUATION ATTENUATES THE SEX-SPECIFIC ASSOCIATIONS BETWEEN ISCHEMIC PAIN, BLOOD PRESSURE, AND ARTERIAL STIFFNESS**

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**BACKGROUND:** Cardiovascular reactivity (CVR) during physical stress is prognostic for incident cardiovascular disease. CVR is influenced by perceived pain. However, there is limited data on the effect of sex differences and repeated exposures to painful stimuli on CVR.

**METHODS:** We measured blood pressure (BP) and carotid-femoral pulse wave velocity (cf-PWV; an index of arterial stiffness) at rest, during isometric handgrip (HG) exercise at 30% of maximum voluntary contraction, and during post-exercise circulatory occlusion (PECO) during two identical trials in 39 adults (20M/19F; 18-39 yrs). We assessed participants' perceived pain using a visual analog scale after the first minute of each stimulus. We collected BP during minute two of each stimulus and cf-PWV during minute three of each stimulus.

**RESULTS:** In male participants, we observed moderate associations ( $P_s \leq 0.023$ ) between perceived pain and changes in brachial diastolic ( $r = 0.620$ ) and mean BP ( $r = 0.597$ ); central diastolic, mean, and systolic BP ( $r_s = 0.519-0.654$ ); and cf-PWV ( $r = 0.680$ ) during PECO in trial #1, but not trial #2 ( $P_s \geq 0.162$ ). However, in female participants, there were no associations between pain and CVR indices during either trial ( $P_s \geq 0.137$ ). Irrespective of sex, reductions in perceived pain during trial #2 relative to trial #1 were weakly to moderately associated ( $P_s \leq 0.038$ ) with reductions in brachial diastolic ( $r = 0.346$ ), mean ( $r = 0.379$ ), and systolic BP ( $r = 0.333$ ); central mean ( $r = 0.400$ ) and systolic BP ( $r = 0.369$ ); and cf-PWV ( $r = 0.526$ ). **CONCLUSIONS:** These findings suggest 1) there are sex differences in pain modulation of CVR in young adults and 2) habituation blunts pain and CVR during PECO, irrespective of sex.

**P177: INFLUENCE OF DIETARY SODIUM AND FIBER ON AMBULATORY BLOOD PRESSURE IN HEALTHY YOUNG ADULTS**

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**BACKGROUND:** Dietary sodium ( $\text{Na}^+$ ) elevates blood pressure (BP) and blunts nocturnal BP dipping, which is prognostic of future target organ damage and cardiovascular outcomes. Dietary fiber is associated with reduced resting BP. However, the combined effects of dietary  $\text{Na}^+$  and fiber on ambulatory BP measures, such as nocturnal BP and night-to-day dip ratio (nighttime/daytime BP), are unclear. Therefore, we assessed associations between dietary  $\text{Na}^+$  indexed to fiber ( $\text{Na}^+/\text{fiber}$ ) and soluble fiber ( $\text{Na}^+/\text{soluble fiber}$ ) on ambulatory BP in young adults.

**METHODS:** Sixty-two participants (30 M/32 F, 39 White adults/23 Black adults, age  $21.2 \pm 2.6$  years, BMI  $24 \pm 3$  kg/m<sup>2</sup>; mean  $\pm$  SD) were included in the current analysis. Participants completed a food and fluid log for  $\geq$  two weekdays and  $\geq$  one weekend day. We used Nutrition Data System for Research to quantify average daily  $\text{Na}^+$ , fiber, and soluble fiber intake. For ambulatory BP (Suntech Oscar2), participants wore a brachial cuff programmed to measure BP every 20 minutes during awake hours and every 30 minutes during sleep. Primary BP outcomes were average awake and asleep systolic BP (SBP) and diastolic BP (DBP), and night-to-day SBP and DBP dip ratio. Associations between variables were made using Spearman's Rho ( $\rho$ ) correlations controlled for sex, BMI, and race with  $\alpha$  set at  $\leq 0.05$ .

**RESULTS:** When controlling for sex and BMI, dietary  $\text{Na}^+$  was correlated with awake SBP ( $\rho = 0.36$ ,  $p = 0.005$ ) and asleep SBP ( $\rho = 0.26$ ,  $p = 0.044$ ) but not BP dipping ratios ( $p_s \geq 0.542$ ). Dietary  $\text{Na}^+/\text{fiber}$  was also correlated with asleep SBP ( $\rho = 0.26$ ,  $p = 0.046$ ) and DBP ( $\rho = 0.25$ ,  $p = 0.050$ ) but not BP dipping ratios ( $p_s \geq 0.243$ ). Dietary  $\text{Na}^+/\text{soluble fiber}$  was correlated with SBP dip ratio ( $\rho = 0.27$ ,  $p = 0.036$ ) and asleep SBP ( $\rho = 0.32$ ,  $p = 0.012$ ). When controlling for race, in addition to sex and BMI, dietary  $\text{Na}^+$  remained correlated to awake SBP ( $\rho = 0.36$ ,  $p = 0.005$ ) and asleep SBP ( $\rho = 0.29$ ,  $p = 0.028$ ). Dietary  $\text{Na}^+/\text{soluble fiber}$  remained correlated with asleep SBP ( $\rho = 0.28$ ,  $p = 0.030$ ). However, controlling for race attenuated the

associations between  $\text{Na}^+/\text{fiber}$  on asleep BP and  $\text{Na}^+/\text{soluble fiber}$  on BP dipping ( $p_s \geq 0.130$ ). **CONCLUSIONS:** Our cross-sectional data in healthy young adults indicate that dietary sodium indexed to soluble fiber is independently associated with elevated nocturnal blood pressure.

**P178: CAN WHITE-COAT BLOOD PRESSURE ELEVATIONS BE REDUCED USING A VIRTUAL REALITY HEADSET?**

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**BACKGROUND:** White coat hypertension (WCH) refers to patients with high blood pressure (BP) in a clinical setting, but normal BP at home. This condition is common and problematic, as it prevents physicians from properly evaluating and treating elevated BP. Strategies have been developed to obtain valid BP measurements for WCH patients including 24-hour ambulatory BP monitoring and the automated office BP measurement. However, these strategies are time-consuming and impractical. Practical approaches are needed to rapidly obtain valid BP measures. In this pilot study, we explore a potential solution: virtual reality (VR) headsets. This intervention may be beneficial as calming scenes can be easily displayed to patients.

**PURPOSE:** Have WCH patients complete a 5-minute VR intervention (calm beach scene) and determine if BP decreases significantly. **METHODS:** WCH patients (13 males, 13 females, age 55+) were recruited from a hospital database (at Mayo Clinic Florida). All the patients were previously diagnosed as WCH by their physician. Patients who agreed to participate arrived 15 minutes early for a previously scheduled routine appointment. First, the participant signed the informed consent. Then a baseline BP measurement was collected taken. (Welch Allyn Connex 6700 Vital Signs Monitor). Next, the patient wore the VR headset for 5 minutes Oculus Quest 2 with Skybox VR Video Player). The VR displayed a "calming beach scene" and BP was collected again (at 5-minutes). **RESULTS:** The systolic BP reduced significantly ( $p \leq 0.01$ ) from baseline ( $154.0 \pm 23.7$ ) to the VR condition ( $147.4 \pm 22.1$ ). For diastolic BP, there was no significant difference ( $p = 0.12$ ) between the baseline ( $85.3 \pm 24.4$ ) and VR ( $83.6 \pm 14.2$ ). On 5-point scale questions, 21 of 22 patients answered favorably when asked if the VR experience was "enjoyable" ( $4.45 \pm 0.78$ ) and if they believed it could lower their blood pressure ( $4.0 \pm 0.93$ ). Further, only 1 of 22 participants reported feeling "nervous" while wearing the VR device ( $1.54 \pm 0.88$ ). **CONCLUSION:** The VR device appeared to quickly reduce systolic BP by a clinically relevant amount and the majority of WCH participants responded positively to the intervention. This approach appears to have the potential to improve clinical practice. Future studies should attempt to optimize this intervention; detailed studies are needed to better understand the optimal exposure time and scene.

**P180: COMPARING POST-OCCCLUSIVE REACTIVE HYPEREMIA IN HABITUAL CAFFEINE USERS WHEN CONSUMING AND ABSTAINING FROM CAFFEINE**

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**BACKGROUND:** Since caffeine affects cardiovascular responses, studies measuring post-occlusive reactive hyperemia (PORH) commonly require caffeine abstinence. For habitual users, effects may be attenuated, and it is unknown if abstinence alters PORH.

**PURPOSE:** Compare PORH in habitual caffeine users when they consume or abstain from daily caffeine intake. **METHODS:** 28 participants completed a 3 visit within-subject study. Visit 1 consisted of familiarization and caffeine intake assessment. Visits 2-3 (1h after typical dose) consisted of PORH measures, one with (CAFF) and one without (ABS) typical caffeine doses (counterbalanced). Beginning of visits 2-3, arterial occlusion pressure (AOP) was measured via handheld Doppler probe. Heart rate (HR), systolic (SBP), and diastolic (DBP) blood pressure were measured simultaneously on the opposite arm. Testing consisted of 2 min of baseline, followed by 5 min of cuff inflation at 130% AOP, then 3 min of PORH measured with Doppler ultrasound and near-infrared spectroscopy (NIRS). Peak hyperemic velocity was the highest value of a 3s moving average after cuff deflation. Baseline velocity was the average of the 2 min period. NIRS tissue saturation index rate of change during ischemia (Slope 1) and for 30s after cuff deflation (Slope 2) was quantified via linear regression. Bayesian paired t tests were used to compare all variables between conditions.  $BF_{10}$  = likelihood of alternative vs null. Results are mean  $\pm$  SD. **RESULTS:** There was moderate evidence that baseline velocity was the same for CAFF ( $9.3 \pm 4.8$ ) and ABS ( $7.5 \pm 4.9$ ,  $BF_{10} = 1.0$ ). There was moderate evidence that peak hyperemic velocity (cm/s) was the same for CAFF ( $77.3 \pm 16.7$ ) and ABS ( $77.6 \pm 19.0$ ,  $BF_{10} = .20$ ). There was moderate evidence that Slope 2 (%/s) was the same for CAFF ( $1.9 \pm .46$ ) and ABS ( $1.8 \pm .42$ , ( $BF_{10} = .20$ ). There was

moderate evidence that Slope 1 was the same for CAFF (-11±.04) and ABS (-12±.03,  $BF_{10}= .20$ ). There was moderate evidence that SBP (mmHg) was the same for CAFF (116.0±9.8) and ABS (115.5±10.7,  $BF_{10}= .220$ ). For DBP (mmHg) evidence was weak ( $BF_{10}= 1.1$ ) when comparing CAFF (69.6±5.8) and ABS (69.5±5.4). For AOP (mmHg) evidence was weak ( $BF_{10}= .46$ ) when comparing CAFF (146.6±15.0) and ABS (143.0±16.4). There was moderate evidence that HR (bpm) was the same for CAFF (66.5±12.3) and ABS (66.9±13.0,  $BF_{10}= .2$ ). **CONCLUSION:** In habitual users, consuming typical caffeine doses does not appear to affect post-occlusive reactive hyperemia.

#### **P181: THE INFLUENCE OF BEETROOT JUICE ON RACIAL DISPARITIES IN VASCULAR HEALTH**

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**BACKGROUND:** In America, Black adults are 30% more likely to die from cardiovascular disease than White adults. More than half of this racial health disparity can be attributed to greater prevalence of high blood pressure (BP) and vascular dysfunction in Black adults. Nitric oxide (NO) is a potent signaling molecule, key regulator of vascular health, and NO bioavailability is suspected to be lower in Black individuals. Therefore, we tested the hypothesis that increasing NO bioavailability via nitrate-rich beetroot juice (BRJ) would attenuate racial differences in BP and vascular health in Black compared to White adults. **METHODS:** We recruited 18 Black (10M/8F; 21±3 years; 24±3 kg/m<sup>2</sup>) and 20 White (10M/10F; 21±4 years; 23±3 kg/m<sup>2</sup>) young adults for a randomized, placebo-controlled, acute BRJ study. Central and peripheral BP and carotid-femoral pulse wave velocity (cf-PWV; an index of central arterial stiffness) were measured before and two hours after ingesting nitrate-rich BRJ (~12.8 mmol) and nitrate-deplete BRJ placebo (PLA), given in random order. Baseline cardiovascular measures were compared between visits (paired) and races (independent) t-tests. Post-supplementation cardiovascular measures were compared between races (i.e., Black vs. White) and treatment (i.e., BRJ vs. PLA) using linear mixed models. **RESULTS:** Compared to White participants, Black participants demonstrated greater baseline brachial diastolic (66±7 vs. 71±6 mmHg;  $P=0.009$ ), central systolic (100±8 vs. 107±10 mmHg;  $P=0.028$ ), and central diastolic BP (67±6 vs. 72±6 mmHg;  $P=0.014$ ). Brachial systolic BP (115±8 vs. 121±10 mmHg;  $P=0.051$ ) and cf-PWV (5.7±0.8 vs. 6.1±0.8 m/s;  $P=0.075$ ) were not statistically different in White vs. Black participants. Baseline BP and cf-PWV values were not different between BRJ and PLA visits ( $P\geq 0.288$ ). Compared to PLA, post-BRJ supplementation brachial (-3.8 mmHg; 95%CI: -6.6 to -1.1) and central systolic BP (-2.8 mmHg; 95%CI: -5.1 to -0.5) were lower, but not other treatment effects were observed ( $P\geq 0.301$ ). Significant main effects for race ( $P\leq 0.020$ ) indicated that baseline differences in BP (i.e., higher in Black vs. White) remained post-supplementation. **CONCLUSION:** These data suggest that an acute nitrate-rich BRJ supplement lowers central and peripheral BP in young Black and White adults. However, acute BRJ supplementation does not appear to influence cf-PWV or attenuate racial differences in vascular health indices.

#### **P182: THE EFFECTS OF A HIGH SALT DIET ON URINARY NEPHRIN EXCRETION IN HEALTHY YOUNG ADULTS**

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**BACKGROUND:** Chronic high salt diet (HSD) increases the risk of cardiovascular disease and kidney disease. In rodents, HSD causes tubular injury despite no changes in blood pressure and glomerular injury. Recently, our group and others demonstrated that short-term HSD increases tubular injury in humans; however, it is unclear whether HSD causes glomerular injury in humans. Therefore, we sought to examine whether a short-term HSD increases urinary nephrin excretion, a biomarker for glomerular injury, in healthy young adults. **METHODS:** We analyzed data from 13 participants (7 Males/6 Females; age: 24 ± 4 years; BMI: 23.8 ± 2.9 kg/m<sup>2</sup>; BP: 112 ± 11/66 ± 10 mmHg, mean ± SD) recruited from a larger randomized, crossover, double-blind study (NCT03565653). Participants consumed HSD (3.9 grams of sodium) or placebo (PLA; dextrose) capsules for 10 days each separated by ≥ 2 weeks. Participants collected a 24-hr urine sample in a light-protected container from which mixed aliquots were used to measure urine flow rate, sodium excretion, and biomarkers of glomerular injury (nephrin) and filtration (Cystatin C excretion and creatinine clearance). We measured urine nephrin and

Cystatin C concentration using enzyme-linked immunosorbent assays. We measured urine and serum creatinine using the Jaffe reaction to subsequently calculate creatinine clearance. Statistical analysis included paired t-tests and Wilcoxon signed rank tests with  $\alpha$  set at < 0.05. **RESULTS:** There were no significant differences for urine nephrin concentration in HSD versus PLA (0.82 ± 0.66 vs 0.69 ± 0.62 µg/ml,  $p = 0.38$ ), nephrin indexed to flow rate (1.04 ± 0.67 vs 0.89 ± 0.97 µg/min,  $p = 0.22$ ), or nephrin indexed to creatinine (9.72 ± 6.56 vs 9.81 ± 8.79 ng/ml÷mg/dL,  $p = 0.89$ ). Similar to our previous findings, there was an increase in urinary Cystatin C excretion (0.13 ± 0.04 vs 0.10 ± 0.04 mg/day,  $p = 0.04$ ) and a trend for elevated creatinine clearance (143 ± 26 vs 125 ± 58 mL/min/1.73m<sup>2</sup>  $p = 0.08$ ) after HSD. **CONCLUSION:** These preliminary findings suggest that a short-term high salt diet does not elicit glomerular injury in a small cohort of healthy young adults, but does increase glomerular filtration. Further research on high salt and glomerular injury is warranted in larger, diverse cohorts.

#### **P183: CHARACTERIZING THE PULMONARY AND CARDIOMETABOLIC RESPONSES TO EXERCISE IN PEOPLE WITH LONG COVID**

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**BACKGROUND:** Up to 40% of people infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) develop long COVID, defined as COVID-19 sequelae (e.g., fatigue, dyspnea, chest tightness, exertional intolerance) persisting >12 weeks. Cardiopulmonary exercise testing (CPET) is often used as first-line assessment when investigating the possible causes of dyspnea and exertional intolerance. **PURPOSE:** To investigate the potential causes of exercise limitation in people with long COVID by characterizing the pulmonary and cardiometabolic responses to CPET. **METHODS:** Twenty adults (13 females; 40±11 y) with a diagnosis of long COVID participated. Following comprehensive pulmonary function assessment, a maximal CPET was performed on a motorized treadmill. Peak oxygen uptake ( $VO_{2peak}$ ) was measured as exercise capacity. Heart rate (HR), carbon dioxide production ( $VCO_2$ ), and minute ventilation ( $V_E$ ) and derived variables including  $O_2$  pulse ( $VO_2/HR$ ), chronotropic index (CI), respiratory exchange ratio (RER), and ventilatory efficiency ( $V_E/VCO_2$ ) were measured during each CPET. Anaerobic threshold (AT) was inferred from gas exchange threshold (GET). **RESULTS:** There was inter-individual heterogeneity in  $VO_{2peak}$  (103±25% predicted [%p], range 76 to 188%p). We subdivided our population into group groups: 1) 'low'  $VO_{2peak}$  (<85% predicted, 80±3%p;  $n=6$ ) and 2) 'normal'  $VO_{2peak}$  (≥85% predicted, 113±24%p;  $n=14$ ). Indices of lung function tended to be lower in the low  $VO_{2peak}$  group, but there was no relationship between forced expiratory volume in 1 s, forced vital capacity, or total lung capacity and  $VO_{2peak}$  across the entire cohort (all  $r\leq 0.35$ ,  $P\geq 0.41$ ). Peak HR (95±10 vs 96±7%p),  $O_{2pulse}$  (13±4 vs. 14±5%p), and RER (1.15±0.11 vs. 1.16±0.08), and CI (0.91±0.20 vs. 0.94±0.11) were not different between the 'low' vs. 'normal'  $VO_{2peak}$  groups (all  $P\geq 0.59$ ). Neither  $V_E/VCO_2$  nadir (27±2 vs. 27±3,  $P=0.83$ ) nor GET were different between the two groups. **CONCLUSIONS:** Some but not all people with long COVID have decreased exercise capacity ( $VO_{2peak}$  <85% predicted). The pulmonary and cardiometabolic responses to CPET were not different in people with a 'low' vs. 'normal'  $VO_{2peak}$ . In general, the cardiopulmonary responses to CPET were normal across our cohort. We suggest that decreased exercise capacity in people with long COVID may occur due to residual physical deconditioning, which may improve with regular exercise.

#### **P184: ACUTE CARDIOVASCULAR AND THERMODYNAMIC EFFECTS OF PASSIVE HEATING AND AEROBIC EXERCISE**

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**BACKGROUND:** The effects of aerobic exercise (AE) on vascular health and function are well established, hence it is considered the cornerstone therapy to prevent and treat cardiovascular diseases. Yet, most adults do not engage in the recommended levels of AE to realize these health benefits. Alternate therapeutic modalities, like passive heating (PH), may provide similar acute cardiovascular benefit, but findings and methodologies are inconsistent. **METHODS:** We evaluated cardiovascular and thermal responses to AE and PH in 7 low-fit but healthy adults (3 women;  $M\pm SD$  age=23±3 y, peak oxygen uptake [ $VO_2$ ]=22.8±2.6 ml·kg<sup>-1</sup>·min<sup>-1</sup>) with normal systolic/diastolic blood pressure (SBP/DBP: 116±16/75±11 mm Hg). Participants completed a familiarization visit and 2 randomly assigned 30-min experimental interventions separated by ≥48 h: AE (recumbent cycling at 40%  $VO_2$  reserve) and PH (recumbent rest wearing a water-perfused, tube-lined

suit circulating 49 °C water). SBP, DBP, heart rate (HR), vascular stiffness (pulse wave velocity [PWV]), core ( $T_c$ ) and skin ( $T_{sk}$ ) temperature were measured pre-, immediately post-, and 60 min post-intervention. Statistical analyses included descriptive statistics and two-way repeated measure ANOVA. **RESULTS:** Changes in SBP, DBP, and PWV were not significantly different from rest by time or intervention. HR was elevated from rest immediately following PH and AE (mean difference [MD] $\pm$ SD=4.8 $\pm$ 3.4 beats/min,  $p=0.04$ ).  $T_c$  increased more from rest immediately post-AE vs. PH (0.4 $\pm$ 0.3 °C,  $p=0.01$ ), and remained higher 60 min post-intervention (0.3 $\pm$ 0.3 °C,  $p=0.01$ ).  $T_{sk}$  increased more from rest immediately post-PH vs. AE (3.6 $\pm$ 2.6 °C,  $p=0.01$ ), and remained higher 60 min post-intervention (2.8 $\pm$ 1.6 °C,  $p=0.02$ ). **CONCLUSIONS:** Thirty min of AE or PH did not elicit significant changes in BP or vascular stiffness outcomes immediately post-intervention or during 60 min of recovery, nor did responses differ by intervention.  $T_c$  and  $T_{sk}$  increased compared to rest, but no consistent pattern emerged for AE or PH. Our findings suggest that the "dose" of AE and PH prescribed was insufficient for inducing favorable cardiovascular changes in our sample of young, healthy adults. To determine whether PH can serve as a suitable alternative for those who prefer not to or cannot participate in AE, it should be further investigated among adults with higher BP who stand to benefit the most. Moreover, future studies should focus on identifying the "optimal dose" of PH for therapeutic benefit.

#### **P185: A COMPARISON OF FITNESS CHARACTERISTICS BETWEEN FIREFIGHTERS AND POLICE OFFICERS**

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**BACKGROUND:** Cardiovascular health and physical activity in emergency responders has declined, putting them at greater risk of a myriad of conditions, especially when performing strenuous occupational tasks. Heart rate variability (HRV) provides indices of autonomic system activity, which has shown a relationship to cardiovascular disease and physical activity in middle-aged adults. The purpose of this study was to assess the relationship of HRV and physical activity indices in firefighters and police officers. **METHODS:** Emergency responders (12 police officers and 9 firefighters) participated in two separate laboratory sessions with physical activity measured for 6 days between visits using ActivPal3. Physical activity (steps per day, active time, standing time, sedentary time and car time) was averaged for the working days (3-5 days). Body composition was assessed in visit one and the second visit consisted of a resting heart rate, (HRV) and blood pressure measures in a ten-minute seated position. HRV included a 5-min assessment of standard deviations of all the NN intervals (SDNN), root mean square successive difference (RMSSD), high- (HF) and low- (LF) frequency, LF/HF ratio indices. Pearson correlations were used to examine relationships between HRV and physical activity indices. **RESULTS:** First responders' average age (40.8 $\pm$  9.4y), height (1.7 $\pm$ 0.6m), and weight (84.1 $\pm$  18.7kg) were obtained prior to testing. Mean HR was reported as 72 $\pm$ 12bpm, RMSSD 28.1 $\pm$ 15.1ms, LF 828.7 $\pm$ 953.6ms<sup>2</sup>, HF 328.1 $\pm$ 320.1ms<sup>2</sup>, and LF/HF 3.8 $\pm$ 3.4. Emergency responders' average physical activity on working days was follows: steps per day 9793 $\pm$ 3992steps, active time 2.1 $\pm$ 1.9hr, sedentary time 8.0  $\pm$ 0.7hr, and car time 2.2 $\pm$ 0.8hr. Car time was related to RMSSD ( $r=-0.48$ ,  $p=0.02$ ) and HF ( $r=-0.53$ ,  $p=0.01$ ). No other relationships were found between PA and HRV ( $p>0.05$ ). **CONCLUSIONS:** Overall, HRV indices suggest lower parasympathetic activity. A lower HRV for emergency responders was also observed in relationship to time spent sitting in a car, suggesting potential negative consequences of prolonged sitting on cardiovascular health. Combining HRV with accelerometer-based physical activity measurements may enhance monitoring cardiovascular health and fitness unobtrusively in this population.

#### **P186: PERIPHERAL AND CENTRAL ARTERIAL STIFFNESS AND HEMODYNAMICS IN ADULTS WITH AND WITHOUT DOWN SYNDROME**

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**BACKGROUND:** Adults with Down syndrome (DS) have decreased levels of arterial stiffness compared to same age peers without Down syndrome (non-DS). This is thought to be due to lower blood pressure among adults with DS. The purpose of this study was to compare central and peripheral arterial stiffness between adults with and without DS who were matched for age and blood pressure. **METHODS:** Seventeen adults with DS (age 38 $\pm$ 9 yrs.; 10 men) and 17 adults without DS (age 36 $\pm$ 11 yrs.; 7 men) underwent measurement of body composition by bioelectrical impedance. Central and peripheral arterial hemodynamics and stiffness were measured by carotid-femoral (CF-PWV) and carotid-radial pulse wave velocity (CR-PWV) analysis, respectively. Independent samples t-tests were performed to

investigate differences between groups in hemodynamics, arterial stiffness, and augmentation index (AIx). **RESULTS:** No significant differences were present between groups for central or peripheral systolic blood pressure ( $p=.320$ ;  $p=.194$ ), diastolic blood pressure ( $p=.102$ ), or mean arterial pressure ( $p=.251$ ). Significant differences were present between groups for height (DS: 151 $\pm$ 9 cm, non-DS: 172 $\pm$ 12 cm,  $p<.001$ ), BMI (DS: 33 $\pm$ 5 kg/m<sup>2</sup>, non-DS: 26 $\pm$ 5 kg/m<sup>2</sup>,  $p<.001$ ), and body fat percentage (DS: 32 $\pm$ 7%, non-DS: 27 $\pm$ 9%,  $p=.042$ ), but not for weight (DS: 77 $\pm$ 13 kg, non-DS: 77 $\pm$ 21 kg,  $p=.496$ ). CF-PWV was significantly greater in non-DS (DS: 6 $\pm$ 1 m/s, non-DS: 8 $\pm$ 2 m/s,  $p=.012$ ), but no differences were present between groups for CR-PWV (DS: 9 $\pm$ 2 m/s, non-DS: 10 $\pm$ 3 m/s,  $p=.139$ ). Peripheral AIx was significantly greater in adults with DS (DS: 10 $\pm$ 21 percent, non-DS: -7 $\pm$ 20 percent,  $p=.012$ ), but central AIx did not differ between groups (DS: 2 $\pm$ 20 percent, non-DS: -8 $\pm$ 21 percent,  $p=.088$ ). **CONCLUSION:** Our findings confirm past research demonstrating lower central arterial stiffness in adults with than without DS. However, we found no difference between groups for peripheral arterial stiffness. These findings may be due to differences in body fat percentage or AIx between groups. Funding: Mississippi State University Office of Research and Economic Development and I'm An Athlete Foundation

#### **P187: ACUTE EFFECTS OF TRUNK STRETCHING ON AORTIC ARTERIAL STIFFNESS IN MIDDLE-AGED TO OLDER ADULTS**

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**BACKGROUND:** Aortic arterial stiffness increases with age and is associated with elevated risk for cardiovascular morbidity and mortality. Physical activity may alter the trajectory of age-related arterial stiffening. In young males, it has been demonstrated that acute trunk stretching reduces arterial stiffness and increases carotid arterial compliance, but whether such benefits translate to middle-aged to older males and females is less clear. Therefore, the purpose of this study was to examine the effects of acute trunk stretching using an exercise ball on aortic arterial stiffness and arterial wave reflections in middle-aged to older adults. **METHODS:** We measured carotid-femoral pulse wave velocity (cf-PWV; an index of aortic arterial stiffness) and augmentation index normalized to a heart rate of 75 beats per minute (AIx75; an index of arterial wave reflection and myocardial burden) in 13 middle-aged to older adults (6M/7F; 70  $\pm$  9 yrs; 31.1  $\pm$  4.4 kg/m<sup>2</sup>; Means  $\pm$  SD) before and 10-min after partner-assisted passive trunk stretching and a time-matched control visit, the order of which was randomized. The passive stretching visit consisted of six trunk stretches (flexion, extension, and bi-directional lateral flexion and standing rotation). For each participant, the first stretch was randomized. Each stretch was held for 30 seconds, followed by 30 seconds of relaxation, and this sequence was repeated 5 times in rotational order for a total of 30 minutes. The time-matched control visit consisted of 30 minutes of quiet seated upright rest. Visits were separated by a minimum of 48 hours (average separation = 7  $\pm$  9 days). A repeated measures linear mixed model was used to compare changes ( $\Delta$ ; post - pre) in cf-PWV and AIx75 between visits. **RESULTS:** Average resting cf-PWV during the two visits was 9.01  $\pm$  1.4 m/s and AIx75 was 34.8  $\pm$  7.6 %. Changes in cf-PWV were similar between trunk stretching (-0.09  $\pm$  0.64 m/s) and control (0.23  $\pm$  0.62 m/s) visits, without adjustment for mean arterial pressure ( $p = 0.218$ ) and with adjustment ( $p = 0.969$ ). Likewise, changes in AIx75 were similar ( $p = 0.151$ ) between trunk stretching (0.50  $\pm$  4.20 %) and control visits (-2.42  $\pm$  5.72 %). **CONCLUSION:** These preliminary findings indicate that acute trunk stretching using an exercise ball does not alter aortic arterial stiffness or arterial wave reflections in middle-aged to older adults.

#### **P188: COMPARING BRACHIAL ARTERY SHEAR RATE RESPONSES TO 1- AND 2- 20-SECOND CYCLING SPRINTS**

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**BACKGROUND:** Training with just 1 x 20s cycling sprint does not improve cardiorespiratory fitness (CRF), but 2 sprints does. If the arterial shear stimulus is high enough following just 1 sprint, training may still improve systemic vascular function even without improved CRF. **PURPOSE:** Compare brachial artery shear rate between 1- and 2- 20s sprints. **METHODS:** In 1 visit, 40 healthy participants completed 2 20s all-out leg cycling sprints (5 min rest between). Before and after each sprint, participants sat upright with their arm supported. Duplex and B mode ultrasound recordings of the brachial

artery were made sequentially (30s duplex for blood velocity, then 5-10s B mode for diameter) at baseline, in minutes 1 (M1), 3 (M3), and 5 (M5) of recovery after sprint 1 (S1) and 2 (S2), then at 10- (M10) and 15- (M15) min post-exercise. For each time point, diameter, shear rate, and blood flow were averaged over video lengths. Peak values were taken from 3s averaging. Bayesian rmANOVA were used to compare all variables between time points.  $BF_{10}$ =likelihood of alternative vs. null. Results are mean±SD. **RESULTS:** After S1, average shear rate (1/s) increased from baseline (70.5±46.8) and did not return until M15 (74.3±41.2,  $BF_{10}$ =0.2). Comparing sprints, average shear rate was the same for S1M1 (182.5±87.6) vs S2M1 (184.8±104.4) and for S1M3 (108.3±48.9) vs S2M3 (105.1±47.6,  $BF_{10}$  both <.2), but evidence was weak for S1M5 (80.2±37.5) vs S2M5 (94.0±45.2,  $BF_{10}$ =1.1). Peak shear rate followed the same pattern. Diameter (mm) decreased from baseline (3.9±0.5) after S1 and did not return until M15 (3.8±0.5,  $BF_{10}$ =0.2). Comparing sprints, diameter was higher at S1M1 (3.8±0.5) vs all other time points ( $BF_{10}$  all >4.6). Diameter was the same for S1M3 (3.6±0.6), S1M5 (3.6±0.6), S2M1 (3.6±0.6), S2M3 (3.7±0.5), and S2M5 (3.6±0.6,  $BF_{10}$  all <.2). Average blood flow (mL/min) increased from baseline (48.3±32.4) after both sprints, returning toward baseline at S1M5 (46.9±28.0,  $BF_{10}$ =0.2), S2M5 (55.9±36.2,  $BF_{10}$ =0.4), and 15m (51.5±33.3,  $BF_{10}$ =0.2). Average blood flow was highest at S1M1 (114.9±57.1) and S2M1 (99.8±58.6), although evidence was weak when comparing them ( $BF_{10}$ =1.0). **CONCLUSION:** While there may be a greater total shear stimulus from doing 2 sprints, the magnitude of the shear stimulus is the same after 1, i.e., it is not augmented after a second sprint. Investigating whether training with 1 sprint can improve vascular function may be warranted.

#### P189: SEGMENTAL LEG BLOOD FLOW MEASURED WITH NEAR-INFRARED SPECTROSCOPY

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**BACKGROUND:** Peripheral arterial disease (PAD) is a significant cause of morbidity and mortality worldwide. The ankle brachial systolic blood pressure is typically used to evaluate patients with PAD; however, it is not sensitive to mild disease and confounded by hardening of the arteries. Alternatively, near-infrared spectroscopy (NIRS) can measure blood flow as the rate of recovery oxygen saturation after ischemia. This study determined the shortest ischemic duration with acceptable reproducibility for NIRS measuring blood flow in three locations concurrently. **METHODS:** We tested young, healthy, male (n=6), and female (n=1) subjects on two separate days. NIRS was simultaneously measured on the vastus lateralis, medial gastrocnemius, and foot pad of the right leg. The half time ( $T_{1/2}$ ) of oxygen saturation was measured after four ischemic cuff durations (30, 60, 180, 300 seconds). The cuff durations were randomized for testing but are presented in ascending order. Paired t-tests were used to compare day one to day two measures in four different locations. **RESULTS:** The  $T_{1/2}$  for the foot was 13.0 ± 7.3, 13.5 ± 6.5, 12.7 ± 3.7, 15.1 ± 4.4 seconds. The  $T_{1/2}$  for the calf was 8.5 ± 4.3, 5.0 ± 1.9, 6.2 ± 1.7, 8.8 ± 4.1 seconds. The  $T_{1/2}$  for the thigh was 6.6 ± 4.6, 6.0 ± 2.4, 6.2 ± 1.7, 8.5 ± 2.5 seconds. The tissue saturation index (TSI) percent values for the foot were 2.1 ± 0.9, 4.5 ± 2.1, 13.2 ± 11.6, 20.1 ± 16.7. The values of the calf were 2.1 ± 1.5, 7.4 ± 3.7, 22.1 ± 13.1, 34.2 ± 20.4. The values for the thigh were 3.13 ± 0.8, 6.0 ± 3.1, 18.9 ± 12.1, 26.1 ± 17.6. There was no significant difference between day one and day two at any location. The foot pad  $T_{1/2}$  values were significantly longer than the muscle locations. Signal magnitudes were significantly higher for the 180 and 300 second cuff durations. **CONCLUSIONS:** Our results suggest the cuff duration of 180 seconds provided the shortest ischemic duration that produced adequate reproducibility and signal intensity. NIRS has the potential to measure blood flow in different locations of the legs of patients with PAD.

#### P190: EXERCISE CAPACITY AND CENTRAL ARTERIAL HEMODYNAMICS IN HEART FAILURE WITH PRESERVED EJECTION FRACTION

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**BACKGROUND:** Heart failure with preserved ejection fraction (HFpEF) is characterized by exertional intolerance. Magnified arterial wave reflections that increase the left ventricular (LV) late systolic pulsatile load may contribute to HFpEF related exercise intolerance. Our aim was to investigate the relationship between resting aortic hemodynamics and exercise capacity. **METHODS:** 35 patients with HFpEF (24 female, 27 African American; Median [IQR]: Age 63 [54, 69] years; BMI 37.9 [33.4, 40.9] kg/m<sup>2</sup>) underwent vascular testing

and cardiopulmonary exercise testing. Peak oxygen consumption ( $VO_{2peak}$ ) was measured via breath-by-breath gas analysis during a 0.6 MET•min<sup>-1</sup> graded treadmill test to volitional fatigue. Resting aortic pressure waveforms were synthesized from radial artery waveforms obtained by applanation tonometry. Specifically, we report the augmentation index normalized to a heart rate of 75bpm ( $AI_{X75}$ ): an indicator of arterial stiffness and surrogate for the magnitude of the LV systolic load; the round-trip transit time ( $T_r$ ): the travel time of the pressure wave from the heart to the major reflecting sites and back; and the reflection index (RiX): the magnitude of reflected wave relative to the forward travelling wave. We compared exercise capacity according to a median split for  $AI_{X75}$  (<25>),  $T_r$  (<137s>) and RiX (<73>). **RESULTS:** Patients with a higher  $AI_{X75}$ , signifying increased arterial stiffness and increased LV systolic load, had a lower absolute  $VO_{2peak}$  (1.28 [1.17, 1.40] vs. 1.85 [1.50, 2.21] L/min,  $p$ <0.001) and shorter exercise time (505 [384, 545] vs. 637 [458, 765] seconds,  $p$ =0.041). Patients with a faster  $T_r$  signifying reflected waves that arrive at the heart earlier in systole, had lower relative  $VO_{2peak}$  (13.1 [11.57, 14.6] vs. 17.1 [13.1, 18.6] mL/kg/min,  $p$ =0.044) and a trend for shorter exercise times (466 [354, 550] vs. 637 [503, 658] seconds,  $p$ =0.056). Patients with higher RiX had a lower absolute  $VO_{2peak}$  (1.28 [1.17, 1.66] vs. 1.66 [1.37, 2.12] L/min,  $p$ =0.009). **CONCLUSIONS:** Our results show that in a cohort of patients with HFpEF, aberrant resting arterial hemodynamics that increase LV systolic afterload are associated with worse exercise capacity. Future research should investigate arterial hemodynamics during exercise to provide insight into their potential contribution to exercise intolerance in HFpEF. Supported by AHA 19CDA3474002 & 19CDA34660318 and NIH UL1TR002649

#### P191: LEG-LIFTS TO MEASURE BLOOD FLOW RECOVERY USING NEAR-INFRARED SPECTROSCOPY

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**Background:** Peripheral Arterial disease (PAD) is a common cardiovascular disease. The ankle-brachial index test (ABI) is used to evaluate PAD, but it lacks sensitivity in detecting mild disease. Additionally, the hardening of arteries commonly associated with diabetes confounds ABI results. This study evaluated an alternative method for testing for PAD that used near-infrared spectroscopy (NIRS) to measure the blood flow response to leg lifts. NIRS uses cuff ischemia, which is poorly tolerated by some patients. We hypothesized that the blood flow response to lifting the leg of the subject to 45 degrees would have good reproducibility and validity compared to reactive hyperemia after cuff ischemia. **Methods:** Young, healthy adults were tested on two separate days (males: n=6 and females: n=1). Blood flow was measured as the half-time of recovery ( $T_{1/2}$ ) of the NIRS tissue saturation index (TSI) after leg lifts or cuff ischemia. The total signal was measured as the change in TSI due to the leg lifts or ischemia. NIRS devices were placed on the vastus lateralis, medial gastrocnemius, and the arch of the foot pad. T-tests and correlations (sample size permitting) were made to compare values between days and between tests. **Results:** All subjects preferred the leg lifts to cuff ischemia as a method of measuring blood flow. Two people were not retested. Out of 12 possible tests: all of the 180s cuffs and all foot leg-lifts produced analyzable data. Only 9 calf tests and 5 thigh tests were analyzable.  $T_{1/2}$  values for 60 seconds and 120 seconds of leg lifts were 7.8±3.4 and 8.4±2.6 for the thigh, 5.9±2.5 and 6.9±3.2 for the calf, and 12.4±5.4 and 12.7±6.6 for the foot. For comparison, the values were 6.2±1.7, 6.2±1.7, and 12.7±3.7 for 180 seconds of ischemia. The mean values were not different between values for all measures. The magnitudes of the blood flow response were ~10-30% of the signal for the 180 seconds cuff ischemia, which contributed to the difficulty in making the  $T_{1/2}$  measurements with leg lifts. **Conclusions:** Leg lifts are a subject-preferred method to measure blood flow in the leg. However, the low success rates support performing additional studies or protocol adjustments before leg lifts can be recommended for use in evaluating PAD.

#### P192: TRIMETHYLAMINE N-OXIDE IS ASSOCIATED WITH VASCULAR DYSFUNCTION AND PHYSICAL ACTIVITY IN LIVER TRANSPLANT RECIPIENTS

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**BACKGROUND:** Liver transplant (LT) recipients have an increased risk of cardiovascular disease (CVD), but the underlying mechanisms are not fully understood. In the general population, the gut microbial metabolite trimethylamine n-oxide (TMAO) is associated with atherosclerotic CVD. Physical activity is known to reduce CVD risk, and recent evidence also suggests that exercise can positively modify the

gut microbiome. The purpose of this study was to examine the relationship between serum TMAO, vascular endothelial function, and physical activity levels in LT recipients. We hypothesized that higher levels of TMAO would be associated with vascular endothelial dysfunction and low physical activity levels. **METHODS:** We enrolled 21 LT recipients (11 Female; 6 African American, 1 Asian; Median [Interquartile Range]: Age, 56 [49-64] years; body mass index (BMI), 35.3 [32.1-40.9] kg/m<sup>2</sup>). Conduit artery endothelial function was assessed by flow-mediated dilation of the brachial artery (FMD<sub>BA</sub>) with duplex ultrasound. Venous blood samples were analyzed for levels of TMAO by nuclear magnetic resonance spectroscopy. Patients wore accelerometers at the waist for 7 consecutive days, and data were averaged to obtain daily habitual physical activity levels. After evaluation of statistical assumptions, nonparametric associations were assessed using Spearman's rho. **RESULTS:** Conduit artery endothelial function (4.09 [3.69-5.50] %) was negatively associated with TMAO (4.73 [2.94-7.81] μM;  $\rho = -0.49$ ,  $p = 0.03$ ). TMAO levels were negatively associated with total physical activity (vector magnitude: 262079 [165640-319673] counts;  $\rho = -0.49$ ,  $p = 0.03$ ) and time spent in moderate intensity physical activity (19 [10-25] minutes;  $\rho = -0.44$ ,  $p = 0.048$ ) but not with daily step counts, sedentary time, or time spent in light physical activity. **CONCLUSIONS:** Our findings show that higher TMAO levels are associated with worse vascular endothelial function in LT recipients indicating a higher risk for the development of atherosclerotic CVD. Furthermore, higher levels of total and moderate intensity physical activity were associated with lower levels of TMAO. Future LT studies should investigate the efficacy of moderate intensity exercise interventions to improve vascular function by attenuating TMAO. **FUNDING:** Supported by NIH UL1TR002649

**P193: AGREEMENT BETWEEN CAROTID- AND HEART-FEMORAL PULSE WAVE VELOCITY MEASURED WITH ELECTROCARDIOGRAM AND PHOTOPLETHYSMOGRAPHY**

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**BACKGROUND:** Carotid-femoral pulse wave velocity (cfPWV) is considered the gold standard for estimating central arterial stiffness, an independent risk factor for cardiovascular disease (CVD) risk. Appropriately measuring cfPWV requires technical expertise, palpation of the carotid artery—which can cause participant discomfort—and may be confounded by factors such as carotid artery plaque, which reduces accuracy. Measuring heart-femoral PWV (hfPWV) is an alternative that may make assessing AS more accessible to clinicians, however, the extent of its agreement to cfPWV is not yet fully known. **METHODS:** Five young, healthy female adults aged 26.6 ± 5.9 years old (out of forty total planned) were recruited. hfPWV and cfPWV were measured using electrocardiogram (Equivital) and photoplethysmography, respectively. Measurements were recorded after a five-minute resting period between supine, semi-recumbent, and seated postures. Agreement between the two measurements was determined using the correlation class coefficient (CCC). **RESULTS:** Analysis is ongoing. However, analysis of a preliminary sample size  $n = 5$  resulted in a CCC of 0.0395 between hfPWV and cfPWV. **CONCLUSIONS:** The current preliminary findings indicate that there is poor agreement between hfPWV and cfPWV. The results at this time, however, are underpowered. Once the study is completed, the conclusions may serve to provide clinicians additional tools to assess cardiovascular health. **FUNDING:** No funding applicable.

**P194: AGREEMENT BETWEEN TWO MEASURES OF CEREBRAL ARTERIAL STIFFNESS AS MEASURED WITH TRANSCRANIAL DOPPLER**

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**PURPOSE:** Cerebral arterial stiffness is thought to be an indicator of stroke risk. Currently, multiple non-invasive techniques for assessing the stiffness of the cerebral arteries exist. While recent studies have focused on carotid-cerebral pulse wave velocity (ccPWV), this technique requires a high amount of operator training and cannot be measured continuously. One technique that addresses these problems is heart-cerebral pulse wave velocity (hcPWV). However, the agreement between hcPWV and ccPWV is unknown. This study aims to determine the agreement between heart-cerebral artery pulse wave velocity (hcPWV) and carotid-cerebral pulse wave velocity (ccPWV). **METHODS:** 5 healthy, young adults (26.6 ± 5.9 years old, 100% female) were recruited. hcPWV was assessed using an electrocardiogram and a transcranial doppler (TCD), and ccPWV was measured using only TCD. Participants were moved through a 3-posture test (supine, semi-recumbent, and seated) with measurements taken after a 5-minute rest in each posture. Agreement

between the two measures was determined by calculating concordance correlation coefficients (CCCs) using custom R code. **RESULTS:** Our preliminary analysis generated an overall CCC of 0.128, indicating poor agreement between hcPWV and ccPWV. **CONCLUSIONS:** The current findings indicate that there is poor agreement between hcPWV and ccPWV. However, these results are underpowered, and may change as the full sample size is recruited (40 participants). Future results may provide evidence for researchers to be able to compare measurements of hcPWV and ccPWV in previous literature, and provide options for future investigations of cerebral arterial stiffness.

**P195: AGREEMENT BETWEEN TWO MEASURES OF CAROTID-CEREBRAL PULSE WAVE VELOCITY AS MEASURED WITH TRANSCRANIAL DOPPLER AND PHOTOPLETHYSMOGRAPHY**

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**BACKGROUND:** While the relationship between stroke and cardiovascular risk factors such as central arterial stiffness are well-established, measures of cerebral arterial stiffness, specifically carotid-cerebral pulse wave velocity (ccPWV), are underdeveloped. More easily accessible methods of cerebral arterial stiffness would allow for further insight and quantification of stroke risk. The current methodology for assessing ccPWV requires the use of two transcranial doppler ultrasound (TCD) probes. TCD is a method that is costly and requires a great deal of operator training to acquire a measurement. Photoplethysmography (PPG) is a measure that could potentially be used in conjunction with TCD as a measure of continuous ccPWV. PPG is a much more accessible piece of equipment that allows for continuous measurement of arterial stiffness. The purpose of this study was to determine the agreement of TCD-derived and TCD/PPG derived ccPWV, which may identify a simpler method for clinicians seeking information on potential risk of stroke. **METHODS:** This study included a sample of  $n=5$  participants (age 26.6 ± 5.9 y). Agreement was determined by comparing the ccPWV measures taken using TCD and TCD + PPG. Agreement was determined using the correlation class coefficient (CCC) when comparing the test devices to the criterion in the supine, seated, and semi-recumbent positions. When comparing against the criterion, ccPWV, the test measures were considered accurate if the absolute standard error of estimate is <1.0 m/s, which is considered to be a clinically meaningful change. **RESULTS:** Data analysis is ongoing, however, an interim analysis performed on a sample of  $n=5$  indicated a CCC [1] = 0.162. **CONCLUSIONS:** While this interim analysis indicated poor agreement between the two measures, sample size was a limiting factor. Data collection is ongoing, with the aim being a total sample size of  $n=40$  participants. As a result, agreement between these two methods may improve, indicating that TCD/PPG derived ccPWV can be used as a more readily available and accessible method for clinicians to assess stroke risk.

**P196: CENTRAL VASCULAR HEMODYNAMICS IN FEMALE ATHLETES VERSUS SEDENTARY/ RECREATIONALLY ACTIVE WOMEN**

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**BACKGROUND:** The cardiac adaptations to years of intense exercise, termed 'athlete's heart', have been thoroughly studied in males. Arterial changes may precede cardiac adaptations. Research is limited regarding 'athlete's arteries', especially in female populations. **PURPOSE:** To assess differences in resting central hemodynamics between highly trained and elite athletes, henceforth "athletes", and sedentary or recreationally active controls. **METHODS:** Fifteen women ( $n=15$ ; mean age=23.9 years; mean BMI=22.8kg/m<sup>2</sup>; 27% athletes) were included. Participants were excluded if they were smokers, had diabetes, or took any cardiovascular medications. Participants were classified as either Sedentary/Recreationally Active or Athletes using self-report of training and competition status. Participants completed a single study visit where brachial blood pressure was measured using an oscillometric cuff and applanation tonometry was performed. Wave reflection (augmentation index; AIx) and central arterial stiffness (central pulse wave velocity; cPWV) were assessed. Wilcoxon rank-sum tests or t-tests were used to test for differences in medians or means between groups. **RESULTS:** Body mass index (BMI) was similar between the athlete and control group (21.94±1.0 vs 23.05±1.6 kg/m<sup>2</sup>). The athletes performed strenuous exercise 4.5 times per week on average, compared to the control group who performed strenuous exercise on average 3.3 times per week (4.5±0.9 vs 3.27±0.6). There were no differences in brachial systolic or diastolic blood pressure between groups (111.5±6.1 vs 115.7±4.0 mmHg; 67.8±3.8 vs 67.4±2.8 mmHg, all  $p>0.74$  in athletes versus controls, respectively). cPWV was similar between groups (5.05±0.8 vs 4.13±0.2 m/s,  $p=0.43$ ). Forward wave magnitude approached statistical significance,

with non-significantly lower values demonstrated in the athlete group (23.75±2.1 vs 28±1.3 mmHg,  $p=0.10$ ). **CONCLUSIONS:** Athletes and Sedentary/Recreationally Active controls exhibited similar central hemodynamics in our small pilot study, though some non-significant trends warrant further investigation in larger samples. Further research is necessary to understand vascular function in female athletes.

**P197: EFFECTS OF RESTROOM ACCESS AND FLUID CONSUMPTION ON TEACHER RENAL AND CARDIOVASCULAR HEALTH**

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**BACKGROUND:** There is little research on teacher health and wellness in the United States, and almost nothing available on the effects of water intake on teacher health and wellness. The purpose of this study is to (1) investigate how school policy affects the ability of teachers to drink adequate fluids and use the restroom when needed; (2) to determine how this may impact teacher kidney and heart health.

**METHODS:** Eighteen elementary school teachers were included in the study (age: 33.56±9.2 yrs, body fat: 36.37±10.6%). Pre and post school day vital assessments were taken, with pre-testing occurring before student arrival and post-testing once students had left. Resting blood pressure and heart rate were measured using an automated BP monitor and Polar H10 HR monitor, respectively. Height, weight, and body composition were derived using a multi-frequency bioelectrical impedance analysis scale (BIA; Tanita RD-545). Urine Samples were collected pre and post for analysis of urine specific gravity (USG). Data was analyzed using a paired samples *t*-test for time (pre-post) and Pearson correlation analysis at an  $\alpha$  of  $p \leq 0.05$ . **RESULTS:** There was a significant ( $p=0.048$ ) reduction in USG from pre-testing (1.021±0.008) to post-testing (1.017±0.008). It was determined that 44.4% of participants were dehydrated at the end of the day based on USG, and 61.1% of participants did not meet the recommended water intake. There was a strong, significant ( $r=0.54$ ,  $p=0.022$ ) correlation between oz. of water consumed and post-pre body-water%. There was a strong, significant, inverse correlation ( $r=-0.55$ ,  $p=0.029$ ) between perceived difficulty with using the restroom vs age of the teacher, suggesting that younger teachers perceived it to be more difficult to access the restroom. Moderate correlation ( $r=0.44$ ) was seen between water consumed and change in blood pressure (post-pre), but it was not significant ( $p=0.0654$ ). Only 16.7% of teachers exhibited stage 1 hypertension based upon SBP, with the rest of the participants being normotensive. **DISCUSSION:** Our results provide a characterization of teacher health profile and how daily restroom access affects these measures. It appears that restroom access is limited and reduces fluid consumption for most teachers. Additional research is clearly needed in this population.

**P198: PHYSIOLOGICAL STRAIN AMONG FIRE FIGHTERS PERFORMING NON-FIRE EMERGENCY SERVICES**

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**BACKGROUND:** Cardiac fatalities are the leading cause of death amongst firefighters (FFs) in the US. Poor cardiovascular health is an important mediator of this high prevalence. FFs often perform other services outside of what is traditionally thought of as firefighting (i.e., fire suppression), for example, they provide non-fire emergency services for large-scale local events. Despite appearing to be less physically demanding than fire-related duties, it is unclear whether FFs experience heightened levels of physiological strain while providing non-fire emergency services. **METHODS:** 15 male FFs (M±SD; age=40±11 y, 100% white/Caucasian) were observed across 5 games while performing emergency medical services during home football games at The University of Alabama. FFs completed health and exercise history questionnaires; heart rate (HR), blood pressure (BP), and body weight were measured pre- and post-shift. FFs were assigned to a bike ( $n=6$ ) or logistics ( $n=9$ ) team and wore GPS-enabled monitoring systems that recorded physiological and environmental data during each shift. Analyses included descriptive statistics, independent *t*-tests, and bivariate correlations. **RESULTS:** Averaged across the 5 games, shifts lasted 8.2±1.0 h and reached temperatures of 22.8±3.0 °C. FFs were obese (based on body mass index [BMI]=33.1±6.2 kg/m<sup>2</sup>) and had stage 2 hypertension based on pre-shift resting systolic BP/diastolic BP values (142.6±14.2/85.7±29.2 mmHg). FFs assigned to the bike team were younger (MD±SD; -13.8±16.6 y,  $p<0.001$ ), had a lower BMI (-5.1±9.2 kg/m<sup>2</sup>,  $p=0.02$ ), but achieved higher average HR (8.1%±11.5% of maximal HR,  $p=0.002$ ) and training intensity (a measure of combined mechanical and cardiac load: 0.5±0.5 units,  $p<0.001$ ) compared to logistics. Average HR ( $r=0.69$ ,  $p<0.001$ ), peak

core temperature ( $r=0.57$ ,  $p=0.003$ ), and distance traveled ( $r=0.77$ ,  $p=0.01$ ) were positively associated with a higher training intensity. Age ( $r=-0.74$ ,  $p<0.001$ ) and BMI ( $r=-0.53$ ,  $p=0.02$ ) were negatively associated with training intensity. **CONCLUSIONS:** FFs presented with suboptimal cardiovascular health and experienced increased levels of physiological strain while performing non-fire emergency services. Physiological strain differed by FF assignment (bike vs. logistics), but it also appeared to be mediated by individual factors. Improving cardiovascular health should remain a top priority for the health, safety, and performance of FFs.

**P199: COMBINED INFLUENCE OF POSTURE AND ISOMETRIC HANDGRIP ON PHASE IIA RESPONSES TO THE VALSALVA MANEUVER**

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**BACKGROUND:** The Valsalva maneuver (VL) is a well-documented assessment of autonomic function, and is characterized by 5 distinct blood pressure phases (Phases I, IIa, IIb, III, and IV). While body position is known to influence the early phase II (a.k.a. "phase IIa") blood pressure responses, the influence of sympathoexcitation is less clear. The aim of this study was to examine the independent and combined effects of sympathoexcitation (via isometric handgrip) and body position on the phase IIa blood pressure responses to VLs in young healthy adults. **METHODS:** Seventeen subjects (9 male) participated in 4 separate experimental trials (T<sub>1</sub>-T<sub>4</sub>) repeated across 2 different conditions (supine and seated). Trials were conducted in sequential order, and included VLs performed without handgrip (Trials 1 [T<sub>1</sub>] and 4 [T<sub>4</sub>]), five minutes of isometric handgrip (HG; 35% MVC; Trial 2 [T<sub>2</sub>]), and VLs performed with superimposed HG (Trial 3 [T<sub>3</sub>]). Cardiac rhythm (electrocardiography) and beat-by-beat blood pressure data were collected continuously during each trial, and the relative changes in heart rate ( $\Delta$ HR), mean arterial pressure ( $\Delta$ MAP), systolic blood pressure ( $\Delta$ SBP), and diastolic blood pressure ( $\Delta$ DBP) were compared between conditions and across trials using analyses of variance with repeated measures. **RESULTS:** Phase IIa  $\Delta$ SBP responses were significantly blunted during T<sub>3</sub> compared to T<sub>1</sub> in the supine condition (+6 ± 3  $\Delta$ mmHg,  $P=0.03$ ), and  $\Delta$ MAP,  $\Delta$ SBP, and  $\Delta$ DBP responses were significantly augmented during T<sub>1</sub> in the seated condition compared to T<sub>1</sub> in the supine condition (-9 ± 2  $\Delta$ mmHg, -15 ± 4  $\Delta$ mmHg, -8 ± 2  $\Delta$ mmHg, respectively, all  $P \leq 0.01$ ). However, no significant differences were observed for  $\Delta$ MAP,  $\Delta$ SBP, or  $\Delta$ DBP between T<sub>3</sub> in the seated condition compared to T<sub>1</sub> in the supine condition (-6 ± 3  $\Delta$ mmHg, -8 ± 4  $\Delta$ mmHg, and -3 ± 2  $\Delta$ mmHg, respectively, all  $P \geq 0.10$ ), suggesting that handgrip mitigated the influence of orthostasis. No significant differences were observed for  $\Delta$ HR responses during phase IIa for any comparison (all  $P \geq 0.40$ ). **CONCLUSIONS:** Handgrip blunts the phase IIa blood pressure responses to VLs performed in the supine condition, and also appears to mitigate the exaggerated phase IIa responses observed during orthostasis. This information has important implications for understanding the physiological factors contributing to abnormal VL responses in young healthy adults.

**P200: INFLUENCE OF BODY POSITION ON VALSALVA RESPONSES IN YOUNG BLACK AND AFRICAN AMERICAN ADULTS**

Ryan Aultman, Marshall Dearmon, Kenneth R. Ladner, Barry Faulkner, Ta'Quoris Newsome, Jon Stavres. *The University of Southern Mississippi, Hattiesburg, MS.*

**BACKGROUND:** Evidence suggests that Black and African American (BAA) individuals are more susceptible to autonomic dysfunction compared to White individuals. However, it remains unclear if these findings extend to the autonomic responses to the Valsalva (VL) maneuver. Accordingly, this study compared blood pressure and heart rate responses to the VL maneuver between BAA and White individuals. **METHODS:** Twenty individuals (10 BAA, 10 White) completed two VLs, each separated by 45 seconds, in both the seated and supine positions (4 VLs in total). VLs were maintained at 45 mmHg, and the order of conditions was counterbalanced between participants. Cardiac rhythm and beat-by-beat blood pressure were continuously recorded throughout each VL, and the relative changes in mean arterial pressure ( $\Delta$ MAP), systolic blood pressure ( $\Delta$ SBP), diastolic blood pressure ( $\Delta$ DBP), pulse pressure ( $\Delta$ PP), and heart rate ( $\Delta$ HR) were recorded for phases I (initial hypertensive response), IIa (early phase II depressor response), IIb (late phase II blood pressure recovery), III (rebound hypotensive response after exhalation), and IV (45 second period following exhalation) of each VL. Responses were averaged across both VLs performed within each condition (seated vs. supine), and compared across conditions and between races using repeated measures analyses of variance. **RESULTS:** At baseline, the

BAA group demonstrated a significantly lower mean PP compared to White individuals ( $-18 \pm 8$  mmHg,  $P=0.01$ ), and tended to demonstrate an elevated mean DBP ( $+10 \pm 4$  mmHg,  $P=0.05$ ). When VL responses were compared between groups and across conditions, a significant race by condition interaction was observed for the  $\Delta$ MAP response during phase IIa ( $F_{1,18}=6.80$ ,  $P=0.01$ ). This was explained by a significant exaggeration of the phase IIa  $\Delta$ MAP response in White individuals during the seated condition ( $-9 \pm 2$   $\Delta$ mmHg,  $P<0.01$ ), which was not observed in the BAA group ( $-1 \pm 2$   $\Delta$ mmHg,  $P=0.64$ ). Significant main effects of race were also observed for the absolute DBP responses, such that DBP was higher in the BAA group compared to White individuals during all phases (all  $P<0.04$ ), with the exception of phase IIb ( $P=0.34$ ). **CONCLUSIONS:** These findings suggest that phase IIa VL responses are altered in BAA individuals compared to White individuals. This may have important implications for better understanding autonomic dysfunction in this population.

#### **P201: INFLUENCE OF ISOMETRIC HANDGRIP AND BODY POSITION ON BAROREFLEX SENSITIVITY IN BLACK AND WHITE ADULTS**

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**BACKGROUND:** Resting sympathetic tone has been shown to be elevated in Black and African American (BAA) individuals compared to White individuals, but differences in Baroreflex Sensitivity (BRS) are less clear. Considering that exercise and orthostasis are both known to elicit acute changes in sympathetic tone, evaluating changes in BRS during handgrip exercise or during an orthostatic challenge may unmask any potential differences in BRS between BAA and White individuals. As such, the purpose of this study was to examine the relative influences of isometric handgrip exercise and body position on BRS in a sample of BAA and White participants. **METHODS:** Cardiac rhythm (via electrocardiography) and beat-by-beat blood pressure (via finger photoplethysmography) were continuously recorded in twenty participants (10 BAA, 10 White) during 3 minutes of rest and 3 minutes of isometric handgrip exercise (35% maximal voluntary isometric contraction) in the supine and seated positions. After manual exclusion of cardiac arrhythmias, BRS was evaluated for each 3-minute period using the sequence method (seq. length  $\geq 3$ ,  $r \geq 0.8$ , delay = 0 beats). BRS was quantified as the total baroreflex gain of up-ramping sequences ( $BRS_{up}$ ), the gain of down-ramping sequences ( $BRS_{down}$ ), and total gain ( $BRS_{total}$ ). Each value was compared across conditions (supine rest vs. supine handgrip exercise vs. seated rest) and between races using analyses of variance with repeated measures. **RESULTS:** At baseline, no significant differences were observed for  $BRS_{up}$  ( $-0.12 \pm 10.97$  ms/mmHg,  $P=0.99$ ),  $BRS_{down}$  ( $-2.06 \pm 8.24$  ms/mmHg,  $P=0.80$ ), or  $BRS_{total}$  ( $-3.14 \pm 9.35$  ms/mmHg,  $P=0.74$ ) between BAA or White participants. When the influence of handgrip and body position were examined, no significant race by condition interactions were observed for any value (all  $P \geq 0.31$ ). Instead, significant main effects of condition were observed for the entire sample ( $F_{1,32}=9.75$ ,  $P<0.01$ ), which was explained by significant decreases in  $BRS_{up}$  ( $-21.82 \pm 5.14$  ms/mmHg,  $P<0.01$ ) and  $BRS_{total}$  ( $-13.41 \pm 4.54$  ms/mmHg,  $P=0.02$ ) during handgrip compared to supine rest.  $BRS_{up}$  was also significantly lower during handgrip exercise compared to seated rest ( $-10.43 \pm 3.85$  ms/mmHg,  $P=0.04$ ). **CONCLUSIONS:** These results suggest that handgrip exercise decreases BRS similarly between BAA and White individuals, supporting the notion that BRS may not be significantly altered in healthy BAA adults.

#### **P202: PHYSICAL ACTIVITY, SLEEP, AND RACIAL DISPARITIES IN CARDIOVASCULAR HEALTH**

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**BACKGROUND:** Cardiovascular disease (CVD) is the leading cause of death worldwide. In America, Black adults have a greater number of CVD risk factors and are more likely to develop and die from CVD than any other race. Lifestyle factors, such as physical activity (PA) and sleep, critically influence CVD risk. However, the role of lifestyle in mediating racial disparities in CVD risk factors in young adults is unclear. Therefore, we assessed known cardiovascular risk factors, blood pressure (BP) and arterial stiffness, as well as objective physical activity and sleep habits, in young Black and White adults. **METHODS:** We measured central BP and carotid-femoral pulse wave velocity (cf-PWV; an index of arterial stiffness) in 15 Black (8F/7M;  $21 \pm 3$  years, BMI:  $24 \pm 5$  kg/m<sup>2</sup>) and 20 White (10F/10M;  $21 \pm 4$  yrs, BMI:  $23 \pm 3$  kg/m<sup>2</sup>) participants via pulse waveform analysis and applanation tonometry, respectively. Additionally, we used wrist-worn actigraphy to quantify seven-day PA (sedentary time, low intensity PA, moderate-vigorous PA, and total steps) and sleep (total sleep time [TST] and sleep irregularity, defined as the standard deviation of nightly sleep

duration) habits. Cardiovascular measures and lifestyle factors were compared between races using independent t-tests. Analysis of covariance was then used to inspect for race differences in cardiovascular health after adjusting for lifestyle factors that differed by race. **RESULTS:** Compared to White participants, Black participants demonstrated greater systolic ( $100 \pm 8$  vs.  $107 \pm 11$  mmHg;  $p=0.02$ ) and diastolic ( $67 \pm 6$  vs.  $72 \pm 7$  mmHg;  $p=0.02$ ) BP. Meanwhile, cf-PWV differences in Black ( $6.2 \pm 0.8$  m/s) vs. White ( $5.7 \pm 0.8$  m/s) participants were inconclusive ( $p=0.06$ ). PA metrics did not differ between races (all  $p>0.05$ ). Likewise, TST was not different between the races ( $p=0.53$ ), but sleep irregularity was greater ( $p=0.02$ ) in Black ( $81 \pm 24$  min) vs. White ( $59 \pm 26$  min) participants. After adjusting for sleep irregularity, no race differences in central systolic ( $p=0.94$ ), diastolic ( $p=0.15$ ), or cf-PWV ( $p=0.85$ ) were seen. **CONCLUSIONS:** We observed higher blood pressure and potentially greater arterial stiffness in young Black vs White individuals. Detected differences in central BP were no longer significant once we adjusted for sleep irregularity. These findings suggest that irregular sleep duration may contribute to the preclinical development of CVD in young Black individuals.

#### **P203: CORRELATION BETWEEN NON-INVASIVE MITOCHONDRIAL CAPACITY ASSESSMENT AND OXYGEN UPTAKE KINETICS FOLLOWING MODERATE INTENSITY EXERCISE**

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**BACKGROUND:** Mitochondrial capacity ( $mVO_2$ ) is important for our understanding of exercise capacity as it plays a vital role in aerobic metabolism. Pulmonary oxygen uptake ( $pVO_2$ ) kinetics have been shown to closely match  $mVO_2$ . Non-invasive measures of  $mVO_2$  using near-infrared spectroscopy (NIRS) have become increasingly popular as it has been found to be a reliable measure of  $mVO_2$ . The purpose of the present investigation was to assess the relationship between  $mVO_2$  and  $pVO_2$  on- and off-kinetics following moderate intensity exercise. **METHODS:** Seven healthy males ( $24 \pm 5$  yrs.) performed 2 bouts of moderate intensity (80% of lactate threshold) cycling exercise for 6 minutes followed by a 5-min cooldown at 20W.  $mVO_2$  assessment was performed prior to and following each exercise bout.  $pVO_2$  was continuously recorded breath-by-breath. Phase II kinetics (on-kinetics) were analyzed using either a 1- or 2-component exponential model after interpolating to 1 s and ensemble averaging each trial.  $mVO_2$  was determined from 20 short (5-10 s) arterial occlusions. Deoxyhemoglobin (HHb) was measured at the vastus lateralis and the slope of change in HHb during the first 3-5 seconds of each occlusion was plotted over time as  $mVO_2$ .  $pVO_2$  off-kinetics and  $mVO_2$  were analyzed using a mono-exponential decay model. Matched pairs t-tests were used to compare  $pVO_2$  on- and off-kinetics and pre- and post- $mVO_2$ . Pearson correlation coefficients were computed to assess relationships between  $pVO_2$  on- and off-kinetics and pre- and post- $mVO_2$  recovery constants. Significance was established if  $p < 0.05$ . **RESULTS:**  $pVO_2$  on- and off-transient kinetics were similar (ON:  $44.0 \pm 11.0$  s; OFF:  $34.4 \pm 9.5$  s).  $mVO_2$  recovery kinetics were similar before and after exercise (PRE:  $30.4 \pm 6.1$  s; POST:  $28.9 \pm 11.5$  s).  $pVO_2$  off-kinetics were not correlated with  $mVO_2$  recovery prior to exercise ( $r = 0.447$ ), but was strongly correlated with post-exercise  $mVO_2$  ( $r = 0.700$ ).  $pVO_2$  on-kinetics were not correlated with  $mVO_2$  prior to ( $r = -0.596$ ) or after ( $r = -0.293$ ) exercise. **CONCLUSION:** Non-invasive assessment of  $mVO_2$  is not affected by a bout of moderate intensity exercise.  $mVO_2$  was not different pre- and post-exercise.  $pVO_2$  off-kinetics are positively and strongly correlated to  $mVO_2$  post-exercise but not correlated with pre-exercise  $mVO_2$ . There is no correlation between  $mVO_2$  and  $pVO_2$  on-kinetics before or after moderate exercise.

#### **P204: COMPARISON OF PRESEASON FALL TRAINING CAMP EXTERNAL DEMANDS OF NCAA DIVISION I COLLEGE FOOTBALL PLAYERS**

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**BACKGROUND:** Preseason fall training camp is one of the most physically demanding time periods for American football players. The increased external load is typically accompanied by a greater rate of injury, however it is unknown if certain player positions experience greater physical stress than others. The purpose of this study was to investigate differences in external loads of positional groups using global positioning satellite (GPS) technology during preseason fall training camp. **METHODS:** Sixty-nine National Collegiate Athletic Association (NCAA) Division I football players were monitored using GPS receivers with integrated accelerometers and gyroscope (Catapult) during 14 practices throughout the 2022 preseason fall training camp. Groups were categorized as skill (SK: defensive backs, quarterbacks, running backs, wide receivers,  $n = 30$ ), midfield (MD:

linebackers, tight ends,  $n = 9$ ), or linemen (LM: defensive line, offensive line, edge players,  $n = 30$ ) positions. Mean daily external load (Player Load [PL]) was quantified as the sum of accelerations across all axes of the internal triaxial accelerometer during movement in arbitrary units (AU). Differences in PL between positional groups were determined by one-way ANOVA with post-hoc Bonferroni statistical analyses. An alpha level of 0.05 was used to determine statistical significance. RESULTS: The mean practice PL for SK was 391 AU, MD was 364 AU, and LM was 305 AU. The ANOVA revealed significant differences ( $p < 0.01$ ) between positional groups. Post-hoc tests indicated significant differences in PL between LM and MD ( $p < 0.01$ ) and between LM and SK ( $p < 0.01$ ). However, no significant differences were found between SK and MD ( $p = 0.44$ ) positional groups. CONCLUSIONS: These findings suggest LM positions have significantly lower external demands compared to other positions during preseason fall training camp. It is unknown from this study if these loads are appropriate based on game demands, or if LM need to increase workload during preseason to be adequately prepared for competition. Therefore, future studies should investigate positional differences in PL during season practices and games to better understand the cumulative demands on each position. Additionally, future studies should compare external load determined by PL to novel load metrics in LM positions.

#### **P206: ISOMETRIC MID-THIGH PULL KINETICS PREDICT DRIVER CLUB HEAD SPEED IN COLLEGIATE GOLFERS**

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BACKGROUND: Within golf, force generation and the relationship to club head speed (CHS) has been frequently investigated. Recently, positive relationships between force generation and CHS during an isometric mid-thigh pull (IMTP) have been reported in golfers that may reflect the force generation capability during the swing. But, contributions from the lead and trail legs and their relationship to CHS are not known. The purpose of this study was two-fold: 1) to determine differences in force generation capability during an IMTP between the lead and trail legs, and 2) identify force generation predictors of CHS from an IMTP test. METHODS: 18 Division II golfers (male=10; female=8; age:  $20 \pm 1$  y; height:  $171.4 \pm 4.7$  cm; mass:  $69.7 \pm 17.5$  kg) completed the study. Participants completed 10 stock swings on a FlightScope Mevo+ in an indoor environment with their driver. On a separate day, 3 trials of a 5 second IMTP was completed on a dual-force platform. Ground reaction force (GRF) data was used to identify peak vertical GRF and RFD at 50, 100, 150, and 200ms during the IMTP trials from both legs. Averages from the 3 IMTP trials and the average of the 5 highest CHS from driver were used in the analysis. A stepwise regression model using backward elimination was computed to identify significant predictors of CHS. Further, dependent variables from the IMTP were also compared between the lead and trail legs using a dependent samples t-test ( $p < 0.05$ ) and the magnitude of differences were evaluated using Cohen's D effect sizes. RESULTS: Average CHS for driver was  $105.5 \pm 11.9$  mph. The trail leg generated greater peak vertical GRF ( $p = 0.023$ ;  $ES = 0.40$ ), RFD at 150 ( $p = 0.004$ ;  $ES = 0.004$ ), and RFD at 200 ( $p < 0.001$ ;  $ES = 0.039$ ) compared to the lead leg. The stepwise regression model identified 5 variables that were significant predictors of CHS: (1) trail leg RFD at 50ms ( $p = 0.001$ ;  $r = 0.646$ ), (2) lead leg RFD at 50ms ( $p < 0.001$ ;  $r = 0.514$ ), (3) trail leg RFD at 100ms ( $p = 0.014$ ;  $r = 0.650$ ), (4) lead leg RFD at 100ms ( $p = 0.006$ ;  $r = 0.514$ ), and (5) trail leg RFD at 200ms ( $p < 0.001$ ;  $r = 0.739$ ), explaining a combined 88% of the variance in CHS. CONCLUSIONS: Greater peak force and RFD at 150 and 200ms suggests that the lead and trail legs exhibit different force generation capabilities during an IMTP. While the differences between legs could be due to many factors, both lead and trail leg RFD at 50 and 100ms appear to be significant predictors of CHS.

#### **P207: THE EFFECTS OF GOLF BAG TRANSPORT STYLE ON PERCEIVED EXERTION, HEART RATE, AND ENERGY EXPENDITURE**

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BACKGROUND: For amateur golfers, there are multiple ways to transport their clubs during a round. Golf bags when acutely carried with a dual strap attenuate perceived effort and physiological demands compared to a single strap. However, it is not known how this compares to other carriage styles, or over longer durations. Thus, the purpose of this study was to examine the effects of different golf bag

carriage methods on heart rate, energy expenditure, and perceived exertion (RPE) over the course of a 3 mile walk. METHODS: Recreational male and female golfers ( $n = 10$ ;  $f = 6$ ,  $m = 4$ ) completed the study. Participants completed a 3 mile walk along a designated path within the biomechanics laboratory for each load carry condition (no bag, push cart, single strap, dual strap high, dual strap low) wearing a statsport bioharness system which includes a polar heart rate (HR) monitor and global position system (GPS) to calculate caloric expenditure (KCALS). At each quarter mile, HR, KCALS and RPE were collected. Dependent variables were analyzed using a  $5 \times 13$  (Load  $\times$  Distance) repeated measures analysis of variance. Significant main effects were further examined using a Bonferroni correction factor and for interactions, simple effects were calculated. All analyses were conducted with an a priori alpha level of 0.05, and partial eta squared were calculated as measures of effect size. RESULTS: Analyses suggest distance main effects for HR ( $F(6,78) = 95.585$ ,  $p < 0.001$ ,  $\eta^2 = 0.880$ ) and KCALS ( $F(6,78) = 118.962$ ,  $p < 0.001$ ,  $\eta^2 = 0.901$ ). Large increases in HR from pre to 0.5 miles, then increases over time. KCALS showed an increase in energy expenditure for each distance measure. Further, there was a near significant interaction for KCALS ( $F(24,312) = 1.536$ ,  $p = 0.054$ ,  $\eta^2 = 0.106$ ). This potential interaction suggests that over the walk, energy expenditure was highest in the SS and low bag condition, followed by the push cart and high bag condition, with the no bag condition being the lowest. RPE results suggest an interaction. There were no significant differences between any load conditions at the start of testing. However over the walk the single strap and high bag had higher RPE. CONCLUSIONS: These findings corroborate previous results that a single strap method may facilitate fatigue. The current results suggest using a push cart if possible or using a dual strap carry style to mitigate physiological demands.

#### **P208: COMPARISON OF VERTICAL JUMP PERFORMANCE BETWEEN FEMALE COLLEGIATE BASKETBALL AND VOLLEYBALL ATHLETES**

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BACKGROUND: The vertical jump task is a critical skill needed in both basketball and volleyball. Jumping has been performed at both maximal and submaximal levels during competition. However, other differences exist between basketball and volleyball in terms of the demands that are placed on the athlete. As such it has been shown that sport-specific demands can alter the strategy used by athletes to achieve a maximal vertical jump performance. Thus, the purpose of this investigation was to compare vertical jump performance between sports that have a reliance on the task within competition. METHODS: 29 NCAA Division I female athletes (14 basketball and 15 volleyball) took part in this investigation. All testing occurred as part of a routine athlete monitoring program and all data used was from the first week of the competitive season. Before testing, all participants completed a standardized warm-up. Each participant completed two trials performed on a force platform with a dowel placed across the shoulders. All data from the force platform was collected at 1000 Hz. Variables of interest included jump height, mean force, phase duration, countermovement depth, and reactive strength index modified. Independent samples t-tests were completed for each variable. RESULTS: Statistically significant differences were seen in greater mean force ( $p = 0.04$ ), and faster propulsive duration ( $p = 0.005$ ) in basketball athletes. Volleyball athletes had a greater countermovement depth ( $p = 0.002$ ) and jump height (0.04). CONCLUSIONS: The results from this investigation demonstrate differences in the strategy used between the two sports during the vertical jump. As jump height was greater in the volleyball athletes, they appeared to demonstrate a strategy using greater time and less force while basketball athletes used the opposite strategy of high force and short time. This can be explained through the nature of the two sports where basketball has many short duration and reactive movements, while volleyball has more of a timing element to jump which allows for a greater duration during the task. Thus, while both sports require high levels of performance in the same task, the strategy used appears to be different. Training for performance improvement should take this into consideration and programs should be based on the demands of the task within the sport.

#### **P209: PRE-MATCH COUNTERMOVEMENT JUMPS POSITIVELY CORRELATE WITH MATCH MECHANICAL LOAD**

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BACKGROUND: In collegiate soccer, information regarding players' readiness may aid coaching in regards to tactical decisions and athlete playing time. In sport, countermovement jumps (CMJ) offer a potential quantitative modality to assess player readiness. The purpose of this

study was to assess the within-subjects' correlation of matchday CMJ height and match internal and external loads in NCAA Division I women's soccer athletes. The authors hypothesized that matchday CMJ height would show positive moderate correlations with match workload variables. **METHODS:** A total of 10 female soccer players ( $20 \pm 1.3$  years;  $1.72 \pm 0.06$  m), which started at least 3 matches during the 2020 8-match competitive season, participated in this study. Repeated measures correlations were used to determine the within-subjects' correlations of matchday CMJ height and total distance covered (TD), training load score (TLS), number of sprints (Sprints), distance covered at high-speed ( $< 15.0$  km/h; HSD), and mechanical load (ML). ML was calculated as the sum of the accelerations above  $2 \text{ m.s}^2$  and decelerations below  $-2 \text{ m.s}^2$ . Alpha was set a priori at  $p \leq 0.05$  and the data was analyzed using R Studio executing R. **RESULTS:** A moderate positive significant correlation between CMJ height and ML was observed ( $p < 0.001$ ;  $r = 0.402$ , 95% CI = 0.099, 0.637). The correlations between CMJ height and the other internal and external load training load variables were not statistically significant ( $p > 0.05$ ). CMJ height showed very weak to weak nonsignificant relationships with TD ( $r = 0.138$ ,  $p = 0.386$ , 95% CI = -0.185, 0.435), TLS ( $r = 0.051$ ,  $p = 0.749$ , 95% CI = -0.268, 0.361), Sprints ( $r = 0.226$ ,  $p = 0.154$ , 95% CI = -0.096, 0.506), and HSD ( $r = 0.069$ ,  $p = 0.664$ , 95% CI = -0.251, 0.377). **CONCLUSIONS:** In-match ML is positively correlated with matchday CMJ height within the current investigation. These results suggest that CMJ can potentially measure pre-match neuromuscular status and athletes' readiness. This may potentially influence the athletes' ability to perform high-intensity accelerations and decelerations during NCAA DI women's soccer matches.

#### **P210: COMPARISON OF GAME DATA BETWEEN HALVES AND QUARTERS IN DIVISION I WOMEN'S LACROSSE**

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**BACKGROUND:** A new competition format set forth by the National Collegiate Athletic Association in women's lacrosse consists of four, 15-minute quarters, as opposed to two, 30-minute halves in the previous format. The purpose of this study was to compare in-game external load demands from the previous game format (2x30-minute halves) to the new format (4x15-minute quarters) in collegiate women's lacrosse. **METHODS:** Participants ( $n = 13$ ) were monitored with VX Sport microtechnology consisting of a global positioning system over the course of two competitive seasons. External workload variables (total distance, high-intensity distance [HID], high-intensity sprints, high-intensity sprint distance, accelerations, and decelerations) were collected per minute of play time (PT) by half (H) for year one (Y1) and by quarter (Q) for year 2 (Y2). External workload variables were compared between Y1H1 and Y2H1 (Q 1 and 2 combined), Y1H2 and Y2H2 (Q 3 and 4 combined), and Y1 to Y2 for whole game totals. Alpha level was set at 0.017. **RESULTS:** Results showed a higher per minute game load with Y2 compared to Y1. In H1, Y2 registered more distance (Y2:  $179 \pm 37$  m, Y1:  $69 \pm 45$  m), HID (Y2:  $26.4 \pm 9.8$  m, Y1:  $6.5 \pm 5.0$  m), accelerations (Y2:  $3.2 \pm 8.7$  m, Y1:  $1.4 \pm .9$ ), and decelerations (Y2:  $1.0 \pm .3$ , Y1:  $.4 \pm .3$ ), all  $p < .001$ . Y2H1 was also greater in high-intensity sprints (Y2:  $.36 \pm .25$ , Y1:  $.07 \pm .06$ ,  $p = .006$ ) and high-intensity sprint distance (Y2:  $13.2 \pm 8.7$  m, Y1:  $2.3 \pm 2.0$ ,  $p = .004$ ). Y2 was also greater in H2 for distance (Y2:  $175 \pm 24$  m, Y1:  $109 \pm 28$  m,  $p < .001$ ), HID (Y2:  $21.1 \pm 6$  m, Y1:  $9.9 \pm 3.3$  m,  $p < .001$ ), high-intensity sprints (Y2:  $.29 \pm .19$ , Y1:  $.11 \pm .04$ ,  $p = .003$ ), accelerations (Y2:  $2.8 \pm .6$ , Y1:  $2.1 \pm .5$ ,  $p = .003$ ), decelerations (Y2:  $.9 \pm .2$ , Y1:  $.5 \pm .1$ ,  $p = .001$ ) and high-intensity sprint distance (Y2:  $10.6 \pm 6.4$  m, Y1:  $3.7 \pm 1.4$  m,  $p = .002$ ). Differences were found for high-intensity sprints (Y2:  $.24 \pm .3$ , Y1:  $.11 \pm .05$ ,  $p = .009$ ) when comparing whole game totals. **CONCLUSIONS:** The new competitive format presented a greater demand for players, with more high-intensity efforts and a greater anaerobic demand. This change in format will shift how athletes should be trained, improving the speed of the game and potentially altering substitution strategies. Coaches can use this information as key performance indicators to develop and alter conditioning programs and drills that focus on meeting higher-intensity game demands.

#### **P211: PREDICTING GAME OUTCOME BASED ON GAME LOCATION AND WELLNESS IN DIVISION I WOMEN'S LACROSSE ATHLETES**

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**BACKGROUND:** Athlete wellness—a subjective measure assessing the response to the previous day's physiological and psychological stress—has subsequent influence on the following day's performance. Game location (i.e., home, away) is also believed to influence performance.

The purpose of this study was to determine if game location, game day wellness, or pre-game day wellness were related to game outcome for a collegiate women's lacrosse team. **METHODS:** Athletes ( $n = 34$ ) completed a daily subjective wellness survey each morning. The survey consisted of four questions related to muscle soreness, sleep quality, stress, and fatigue. Each question was rated in arbitrary units (AU) using the anchors of 0, 25, 50, 75, and 100, with higher scores representing positive affect. The scores of each of the four responses were averaged to calculate the overall wellness score. Individual athlete wellness scores from the day prior to a game and game day were categorized as above or below the team mean for each game. A chi-square analysis was used to evaluate the relationship between the wellness variables and game location with the game outcome. **RESULTS:** The season consisted of seven losses and nine wins, with 10 games played at an away location and six games played at home. Location was not related to game outcome ( $p = .152$ ), nor were any of the game day wellness sub-scores or composite score (wellness:  $71.4 \pm 2.7$  AU,  $p = .614$ ; muscle soreness:  $63.8 \pm 2.9$  AU,  $p = .527$ ; sleep:  $83.0 \pm 3.4$  AU,  $p = .527$ ; energy:  $80.0 \pm 1.5$  AU,  $p = .490$ ; stress:  $65.0 \pm 4.7$  AU,  $p = .490$ ) or the pre-game day wellness sub-scores or composite scores (wellness:  $66.2 \pm 2.2$  AU,  $p = .614$ ; muscle soreness:  $57.3 \pm 5.7$  AU,  $p = .3691$ ; sleep:  $76.8 \pm 4.0$  AU,  $p = .308$ ; energy:  $72.8 \pm 5.2$  AU,  $p = .853$ ; stress:  $61.7 \pm 6.8$  AU,  $p = .170$ ). **CONCLUSIONS:** Game location, pre-game day wellness, and game day wellness were not related to game outcome in Division I women's lacrosse athletes. These findings refute previous beliefs regarding the importance of "home field advantage." Further exploration regarding sleep quality differences in relation to game location and subsequent game outcome are warranted.

#### **P212: A PILOT INVESTIGATION OF LOW BACK PAIN, MOBILITY, AND MECHANICS IN COLLEGIATE POLE VAULTERS**

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**BACKGROUND:** Researchers have demonstrated that the high prevalence of back pain reported by collegiate pole vaulters is associated with poor mechanics during the take-off phase of the vault or due to limited mobility in hips and shoulders. The combined association between vaulting mechanics and mobility on low back pain has not been explored. **METHODS:** Five collegiate pole vaulters were recruited to explore the impact of vaulting mechanics and mobility on self-reported back pain. Subjects completed two vaulting trials and a subsequent range of motion analysis using the GoPro HERO8 video camera and were analyzed using Dartfish Software (7.5). Vaulting mechanics were measured as a function of body position during the plant and take-off phases of an active vault; active and passive range of motion were used to quantify shoulder, hamstring, and hip mobility in lead- and non-lead limbs. Subjects were stratified according to the presence ( $n = 3$ ) or absence ( $n = 2$ ) of back pain. Two one-way ANOVA's were performed to assess differences in vaulting mechanics and mobility factors between groups. **RESULTS:** Differences in vaulting mechanics ( $p > 0.05$ ) and mobility factors ( $p > 0.05$ ) did not occur according to the presence or absence of back pain; however, non-significant trends suggest that mobility factors (specifically, active hamstring flexibility/hip flexion ( $p = 0.06$ ) and passive hip extension ( $p = 0.09$ ) in the non-lead leg) may be associated with back pain in collegiate vaulters. **CONCLUSION:** While limited by a small sample, this study serves as the first-known exploration of the association between vaulting mechanics and mobility factors on back pain within a sample of collegiate pole vaulters. While no association was observed, findings suggest that mobility factors in the non-lead leg may be associated with the presence of back injuries in collegiate vaulters. These observations differ from prior literature reporting associations between back pain and mobility factors on the lead leg, suggesting a need for further investigation.

#### **P213: THE ASSOCIATION BETWEEN FAT DISTRIBUTION PATTERNS AND HAMSTRING STRENGTH IN DIVISION I ATHLETES**

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**Background:** There are a wide variety of body statures and compositions among Division I athletes depending on sport and position. Different fat distribution patterns (e.g., storing more fat abdominally) may impact lower extremity strength which may also be a risk factor for injury. Therefore, the purpose of this study was to evaluate the association of trunk:leg fat mass (TLFM) ratio and leg fat percentage (leg%fat) and eccentric hamstring strength in Division I athletes. **Methods:** Thirty-nine Division I athletes enrolled in the current study (74% female; Age:  $18.8 \pm 1.2$  yrs, Ht:  $175.4 \pm 8.6$  cm, Wt:  $72.8 \pm 11.0$  kg). Hamstring strength was evaluated using a Nordbord and normalized to body mass. In a kneeling position,

participants' ankles were secured and they were asked to gradually lean forward resisting movement with both legs. To measure leg%fat ([right leg FM+left leg FM]/total leg mass x 100) and TLFM (trunk FM/[right leg FM+left leg FM]) each participant completed a dual energy x-ray absorptiometry scan. Pearson correlation coefficients assessed the association between hamstring strength and body composition in males and females separately. Results: In males, there were no significant associations between TLFM and right (R) or left (L) normalized hamstring maximal force (nMaxF; R:  $r=0.17$ ; L:  $r=0.21$ ,  $p>0.05$ ) or normalized hamstring average force (nAvgF; R:  $r=0.18$ ; L:  $r=0.16$ ,  $p>0.05$ ). Leg%fat and right nMaxF were negatively associated ( $r=-0.64$ ,  $p=0.045$ ). However, there were no other significant associations between leg%fat and strength (nMaxF L:  $r=-0.57$ ; nAvgF R:  $r=-0.61$ ; L:  $r=-0.53$ ,  $p>0.05$ ). In females, there were no significant associations between TLFM and nMaxF (R:  $r=-0.06$ ; L:  $r=-0.04$ ,  $p>0.05$ ) or nAvgF (R:  $r=-0.11$ ; L:  $r=-0.10$ ,  $p>0.05$ ). Similarly, there were no significant associations between leg%fat and nMaxF (R:  $r=-0.22$ ; L:  $r=-0.20$ ,  $p>0.05$ ) or nAvgF (R:  $r=-0.16$ ; L:  $r=-0.15$ ,  $p>0.05$ ). Conclusions: Overall, the results of this study suggest that varying fat distribution patterns may not significantly impact eccentric hamstring strength in an athletic population. However, the influence of %legfat on maximal strength should be evaluated further. Additionally, future research should evaluate how fat distribution may influence different strength assessments (e.g., hip strength) and biomechanics of movement to further understand if varying fat distribution can influence injury risk and performance in athletes.

#### **P214: EXAMINING STRENGTH DIFFERENCE BETWEEN POWER-FIRST AND PARALLEL PROGRESSION LIFTING MODEL IN DIVISION I VOLLEYBALL**

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**BACKGROUND:** Power-first (PF) model begins with a power development phase preparing for advanced absolute strength later. In a parallel progression (PP) model, all forms of strength development are addressed at the same time and in parallel fashion. The purpose of this study was to examine differences in countermovement jump (CMJ), single leg jumps and 4-jump test on force plates after 8 weeks of training between the two models. **METHODS:** Division I Volleyball athletes underwent 2 weeks of basic strength training familiarization prior to being randomly assigned to power-first group ( $n=6$ ) and parallel progression group ( $n=5$ ). Pre and post testing was performed on VALD ForceDeck (VALD; VALD Performance, Charlotte, NC) for countermovement jumps (3), single leg jumps (3) and 4-jump tests (3). **RESULTS:** All data was compared as a change score and a Mann-Whitney U was run for the analysis and significance was set at  $p=0.05$ . There were significant differences in jump height (PF: 0.81 cm vs PP: 9.09 cm;  $\eta^2 = 0.48$ ,  $p=0.03$ ), relative peak power (PF: 1.01 N/kg vs PP: 9.08 N/kg;  $\eta^2 = 0.56$ ,  $p=0.017$ ), vertical takeoff velocity (PF: 0.03 m/s vs PP: 0.36 m/s;  $\eta^2 = 0.53$ ,  $p=0.022$ ) and relative eccentric rate of force development (PF: -1.83 N/S/kg vs PP: 10.2 N/S/kg;  $\eta^2 = 0.76$ ,  $p=0.008$ ). There were no significant differences found between groups for any of the variables for single leg jump and 4-jump. **CONCLUSION:** Based on the current data, it may be recommended to train volleyball athletes with the parallel progression model over the power-first model. Although additional research should seek to expand utilizing multiple volleyball teams to examine this paradigm.

#### **P215: PRESEASON VERSUS INSEASON WORKLOAD COMPARISON BY VELOCITY BAND IN MENS COLLEGIATE SOCCER**

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**BACKGROUND:** The law of specificity underlies the importance of strength and conditioning which ensures athletes train to meet the demands of their respective sport. Monitoring tools such as Global Positioning Systems (GPS) aid professionals in prescribing individualized and categorized needs-based training loads to improve sport performance while also reducing the risk of injury. **PURPOSE:** The purpose of this study compared differences between preseason and in-season external workload metrics such as total distance traveled (TDT) and distance traveled within velocity distance bands (VDBs); defined by the manufacturer for collegiate male soccer players: Tier I-1-3 m/s, Tier II-3-5 m/s, Tier III-5-7 m/s, Tier IV-7-9 m/s. **METHODS:** Twenty-one (age:  $19.6\pm 1.2$  years, height:  $180.7\pm 8.3$  cm, mass:  $75.6\pm 7.4$  kg) collegiate men's soccer players participated in the current study. Workload data of practices and games were collected during a two-week preseason and ten-week in-season period using a 10Hz Titan 1+ (Integrated Bionics, Houston, Texas, USA - 2"x1.5"x.25"). GPS devices were secured by a jersey

resting between the scapulae for every practice and competitive match. The sport coach activated and distributed the devices 15 minutes prior to each participant taking the field and was subsequently turned off following each session to standardized workload data across the competitive period. Paired samples t-tests were used to compare differences in TDT between preseason and in season periods. A 2x4 (Time [preseason, in-season]) X (VDBs [Tier I, II, III, IV]) repeated measures ANOVA with an alpha level of  $p<0.05$  was used for all analyses. Participants were removed from the analysis if they participated in <75% of the total number of training sessions or matches ( $n=2$ ). **RESULTS:** Significant differences ( $p<.001$ ) were observed between preseason TDT ( $19285.4\pm 6419.6$ m) compared to in-season TDT ( $25714.3\pm 6716.8$ m). Significant main effect differences ( $p<.001$ ) were seen in pre-season VDBs (Tier I:  $1189.9\pm 3856.7$ m, Tier II:  $3294.5\pm 1903$ m, Tier III:  $572.2\pm 419$ m, Tier IV:  $63.9\pm 63.1$ m) when compared to in-season VDBs (Tier I:  $14840.7\pm 3977.8$ m, Tier II:  $4545.2\pm 2323.8$ m, Tier III:  $798.1\pm 485.2$ m, Tier IV:  $73\pm 69.7$ m). **CONCLUSION:** Coaches can utilize this data to monitor and alter individual and team workloads to attenuate soft tissue injuries that occur with overtraining and ensure off-season training are at intensities that match in-season demands.

#### **P216: CHANGES IN CLEAN BARBELL KINETICS WITH INCREASING LOAD IN MASTERS OLYMPIC WEIGHTLIFTING**

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**Background:** While previous studies have discussed the general relationship between biomechanical variables in the clean movement, few studies have examined the effect of load during the second pull phase. Currently, there is a lack of research pertaining to the effects of load on variables such as peak power, peak force, and timing of the first (FP) and second (SP) pull of the clean. **Purpose:** To determine the effect of submaximal loads on the FP and SP of the clean in masters Olympic weightlifting athletes. **Methods:** Thirty-six master Olympic weightlifting athletes (35-65 years) including 20 women (age  $46.7\pm 9.1$  years) and 16 men ( $50.2\pm 10.4$  years) who participated in the 2017 National Masters Weightlifting Championships completed 2 clean and jerks using loads of 65%, 75%, and 85% of their estimated one repetition maximum with rest periods of 3-5 minutes between lifts. Simultaneously with each lift, three-dimensional barbell kinematics were collected (12 infrared cameras) and used to compute several characteristics, including FP peak force (PF), FP peak power (PP), SP PF, SP PP, and the FP/SP phase times PF and PP were normalized to body mass. Separate sex by load analysis of variance analyses were conducted. **Results:** There were significant sex differences for FP PF ( $P=.005$ ,  $d=1.0$ ), FP PP ( $P=.003$ ,  $d=1.1$ ), and SP PP ( $P=.045$ ,  $d=.70$ ). SP PF was not different between sexes ( $P=.105$ ,  $d=.56$ ), neither were any of the sex by load interactions ( $P=.285$ ). Post hoc trend analyses of significant load effects yielded similar (significant linear trends) increases between each subsequent load for FP PF ( $P<.001$ ,  $d=5.3$ ) and PP ( $P<.001$ ,  $d=2.1$ ), whereas there was a greater increase in SP PF ( $P=.041$ ,  $d=.73$ ) and PP ( $P=.010$ ,  $d=.70$ ) between 65% and 75% compared to 75% and 85% (significant quadratic trends). Simple main effect post hoc comparisons of a significant phase by load interaction for phase time yielded no SP changes between loads, whereas the 85% FP time was significantly greater than 75% ( $P=.031$ ,  $d=.95$ ) and 65% ( $P<.001$ ,  $d=1.7$ ). **Conclusion:** These results demonstrate men and women exhibit equal changes for submaximal load increases for FP metric but less change between the two higher loads for SP metrics. Future research should consider changes with higher loads up to maximal effort.

#### **P217: MEASURES OF ATHLETE READINESS THROUGHOUT A DIVISION I COLLEGIATE VOLLEYBALL SEASON**

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**BACKGROUND:** Volleyball is primarily an anaerobic sport, as players need to perform bursts of high intensity exercise followed by short rest repeatedly throughout a match. Managing athlete workloads to maintain high levels of performance is an important part of team success. The purpose of this study was to assess workload, performance, training distress, and sleep, as well as the relationships between these variables. **METHODS:** Female collegiate volleyball players ( $n=19$ ) were monitored throughout the 12-week fall 2021 competitive season (T1-T12). Workloads were quantified by a rolling 7-day sum of session rating of perceived exertion (sRPE). Athletes participated in weekly testing to assess physical readiness, training distress, and sleep quality. Physical readiness was assessed by weekly countermovement jump (CMJ). Training distress was determined using the

Multicomponent Training Distress Scale (MTDS) composite score and sleep quality was assessed using the Groningen Sleep Quality Score (GSQS). Linear mixed-effects models were used to determine change over time in workload, CMJ, MTDS scores, and GSQS scores with post-hoc tests comparing each timepoint back to T1. Relationships between changes in each metric were assessed via repeated measures correlations. An alpha level of 0.05 was used to determine statistical significance. RESULTS: There were time main effects for sRPE ( $P < 0.001$ ), CMJ ( $P < 0.001$ ), MTDS scores ( $P < 0.001$ ), and GSQS scores ( $P = 0.032$ ). sRPE was significantly lower at T6 ( $P < 0.0001$ ) while there were no differences from baseline in CMJ at any timepoint. MTDS scores were significantly elevated at T5 ( $P = 0.049$ ), T8 ( $P = 0.025$ ), T11 ( $P = 0.001$ ), and T12 ( $P = 0.022$ ) and GSQS scores were higher than baseline at T2-T4, T6-T8, and T10-T12 ( $P < 0.05$ ). There was a significant weak correlation between sRPE and CMJ ( $r = 0.2$ ;  $P = 0.33$ ) but no significant relationships between any other variable. CONCLUSIONS: This study showed fluctuations in subjective training distress and sleep while objective workload and performance measures remained stable throughout the season. Future analyses should investigate the relationship between objective and subjective measures on an individual level, rather than as a team, as some individuals may respond differently to both workload and non-training related stressors.

### P218: MUSCLE ACTIVITY COMPARISONS DURING FUNCTIONAL MOVEMENTS IN WOMEN WITH AND WITHOUT PATELLOFEMORAL PAIN

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BACKGROUND: Patellofemoral pain (PFP) is described as generalized knee pain behind or along the medial and/or lateral border(s) of the patella. The etiology of PFP is not fully understood; however, impaired motor control and quadriceps weakness is thought to be related to this disorder, which has been shown to lead to decreased quality of life. There has been little research on differences in muscle activity during functional movements of agonist/antagonist groups or synergistic groups in women with PFP. The purpose of this study was to determine whether women with PFP would exhibit different muscle activity patterns during functional movements, when compared to a control group. METHODS: The experimental group included those who self-reported anterior or retro-patellar pain during at least two of the following activities: kneeling, prolonged sitting, squatting, ascending stairs, descending stairs, jumping, hopping or running. Those that self-reported no pain and presented no other joint issues were placed in the control group. Participants were excluded if they presented a history of joint surgery, patellar dislocation, and signs or symptoms of any joint injury or pain that would prevent completion of any activity required for data collection. Muscle activity, using surface electromyography (sEMG), was assessed on the gluteus medius (GMED), gluteus maximus (GMAX), abductor longus (AL), and the tensor fasciae latae (TFL) during 5 reps of forward lunge, lateral step down, and single leg squat. Statistical analysis included independent samples *t*-tests to compare normalized peak activity of the previously listed muscles between groups, and Hedge's *g* was used to calculate effect sizes. RESULTS: Regarding sEMG, GMED, GMAX, and AL were not significantly different between groups across any movement; however, peak TFL was significantly higher in the experimental group during the descent phase ( $p = .015$ ,  $g = -1.13$ ), and ascent phase ( $p = .010$ ,  $g = -1.13$ ) of the forward lunge. In addition, peak TFL was significantly higher in the experimental group during the descent phase of the lateral step down ( $p = .042$ ,  $g = -1.80$ ). Lastly, peak TFL was significantly higher in the experimental group during the ascent phase ( $p = .046$ ,  $g = -0.90$ ) of the single leg squat. CONCLUSION: The experimental group, or those who had PFP, demonstrated higher peak TFL activity during functional movements. This could be indicative of increased TFL activation to provide stability in the lower extremity during functional tasks; however, future research would be needed to fully understand the relationship between PFP and these muscles.

### P219: ROCK OUT WORKOUT: CARDIODRUMMING'S IMPACT ON FUNCTION WITH DOWN SYNDROME

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BACKGROUND: People with Down syndrome (DS) are at greater risk for obesity and function declines. Exercise professionals are in need of identifying fun, engaging activities that people with DS will enjoy to combat sedentary behaviors. Cardiodrumming is a low-impact, cardiovascular-based exercise modality that is relevant to all populations as intensity of effort is self-regulated. METHODS: Participants with DS ( $n = 10$ ) were assessed for function using the modified Berg balance test (mBERG), Established Populations for

Epidemiological Studies (EPESE), Timed Up and Go (TUG) at baseline and at the end of the eight-week Cardiodrumming intervention. Cardiodrumming consisted of participants self-selecting 'drum sticks' (pool noodles) and station (fixed yoga ball), following trained group exercise leaders through moderate intensity exercise (as measured by heart rate). Sessions consisted of a five-minute warm up, two fifteen-minute active periods broken up by a five-minute active rest, and a five-minute cool down. Pre- and post-data were analyzed using one-way repeated measures ANOVAs for each functional test. RESULTS: There were no improvements in TUG performance ( $F(1,9) = 4.39$ ,  $p = 0.66$ ,  $\eta_p^2 = .328$ ), mBERG ( $F(1,9) = 0.498$ ,  $p = .498$ ,  $\eta_p^2 = .052$ ) or EPESE performance ( $F(1,9) = 1.210$ ,  $p = 0.30$ ,  $\eta_p^2 = .119$ ). CONCLUSIONS: There appears to be no measurable benefit from Cardiodrumming in people with DS in regard to function. This finding may have been influenced by participants engaging at a self-selected intensity, most adopting easier movements or not pushing themselves as directed by the group exercise instructor. Future researchers should emphasize that more attention should be paid to the instructor rather than watching their peers. Overall, participants with DS enjoyed Cardiodrumming, but more incentive to push themselves would be needed to elicit functional adaptations.

### P220: ECG CHARACTERISTICS OF YOUNG HIGH SCHOOL ATHLETES IN NORTHWEST FLORIDA

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BACKGROUND: Sudden cardiac death (SCD) in young athletes is a rare but tragic occurrence. A Preparticipation Physical Examination (PPE) is widely used to identify those athletes who might be at risk of SCD during sports participation. High school athletes in, Escambia, Okaloosa, Santa Rosa and Walton counties in Florida undergo annual sports physicals through a local sports medicine outreach program. Resting electrocardiogram (ECG) screening was implemented for the first time during the 2022 program PPE. The purpose of this study was to report the ECG abnormalities found in young athletes during a single day of PPE including resting ECG screening. METHODS: 1,357 high school athletes (males = 879; females = 478, age  $15.09 \pm 1.3y$ ) completed a resting 12-lead ECG screening, which was read and interpreted by Adult cardiologists using the International Criteria and then referred to Pediatric cardiologists for final clearance. RESULTS: Twenty-three ECGs (3%) were classified as 'abnormal' and referred to pediatric cardiologists for further testing. Of these, ten athletes were cleared by pediatric cardiologists to participate in sports. Four athletes are waiting to be evaluated and six athletes declined further evaluation. Three athletes, all males, were not cleared for sports participation. Of these, two athletes presented with Wolf-Parkinson-White (WPW) syndrome (0.15%) and one athlete (0.10%) presented with dilated cardiomyopathy. CONCLUSIONS: The implementation of ECG screening during a one-day PPE is a valuable best practice, and effective in the detection of cardiac abnormalities in high school athletes. To our knowledge, this is the highest number of athletes screened in one day nationwide.

### P221: IMPACT OF 10-WEEK BINGOCIZE® PROGRAM ON SELF-REPORTED GENERAL HEALTH, FEAR OF FALLING, AND PHYSICAL ACTIVITY

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BACKGROUND: The purpose of this investigation was to examine the effectiveness of Bingocize®. This health promotion program strategically combines the game of bingo with fall prevention/nutrition education and exercise in 39 community centers across the state of Virginia. METHODS: Older adults and participants with disabilities ( $N = 410$ ; age  $75.4 \pm 7.5 y$ ) attended the group Bingocize® sessions two times per week for 10 weeks. Participants played the traditional game of bingo with intermittent strength, balance, and flexibility exercise sessions and nutrition/falls prevention education. Participants completed a pre and post assessment to determine their individual rating for general health, fear of falling, and physical activity level. RESULTS: There was a significant increase in self-reported physical activity levels (Wilcoxon signed-rank;  $Z = -2.804$ ,  $p = 0.005$ ) and in pre and post self-reported responses for general health ( $Z = -2.133$ ,  $p = 0.033$ ), but fear of falling was not different ( $Z = -1.866$ ,  $p = 0.059$ ). However, participants ( $n = 54$ ) with fair or poor health at baseline reported significantly decreased fear of falling ( $Z = -3.145$ ,  $p = .002$ ). CONCLUSIONS: A 10-week Bingocize® program can have a positive impact on increasing the general health and physical activity level of older adults and people with disabilities. The program also appears to improve fear of falling in the participants who report fair or poor health and, therefore, can benefit the most from participation.

**P222: A TAILORED PHYSICAL ACTIVITY INTERVENTION'S EFFECTS ON SELF-EFFICACY, PHYSICAL ACTIVITY, AND HEALTH-RELATED QUALITY OF LIFE.**

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**PURPOSE:** The Physical Activity and Lymphoma Study (PALS) pilot trial tested a six-month tailored physical activity intervention for lymphoma patients undergoing anthracycline-based chemotherapy. PALS was designed to reduce treatment-related cardiovascular morbidity and declines in patient health-related quality of life (HRQL) through tailored exercise. The primary objective of the current study was to investigate the effects of the tailored exercise intervention (PAI) on self-efficacy, physical activity (PA) participation, and HRQL in patients undergoing treatment for lymphoma. **METHODS:** Fifteen patients recently diagnosed with Non-Hodgkin or Hodgkin lymphoma were randomized into the PAI or the healthy living intervention (HLI). Separate linear-mixed effects models adjusted for baseline levels of each outcome used complete case data to examine changes in self-efficacy at baseline, the Godin's Leisure-Time Exercise Questionnaire, and HRQL (SF-36) at 3 and 6 months. **RESULTS:** Self-efficacy for walking was significantly higher in the PAI group compared to the HLI group over time (*Mean difference = 5.35 units (SE 1.20), p < .01*). At 6 months, participants in the PAI group engaged in significantly higher levels of physical activity than the HLI group (*p < 0.01*). There were no significant differences in the physical and mental components of HRQL between groups. **DISCUSSION:** The use of theory-based behavioral strategies to support participant's self-efficacy towards PA and their adherence to the intervention may explain the maintenance of a high level of self-efficacy and more engagement in PA in the PAI group. This research is significant because it demonstrates the importance of promoting self-efficacy for engaging in PA, early and throughout the course of treatment for lymphoma.

**P223: ASSESSMENT OF ACSM'S PREPARTICIPATION SCREENING IN OLDER ADULTS AND THOSE WITH CHRONIC DISEASES**

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**BACKGROUND:** The ACSM exercise preparticipation algorithm is designed to identify increased risk for adverse exercise-related cardiovascular events. It is recommended that individuals complete a health screening to identify the need for medical clearance prior to participating in an exercise program. With the potential for screening to deter exercise engagement, it is important to determine if the updated 11th edition reduces (as intended) unnecessary medical referrals while remaining conservative enough to identify those who may truly benefit from a medical referral. **METHODS:** Seventy-one participants ( $\geq 40$  yrs of age and/or diagnosed with cardiovascular, metabolic, renal and/or pulmonary diseases) were assessed for the need of medical clearance. Participants completed a self-reporting questionnaire to identify their risk factors (based on both 9th edition and 11th edition criteria) and diagnosed cardiovascular, metabolic, renal and pulmonary diseases. They also completed a biometric screening consisting of resting heart rate, resting blood pressure, body mass index, waist circumference, and lipid profile). Need for medical clearance was determined based on the criteria for the 9th and 11th editions of the ACSM Guidelines. Results were analyzed using cross tabulation and chi-squared test to compare 9th and 11th editions. **RESULTS:** The 9th edition preparticipation screening guidelines resulted in 30 participants (42%) classified as high risk, 29 participants (41%) classified as moderate risk, and 12 participants (17%) classified as low risk. In comparison, the updated 11th edition guidelines resulted in 3 participants (10%) being reclassified from high to moderate risk, and 29 participants (100%) being reclassified from moderate to low risk; resulting in a 41% decrease in medical referrals ( $\chi^2 = 70.0$ ;  $p < 0.001$ ). **CONCLUSION:** Current results suggest the updated guidelines significantly reduce unnecessary medical referrals as intended, but also remain conservative enough to identify those who need medical clearance prior to the start of a new exercise program.

**P224: EXAMINING PAIN LEVELS IN COMPETITION AND PERFORMANCE OF FEMALE ATHLETES**

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**BACKGROUND:** In sports, athletes have higher pain tolerance and threshold levels compared to non-athletes. However, there is little research regarding how different types of sports are associated with pain tolerance and threshold in female athletes. The purpose of the study was to examine the levels of pain threshold and tolerance within

a group of female competition and female performance athletes to determine if a difference exists. **METHODS:** 11 athletes (M: 23.1, SD: 7.1) were divided into competition (C) group (n = 5) and performance (P) group (n = 6). Resting hemodynamic measurements, anthropometric measurements, and body composition assessments via dual-energy x-ray absorptiometry (DXA) were measured prior to the induction of experimental pain. Pain threshold and tolerance were induced by the cold pressor test (CPT) and three sets of electrical stimulation (Estim) tests for upper and lower limbs. A Visual Analog Scale (VAS), heart rate (HR), and blood pressure (only CPT) were recorded during the experimental pain to determine pain levels. **RESULTS:** There were no significant differences between groups in beginning measurements ( $p > 0.05$ ) or in physiological responses to the CPT. The pain threshold for both groups occurred at the thirty-second (sec) time marker ( $p > 0.05$ ). From the upper limb Estim assessment, there were no significant physiological differences between groups for pain threshold (C=70-mV; P=50-mV;  $p=0.247$ ), pain tolerance level (C=102-mV; P=95-mV;  $p=0.429$ ), or in VAS scores. In the lower limb assessment, a significant difference in HR was seen between groups at the 100-mV level (C=71 $\pm$ 12.3bpm; P=88 $\pm$ 6.1bpm;  $p=0.041$ ), with no significant difference in the corresponding VAS score. Pain threshold was not significantly different (C=100-mV; P=80-mV;  $p=0.310$ ) however the pain tolerance level was significantly different (C=90-mV; P=60-mV;  $p=0.032$ ), again with no differences in VAS scores. **CONCLUSION:** From our sample, it seems that although the C athletes had higher pain thresholds and tolerance levels for both upper and lower limb assessments, the P group had higher HR measurements throughout both assessments. Further examination into whether performance athletes have altered responses to pain stimuli needs to be completed to understand the performance athlete's psychological response to pain.

**P225: EFFECTS OF A BACTERIAL/VIRAL FILTER ON PARTICLE GENERATION AND CARDIOPULMONARY RESPONSES DURING MAXIMAL EXERCISE TESTING**

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**BACKGROUND:** Increased pulmonary ventilation during cardiopulmonary exercise testing (CPET) causes the generation of potentially infectious micrometer-size respiratory particles. As such, many clinical centers still require staff to don additional personal protective equipment during CPET and/or patients to test negative for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) before CPET. **PURPOSE:** To determine the effect of adding a bacterial/viral filter to the standard mouthpiece assembly during CPET on 1) the amount of detectable micrometer-size particles generated and 2) the cardiopulmonary responses to exercise. **METHODS:** Five healthy adults (one female;  $37 \pm 3$  y) performed a maximal ramp incremental CPET on two separate occasions: 1) with and 2) without a bacterial/viral filter incorporated into the standard CPET mouthpiece assembly (i.e., flanged mouthpiece and flow sensor plus or minus bacterial/viral filter). The order of the two CPETs was randomized between participants. Cardiopulmonary indices and ratings of perceived exertion (leg discomfort, dyspnea) were measured during CPET. Small ( $\leq 4.9 \mu\text{m}$ ) and large ( $5-10 \mu\text{m}$ ) size particle generation during CPET was quantified using a light-scattering particle counter. **RESULTS:** Peak oxygen consumption ( $50.1 \pm 14.5$  vs.  $46.3 \pm 11.9$  ml/kg/min) and oxygen pulse ( $21.2 \pm 6.6$  vs.  $19.4 \pm 5.7$  ml/beat) were greater with vs. without filter (both  $P \leq 0.04$ ). Conversely, peak power ( $302 \pm 95$  vs.  $308 \pm 97$  W), minute ventilation ( $131 \pm 42$  vs.  $129 \pm 41$  L/min), ventilatory equivalent for CO<sub>2</sub> (nadir;  $24 \pm 2$  vs.  $25 \pm 2$ ), heart rate ( $175 \pm 10$  vs.  $176 \pm 9$  beats/min), and O<sub>2</sub> saturation ( $98 \pm 2$  vs.  $98 \pm 2\%$ ) were not different with vs. without filter (all  $P \geq 0.56$ ). Neither leg discomfort ( $9.8 \pm 1.1$  vs.  $9.6 \pm 0.9$ ,  $P = 0.37$ ) nor dyspnea ( $8.4 \pm 1.5$  vs.  $9.0 \pm 1.4$ ,  $P = 0.38$ ) were rated differently between the two trials. Relative to baseline ambient values, the increase in small micrometer-sized particle counts during the 5<sup>th</sup> and final minute of CPET was markedly attenuated with vs. without filter (5<sup>th</sup> minute: with filter  $20 \pm 106$  vs. without filter  $157 \pm 48$  particles/L; final minute: with filter  $70 \pm 101$  vs. without filter  $331 \pm 252$  particles/L); however, these differences were not statistically significant. Large micrometer-sized particle counts did not increase appreciably during CPET and were unaffected by filter use. **CONCLUSIONS:** Adding a bacterial/viral filter to the standard mouthpiece assembly does not appear to negatively impact the cardiopulmonary or perceptual responses to CPET but may help mitigate the risk of micrometer-size particle generation during such exercise.

**P226: DESIGNING FOR INTEGRATION: PLANNING AND EVALUATION OF A CLINICAL EXERCISE ONCOLOGY PROGRAM**

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**BACKGROUND:** Research suggests that exercise has beneficial effects on a variety of cancer related health outcomes. However, effectively implemented exercise programs for individuals with cancer are lacking. The aim of this project was to design and evaluate an exercise program for the Midlands oncology community. **METHODS:** This study was completed in two phases: 1) Pre-integration and 2) Evaluation. A stakeholder advisory group that included partners from the University and hospital systems was formed to guide the project. During the pre-integration phase, key healthcare personnel were interviewed to determine program delivery specifics and referral management. This resulted in the design and execution of an 8-week (offered 2 times per week) aerobic and resistance exercise program that ran 3 times over the course of 10 months. Outcomes included the Bellarmine Norton Assessment Tool (BNAT) consisting of the 2-minute step test, 30-second sit to stand, 30-second arm curl and timed up and go as well as fatigue assessed using the FACIT fatigue scale. **RESULTS:** The pre-integration phase determined the participant referral process and the location/delivery of the program. Specifically, 4 points of interaction were identified as opportunities for referrals (chemotherapy education nurses, primary nurse practitioners, offboarding services and rehabilitation service referral). Further, it was decided to leverage existing rehabilitation infrastructure and facilities to deliver the exercise program, which informed days per week (two), times of offering (6:30am-7:30am and 5:30pm-6:30pm), and outcomes assessed. Program participants experienced significant improvements in cancer-related fatigue (pre: 43.0 ± 9.45, post: 38.00 ± 11.34,  $p < 0.05$ ), 2-minute step test (pre: 74.54 ± 19.29, post: 88.79 ± 11.34,  $p < 0.05$ ), 30-second sit to stand (pre: 10.71 ± 4.19, post: 12.54 ± 5.66,  $p < 0.05$ ), 30-second arm curl (pre: 13.20 ± 3.43, post: 15.88 ± 5.45,  $p < 0.05$ ) and timed up and go (pre: 8.04 ± 3.49, post: 6.38 ± 2.4,  $p < 0.05$ ). **CONCLUSION:** The effectiveness of an exercise program for individuals with cancer was supported by statistically significant improvements in physical function and fatigue. Preplanning with healthcare system stakeholders provided critical input to facilitate referrals and delivery of the program. Future programs aiming for integration should consider this approach.

**P227: EFFECTS OF SEX AND AGE ON PHYSICAL ACTIVITY LEVELS IN 4-YEAR-OLD CHILDREN ATTENDING A DAY CAMP AT THE DIET AND NUTRITION LABORATORY.**

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**BACKGROUND:** According to the National Association of Sports and Physical Education, preschoolers are recommended to engage in at least 60 minutes each of structured and unstructured physical activity (PA). Structured PA refers to periods of time dedicated to PA activities, usually group-based, to provide an opportunity for MVPA engagement. PA in preschoolers remain very low, with a meta-analysis showing that average moderate-to-vigorous PA (MVPA) of preschoolers in childcare settings is 32.1min. PA appears to be greater in boys than girls, healthy versus non-healthy weight children, and decreases with age. However, little is known about whether these factors influence MVPA in structured PA settings. The purpose of this study was to examine average MVPA and the effects of age, sex, and weight status on MVPA in a sample of preschoolers attending a day-camp study. **METHODS:** Twenty-five 4-year-old children attended four 7-hour long day camps in cohorts of 3-4. This study was conducted first in 2019 and again in 2022 using similar methods. The day camps included three meals/snacks and two 60-minute periods of structured PA, including activities such as soccer, racing, and duck-duck-goose. PA was measured using ActigraphGT3X devices worn on the waist with elastic belts. Data from 29 days was not included due to refusal to wear device ( $n=18$  days), removal of device ( $n=7$ ), absence ( $n=2$ ), or device malfunction ( $n=2$ ), resulting in 71 days of measurements. Age and sex were parent-reported. Weight and height were used to calculate BMI-for-Age percentile (BMI%ile). Children were stratified into healthy and non-healthy weight by BMI%ile ( $< 85$  versus  $\geq 85$ %ile). T-tests were used to compare the amount of time spent in MVPA by sex and weight status, controlling for cohort and year (2019 versus 2022). Regression analysis was used to estimate the association between both age and BMI%ile and MVPA, both controlling for cohort and year. Significance was determined at  $p < 0.05$ . **RESULTS:** Mean age was 53.18 ± 3.89 mo, 44% were females, and mean BMI%ile was 55.2 ± 30.57%. Mean time spent in MVPA was 91.9 ± 55.8 minutes,

with 61% of children engaging in at least 60min/d and 41% in at least 120min/d. There was a significant effect of cohort ( $F(8,62)=21.150$ ,  $p < 0.001$ ) and year ( $F(1,69)=83.956$ ,  $p < 0.001$ ) on MVPA. Controlling for cohort and year, there were no differences in time spent in MVPA by sex ( $F(1,67)=2.398$ ,  $p=0.126$ ) or weight status ( $F(1,67)=0.682$ ,  $p=0.412$ ). There was no significant association between age and MVPA ( $\beta = -6.92$ ,  $t=-1.458$ ,  $p=0.150$ ) or BMI%ile and MVPA ( $\beta = 1.964$ ,  $t=0.68$ ,  $p=0.499$ ). **CONCLUSIONS:** In our sample, mean MVPA was 300% greater than the reported average. However, the majority of children did not meet recommendations, indicating that additional efforts, such as longer or more strategic PA sessions, may be required to aid children in meeting these guidelines.

**P228: ACCURACY OF HEALTH METRICS FROM WRIST-WORN FITNESS DEVICES DURING EXERCISE WITHIN DIVERSE COHORTS.**

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**BACKGROUND:** The ability to measure health metrics from commercially available wrist-worn fitness devices may provide valuable information for epidemiological and physiological research pertaining to energy expenditure, exercise intensity, and heart rate. However, despite the advancements in technology, significant error may still arise within the metrics being collected. The purpose of this study was to determine if skin tone and hand-dominance impact the accuracy of heart rate (HR) and energy expenditure (EE) in wrist-worn devices utilizing photoplethysmography. **METHODS:** Twelve volunteers (12 male, age 24 ± 5.9 years) of diverse skin-tone completed a single day laboratory trial comprising of two 15-minute progressive exercise protocols using a treadmill and a Monark 828e cycle ergometer. Two smart-watch brands, Apple Series 3 (AS3) and Fitbit Versa 2 (FV2) were selected from their commercial availability at the time of this study. Participants wore the same model on identical locations of each wrist on their dominant (D) and non-dominant (ND) arm, with the AS3 placed near the ulnar head, and the FV2 placed 2-3 finger widths above the ulnar head. Oxygen consumption and electrocardiography were assessed utilizing a metabolic cart (MGC Diagnostics Ultima™ Cardio2®), and were used as the gold standard to compare the values of HR and EE derived from the smart watches. **RESULTS:** No significant differences were found between skin tone and the percent error in HR (AS3\_D: 0.73 ± 0.63,  $p=0.80$ ; AS3\_ND: 0.19 ± 0.19,  $p=0.57$ ; FV3\_D: 4.01 ± 8.87,  $p=0.61$ ; FV3\_ND: 4.87 ± 8.93,  $p=0.25$ ) and percent error in EE (AS3\_D: 3.71 ± 34.21,  $p=0.62$ ; AS3\_ND: 0.11 ± 25.40,  $p=0.29$ ; FV3\_D: 0.28 ± 28.60,  $p=0.66$ ; FV3\_ND: 1.01 ± 25.75,  $p=0.26$ ) for all watches. However, significant differences were found when comparing hand dominance and total measured EE within brands (AS3\_D vs. AS3\_ND:  $p < 0.001$ ; FV2\_D vs. FV2\_ND:  $p < 0.001$ ), but not with HR (AS3\_D vs. AS3\_ND:  $p=0.78$ ; FV2\_D vs. FV2\_ND:  $p=0.41$ ). **CONCLUSIONS:** All devices accurately measured HR within the acceptable error of 5% in our diverse population. However, EE estimates were up to 66% off from the reference value and were significantly different between identical brands. Individuals and clinicians should be aware of the strengths and limitations of wrist-worn devices and how it may impact exercise prescription and daily caloric intake.

**P229: SELF REPORTED AEROBIC PHYSICAL ACTIVITY COMPARED WITH ACTIPAL TECHNOLOGIES**

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**BACKGROUND:** Reducing sedentary time while maintaining regular physical activity is associated with improvement in health-related fitness components and decreased risk of chronic-related diseases. Currently the 2018 Physical Activity Guidelines for Americans recommend adults complete a minimum of 150 minutes a week of moderate-intensity activity, or a minimum of 75 minutes a week of vigorous-intensity activity, and/or a combination of moderate and vigorous intensity. Present wearable technology, such as the ActivPAL, has allowed individuals to monitor sedentary behavior, however most of the general population does not have access to wearable technology, making a physical activity questionnaire a more realistic approach for tracking physical activity. The purpose of this study was to compare moderate and vigorous self-reported physical activity guidelines compared to ActivPAL technology reports. **METHODS:** Forty-nine college students were recruited for this study (age: 23.02 ± 3.88y, height: 168.93 ± 9.75cm, mass: 78.02 ± 17.36kg, BMI: 27.34 ± 5.55kg/m<sup>2</sup>). Participants were provided with ActivPAL activity monitors to wear for 7 days. The device was secured on the midline of the right thigh, one-third of the way down from the top of the thigh. After the 7-day wear period, the physical activity monitors were returned and participants completed a Physical Activity and Exercise Context Questionnaire. Two paired sample t-test were conducted to compare the means of total exercise minutes for moderate and

vigorous activity between self-reported physical activity and ActiPAL data. **RESULTS:** There was a significant difference ( $p < .001$ ) in total time self-reported moderate physical activity ( $563.53 \pm 569.37$  min) and ActiPAL moderate physical activity ( $236.55 \pm 172.11$  min). There was also significant difference ( $p < .001$ ) in total time self-reported vigorous physical activity ( $138.30 \pm 195.32$  min) and ActiPAL reported vigorous physical activity ( $11.58 \pm 25.07$  min). **CONCLUSION:** While self-reported physical activity is a more practical approach, individuals often misrepresent aerobic moderate activity and over-represent aerobic vigorous activity compared to ActiPAL. Practitioners should be cautious when asking college students to self-report time spent in moderate and vigorous aerobic physical activity. Future research studies should investigate the validity of the ActiPAL across all modes of aerobic activity.

### P230: SEX-DIFFERENCES IN REPETITIONS TO FAILURE AND NEUROMUSCULAR FATIGUE OF THE ELBOW FLEXORS

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**BACKGROUND:** The purpose of this investigation was to examine sex-differences in repetitions completed and changes in maximal voluntary isometric contraction (MVIC) strength following consecutive sets to failure at 80% and 30% 1-repetition maximum (1RM). **METHODS:** Twenty-two healthy, resistance-trained subjects (9 females) completed a single visit. Subjects arrived at the lab after abstaining from caffeine for a minimum of 8 hours and upper body exercise for at least 48 hours prior to their visit. Subjects then completed 1RM testing of a bilateral preacher curl exercise. 2-3 minutes of rest was given between each attempt, and all subject's 1RM was found within 5 attempts. Following a 5-minute rest, subjects completed consecutive sets to volitional failure at 80% and 30% 1RM with no rest between sets. MVIC strength of the dominant arm was measured prior to (PRE) and after (POST<sub>80</sub>/POST<sub>30</sub>) each set. Each MVIC was analyzed offline to calculate peak force (PF) from the greatest 200 ms window during each MVIC attempt. **RESULTS:** Independent samples t-tests indicated there were no significant differences in repetitions completed between sexes at 80% 1RM (F:  $7.9 \pm 3.3$  reps; M:  $7.8 \pm 2.5$  reps;  $p = 0.923$ ). However, females completed significantly more repetitions at 30% 1RM (F:  $42.9 \pm 11.4$  reps; M:  $33.7 \pm 5.9$  reps;  $p = 0.022$ ). There was a significant Sex (M/F)  $\times$  Time (PRE/POST<sub>80</sub>/POST<sub>30</sub>) interaction for PF ( $p = 0.006$ ). Post-hoc analyses indicated that males exhibited greater PF at all timepoints ( $p < 0.001-0.003$ ). For females, PF non-significantly decreased from PRE ( $208.3 \pm 56.9$  N) to POST<sub>80</sub> ( $192.6 \pm 51.1$  N;  $p = 0.075$ ) and significantly decreased from POST<sub>80</sub> to POST<sub>30</sub> ( $167.2 \pm 58.9$  N;  $p = 0.01$ ). In males, PF significantly decreased across all timepoints (PRE:  $388.8 \pm 68.1$  N; POST<sub>80</sub>:  $339.4 \pm 56.9$ ; POST<sub>30</sub>:  $284.9 \pm 91.8$  N;  $p < 0.001-0.002$ ). **CONCLUSIONS:** Our data suggest that sex-differences in repetitions to failure may be exclusive to lower loads, as both males and females completed a similar number of repetitions at 80% 1RM. Additionally, our data suggest that neuromuscular fatigue may also be sex-dependent, as PF significantly declined across all timepoints in males, but not until POST<sub>30</sub> in females. **FUNDING:** This project was funded by the University of South Alabama's Summer Undergraduate Research Fellowship and Bukstein Fellowship.

### P231: IMPACT OF PROTECTIVE GEAR ON LOWER BODY DYNAMIC BALANCE AND MOTOR CONTROL IN FIREFIGHTERS

Matthew Dohmeier, James Bernedo, Eva Janofsky, Mike Iosia. Lee University, Cleveland, TN.

**OBJECTIVE:** The purpose of this study was to measure the impact of personal protective ensembles (PPE) and self-contained breathing apparatus (SCBA) on firefighters' lower body dynamic balance and motor control using the Y-Balance Test (YBT). **METHODS:** Fourteen firefighters (13 male and 1 female) from the local municipal fire department volunteered for the study. Lower body YBT composite reach scores were measured on both right and left sides, on three separate occasions wearing workout gear (PT), PPE, and PPE + SCBA (SCBA gear). Testing order was counterbalanced to mitigate the learning effect. Composite scores were normalized for limb length and reported as percentages. Paired T-Tests were run using IBM SPSS V25 to identify statistical differences at an alpha level of  $p \leq 0.05$ . **RESULTS:** Statistical analysis of the YBT data showed there were significant differences between the right leg lower body composite score between PT and PPE gear ( $103.98 \pm 7.53$ ,  $100.71 \pm 6.68$ ,  $p = 0.038$ , mean difference = 3.26%), PT and SCBA gear ( $103.98 \pm 7.53$ ,  $96.39 \pm 8.31$ ,  $p = 0.001$ , mean difference = 7.59%), and PPE and SCBA gear ( $100.71 \pm 6.68$ ,  $96.39 \pm 8.31$ ,  $p = 0.021$ , mean difference = 4.32%). There were also significant differences found in the left side lower body composite scores between PT and SCBA gear ( $105.42 \pm 8.47$ ,  $97.50 \pm 9.33$ ,  $p = 0.004$ , mean difference = 7.92%) and PPE

and SCBA gear ( $102.15 \pm 7.64$ ,  $97.50 \pm 9.33$ ,  $p = 0.034$ , mean difference = 4.65%). No significant difference was found between left leg PT and PPE composite scores ( $105.42 \pm 8.47$ ,  $102.15 \pm 7.64$ ,  $p = 0.054$ , mean difference = 3.27%). **CONCLUSION:** In a previous study by Games et al (2019), a decrease in composite scores of 5.52% on the right and 5.06% on the left was found. This study found decreases of 7.59% on the right and 7.92% on the left. Results suggest that the weight added by the PPE and PPE + SCBA negatively impacted reach scores. Average body mass with PT gear (PTWt.) was  $89.25 \pm 3.35$  kg, PTWt. + PPE =  $100.32 \pm 3.35$  kg; and PTWt. + SCBA =  $113.11 \pm 3.35$  kg. Further research is needed to identify any changes in injury risk while training in full gear.

### P232: IMPACT OF PROTECTIVE GEAR ON DYNAMIC BALANCE AND MOBILITY IN FIREFIGHTERS USING THE Y-BALANCE SCALE

James R. Bernedo, Matthew Dohmeier, Eva Janofsky, Mike Iosia. Lee University, Cleveland, TN.

**OBJECTIVE:** The purpose of this study was to measure the impact of personal protective ensembles (PPE) and self-contained breathing apparatus (SCBA) on firefighters' upper body dynamic balance and motor control using the Y-Balance Test (YBT). **METHODS:** Dynamic balance was measured using the upper-body Y-balance test. Fourteen firefighters (13 M, 1 F) were recruited for the study from the local municipal fire department. Upper body composite reach scores were measured on both sides on three separate occasions, wearing workout gear (PT), PPE, and PPE and SCBA. SPSS was used to identify statistical differences using paired sample t-tests. **RESULTS:** There was a statistically significant decrease ( $p < 0.001$ ) on both right and left upper body composite scores respectively, between PT and SCBA ( $94.58 \pm 9.30$ ,  $82.42 \pm 10.01$ ,  $p = 0.001$ , mean difference = 12.16%), as well as PPE and SCBA ( $92.91 \pm 9.13$ ,  $82.42 \pm 10.01$ ,  $p = 0.001$ , mean difference = 10.49%). On the left PT and SCBA ( $95.96 \pm 8.81$ ,  $84.68 \pm 9.37$ ,  $p = 0.001$ , mean difference = 11.28%), as well as between PPE and SCBA ( $94.54 \pm 9.92$ ,  $84.68 \pm 9.37$ ,  $p = 0.001$ , mean difference = 9.86%). There were no statistical differences on either side between PT and PPE. **CONCLUSION:** Data from the study indicates that the SCBA had the greatest impact on upper body Y-Balance scores. The average decrease in statistically significant data on right side was 12.16% (PT vs SCBA) and 10.49% (PPE vs PPE + SCBA) and on the left 11.28% (PT vs SCBA) and 9.86% (PPE vs PPE + SCBA). Decreases in dynamic balance in the upper body can be attributed to the increase in weight from PT ( $93.3$  kg  $\pm$  21.647), PPE ( $100.76$  kg  $\pm$  14.152), to PPE+SCBA ( $112.854$  kg  $\pm$  12.4799) due to the self-contained breathing apparatus (SCBA) that firefighters wear. Firefighter command structures may wish to take into consideration the impact of upper body reach balance and stability when training with the SCBA. Further research is needed to identify cut points in composite scores which may be associated with increased risk of injury.

### P233: ACTIGRAPH AND STEPWATCH STEP COUNT COMPARISONS FOLLOWING GYM-BASED AEROBIC EXERCISES

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**BACKGROUND:** The purpose of this research was to investigate step count accumulation in research-grade activity monitors during gym-based aerobic exercise activities at moderate and vigorous intensities. **METHODS:** This was part of a larger parent study including consumer-grade activity monitors and heart rate (HR) accuracy. In this sub-study 22 participants ( $29 \pm 3.8$  yr) wore a Polar T-31 strap across the chest, StepWatch 4 activity monitor (SW) on the right ankle, and an ActiGraph GT9X (AG) on the wrist, randomly assigned left or right. Participants completed aerobic exercise on six exercise machines for 3-min at moderate and vigorous intensities. Exercise included step-like activities (SL-A; i.e., elliptical, stair climber, arc trainer) and non-step-like activities (NSL-A; i.e., row machine, Airdryer bike, and stationary bike). During SL-A, video recordings of the lower body were captured, and steps were subsequently hand counted (HC). From the AG, steps were recorded from the screen before and after each 3-min exercise bout to determine steps per bout (AG<sub>MVM</sub>). Additionally, AG data were downloaded with (AG<sub>LFE</sub>) and without (AG<sub>N</sub>) the low frequency extension (LFE), and then were summed across the 3-min bouts. Steps were downloaded from the SW (initialized with default settings) and summed across each 3-min bout. For SL-A, steps were converted to percent of HC steps and for NSL-A, steps accumulated during 3-min bouts were divided by 3 to produce a steps/min value. One-sample t-tests were used to compare SL-A to 100% of HC steps and NSL-A to 0 steps (because zero step-like motions were completed during these exercises). **RESULTS:** For SL-A, the SW captured 95.1 to 99.0% of HC steps, while the AG<sub>MVM</sub>, AG<sub>LFE</sub>, and AG<sub>N</sub> captured 0.1 to 68.5%, 55.7 to 71.9%, and 14.3 to 53.6% of HC steps, respectively. T-test showed all

step counting methods to be significantly different from 100% of HC except for SW during elliptical ( $P=.74$ ) and step climber ( $P=.36$ ) activities. For NSL-A, the SW captured 1.1 to 131.5 steps/min, while the  $AG_{MAYM}$ ,  $AG_{LFE}$ , and  $AG_N$  captured 1.2 to 54.7, 48.2 to 56.0, and 6.9 to 40.8 steps/min, respectively. T-test results showed all step counting methods for all activities significantly over-estimated steps ( $P<.05$ ), when compared to 0 steps/min taken. **CONCLUSIONS:** Many aerobic exercise machines, even those that mimic stepping, show large step count error and thus should be interpreted with caution.

**P234: TIME SPENT IN SEDENTARY AND PHYSICAL ACTIVITY IN COLLEGE-AGED WOMEN BASED ON BODY COMPOSITION**

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**BACKGROUND:** Physical activity is an important contributor to overall health; however, as most young adults transition into college, physical activity decreases and sedentary time increases. Body composition also may change during this time. While these factors have been studied in students at large, public 4-year institutions, less is known about the health habits of students at smaller, commuter-based campuses. The purpose of this study was to examine if differences existed in time spent in physical activity categories (sedentary; light; moderate to vigorous, MVPA) between women with a healthy body fat (HBF) percentage and those considered overfat (OBF). **METHODS:** 49 traditional-aged (18-25 y), full-time female students at a rural, commuter-based, predominantly two-year university were recruited. Height (cm), weight (kg), and body fat percentage (%fat, dual energy x-ray absorptiometry) were measured. Participants were requested to wear an accelerometer during all waking hours for 7 consecutive days. Groups were determined using ACSM recommendations for women: a healthy body fat group (HBF;  $\leq 32.0$  %fat,  $n = 21$ ) and an overfat group (OBF,  $>32.0$  %fat,  $n = 28$ ). A one-way MANOVA was used to determine differences in time spent in physical activity (sedentary, light, MVPA) based on %fat. **RESULTS:** No significant differences were found for time spent at any intensity level between groups, Wilks' lambda = .951,  $F(3, 45) = .773$ ,  $p = .5151$ , partial eta squared = .049, (Sedentary time, HBF = 4024.9 vs. OBF = 3848.2 min; Light, HBF = 1380.1 vs. OBF = 1086.2 min; MVPA, HBF = 193.2 vs. OBF = 227.9 min). **DISCUSSION:** Despite previously reported associations between obesity and physical activity, there were no differences in any physical activity category between the groups. The small sample may have impacted the lack of statistical significance as there seemed to be some practical differences between groups. In particular, the HBF group spent 300 minutes more per week in light physical activity. Perhaps this indicates time spent in non-exercise activity thermogenesis through light activity is a critical factor in our sample. In addition to a larger sample size, other measures of health or health behaviors such as nutrition, sleep, and cardiovascular fitness may have further strengthened our understanding of these groups. Funded by the Research and Productive Scholarship Grant

**P235: PERCEPTIONS OF PHYSICAL ACTIVITY CO-PARTICIPATION IN MOTHERS WITH YOUNG CHILDREN**

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**PURPOSE:** The purpose of this study was to understand mother's perceptions about co-participation of physical activity (Co-PA) with their young child. A secondary purpose was to explore similarities and differences of these perceptions among White and Black, Indigenous, and people of color (BIPOC) mothers. **METHODS:** Thirty mothers (White  $n=14$  and BIPOC  $n=16$ ) with children 2-5 years of age completed a semi-structured interview focusing on their current physical activity interactions, beliefs, motivators, barriers, and desired experiences with their child. Transcribed interviews were coded and then the codes were categorized into themes and subthemes. **RESULTS:** Half of the mothers met physical activity recommendations, 60% had a college or graduate degree, and 63% had 1 or 2 children. All mothers mentioned the importance of Co-PA, especially given the amount of technology present in today's society. Co-PA allowed bonding time, educational moments, and healthier lifestyles. Common facilitators included social interactions, planning time to be active together, and weather. An important theme discussed by the mothers were the social benefits of Co-PA, including: the importance of being active with other family members, improved connection and cooperation between mother and child, and engaging in Co-PA outside would encourage neighbors to be active. Common Co-PA barriers were time, needing to modify PA based on the young child's age and mood, and lack of resources. There were more similarities than differences in Co-PA perceptions between racial groups. Some of the differences noted included White mothers expressing more concern about the increase in sedentary behaviors, whereas BIPOC mothers highlighted

the importance of modeling physical activity and using physical activity to improve health and expend energy for their child. Regarding barriers, White mothers described screen time as an important barrier whereas BIPOC mothers mentioned inadequate resources/space for Co-PA. Lastly, regarding social aspects, White mothers noted Co-PA resulted in more educational moments, but BIPOC mothers highlighted the importance of Co-PA as a way to motivate neighbors to be active. **CONCLUSION:** All mothers valued the importance of being active with their young child but emphasized some different barriers and benefits by race. This information can be used to develop family-based interventions to improve Co-PA.

**P236: THE EFFECTS OF ACUTE YOHIMBINE HYDROCHLORIDE INGESTION ON DIURNAL CHANGES IN EXERCISE PERFORMANCE**

Megan Barnes, Camryn Cowan, Rebecca Rogers, Christopher Ballmann, FACSM. *Samford University, Birmingham, AL.*

Diurnal fluctuations in exercise ability may confound training and competition performance during morning hours. Yohimbine hydrochloride (YHM) is an alpha-2-adrenergic receptor antagonist which induces sympathetic stimulation via catecholamine release. While YHM ingestion has been shown to acutely improve exercise performance when time of day is standardized, it is unknown if YHM counteracts performance decrements associated with early morning times. Thus, the purpose of this study was to investigate if acute YHM ingestion influences rowing performance at varying times of day. Physically active females participated in three counterbalanced rowing time trials: 1) Morning-Placebo (AM-PL), 2) Morning-Yohimbine (AM-YHM), and 3) Afternoon-Control (PM). For each AM trial, participants consumed their respective treatment 20 minutes before exercise while no treatment was given for PM. Participants then completed a 2000m rowing time trial while power output, time to completion (TTC), and HR were recorded each minute. Blood [La-] was measured pre- and post-exercise. Findings showed that YHM ingestion resulted in greater power output ( $p = 0.045$ ) and faster TTC ( $p = 0.044$ ) compared to PL during AM trials. HR was not significantly different between any trials ( $p < 0.05$ ). Blood [La-] was significantly lower post-exercise with YHM ingestion versus PL ( $p = 0.012$ ) during AM trials. No other differences for HR, power output, TTC, or [La-] existed between trials ( $p > 0.05$ ). These findings suggest that acute YHM ingestion may counteract performance decrements during AM times which could possibly improve training or competition outcomes during early times of day.

**P237: THE EFFECTS OF OXYGEN NANOBUBBLE CONSUMPTION ON REPEATED WINGATE SPRINT PERFORMANCE**

Camryn Cowan, Megan Barnes, Rebecca Rogers, Christopher Ballmann, FACSM. *Samford University, Birmingham, AL.*

Oxygen nanobubbles (ONB) have been implicated in enhancement of oxygen delivery to a variety of tissues. Recently, ONBs have become commercially available and are marketed for recreational use prior to exercise in efforts to improve performance. Since phosphocreatine resynthesis is largely limited by oxidative ATP production, ONBs may serve as a means to improve oxygen delivery and recovery during anaerobic exercise. The purpose of this study was to elucidate the effects of ONB ingestion on repeated sprint performance. Physically active females participated in two counterbalanced repeated sprint trials each with a different condition: 1) Placebo, 2) ONB solution. For each trial, participants consumed their respective treatment 10 minutes before exercise. Following a warm-up, participants completed  $3 \times 15$  second Wingate anaerobic tests (WAnT) separated by 2 minutes of active recovery. Blood [La-] was measured pre- and post-exercise. HR and RPE were measured following each WAnT. Findings showed no differences between treatments for anaerobic capacity ( $p = 0.395$ ), fatigue index ( $p = 0.785$ ), HR (0.331), or RPE ( $p = 0.171$ ). While blood [La-] increased from pre- to post-exercise ( $p < 0.001$ ), no differences between conditions existed ( $p = 0.270$ ). These findings suggest ONBs may not be a viable ergogenic aid for anaerobic exercise.

**P238: EXERCISE PRESCRIPTION INTERVENTION ON A 21-YEAR-OLD FEMALE WITH DIAGNOSED MIGRAINES WITH AURA**

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**BACKGROUND:** According to the American Migraine Foundation, at least 39 million Americans suffer from migraines. Exercise science practitioners often work with clients who experience migraines, but little evidence exists to guide specific exercise prescription. The goal of this case report is to describe positive outcomes following a comprehensive exercise program designed by an Exercise Science student for a 21-year-old female who suffers from chronic migraines

with aura. The subject's goal was to increase her overall quality of life by minimizing migraine episodes. **METHODS:** A focused subjective history was taken, and subsequent screening included the PAR-Q, review of systems, health-history, and a quality-of-life assessment. Fitness assessments included cervical strength and motor control, static posture, 1.5-mile run, modified pushup testing, proprioception, and others. Exercise prescription consisted of aerobic exercise, resistance training, flexibility protocols, and postural education. After two weeks, adherence declined, and the program frequency was regressed. Keeping a journal to track her migraine frequency, duration, and symptoms, as well as her self-efficacy rating was added. **RESULTS:** Findings included a 50% decrease in migraine frequency, increased confidence, and a 10% increase quality of life. Telehealth assessments show that static posture improved. The subject attributes the reduction in migraine frequency to the exercise prescription. Remaining measures were undeterminable. **CONCLUSIONS:** The aim of this case report was to describe outcomes following an exercise prescription for a young, female with an 8-year history of migraines. Quality of life, self-efficacy and posture improved, while migraine frequency decreased. A crucial component of exercise professionals' occupational responsibility is to continually increase their knowledge about medical conditions with which clients present. With migraines, clients are often frustrated with inadequate relief through typical medical interventions. As the exercise profession continues to research valuable programs to increase the quality of life of clients with migraines, the scope of practice will expand to benefit practitioners and, more important, society.

**P239: COMPARISON OF HYDRATION STATUS DETERMINED BY USG AND SERUM OSMOLALITY IN DIVISION I SOCCER PLAYERS**  
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**Background:** Urine specific gravity (USG) is a commonly applied biomarker for rapid determination of hydration status. While USG benefits largely from convenience, it may not be as reflective of true hydration status when compared to serum osmolality ( $S_{osm}$ ), the gold standard of hydration detection. Subsequently, decisions made regarding a team sport athlete's readiness to play based on USG may warrant a certain degree of caution. Therefore, the purpose of this study was to assess the concordance between hydration status measured by USG and  $S_{osm}$  in male and female Division I soccer players. **Methods:** Sixty-four National Collegiate Athletic Association Division I soccer players ( $n = 31$  women,  $n = 33$  men;  $M_{weight} \pm SE = 70.06 \pm 0.90$  kg;  $M_{\%BF} = 15.05 \pm 0.94$  %;  $MVO_{2max} = 51.97 \pm 0.76$  mL/kg/min) participated in testing Blood draws and urine collection occurred in the morning and in a fasted state at six time points for the women and three time points for the men throughout the season. Data from all timepoints were compiled to determine mean  $\pm$  SE for  $S_{osm}$  and USG. Pearson-product moment correlations were used to assess relationships between USG and  $S_{osm}$ . An alpha level of 0.05 was used to determine statistical significance. **Results:** Mean  $S_{osm} \pm SE$  was  $286.57 \pm 0.39$  mOsm/kg, while mean USG was  $1.02 \pm 0.00$  for the women throughout the season. For the men, mean  $S_{osm}$  was  $289.38 \pm 0.61$  mOsm/kg, while mean USG was  $1.02 \pm 0.00$ . In both women ( $r = -0.06$ ,  $p = 0.42$ ) and men ( $r = 0.02$ ,  $p = 0.86$ ), no statistically significant correlations were observed between USG and  $S_{osm}$ . **Conclusions:** These findings suggest a lack of agreement between USG and  $S_{osm}$  when assessed over the course of a collegiate soccer season. While USG is capable of quickly providing a field-based estimate of hydration status, coaches and athletes should be mindful of potential differences when compared to  $S_{osm}$ . In light of the fact that athletes routinely deal with significant variations in hydration status, the lack of correlation between USG and  $S_{osm}$  suggest an athlete may be mistakenly categorized as hydrated or dehydrated prior to sport practice or competition.

**P240: EFFECTS OF AN ARM SWING ON COUNTERMOVEMENT JUMP PERFORMANCE IN RECREATIONALLY TRAINED ADULTS**  
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**BACKGROUND:** The countermovement jump (CMJ) is a common assessment of vertical jump capabilities and overall athletic performance. In research studies and in clinical settings, the CMJ is commonly performed without the use of an arm swing (hands placed on hips) to control for the effects of upper-body movement on vertical jump performance. However, in field-based settings, such as during an exercise routine, an arm swing is commonly employed during the CMJ, which may augment overall performance. While jumping with no arm swing may allow for more precise, controlled assessments of lower-body performance, integrating the use of arm swing may yield more sport-specific results. The purpose of this study was to compare the effects of arm swing (AS) and no arm swing (NAS) on CMJ performance. **METHODS:** Ten recreationally trained males and females

(age=23±2 yrs, height=171±7 cm, body mass=72±12 kg) participated. Participants completed six total CMJs, three with AS and three with NAS, in random order. Ground reaction forces were collected during all CMJ attempts to quantify unweighting, braking, propulsive, and performance metrics. Dependent samples t-tests were used to examine differences for all unweighting, braking, propulsive, and performance metrics. **RESULTS:** The NAS condition resulted in greater braking phase metrics, such that force at the low position of the countermovement and braking eccentric force were greater than the AS ( $p \leq 0.020$ ). The AS condition resulted in greater propulsive and performance metrics, such that peak propulsive power and jump height were greater than the NAS ( $p \leq 0.024$ ). **CONCLUSIONS:** The present study demonstrates that braking phase metrics may be superior when no arm swing is employed during the CMJ, however, it does appear that propulsive power production and vertical jump performance are positively affected by using an arm swing during the jump even with lower braking phase metrics. Although prohibiting an arm swing during the CMJ may allow greater isolation of lower-body performance, which can be beneficial in research and/or clinical settings when experimental control is a priority, it may be suggested that permitting the use of an arm swing could potentially allow a more holistic examination of overall athletic performance and sport-specific capabilities during jumping movements, which may prove beneficial in sports performance settings.

**P241: WEARING A PERFORMANCE MOUTHPIECE DOES NOT EFFECT PEAK FORCE AND POWER OUTPUT DURING VERTICAL JUMP**

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**BACKGROUND:** Performance mouthpieces (MP) are purported to optimize temporomandibular joint position and facilitate stronger jaw clenching in order to enhance athletic performance. Due to the varying nature and design of these products, research examining each specific MP is needed to determine individual product efficacy. The purpose of this investigation was to determine the efficacy of the AIRWAAV™ performance mouthpiece on peak muscular force and power output during maximum countermovement vertical jump (CMVJ) assessment. **METHODS:** Participants included nine male and fifteen female ( $n=24$ ) college athletes. During the initial laboratory visit, athletes provided written informed consent, participated in MP fitting conducted according to the manufacturer's instructions, and were familiarized with data collection procedures. A one-week MP familiarization period occurred, in which athletes wore the MP for all training and conditioning activities. Maximal CMVJ assessments were performed on an AMTI AccuPower portable force platform under four experimental conditions: jaw clenched with MP, jaw relaxed with MP, jaw clenched without MP, and jaw relaxed without MP. Athletes executed three maximum CMVJ trials with hands on hips for each experimental condition. A 30-second rest period separated each jump trial and a 5-minute rest period was provided between each experimental condition. Peak vertical force during the propulsive phase of the CMVJ was identified and muscular power output was calculated from the recorded force\*time data. Variables from all jump trials for each condition were averaged for analysis. A repeated measures ANOVA was utilized to determine dependent variable differences among experimental conditions. **RESULTS:** Results indicated that there was no differences in peak force or power output between any experimental conditions ( $p > 0.05$ ). However, there was considerable variability in individual response to experimental conditions. **CONCLUSIONS:** Wearing the AIRWAAV™ MP to enhance force and power cannot be globally recommended. However, some athletes demonstrated enhanced muscular force and power output in the MP and jaw clench conditions, while others experienced little or no change. Therefore, the efficacy of utilizing the AIRWAAV™ MP should be determined on an individual basis. Additionally, it is possible that MP use could positively affect performance variables during other assessment activities.

**P242: THE EFFECTS OF MUSIC PREFERENCE ON VERTICAL JUMP AND MAXIMAL ISOMETRIC PERFORMANCE**

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Music preference has been repeatedly shown to modulate the ergogenic potential of listening to music during endurance, sprint, and resistance exercise. However, little is known as to whether music preference enhances the ability to perform shorter ballistic movements. The purpose of this study was to investigate if listening to preferred music during a countermovement jump (CMJ) and maximal isometric exercise enhances performance and motivation. Physically active females participated in two counterbalanced explosive exercise trials each with a different condition: 1) No music, 2) Preferred music.

Participants completed three maximal isometric mid-thigh pull (IMTP) and CMJ attempts. Performance variables were measured via force plates. All three attempts were averaged for analysis. Following the commencement of the exercise, participants were asked to rate how motivated they felt during the exercise portion using a visual analog scale. For IMTP, there were no significant differences between conditions for net force ( $p = 0.38$ ) or rate of force development ( $p = 0.178$ ). Furthermore, no differences in jump height ( $p = 0.651$ ) or peak velocity ( $p = 0.134$ ) were observed. These findings do not support ergogenic effects of preferred music during short explosive exercise. This may be due to the timing and short duration of activity and future studies are needed to determine the optimal time for music to be played to enhance explosive performance.

**P243: EFFECTS OF FREQUENT EXERCISE ON PERCEIVED WORK-RELATED PRODUCTIVITY IN INDIVIDUALS WORKING FROM HOME**

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**Background:** Recent advances in technology and the unprecedented conditions introduced by the COVID-19 pandemic have left many employees working remotely from home. Changes in environment and social or professional interaction often introduces new stressors for an employee to overcome, which may lead to reductions in work-related productivity. Many studies indicate that exercise can increase performance, productivity at work, and cognitive function, but to our knowledge, there are no studies focusing on the effects of exercise on productivity in individuals working from home. **Purpose:** The purpose of this study was to determine if frequent exercise bouts throughout the day could improve work-related productivity in individuals working from home. **Methods:** All participants ( $n=10$ ) received a verbal explanation via Zoom of the research study including procedures, risks, and benefits of participation. For the first full work week, all participants tracked their independent exercise minutes in a provided Excel spreadsheet and completed a self-assessed productivity questionnaire for each workday (Monday-Friday) through Microsoft Forms. For the second week, participants were asked to maintain their normal exercise routine while implementing the exercise program provided. The program consisted of 6 5-minute bouts of exercise spaced throughout the workday. Participants continued to complete the self-assessed productivity questionnaire for each workday. The completed exercise spreadsheet was collected from each participant following the two-week study. **Results:** The change in exercise minutes from the first week ( $M = 197.50$ ,  $SD = 72.78$ ) to the second week ( $M = 304.50$ ,  $SD = 68.46$ ) was found to be statistically significant ( $t(9) = -3.978$ ,  $p = .003$ ). A paired samples t-test conducted between productivity at baseline ( $M = 0.53$ ,  $SD = 0.17$ ) and during the intervention ( $M = 0.63$ ,  $SD = 0.14$ ) approached significance ( $t(9) = -2.085$ ,  $p = .067$ ,  $d = 0.62$ ). **Conclusion:** Frequent bouts of exercise throughout the day may have an impact on work-related productivity. Incorporating five-minute bouts of exercise throughout the day has a significant effect on total exercise minutes and is beneficial for increasing physical activity for those working from home. More research is needed on the effects of exercise on work-related productivity levels. Future studies should be completed using larger samples sizes to increase power. Increasing study duration would allow researchers to determine the long-term effects exercise bouts have on work-related productivity when working from home.

**P244: PHYSIOLOGICAL, PERCEPTUAL, AND NEUROMUSCULAR RESPONSES TO VO<sub>2</sub>-CLAMP CYCLE ERGOMETRY EXERCISE**

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**BACKGROUND:** Recommendations for endurance exercise prescription are based on percentages of an individual's heart rate (HR) or volume of oxygen consumption (VO<sub>2</sub>) maximum or reserve. These intensities are then extrapolated to a power output (P) or velocity. Previous work has demonstrated a dissociation of the physiological, perceptual, and neuromuscular responses to exercise anchored to the critical heart rate (CHR) compared to the P associated with CHR (PCHR). However, it is unclear if a similar dissociation, due to reductions in P to maintain the designated intensity, would be present during exercise anchored to the VO<sub>2</sub> associated with CHR (VO<sub>2</sub>CHR). The purpose of this study was to examine the patterns in physiological (VO<sub>2</sub>, HR, P, respiration rate [RR], muscle oxygen saturation [%SmO<sub>2</sub>]), neuromuscular (electromyographic and mechanomyographic amplitude [EMG AMP, MMG AMP] and mean power frequency [EMG MPF, MMG MPF]), and perceptual (rating of perceived exertion [RPE]) responses during exercise at VO<sub>2</sub>CHR (VO<sub>2</sub>-clamp). **METHODS:** On separate days, ten participants

(Age=25±4yrs; Height=173.1±11.9cm; Mass=74.7±8.5kg) performed a graded exercise test, 4 constant P trials at 85-100% of peak P (PP) to derive CHR and VO<sub>2</sub>CHR from the total heartbeats vs. time to exhaustion (T<sub>lim</sub>) and the VO<sub>2</sub> vs. HR relationships, respectively. Responses were recorded during a trial to exhaustion at VO<sub>2</sub>CHR (32.86±7.12mL·kg<sup>-1</sup>·min<sup>-1</sup>; T<sub>lim</sub>=31.31±21.37min) and normalized in 10% intervals of T<sub>lim</sub> to their respective values at PP. **RESULTS:** The one-way repeated-measures ANOVA with follow-up Student Newman-Keuls tests indicated there were differences ( $p < 0.001$ ) among timepoints for HR (mean±SD %change=8±3%), RR (43±38%), P (-15±5%), EMG MPF (10±8%), and RPE (65±38%), but no differences ( $p = 0.077-0.955$ ) for %SmO<sub>2</sub> (-17±53%), EMG AMP (-3±16%), MMG AMP (40±61%), and MMG MPF (1±7%). **CONCLUSIONS:** The loss in performance observed during VO<sub>2</sub>-clamp exercise may provide a quantification of the inefficiency associated with the VO<sub>2</sub> slow component phenomenon. The EMG, MMG, and %SmO<sub>2</sub> responses suggested continued muscle activation levels despite the reductions in P, but the HR, RR, and RPE responses suggested a combination of feedforward and feedback mechanisms regulating T<sub>lim</sub>. VO<sub>2</sub>-clamp exercise may present a novel methodology to examine mechanisms of fatigue and future studies should examine responses to VO<sub>2</sub>-clamp exercise at a uniform threshold.

**P245: INDIVIDUAL AND COMPOSITE ELECTROMYOGRAPHIC RESPONSES DURING FATIGUING FOREARM FLEXION EXERCISE**

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**BACKGROUND:** Discrepancies between the individual and the composite (mean) responses in electromyographic (EMG) amplitude (AMP) and mean power frequency (MPF) have been reported for lower-body dynamic constant external resistance (DCER) exercise. This study compared the composite and individual patterns of responses for EMG AMP and MPF during fatiguing DCER forearm flexion performed at 30% of the 1-repetition maximum (1RM). **METHODS:** 8 recreationally active women (age=23.25±3.58yrs; weight=67.48±13.44kg; height=166±7.15cm) performed a DCER 1RM bilateral forearm flexion test and repetitions to failure (RTF) at 30% 1RM. EMG signals were recorded for the biceps brachii of the right arm. Separate, polynomial regression analyses (linear and quadratic) were used to define the individual and composite normalized EMG AMP and MPF versus repetitions relationship during the RTF ( $\alpha=0.05$ ). **RESULTS:** The mean ± standard deviation for the number of repetitions completed during the RTF trials at 30% 1RM was 112±87 repetitions. There was a positive, linear relationship ( $r^2=0.976$ ;  $p < 0.001$ ) between normalized EMG AMP and repetitions for the composite. For the individual EMG AMP responses, it was revealed that 6 subjects demonstrated a positive, linear relationship ( $r^2=0.236-0.958$ ;  $p < 0.001-0.023$ ), and 2 subjects demonstrated a positive, quadratic relationship ( $R^2=0.911-0.929$ ;  $p < 0.001-0.002$ ). There was a negative, linear relationship ( $r^2=0.942$ ;  $p < 0.001$ ) between normalized EMG MPF and repetitions for the composite. For the individual EMG MPF responses, it was revealed that 4 subjects demonstrated a negative linear relationship ( $r^2=0.503-0.942$ ;  $p < 0.001-0.015$ ), 3 subjects demonstrated a negative, quadratic relationship ( $R^2=0.236-0.948$ ;  $p < 0.001-0.020$ ), and 1 subject did not demonstrate a significant linear or quadratic relationship ( $p > 0.05$ ) for EMG MPF. **CONCLUSIONS:** Under fatiguing conditions, increases in EMG AMP may reflect indices of motor unit recruitment, rate coding, and/or synchronization, while decreases in EMG MPF may reflect decreased action potential conduction velocities along the sarcolemma. Most participants demonstrated a similar direction (88-100%), but fewer demonstrated a similar pattern (50-75%) of response for EMG AMP and MPF. These findings suggested that inferences made regarding the patterns of neuromuscular responses to fatiguing DCER muscle actions should be considered on a subject-by-subject basis.

**P246: THE CORRELATION BETWEEN THE TIMED UP-AND-GO TEST AND CARDIOVASCULAR HEALTH**

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**BACKGROUND:** During the aging process fitness and functional independence are reported to be associated with cardiovascular health. Therefore, the purpose of this study was to determine if participating in a fitness class and functional independence as measured by the timed-up-and-go(TUG) test are associated with cardiometabolic risk factors in older adults. **METHODS:** A correlational research design was used as 100 adults ≥ 55 years of age, who were participating in senior fitness classes, had blood profiles and functional independence assessments completed via PTS Diagnostics PTS760 CardioChek Plus Analyzer (Kernersville, NC, and the TUG test). The participants were 70.1 ± 5.7 years of age, completed informed consent prior to testing

and were assessed during morning sessions. The blood profile included total cholesterol, HDL-cholesterol, triglycerides, blood glucose, and glycosylated hemoglobin (HbA1c). The participants started the TUG test from a sitting position. On the signal "go" participants stood and walked quickly but comfortably, and without running, to and around a cone three meters away, back to the chair and sit. RESULTS: The participants cholesterol was 166 mg/dL, HDL-C was 51.3 mg/dL, triglyceride mg/dL was 137.1, blood glucose was 110.2 mg/dL, HbA1c was 6.2% and TUG time was 6.9 seconds. The cardiometabolic risk factors were generally not in the range to suggest a risk of developing cardiovascular disease. However, HbA1c and blood glucose levels suggest the group was prediabetic. When relationships were determined between TUG and the cardiometabolic risk factors, TUG was only related to HbA1c ( $p < 0.05$ ;  $r = 0.22$ ). Although further research is needed to validate findings in this study. While fitness classes and functional independence enhances the quality of life in older adults by enhancing ambulatory skills, it does not appear to enhance cardiometabolic health in older adults.

#### **P247: SEDENTARY BEHAVIOR IN ADULTS WITH AND WITHOUT DOWN SYNDROME**

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**BACKGROUND:** Low physical activity levels and high sedentary behavior have been observed among adults with Down syndrome (DS). Further investigation of sedentary behavior can provide insight into the behavior patterns of adults with DS. The purpose of this study was to compare sedentary behavior levels and patterns between people with and without DS matched for age, race, and sex. **METHODS:** Fifteen adults with DS (age  $41 \pm 12$  yrs.; 7 men) and 15 adults without DS (non-DS; age  $37 \pm 11$  yrs.; 7 men) wore a triaxial accelerometer (wGT3X-BT, Actigraph) on the non-dominant hip to measure sedentary behavior levels. Specific sedentary vector magnitude cut points were used for adults with DS ( $< 236$  counts/min) and non-DS ( $< 200$  counts/min). Sedentary bout analysis was performed based on  $\geq 1$  min,  $\geq 10$  min,  $\geq 30$  min, and  $\geq 60$  min bout lengths. Independent samples t-tests were performed to determine differences between groups for sedentary behavior variables. **RESULTS:** There were no differences between groups for wear days (DS:  $6 \pm 1$  days, non-DS:  $7 \pm 1$  days,  $p = .231$ ) or wear time (DS:  $5354 \pm 1329$  min, non-DS:  $5577 \pm 819$  min,  $p = .292$ ). Adults with DS had significantly fewer sedentary bouts lasting 10 min (DS:  $66 \pm 32$  bouts, non-DS:  $89 \pm 26$  bouts,  $p = .023$ ), and 30 min (DS:  $11 \pm 7$  bouts, non-DS:  $19 \pm 13$  bouts,  $p = .019$ ), but there was no difference between groups for bouts lasting 1 min (DS:  $562 \pm 137$  bouts, non-DS:  $499 \pm 152$  bouts,  $p = .121$ ) and 60 min (DS:  $2 \pm 2$  bouts, non-DS:  $5 \pm 6$  bouts,  $p = .056$ ). Adults with DS had significantly less average sedentary bout length for bouts lasting 1 min (DS:  $5 \pm 1$  min, non-DS:  $8 \pm 5$  min,  $p = .023$ ) and 60 min (DS:  $40 \pm 40$  min, non-DS:  $65 \pm 36$  min,  $p = .043$ ), but bouts lasting 10 min (DS:  $21 \pm 3$  min, non-DS:  $23 \pm 7$  min,  $p = .073$ ) and 30 min (DS:  $47 \pm 7$  min, non-DS:  $48 \pm 9$  min,  $p = .301$ ) did not differ. Even when the number of bouts between groups were not different ( $\geq 1$  min and  $\geq 60$  min), adults with DS spent less average time in the bout duration. Also, adults with DS had similar average bout duration while performing fewer overall bouts ( $\geq 10$  min and  $\geq 30$  min). **CONCLUSION:** Adults with DS performed shorter and fewer bouts of sedentary behavior than adults without DS. Therefore, adults with DS may break up sedentary bouts at a higher rate than non-DS. **Funding:** Mississippi State University Office of Research and Economic Development and I'm An Athlete Foundation

#### **P248: A PILOT STUDY COMPARING THE TRADITIONAL BAR GRIP AND THE PELVIC BELT METHODS TO MEASURE MID-THIGH ISOMETRIC PULL PERFORMANCE IN COLLEGIATE MALE ATHLETES**

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**BACKGROUND:** The isometric mid-thigh pull test (IMTP) is an effective and reliable method to measure maximal strength in various populations. Using portable force plates, one study compared a bar grip method and a pelvic belt method of the IMTP test and demonstrated a good test-retest reliability. This study, however, only provided limited performance information. Therefore, the purpose of this study was to compare the bar grip (Bar) method and the pelvic belt (Pel) method and provide more in-depth force generation performance data. **METHODS:** Ten male collegiate athletes (mean  $\pm$  SD): age ( $19.9 \pm 1.2$  yrs); body weight ( $72.90 \pm 8.24$  kg); height ( $1.77 \pm 0.06$  m); BMI ( $23.14 \pm 2.05$  kg-m<sup>-2</sup>) volunteered to participate in the study. IMTP testing data included peak force, relative peak force, peak force relative to body weight and force at various times in

milliseconds. **RESULTS:** Significant and large effect size differences were observed between the groups for peak force (Bar:  $1966.50 \pm 292.36$ ; Pel:  $2658.30 \pm 630.58$  N,  $p < 0.01$ ,  $d = -1.34$ ), relative peak force (Bar:  $27.33 \pm 5.48$ ; Pel:  $36.94 \pm 9.73$  N-kg<sup>-1</sup>,  $p < 0.01$ ,  $d = -1.33$ ) and peak force relative to body weight (Bar:  $221.60 \pm 52.37$ ; Pel:  $291.80 \pm 81.78$  %,  $p < 0.01$ ,  $d = -1.03$ ) Peak force at 50, 100, 150, 200 and 250 milliseconds were not significantly different ( $p > 0.05$ ) and displayed moderate, small, trivial, small and moderate effect size ( $d$ ), respectively and between the groups. **CONCLUSIONS:** The results of the study suggest that utilizing the Pel method to perform the IMTP test yields higher absolute and relative peak force values. Further, these changes seem to be associated with the extent of the relative involvement of the lower and the upper extremities in each of the methods.

#### **P249: A PRELIMINARY ANALYSIS OF RESPONSES TO EXERCISE ANCHORED TO VIGOROUS INTENSITY HEART RATES**

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**BACKGROUND:** Exercise prescription to improve cardiorespiratory endurance (CE) is often based on percentages of the reserve or maximum heart rate (HR<sub>max</sub>). However, no studies have examined the responses to constant HR exercise at the current vigorous intensity recommendations. This study examined the responses to constant HR exercise at the upper (95%HR<sub>max</sub>) and lower (77%HR<sub>max</sub>) vigorous intensity range and quantified the time spent in the severe (>respiratory compensation point [RCP]), heavy (<RCP, >ventilatory threshold [VT]), and moderate (<VT) intensity domains. **METHODS:** Six subjects (mean  $\pm$  SD age =  $26.4 \pm 4.8$  yrs, height =  $170.9 \pm 8.9$  cm, weight =  $73.5 \pm 11.3$  kg) performed a graded exercise test on a cycle ergometer to determine the maximum volume of oxygen consumption (VO<sub>2max</sub>), HR<sub>max</sub>, 77% and 95% HR<sub>max</sub>, peak power output (PPO), VT, and RCP. On separate days, subjects performed constant HR trials to exhaustion (or to 60 min, plus the time to reach the HR) at 77% (time to exhaustion [T<sub>Lim</sub>] =  $51.06 \pm 19.12$  min, range =  $25.33$ - $64.67$  min) and 95% HR<sub>max</sub> (T<sub>Lim</sub> =  $21.17 \pm 11.65$  min, range =  $8.00$ - $35.67$  min) with VO<sub>2</sub> and power output (P) recorded and normalized to their respective values at PPO in 10% intervals of T<sub>Lim</sub>. Polynomial regression analyses were used to examine the change (positive, negative) and pattern (linear, quadratic) of VO<sub>2</sub> and P ( $\alpha = 0.05$ ). **RESULTS:** For each subject, the average HR at 77% ( $144 \pm 4$  beats-min<sup>-1</sup> [b-min<sup>-1</sup>]) and 95% ( $177 \pm 5$  b-min<sup>-1</sup>) HR<sub>max</sub> was maintained within a  $\pm 2$  b-min<sup>-1</sup> for each trial. At 77% HR<sub>max</sub>, subjects demonstrated linear (n=2) and quadratic (n=4) decreases in VO<sub>2</sub> and linear (n=3) and quadratic decreases in P (n=3). Subjects spent an average of  $44.71 \pm 20.32$ ,  $6.33 \pm 9.12$ , and  $0.00 \pm 0.00$  min in the moderate, heavy, and severe intensity domains, respectively. At 95%HR<sub>max</sub>, subjects demonstrated linear (n=5) and quadratic (n=1) decreases in VO<sub>2</sub> and linear (n=4) and quadratic (n=2) decreases in P. Subjects spent an average of  $8.06 \pm 9.97$ ,  $10.22 \pm 6.15$ , and  $2.89 \pm 2.04$  minutes in the moderate, heavy, and severe intensity domains, respectively. **CONCLUSIONS:** There were decreases in the metabolic cost of exercise that tracked P for exercise anchored to the lower and upper HR. The lower HR may be at an intensity that is too low to maximize the metabolic stimulus (exercise primarily in the moderate domain), while the upper HR may be at an intensity too high to be sustained for the recommended time (20-60min) to improve CE.

#### **P250: CARDIOVASCULAR RESPONSES TO A THREE WEEK LOW-VOLUME HIGH-INTENSITY CYCLING PROTOCOL**

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**BACKGROUND:** High-intensity interval training (HIIT) has shown promise as an effective replacement for traditional longer-duration moderate exercise due to the considerably lower time commitment, but additional evidence is needed to determine how little exercise is enough to elicit improvements in cardiorespiratory fitness. It was hypothesized that significant increases in VO<sub>2max</sub> would be observed after ten sessions of the 2x3 protocol. Thus, the purpose of this study was to examine the cardiorespiratory responses using this protocol in healthy, sedentary individuals. **METHODS:** Fourteen participants completed baseline oxygen consumption (VO<sub>2max</sub>) testing using a cycle ergometer. Heart rate (HR), systolic blood pressure (SBP) and diastolic blood pressure (DBP), VO<sub>2</sub>, respiratory exchange ratio (RER), and rate of perceived exertion (RPE) were measured. Pulse pressure and rate pressure product (RPP) were calculated from the observed values. Exercise intervention trials began 48 hours after the completion of baseline testing. The protocol was three weeks long consisting of three sessions lasting ~14 minutes each week. Each session consisted of a warm-up, followed by two 3-min sub-maximal high-intensity cycling intervals at 85-90% of VO<sub>2max</sub> at rates of 50-100 rpm with two minutes

of low-intensity (50-60%  $VO_{2max}$ ) recovery between and a cool-down after the second interval. **RESULTS:** No significant changes were observed for maximal graded exercise test HR, peak RER, maximal DBP, or time to exhaustion. However,  $VO_{2peak}$  increased from  $31.79 \pm 1.14 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$  pre-intervention, to  $35.89 \pm 1.81 \text{ ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$  post-intervention, resulting in a significant improvement ( $p=0.012$ ). Significant increases were also observed in maximal SBP ( $158 \pm 5.5 \text{ mmHg}$  to  $174.43 \pm 9.28 \text{ mmHg}$ ;  $p=0.030$ ), as well as RPP at HR max ( $288.20 \pm 11.65 \text{ bpm}$  to  $314.48 \pm 16.38 \text{ bpm}$ ;  $p=0.043$ ). **CONCLUSIONS:** The employed low-volume high-intensity protocol period did elicit a significant improvement in  $VO_{2peak}$  as has been shown in a number of previous HIIT studies. Since the 14-minute protocol was well tolerated by participants, the findings of this study demonstrated the potential of a low-volume high-intensity cycling protocol to increase exercise adherence due to its short duration and sub-maximal nature. This project was partially supported by the Kenelly Family Endowed Professorship.

#### **P251: $VO_{2max}$ OBSERVATION WINDOW DIFFERENCES IN FEMALE NCAA CROSS-COUNTRY ATHLETES**

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**BACKGROUND:** This study analyzed differences in  $VO_{2max}$  values (L/min, ml/kg/min, and respiratory exchange ratio (RER)) between varying observation windows (OW): 60s, 30s, and 15s. **METHODS:** Female collegiate cross-country athletes ( $n=13$ ) completed a singular  $VO_{2max}$  test with metabolic data collected via metabolic cart (TrueOne 2400, Parvo Medics Inc., Sandy, UT). Absolute and relative  $VO_{2max}$ , as well as RER data, were then analyzed in increments of 60s, 30s, and 15s. Data were analyzed via repeated measures analysis of variance to detect differences between OW. Intraclass correlation (ICC) was also conducted to assess the relationships of the different OW, with 60s serving as the criterion measurement. **RESULTS:** Regarding absolute  $VO_{2max}$ , all three OW were found to be significantly different ( $p<0.01$ ). Fifteen-second OW was found to have the highest  $VO_{2max}$  ( $3.0 \pm 0.3 \text{ L/min}$ ) compared to 30s and 60s OW ( $2.9 \pm 0.3$  and  $2.9 \pm 0.3 \text{ L/min}$ , respectively). Relative  $VO_{2max}$  followed a similar trend with significance between all OW ( $p<0.01$ ) and higher values at 15s ( $55.4 \pm 3.3 \text{ ml/kg/min}$ ) than 30s or 60s ( $53.9 \pm 2.9$  and  $53.2 \pm 2.8 \text{ ml/kg/min}$ , respectively). No significance was found between OW regarding RER values ( $p=0.38$ ). A strong ICC was found between OW for all variables (absolute  $VO_{2max}$ : ICC=0.98, relative  $VO_{2max}$ : ICC=0.94, RER: ICC=0.92). **CONCLUSIONS:** The current study demonstrates that the chosen OW for  $VO_{2max}$  reporting may result in discrepancies for reported data. A change in  $VO_{2max}$  could occur simply due to the chosen OW, with a smaller OW resulting in an inflated value. Therefore, OW should be considered and reported when conducting a  $VO_{2max}$  test in female collegiate cross-country athletes.

#### **P252: $VO_{2max}$ OBSERVATION WINDOW DIFFERENCES IN MALE NCAA CROSS-COUNTRY ATHLETES**

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**BACKGROUND:** This study analyzed differences in  $VO_{2max}$  values (L/min, ml/kg/min, and respiratory exchange ratio (RER)) between varying observation windows (OW): 60s, 30s, and 15s. **METHODS:** Collegiate male cross-country athletes ( $n=15$ ) completed a singular  $VO_{2max}$  test with metabolic data collected via metabolic cart (TrueOne 2400, ParvoMedics Inc., Sandy, UT). Absolute and relative  $VO_{2max}$ , as well as RER data, were then analyzed in OW of 60s, 30s, and 15s via repeated measures analysis of variance to detect differences between OW. Intraclass correlation (ICC) was also conducted to assess the relationships of the different OW, with 60s serving as the criterion measurement. **RESULTS:** No significant differences were found during any OWs between absolute  $VO_{2max}$  values ( $p=0.15$ ) or RER values ( $p=0.08$ ). Relative  $VO_{2max}$  values were significantly different ( $p<0.05$ ) between 15s, 30s, and 60s OWs ( $70.9 \pm 3.7$ ,  $69.2 \pm 3.9$ , and  $68.6 \pm 3.9 \text{ mL/kg/min}$ , respectively). The ICC between each OW was strong for absolute  $VO_{2max}$ , relative  $VO_{2max}$ , and RER (ICC = 0.95, 0.96, and 0.96, respectively). **CONCLUSIONS:** The current study shows that relative  $VO_{2max}$  results of male cross-country athletes differ when utilizing 15s, 30s, and 60s OWs. Larger values were found to be associated with a smaller OW and it appears that an unspecified OW could lead to inconsistencies in reporting of relative  $VO_{2max}$  values. Future investigations would benefit from the reporting of the OW, when  $VO_{2max}$  testing is a primary variable of concern.

#### **P253: CHARACTERIZING POWER PRODUCTION AND CARDIOVASCULAR RESPONSES TO 2 X 20 SECOND MAXIMAL CYCLING SPRINTS**

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**BACKGROUND:** Training with 2 x 20s cycling sprints improves cardiorespiratory fitness but reducing this to 1 sprint does not. It is unclear if fatigue induced by the first sprint might lead to greater cardiovascular demand in the second sprint. **PURPOSE:** Characterize power production and cardiovascular responses to 1- and 2 - 20s maximal cycling sprints. **METHODS:** In a single lab visit, 43 participants completed 2 x 20 second maximal "Wingate" leg cycling sprints (5 min rest between) with no warm-up or cool-down. Peak and mean power for each sprint (S1 = sprint 1, S2 = sprint 2), were determined by Lode ergometer software. Heart rate (HR) was measured via telemetry and analyzed at baseline, during S1 and S2, in minutes 1 (M1), 3 (M3), and 5 (M5) of recovery after each sprint, and at 10- (M10) and 15- (M15) minutes post-exercise. Mean HR was averaged over windows of 1-min at baseline, 20s during S1 and S2, and for 30s at M1, M3, M5, M10, and M15. Peak HR was the highest value during each window. Bayesian paired t tests were used to compare peak and mean power between sprints. Bayesian rmANOVA were used to compare mean and peak HR between time points.  $BF_{10}$  = likelihood of alternative vs. null. Results are mean $\pm$ SD. **RESULTS:** Mean power (W) was higher for S1 ( $577.7\pm171.8$ ) than S2 ( $543.2\pm159.4$ ,  $BF_{10}=2101.2$ ). Peak power (W) was also higher for S1 ( $935.3\pm326.5$ ) than S2 ( $882.4\pm208.4$ ,  $BF_{10}=57.3$ ). Mean HR (bpm) increased from baseline ( $89.1\pm15.3$ ) and did not return by M10 ( $108.0\pm18.6$ ,  $BF_{10}=526390.3$ ) or M15 ( $106.2\pm18.1$ ,  $BF_{10}=245115.2$ ). Comparing mean HR during the sprints, S2 ( $129.4\pm18.0$ ) was higher than S1 ( $119.2\pm18.8$ ,  $BF_{10}=100615.6$ ). Peak HR (bpm) during S2 ( $149.5\pm20.0$ ) was higher than S1 ( $143.9\pm22.3$ ,  $BF_{10}=28.3$ ). Comparing the recovery from each sprint, mean HR was higher at S2M1 ( $152.1\pm21.9$ ) vs S1M1 ( $144.7\pm23.3$ ,  $BF_{10}=1051.7$ ), S2M3 ( $123.2\pm21.5$ ) vs S1M3 ( $110.7\pm21.1$ ,  $BF_{10}=6.919e+7$ ), and S2M5 ( $115.4\pm21.0$ ) vs S1M5 ( $107.1\pm20.8$ ,  $BF_{10}=351.8$ ). Peak HR followed the same pattern, being higher at S2M1 ( $158.4\pm20.8$ ) vs S1M1 ( $154.2\pm23.4$ ,  $BF_{10}=11.0$ ), S2M3 ( $129.7\pm19.8$ ) vs S1M3 ( $118.6\pm20.0$ ,  $BF_{10}=1.938e+11$ ), and S2M5 ( $120.6\pm19.8$ ) vs S1M5 ( $114.1\pm18.9$ ,  $BF_{10}=22.4$ ). **CONCLUSION:** The lower power production in sprint 2 suggests a robust, fatiguing stimulus was induced by sprint 1. This may have led to a cumulative increase in cardiovascular demand, as heart rate responses were also substantially higher after the second sprint than the first.

#### **P254: CARDIORESPIRATORY RESPONSES TO INCREMENTAL EXERCISE IN FLYWHEEL-BASED INERTIAL TRAINING (FIT) SQUATS**

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**BACKGROUND:** Spaceflight induces rapid loss of aerobic capacity. Flywheel-based inertial training (FIT) - a gravity-independent form of exercise previously used as a countermeasure against unloading-induced muscle atrophy - provides external resistance through moment of inertia (MOI) of a rotating disk in a velocity-dependent manner. Optimizing FIT for cardiorespiratory fitness may improve exercise efficiency and reduce hardware needs associated with deep space exploration. The purpose of this study was to determine the cardiorespiratory responses to FIT with varying MOIs. **METHODS:** 20 healthy, physically active participants (10M, 10F; age: 19-39y) completed two bouts of FIT squats (Excentric Kbox 4Pro) separated by  $\geq 7$ d. Testing consisted of quarter-squats (3 min per stage; 50 repetitions per minute) with increasing MOI increments of  $0.005 \text{ kg}\cdot\text{m}^2$  until volitional fatigue. Squat depth ( $60^\circ$  knee flexion) was monitored by wireless electrogoniometer in real-time. Heart rate (HR) and gas exchange data were averaged over the final 60s of each stage. Inter-session reliability (intra-class correlation coefficients; ICC, Standard Error of the Mean; SEM, and Minimal Difference; MD, and Coefficient of Variation; CV) and reproducibility (Bland-Altman plots) were assessed. A 2x2 mixed model ANOVA was used to assess cardiorespiratory responses to MOI (within subjects) for both sexes (between subjects). **RESULTS:** HR (ICC = 0.81, SEM = 11.13bpm, MD = 30.84bpm, CV = 1.92%) and  $VO_2$  (ICC = 0.81, SEM = 2.00  $\text{mL}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ , MD = 5.53  $\text{mL}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ , CV = 2.53%) demonstrated good reliability. RER (ICC = 0.59, SEM = 0.06, MD = 0.16, CV = 0.95%) demonstrated poor reliability. Bland-Altman plots revealed biases of HR = -1.60%,  $VO_2$  = -4.61%, RER = -2.76% where responses tended to be lesser on trial 2 than trial 1. Mixed model ANOVA revealed a main effect of MOI on HR ( $p<0.001$ ),  $VO_2$  ( $p<0.001$ ) and RER ( $p<0.001$ ). A main effect of sex was noted for  $VO_2$ . There was no

significant MOI x sex interaction for any of the observed variables. **CONCLUSION:** FIT squats provide reliable cardiorespiratory data between testing sessions. However, a small test-retest effect suggests the need for greater familiarization. Standardizing food intake may improve reliability and reproducibility of RER. Increasing MOI during FIT evokes a linear response in HR and VO<sub>2</sub> in males and females. Future work should aim to determine how sustained FIT affects CRF.

**P255: EXPLORING THE PHYSIOLOGICAL EFFECTS OF VIRTUAL REALITY BOXING RELATIVE TO STEADY STATE CARDIOVASCULAR EXERCISE**

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**BACKGROUND:** Recent advancements have enabled technology to be more accessible to the public. Gaming systems, specifically, have been developed to become more immersive to the user, which has led to lower levels of daily physical activity. Virtual reality has positioned itself not only to be used as a gaming system, but also as a form of exercise. **PURPOSE:** To compare the physiological responses of a virtual reality exercise bout to that of traditional aerobic exercise. **METHODS:** Participants [*N* = 14, 7 females; age (*M* ± *SD*); 27.1 ± 7.7 yrs; BMI (*M* ± *SD*); 27.3 ± 5.9] completed two exercise bouts; a virtual reality boxing session (VR) and a moderate-intensity cardio exercise session (MICE). During VR, participants completed 6 bouts of exercise (3 min each) with 30 sec rest between and were instructed to complete the workout without any other manipulation. Throughout MICE, heart rate (HR) and rating of perceived exertion (RPE) were monitored, and adjustments were made to speed and/or grade to maintain moderate intensity. Each session had a total time of 30 minutes, with 5-minute warm-ups and 5-minute cool-downs. HR and Kcal data were collected via Polar HR monitoring device. HR and RPE were collected before (Pre), every 3 minutes during, and immediately after (Post0) each condition. **RESULTS:** Both exercise conditions resulted in elevated RPE and HR during exercise. RPE and HR were significantly increased immediately after the warm-up and remained elevated for the duration of exercise in both conditions [all *P*'s < .001]. Further, the average RPE during VR was significantly greater relative to RPE during MICE [*P* = .04; Cohen's *d* = 0.49]. However, average HR during exercise was not different between conditions [*P* = .09]. Finally, an estimation of Kcal's indicated that participants burned significantly more energy during VR relative to MICE [*M*<sub>diff</sub> ± *SD*]; 101.0 ± 19.9; *P* < .001; Cohen's *d* = 1.83]. **CONCLUSION:** Both exercise conditions resulted in significantly elevated RPE and HR. While RPE was significantly greater during VR, that is most likely due to RPE being collected after each boxing bout and not accounting for the 30 rest. HR data did account for this and was not different between condition. Interestingly, Kcal estimates were significantly greater during VR. Overall, the results emphasize the physiological aspects of VR exercise and provide evidence to use VR as an alternative to cardio based workouts.

**P256: COMPARING EXERCISE INTENSITY OF VIRTUAL REALITY GAMING TO TRADITIONAL GAMING AND EXERCISE IN YOUTH (8-12)**

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**Background:** While 80% of youth do not meet daily physical activity (PA) guidelines, 90% of youth play video games for ≤1 hour daily. Virtual reality (VR) exergames are a form of active video game. The primary aim of the study was to compare the exercise intensity of two Oculus Quest 2 VR games (Beat Saber (BS) and Thrill of the Fight (TOF)) to conventional seated video gaming and treadmill walking. **Methods:** Twenty-three youth (15M) ages 8-12 completed 10-min sessions of five conditions: seated rest, conventional seated video game (Katamari Forever on PS3), treadmill walking (3 mph), and BS and TOF VR games. TOF is a semi-realistic boxing simulator that requires players to mimic the skills and tasks of a real bout such as aiming punches, blocking, dodging, and moving around the ring, while BS requires players to perform upper body movements to avoid obstacles and destroy oncoming shapes according to the rhythm of a song. Exercise intensity was measured via heart rate (HR) and VO<sub>2</sub>. Steady-state values between min 4 and 8 of each condition were averaged for analysis. Repeated measures ANOVA compared HR and VO<sub>2</sub> between conditions. **Results:** Participants average age was 9.4±1.1 years. Approximately 61% were classified as healthy weight, 4% overweight, and 35% obese using CDC Growth Charts. All three active conditions (treadmill walking (134±16 bpm), VR BS (118±13 bpm) and VR TOF (140±15 bpm) had significantly higher (*p*<0.001) HR values compared to rest (93±12 bpm) and seated video game (93±12 bpm). There were no differences between the HR (*p*=0.76) response of treadmill walking or VR TOF. VR BS HR values were

significantly different (*p*<0.001) from all other conditions. Similarly, for VO<sub>2</sub>, treadmill walking (16.8±2.8 mL/kg/min), VR BS (8.9±3.4 mL/kg/min) and VR TOF (15.4±3.9 mL/kg/min) had significantly higher (*p*<0.001) values compared to rest (4.4±1.5 mL/kg/min) and seated video game (4.2±1.4 mL/kg/min). There were no differences between the VO<sub>2</sub> (*p*=0.71) response of treadmill walking or VR TOF. VR BS VO<sub>2</sub> values were significantly different (*p*<0.001) from all other conditions. **Conclusion:** VR can increase energy expenditure above traditional gaming. The exercise intensity of the VR games matched treadmill walking and was influenced by game type. VR exergames can be used as a PA outlet to meet health recommendations for youth interested in video games.

**P257: EFFECTS OF A BRISK 6-MINUTE WALK ON NON-LOCAL PERFORMANCE FATIGUE: PRELIMINARY FINDINGS**

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**BACKGROUND:** Non-local fatigue can be described as performance decrements occurring for a muscle group that was not directly involved in the fatiguing activity that preceded. Little evidence exists on non-local fatigue derived from activities mimicking acts of daily living. Determining whether non-local fatigue exist following brisk walking is worthwhile, and rate of torque development (RTD) is a candidate parameter that might possess increased susceptibility. The purpose of our ongoing study is to determine the responses, if any, for maximal and rapid torque production of the upper body after brisk walking in young and middle-aged females. Here, we report on preliminary findings based on participants completed to date. **METHODS:** Four untrained, females (31.5 ± 17.7 yrs) completed a testing visit 3-7 days following a familiarization session. Subjects completed handgrip testing before and 3, 9, and 11 minutes after a 6-min brisk walking task. The instructions for the walking task were to "cover as much distance as possible". Subjects were instructed to squeeze the handgrip dynamometer as "hard and fast as possible". PT, and peak, early (0-50 ms), and late (0-200 ms) RTD were calculated from the torque-time curve. Friedman's test and relative changes were computed to examine responses across time. **RESULTS:** PT (-2%; *p* = 0.960) nor any RTD measures (*p* > 0.05; -5% - +8.5% were reduced after brisk walking. **CONCLUSIONS:** These preliminary findings suggest that brisk walking does not cause non-local fatigue for the upper body, but interpretation is limited due to our small sample size which resulted in underpowered analyses. As our sample size increases and age-related comparisons are feasible, a primary aim is to determine if these preliminary findings remain consistent in females 45-60 yrs of age since brisk walking may be more demanding in this age group.

**P258: FUNCTIONAL FITNESS AND DAILY STEPS OF COMMUNITY-DWELLING OLDER ADULTS**

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**BACKGROUND:** The aim of this study was to determine the effect of gender on functional fitness and pedometer (activity counts) in community-dwelling older adults. **METHODS:** Sixty-five community-dwelling older adults (38 Female; 27 male) aged 80 ± 7.55 years (mean height: 167.31 ± 10.03 cm; weight: 73.08 ± 15.01 kg; and body mass index: 25.95 ± 4.26 kg/m<sup>2</sup>) were evaluated with the Senior Fitness Test (SFT) for aerobic endurance, balance, agility, functional strength, and flexibility. Each wore an activity tracker that was worn on the participant's shoe for 7 days, per manufacturer's instructions. In addition, the participants completed questionnaires; the mini nutritional assessment (MNA), body image, and geriatric depression scale (GDS). **RESULTS:** The results showed that compared to women, the six-minute walk (*P* < 0.01), eight-foot and go (*P* = 0.02), daily steps (*P* < 0.01), and total steps for week (*P* = 0.03) in men was significantly higher. However, women showed a significant high level of sit and reach (*P* < 0.01) and body image (*P* = 0.01) compared to men. No significant difference was found in MNA (*P* = 42), GDS (*P* = 0.86), chair stand (*P* = 0.48), arm curls (*P* = 0.58) and back scratch (*P* = 0.56) between men and women. **CONCLUSION:** This study found greater functional fitness and daily steps in men adults. Older women may need to increase step count per day/week and continue to concentrate on their strength training.

**P259: RELATIONSHIP BETWEEN CHANGE IN VO2VT2 AND CHANGE IN 2-MILE RUN TIME**

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**BACKGROUND:** Resistance training (RT) is widely understood to influence oxygen consumption kinetics during aerobic exercise. While measurement of cardiovascular fitness has focused heavily on maximal oxygen consumption ( $\text{VO}_2\text{max}$ ), the utility of assessing the second ventilatory threshold ( $\text{VO}_2\text{VT}_2$ ) has gained increasing attention as a relevant metric. The purpose of this study was to identify associations between changes in  $\text{VO}_2\text{max}$  and  $\text{VO}_2\text{VT}_2$  with changes in 2-mile run times following a 6-week RT intervention. **METHODS:** 41 collegiate Reserve Officer Training Corps (ROTC) cadets ( $n = 11$  female;  $n = 30$  male) completed a 6-week RT intervention consisting of 4 sessions per week.  $\text{VO}_2\text{max}$ ,  $\text{VO}_2\text{VT}_2$ , and 2-mile run times were assessed pre- and post-intervention. Heart rate (HR) was measured via chest strap during all testing (Polar Electro Inc., Woodbury, NY, USA). Paired sample t-tests were used to evaluate differences in  $\text{VO}_2\text{max}$ ,  $\text{VO}_2\text{VT}_2$ , and 2-mile run time pre- and post-intervention. To determine relative intensity of the 2-mile run, paired t-tests were used to compare average HR during the 2-mile run and  $\text{HRVT}_2$ . Pearson-product moment correlations were used to assess relationships between individual changes in  $\text{VO}_2\text{max}$  and  $\text{VO}_2\text{VT}_2$  with changes in 2-mile run times. An alpha level of 0.05 was used to determine statistical significance. **RESULTS:** No significant differences were identified pre- to post-testing for  $\text{VO}_2\text{max}$  ( $p > 0.05$ ) or  $\text{VO}_2\text{VT}_2$  ( $p > 0.05$ ). 2-mile run time was significantly different in pre- vs. post-testing ( $17.64 \pm 3.3$  vs.  $16.82 \pm 2.9$ ,  $p < 0.01$ ). Average HR during the 2-mile run was significantly higher compared to  $\text{HRVT}_2$  in pre- to post-testing ( $181.1 \pm 9.7$  vs.  $163 \pm 13.2$ ,  $p < 0.01$ ) ( $180.3 \pm 7.6$  vs.  $160.8 \pm 11.2$ ,  $p < 0.01$ ). No correlations were identified between changes in 2-mile run times and  $\text{VO}_2\text{max}$  ( $r = -0.18$ ,  $p = 0.26$ ) or  $\text{VO}_2\text{VT}_2$  ( $r = -0.03$ ,  $p = 0.86$ ). **CONCLUSIONS:** Our findings suggest  $\text{VO}_2\text{max}$  and  $\text{VO}_2\text{VT}_2$  do not have significant predictive value for changes in 2-mile run time following a 6-week RT intervention. Pre- and post-intervention average HR during the 2-mile run was significantly higher than  $\text{HRVT}_2$ , indicating the run was performed at a high intensity. Future research should investigate the value of various physiological metrics in predicting changes in high intensity run performance, particularly after non-aerobic training interventions.

**P260: EFFECTS OF VIRTUAL INTERACTIVE CYCLING ON PERCEIVED DURATION AND EXERCISE ENJOYMENT IN SEDENTARY ADULTS**

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**BACKGROUND:** Despite the well-established benefits of habitual physical activity (PA), 49.1% of American adults do not meet ACSM aerobic activity recommendations. A possible explanation could be common PA barriers such as: perceived lack of time, knowledge, social support, access to resources, or enjoyment. A potential way to overcome these barriers is the use of virtual exercise such as Spin. Although previous research suggests  $\text{VO}_2$  values during a Spin class are significantly higher than constant load cycling, the perception of a Spin class is unclear. However, when cycling at a high intensity (70%  $\text{VO}_2$  peak) with music (vs. no music) RPE was significantly lower ( $p \leq 0.05$ ). In addition to perception of effort, cycling on an interactive gaming bike was significantly more enjoyable ( $p \leq 0.05$ ) vs traditional constant load cycling, despite similar acute and session RPE values. Therefore, the distraction of the music and instruction of fitness leader in a Spin class could potentially lead to greater enjoyment and an altered perception of exercise duration. The purpose of this study is to examine the effects of a simulated Spin class using the Peloton app vs. an intensity matched workload. **METHODS:** Twenty-four sedentary participants will complete three separate sessions consisting of a  $\text{VO}_2$  peak cycling test and two exercise sessions. The first cycling session will consist of a 30-minute virtually lead cycling class via the Peloton app where participants may adjust their resistance based on the instructor's cues and current fitness levels. Wattage will be collected every 30 seconds of the trial and used to create an intensity matched cycling class using Velotron Coaching Software for the second trial. During trials, metabolic data ( $\text{VO}_2$ ,  $\text{VCO}_2$ ,  $\text{VE}$ ,  $\text{RER}$ ) and HR will be collected every minute while RPE overall, RPE legs, RPE breathing, and lactate will be collected every five minutes. Following both cycling trials, participants will complete a PACES questionnaire to assess exercise enjoyment and will be asked to assess the duration of the session. Between trial comparisons for  $\text{VO}_2$ , HR, wattage, and acute RPE values using separate 2 (condition) x 6 (time point) factorial ANOVAs for each dependent variable. Additionally, paired t-test will be used to compare perceived duration and PACES questionnaire responses. **EXPECTED OUTCOME:** It is hypothesized that individuals will perceive the virtual Spin session as shorter and more enjoyable compared to matched workload session.

**P261: WRIST ACCELEROMETER CUT-POINTS FOR MEASURING PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR IN ADULTS WITH DOWN SYNDROME**

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**BACKGROUND:** The wrist may be an appropriate site for accelerometer placement for adults with Down syndrome (DS) because it may increase compliance. However, wrist accelerometer output has not been calibrated in adults with DS. This study therefore aimed to develop wrist worn accelerometer cut-points for sedentary behavior and moderate and vigorous physical activity for adults with DS. **METHODS:** Twenty-three adults with DS (11 men & 12 women; age  $34 \pm 8$  years) performed 18 tasks each lasting 6 min: lying; sitting; watching a movie; playing app on tablet; drawing; standing; folding clothes; vacuuming; sweeping; moving a box; basketball; soccer; fitness circuit; dancing; walking at the preferred speed and at 0.8 and 1.4  $\text{m s}^{-1}$ ; and running. Rate of oxygen uptake was measured with portable indirect calorimetry (K5, Cosmed) and expressed as Metabolic Equivalents (METs). Vector Magnitude was determined based on output from a triaxial accelerometer (wGT3X-BT, Actigraph) worn on the non-dominant wrist. Vector Magnitude cut-points for sedentary behavior and moderate (3.0 - 5.99 METs) and vigorous ( $\geq 6$  METs) physical activity were determined using Receiver Operating Characteristic (ROC) curves. Area under the ROC curve was used to evaluate overall classification performance of the models. Optimal cut-points maximizing sensitivity and specificity were selected based on Youden's index. **RESULTS:** Area under the ROC curve was high for all models: (a) sedentary behavior (0.95; 95% CI: 0.93 - 0.97); (b) moderate physical activity (0.86; 95% CI: 0.82 - 0.89); and (c) vigorous physical activity (0.91; 95% CI: 0.84 - 0.97). The optimal Vector Magnitude cut-points were: (a) sedentary behavior  $\leq 2680$  counts-min<sup>-1</sup> (sensitivity 0.97; specificity 0.87; Youden's index 0.84); (b) moderate physical activity  $\leq 5013$  counts-min<sup>-1</sup> (sensitivity 0.81; specificity 0.78; Youden's index 0.59); and (c) vigorous physical activity  $\geq 5458$  counts-min<sup>-1</sup> (sensitivity 1.00; specificity 0.66; Youden's index 0.66). **CONCLUSION:** This study offers DS-specific wrist-based accelerometer cut-points for classifying sedentary behavior and physical activity intensity in adults with DS. The cut-points appear to have high accuracy. Use of DS-specific cut-points may advance the study of physical activity and sedentary behavior in adults with DS. Funding: NIH Grant R15HD098660

**P262: ACCELEROMETER CUT POINTS FOR ADULTS WITH DOWN SYNDROME: METS VS. OXYGEN UPTAKE RESERVE**

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**BACKGROUND:** Accelerometer cut points based on 3 and 6 Metabolic Equivalents (METs) for moderate and vigorous physical activity (PA) may not be appropriate for adults with Down syndrome (DS). PA intensity may be better reflected in the oxygen uptake reserve ( $\% \text{VO}_2\text{R}$ ) which can account for the low aerobic fitness and resting metabolic rate of adults with DS. This study examined if accelerometer cut points for moderate and vigorous PA differ between the METs and  $\% \text{VO}_2\text{R}$  approaches to PA intensity in adults with DS. **METHODS:** Twenty-three adults with DS (age  $34 \pm 8$  years; 11 men) performed 18 tasks of varying intensity each lasting 6 min. Aerobic fitness was estimated with a submaximal treadmill test. The rate of oxygen uptake during the treadmill test and the 18 tasks was measured with breath-by-breath portable calorimetry. PA intensity during the tasks was expressed as METs (moderate: 3.0-5.99 METs; vigorous  $\geq 6$  METs) and  $\% \text{VO}_2\text{R}$  (moderate: 40.0-59.9%; vigorous  $\geq 60\%$ ). PA was measured with a triaxial accelerometer (wGT3X-BT, Actigraph) on the non-dominant hip, and the Vector Magnitude (VM) was used in analysis. Receiver Operating Characteristic (ROC) curves were used to identify VM cut points for moderate and vigorous PA using METs and  $\% \text{VO}_2\text{R}$ . Overall classification performance was assessed with the area under the ROC curve. Optimal cut points maximizing sensitivity and specificity were selected using Youden's index. **RESULTS:** Area under the ROC curve was high for all models; for METs: (a) moderate (0.89; 95%CI: 0.85-0.92) and (b) vigorous (0.91; 95%CI: 0.86-0.96); for  $\% \text{VO}_2\text{R}$ : (a) moderate (0.88; 95%CI: 0.84-0.91) and (b) vigorous (0.86; 95%CI: 0.82-0.90). The optimal VM cut points based on METs were: (a) moderate  $\geq 2863$  counts-min<sup>-1</sup> (sensitivity 0.87; specificity 0.77; Youden's index 0.64); and (b) vigorous  $\geq 3698$  counts-min<sup>-1</sup> (sensitivity 1.00; specificity 0.74; Youden's index 0.74). VM cut points based on  $\% \text{VO}_2\text{R}$  were: (a) moderate  $\geq 2056$  counts-min<sup>-1</sup> (sensitivity 0.99; specificity 0.68; Youden's index 0.67); and (b) vigorous  $\geq 3698$  counts-min<sup>-1</sup> (sensitivity 0.77; specificity 0.80; Youden's index 0.57). **CONCLUSION:** Moderate intensity PA cut-points were higher when based on METs than  $\% \text{VO}_2\text{R}$ . Vigorous intensity PA cut-points did not differ between methods. Utilizing cut-points based on  $\% \text{VO}_2\text{R}$  may

more accurately express levels of moderate PA in adults with DS.  
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**P263: COMPARISON OF DIFFERENT VO<sub>2</sub>MAX SCALING MODELS IN NON-OBESE AND OBESE ADULTS**

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**Background:** VO<sub>2</sub>max is typically expressed relative to body mass (ml/min/kg), however, this expression is often biased with respect to variance in body dimensions such as mass and stature. This study sought to identify the most appropriate allometric scaling model used to express aerobic fitness, determined by VO<sub>2</sub>max, that would allow comparisons across differing body types. **Methods:** VO<sub>2</sub>max and body composition data were collected from untrained non-obese and obese participants (N=126). Total body mass (BM), fat-free mass (FFM), and combined leg fat-free mass (LFFM) were used as allometric scaling models to determine the goodness of fit using the Akaike information criterion (AIC) technique. **Results:** Allometric scaled exponents adjusted for BM, FFM and LFFM were 0.67, 0.68 and 0.55, respectively. VO<sub>2</sub>max scaled to BM was 22% higher in non-obese individuals. Scaled to LFFM, VO<sub>2</sub>max was only 7.5% higher in non-obese individuals as compared to obese individuals. Data showed a positive correlation ( $r=0.28$ ;  $p=0.009$ ) between VO<sub>2</sub>max and BM for non-obese participants while a negative correlation ( $r=-0.39$ ;  $p=0.014$ ) was present in the obese participants. AIC values showed the LFFM model as the best fit and the AIC differences for FFM and BM were both >10 "no support" for the model (12.1 and 28.2, respectively). **Conclusion:** Allometric scaling of VO<sub>2</sub> max with the LFFM model provides the best representation aerobic power (AICc = 0 "substantial support). Traditional relative VO<sub>2</sub>max, expressed scaled to BM, offers "essentially no support" according to the AIC difference values (>10) and introduces a bias when comparing individuals of various body sizes and compositions. These results indicate that VO<sub>2</sub>max scaled to BM alone, in obese individuals, reflects the level of adipose tissue more so than functional capacity. Interpretation of aerobic power and comparisons would be most appropriate when allometrically scaled to the metabolically active tissue, in this case, LFFM. The lower mass exponent of 0.55 for LFFM and smaller proportional increase in VO<sub>2</sub>max indicates a greater scaling precision of VO<sub>2</sub>max. This assists in correcting the bias created when scaling to BM by partitioning out the effect of whole-body size and focusing on the primary involved musculature.

**P264: PHYSICAL ACTIVITY ESTIMATED BY DIFFERENT ACCELEROMETER CUT-POINTS IN ADULTS WITH DOWN SYNDROME**

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**BACKGROUND:** Physical activity (PA) and sedentary time in adults with Down syndrome (DS) have been examined with accelerometer cut-points developed for the general population. These cut-points may not be appropriate for adults with DS because the association between PA intensity and accelerometer output may be altered in this population. This study examined if DS-specific cut-points and cut-points developed for the general population differ in estimating sedentary time and PA levels in adults with DS. **METHODS:** Twenty-five adults with DS (age 39±10 yrs; 12 men) had PA and sedentary behavior measured by an accelerometer (wGT3X-BT, Actigraph) on their non-dominant hip. DS-specific vector magnitude cut-points developed by our lab (sedentary: ≤237 counts/min; light ≤2166 counts/min; moderate-to-vigorous: ≥2167 counts/min) and cut points by Freedson (sedentary: ≤199 counts/min; light ≤2690 counts/min; moderate-to-vigorous: ≥2691 counts/min) were used to obtain the variables. Differences between cut-points for total and percent of time in sedentary, light, and moderate-to-vigorous PA were tested with two by three (method × intensity) mixed model ANOVA and follow-up dependent samples t-tests. **RESULTS:** Participants wore the accelerometer for 6.4±1.1 days (4.7±0.8 weekdays; 1.7±0.5 weekend days) for a total of 5540±1364 min or 850±99 min/day. There were significant method × intensity interactions for both total time and percent of time ( $p<.001$ ). T-tests showed significant differences between methods in total time sedentary (DS: 2677±803 min, Freedson: 2538±776 min;  $p<.001$ ), light PA (DS: 2193±742 min, Freedson: 2581±855 min;  $p<.001$ ), and moderate-to-vigorous PA (DS: 102±45 min, Freedson: 64±36 min;  $p<.001$ ). Percent of time spent sedentary (DS: 49±10%, Freedson: 46±10%) and in moderate-to-vigorous PA (DS: 12±5%, Freedson: 7±4%;) was higher with the DS than the Freedson cut-points ( $p<.001$ ). Light PA was higher with the Freedson cut-points (DS: 39±8%, Freedson: 46±8%;  $p<.001$ ). **CONCLUSION:** Greater moderate-to-vigorous and less light PA levels were observed for adults

with DS when using DS-specific cut-points compared to cut-points for the general population. DS-specific cut-points may more accurately assess PA and sedentary behavior in adults with DS. Funding: Mississippi State University Office of Research and Economic Development and I'm An Athlete Foundation

**P265: EFFECT OF MELANIN CONCENTRATION ON HEART RATE READINGS OF WEARABLE FITNESS MONITORS**

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Photoplethysmography (PPG) is a non-invasive technology designed to measure volumetric and circulation changes in blood using low-intensity infrared light or green LED light. This technology is used in fitness tracking devices to estimate heart rate (HR). There is little research on how PPG technology is affected by skin tone, despite the possibility that skin with more melanin may not reflect light as well as lighter skin. The purpose of this study was to investigate the effects of melanin concentration in skin on the HR measurement accuracy of the Apple Watch Series 6, FitBit Versa 3, MI Band, Fitbit Inspire 2, Letsfit Smartwatch, and Garmin Vivo 4 in treadmill walking, and activities of daily living (climbing stairs, vacuuming, picking up toys, and carrying groceries). Participants were college-age adults whose skin tone was visually assessed as Type I/II (light skin tone), Type III/IV (medium skin tone), or Type V/VI (dark skin tone) utilizing the validated Fitzpatrick scale. Participants completed a single session of activity while wearing the devices in a randomized order on both wrists, as well as a Polar HR monitor (the gold standard measurement) fitted to their chest. They performed activities for 5 minutes each with a 3 minute rest period between each. The percent error for each device was calculated by the formula: [(known HR - device HR) / known HR] \*100. An independent t-test was used to compare the percent errors between groups. During the vacuuming, picking up toys, and carrying groceries trials, the Mi band had significantly greater error in the dark skin tone group compared to light or medium ( $p<0.05$ ). There were no other differences between devices ( $p>0.05$ ). These data suggest that the six tested devices work equally well in participants with all skin tones except for the Mi band in individuals with dark skin tone. Additional research on dark skin tones is required to further understand how melanin concentration affects PPG technology.

**P266: EXERCISE INTENSITY CLASSIFICATION OF ACTIVE VIRTUAL REALITY GAMES IN YOUTH (8-12)**

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**Background:** Active virtual reality (VR) games require body movements that may elicit health-enhancing moderate intensity physical activity (MPA). The aim of this study was: (1) to compare VR game intensities to ACSM MPA guidelines and (2) to compare the energy intensity classification of two VR games to a traditional game and treadmill walking in youth aged 8 to 12. **Methods:** VO<sub>2</sub>, HR, and rated perceived exertion (RPE) were collected on 23 participants during 10-min each of seated rest (rest), seated video game (SVG), treadmill walking (5.6 km/h) (TW), and VR games Beat Saber (BS) and Thrill of the Fight (TOF). Average VO<sub>2</sub> (reported as METs), HR (reported as % HR reserve (HRR)) for min 4-8, and average RPE from min 4 and 8 were used in the analyses. Repeated measures ANOVA compared intensity between conditions. For each active condition, MPA was defined as ≥4 and <6 MET, between 40-59% of HRR, and a 5 or 6 on a 10-point RPE scale. **Results:** Based on METs, TW (4.8±0.7 METs) and TOF (4.4±1.2 METs) were classified as MPA, and BS was classified as light (2.6±0.9 METs). During TW, BS and TOF, 87%, 9%, and 65% of participants respectively sustained MPA (min 4-8). METs were significantly greater for TW and TOF than other conditions ( $p<0.05$ ). BS was significantly greater than SVG (1.2±0.4 METs) and rest (1.2±0.4 METs) ( $p<0.05$ ). Based on %HRR, TOF (43±15%) was classified as MPA, and TW (39±11%) and BS (23±10%) were classified as light. During TW, BS and TOF, 34%, 9%, and 52% of participants respectively sustained MPA. %HRR were significantly greater for TW and TOF than other conditions ( $p<0.05$ ). BS was significantly greater than SVG (0±4%) and rest (0±0%) ( $p<0.05$ ). Based on RPE, TOF (5.5±2.3) was classified as MPA and TW (3.9±2.0) and BS (3.7±2.5) were classified as light. During TW, BS and TOF, 22%, 30%, and 61% of participants respectively achieved MPA. RPE for TOF was significantly greater than other conditions ( $p<0.05$ ). TW and BS were not different from each other and significantly greater than SVG (0.8±0.8) and rest (0.4±0.5) ( $p<0.05$ ). **Conclusions:** The VR game TOF was consistently categorized as MPA based on METs, %HRR and RPE, and was equivalent to or greater than a brisk walk for all outcomes. BS was classified as light intensity. For some youth, VR may contribute towards achieving the recommend 60 minutes of

moderate-to-vigorous physical activity per day. Future VR games should aim to include more MPA.

**P267: THE RELATIONSHIP BETWEEN MEASURED VO<sub>2</sub> DURING A NOVEL AEROBIC FIELD TEST AND VO<sub>2</sub>MAX**

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**BACKGROUND:** Despite a variety of fitness tests across the different branches of service, there remains a common requirement to test cardiorespiratory fitness (CRF). The purpose of this study was to assess the relationship between VO<sub>2</sub> during a weighted vest run (WVR) and CRF in currently serving US military personnel to determine if a WVR was a valid predictor of CRF. **METHODS:** Five exercise-trained, US service members (100% male, 22-34yrs) at The Citadel completed a baseline visit and two exercise visits separated by 7 days each. At the baseline visit, participants had body composition measured via BODPOD and completed a modified Army Combat Fitness Test (ACFT), which included vertical jump, three-rep max (3RM) deadlift, leg tuck, sprint drag carry, and a 2-mile run (2MR). Participants then completed two separate exercise visits separated by 7 days in random order: a graded exercise test (GXT) to measure CRF via VO<sub>2</sub>max, and the WVR, which was a 20m pacer test with a 9.07kg weighted vest. Metabolic measures were taken during both the GXT and WVR with the COSMED K5. Pearson's correlations were used to assess the relationship between GXT VO<sub>2</sub>max and WVR VO<sub>2</sub>. Multiple regression analysis was used to examine the relationship between baseline fitness measures and CRF. **RESULTS:** There was a strong significant correlation between 2MR time and WVR VO<sub>2</sub> ( $r = -0.873$ ,  $p = .05$ ). Though not significant, there was a strong, trending correlation ( $r = 0.781$ ,  $p = 0.12$ ) between WVR VO<sub>2</sub> and VO<sub>2</sub>max via GXT. In multiple regression analysis, there was no significant effect of body composition, vertical jump height, 3RM deadlift, leg tuck, or sprint drag carry performance on VO<sub>2</sub>max. **CONCLUSIONS:** These findings suggest that performing a WVR is a valid predictor of CRF while resembling combat performance by including load carriage, change of direction, acceleration/deceleration, and an externally stimulated pace. Additionally, the WVR VO<sub>2</sub> strongly correlated with 2MR, which is the current CRF test used by the US Army. Therefore, these data provide initial evidence of the potential for a WVR to replace traditional CRF field tests in tactical athletes. Replicating this study in a larger sample of US military service members, with an emphasis on combat roles and females, is an important next step.

**P268: 7-WEEK ACCOMMODATING RESISTANCE TRAINING IMPROVES WINGATE PEAK POWER BUT NOT MUSCULAR STRENGTH OR ENDURANCE IN STRENGTH-TRAINED, FEMALES.**  
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Accommodating resistance (AR) is a training technique that includes attaching elastic bands or chains to a loaded barbell to alter the resistance profile throughout barbell movement. This study was the first to quantify the effects of AR versus a traditional resistance (TR) training program on changes in strength and power profiles in a female cohort. Resistance-trained (training history:  $2.4 \pm 1.4$  years) females (age:  $22.1 \pm 3.0$  years) completed baseline and post-intervention tasks which included 1-repetition maximum (1-RM) testing in the back squat (BS) and bench press (BP), a repetition to failure in the BP (60% of 1-RM), and one 30-s maximal Wingate test. Following baseline testing, subjects were stratified (based on relative strength) into either the AR ( $n = 9$ ) or TR ( $n = 10$ ) group and then completed a supervised, 7-week training intervention. Both groups improved their 1-RM in both lifts, but no statistical differences were found between groups in 1-RM for BS, BP, or BP to failure ( $p > 0.05$ ). However, the AR group increased Wingate peak power ( $837 \pm 221$  to  $901 \pm 215$  W;  $p = 0.04$ ), whereas TR ( $868 \pm 244$  to  $8343 \pm 182$  W;  $p = 0.47$ ) did not. This study supports AR with lighter relative barbell load incurs similar strength adaptations as TR. For coaches training athletes concerned with power, AR may be advantageous for improving rate of force development as demonstrated by large increases in peak Wingate power.

**P269: THE EFFECT OF ANKLE BAND JOINT FLOSSING ON SQUAT PERFORMANCE**

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**BACKGROUND:** Band joint flossing is where a compression band or thick, elastic band is tightly wrapped around part of a joint. This technique has been shown to improve range of motion of that joint, reduce pain during and after exercise, and increase injury prevention

by increasing blood and nutrient flow back to that joint once the compression is released. However, most research on band joint flossing is on range of motion and jumping movements only, despite exercisers and athletes commonly using the band joint flossing technique on before performing squat exercises. Therefore, the purpose of this study is to analyze the effects of band joint flossing on barbell squat and isometric squat performance. **METHODS:** College-aged females ( $65.7 \pm 2.1$  in,  $71.2 \pm 13.2$  kg, 1-RM back squat  $72.5 \pm 13.2$  kg) with previous squat experience were recruited to participate in this study. In a crossover, counterbalanced design, participants completed two trials: 1) band joint flossing (BJF) of both ankles, and 2) control (CON) with no flossing. For BJF, a Voodoo floss band was tightly wrapped around both ankles and participants completed 10-20 repetitions of ankle flexion and extension and 10-20 body weight squats. During both trials, participants completed an isometric squat by standing on force platforms with a smith machine locked in place at a knee angle of 80-100 degrees flexion and maximally pushing. Next, participants completed two back squat repetitions at 75% 1-RM as explosively as possible and velocity was recorded through a linear position transducer. Each trial was separated by a minimum of 48 hours. **RESULTS:** There was no significant difference between BJF and CON for barbell velocity ( $p = 0.17$ ) during the back squat. Additionally, there was no significant difference in peak force ( $p = 0.72$ ) or net force ( $p = 0.34$ ) during the isometric squat between BJF or CON. **CONCLUSION:** The results of this study suggests that BJF of the ankles does not improve squat performance with either the back squat or an isometric squat.

**P270: HIGH- VS. LOW-LOAD RESISTANCE TRAINING: COMPARING STRENGTH CHANGES IN THE LOWER BODY**

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**Background** Programmed resistance training to optimize muscle strength is a vital component of exercise programs for athletes and non-athletes alike. Training with high-loads ( $\geq 80\%$  of maximum) has been reported to be a more effective method of increasing muscle strength, compared to training with low-loads ( $\leq 30\%$  of maximum). The purpose of this study was to compare changes in lower-body strength after 9-weeks of high- vs. low-load using a full-body resistance training protocol. **Methods** Seventeen recreationally trained males were selected for this study (mean  $\pm$  standard deviation age =  $20.4 \pm 2.7$  yrs; weight =  $77.9 \pm 16.5$  kg) and were randomly split into a high- (85% 1-RM;  $n = 8$ ) or low-load (30% 1-RM;  $n = 9$ ) training group. Both groups completed 3 training sessions per week, with 3 working sets to failure of the back squat, bench press, deadlift, t-bar row, biceps curl, and lying triceps extension. Predicted 1RM was taken pre- and post-resistance training for the back squat and deadlift. Isometric and isokinetic (angular velocities =  $60$  and  $120^\circ \cdot s^{-1}$ ) assessments of peak torque were taken for knee flexion and extension. Differences in changes of lower-body strength between groups were compared using change scores ( $\Delta 1RM$ ) calculated post-pre. Independent samples t-tests were used to compare  $\Delta 1RM$  between groups. Mixed Factorial ANOVAs were used to compare change in 1RM within and between groups. **Results** Significant differences were found between groups for  $\Delta 1RM$  in the back squat ( $p = 0.012$ ) and deadlift ( $p = 0.031$ ), with significant increases in the 85% group in back squat ( $p = 0.014$ ) and deadlift ( $p = 0.002$ ). Significant decreases in both groups were found in  $60^\circ \cdot s^{-1}$  knee flexion ( $p = 0.005$ ). No significant differences were found for any other measure ( $p \geq 0.078$ ). **Conclusion** This study demonstrates a full-body high-load resistance training program results in greater changes in back squat and deadlift strength overall, but not isometric or isokinetic strength. It is possible the changes in peak torque from the isolated, single-joint knee flexion and extension muscle actions were not as sensitive to change, as these movements do not permit hip flexion or extension during the muscle action. Thus, the principle of specificity must be considered. Overall, the present study demonstrates training at high-loads is more impactful for improving lower-body strength during dynamic, compound movements than training at low-loads.

**P271: THE EFFECTS OF LYRICAL VERSUS INSTRUMENTAL MUSIC ON BENCH PRESS EXERCISE PERFORMANCE**

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Copious amounts of evidence support the ergogenic effects of listening to music during sprint, endurance, and resistance exercise. The presence or absence of lyrics has been shown to modulate neural activation and emotions in resting states. However, it remains unknown how this translates to exercise. The purpose of this study was to investigate the effects of lyrical versus instrumental music on

bench press exercise performance. Resistance trained males participated in two separate bench press trials each with a different music condition: 1) Lyrical music (LM), 2) Instrumental music (IM). Music was identical between conditions except for the presence of lyrics. Following a warm-up, participants completed 1 set  $\times$  2 repetitions as explosively as possible while a linear position transducer monitored mean power and velocity of the barbell. Participants then completed 3 sets  $\times$  repetitions to failure (RTF) at 75% of 1-repetition maximum (1-RM) separated by 2 minutes of rest. Motivation and exercise enjoyment were measured via visual analog scale upon cessation of exercise. RTF, mean velocity, mean power, motivation, and exercise enjoyment were analyzed between conditions. There were no significant differences between IM and LM for mean power ( $p = 0.233$ ), barbell velocity ( $p = 0.168$ ), or total RTF ( $p = 0.368$ ). However, motivation ( $p = 0.048$ ) and exercise enjoyment ( $p = 0.041$ ) were significantly higher with LM versus IM. These data suggest the presence of lyrics does not enhance nor hinder bench press performance. However, increases in motivation and exercise enjoyment with LM could suggest possible implications for lyrical music in exercise adherence.

#### **P272: THE EFFECT OF CARBON-PLATED RUNNING SHOES ON PERFORMANCE**

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**Purpose:** The purpose of this study was to determine the effects of a carbon fiber plate on running economy (RE) in commercially available shoes of nearly identical midsole composition, geometry, and stack height. Three running shoes were compared; a traditional running shoe, no carbon plate, Razor 3 (R3), a half carbon plated shoe Razor Speed Elite Hyper (SE), and a full carbon plated shoe, Nike Vaporfly (VF). **Methods:** Nine male participants (18-35 years old) who had completed a 5 Km run in under 18 minutes and no injury or training disruption within a 6-month period of participation completed this 3-visit study. Participants completed a familiarization session, followed by a second visit in which a  $\dot{V}O_{2max}$  test was performed to determine ventilatory threshold (VT). Visit three included a shoe comparison of three different shoes running on a treadmill at a prescribed intensity: 5-10% above and below VT for a total of six running bouts. Data were collected on  $\dot{V}O_2$ , RPE, shoe comfort, and running economy. Data were analyzed using a linear mixed model. **Results:** When comparing SE vs. R3, the carbon fiber plate did not change RE, when running at intensities below ( $p = 0.355$ ) and above VT ( $p = 0.715$ ). There were no differences in heart rate (HR) and rating of perceived exertion (RPE) in either the R3 ( $p = 0.875$ ) or VF ( $p = 0.054$ ) relative to the SE when performing below VT. However, relative to the SE, the VF showed a 2.8 % and 1.6% improvement in RE below ( $p = 0.005$ ) and above VT ( $p = 0.019$ ) respectively. The main effect of running intensity (above vs. below VT) was observed for  $\dot{V}O_2$  ( $p < 0.001$ ) and HR ( $p < 0.001$ ). R3 remained unchanged independent of running speed relative to the SE ( $p = 0.827$ ), while RE in the VF was increased ( $p = 0.046$ ). No shoe condition  $\times$  speed interaction was observed for HR ( $p = 0.323$ ) or RPE ( $p = 0.125$ ). **Conclusion:** The current findings of this study suggest that a carbon fiber plate alone may not account for RE improvements but play a contributory role in racing. While not statistically significant, the SE may provide physiologically significant improvements at faster running speeds. The current study is ongoing, and additional data are necessary to determine the true benefit or lack thereof of a carbon fiber plate on performance metrics.

#### **P273: BINGE TWITCH STREAMING RUINS SWEET DREAMING: A CASE STUDY**

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**BACKGROUND:** Many college students have irregular lifestyles due to juggling schoolwork, living on their own for the first time, and socializing. This population is important to examine because lifestyle habits (e.g., sleep, physical activity) formed during this life period may persist into older adulthood. With the recent rise of gaming and social streaming platforms such as Twitch, many college students spend their free time sedentary on a screen. This case study aims to assess the habits of a college student who spent 4 days awake Twitch streaming followed by multiple days of sleep recovery. **METHODS:** Objective sleep quality, including sleep duration and efficiency, was assessed using a wrist-worn Philips Actiwatch Spectrum PLUS accelerometer for an 8-day observation period. To assess subjective sleep, the participant completed the Pittsburgh Sleep Quality Index (PSQI). Actigraphy-derived physical activity was concurrently measured using an ActiGraph GT3X waist-worn accelerometer. We also assessed anthropometrics and resting brachial blood pressure (SunTech CT40

oscillometric monitor). **RESULTS:** The participant was a 22-year-old White male. He had a negligible amount of sleep totaling less than 2 hours during the first 4 days of the observation period and self-reported Adderall use and binge Twitch streaming. The binge streaming was followed by a single bout of sleep lasting 21.8 hours. During the entire observation period his sleep duration was 6.1 hours per night and sleep efficiency was 83.2%. Sleep regularity, defined as sleep duration standard deviation (SD), was 6.0, indicating that he had extremely irregular sleep when compared with published data in college students (SD of 1.2). He also reported a PSQI of 7, which is considered disturbed sleep. The participant engaged in 560 sedentary minutes per day and only 22 minutes of moderate or vigorous physical activity per day. His body mass index indicated he was overweight (26.5 kg/m<sup>2</sup>), and he had stage I hypertension (blood pressure: 130/89 mmHg). **CONCLUSION:** Based on our case study, we conclude that binge Twitch streaming may contribute to poor sleep regularity, low physical activity, and elevated blood pressure. Future studies should aim to characterize the cardiometabolic health of regular binge Twitch streamers compared to non-streamers.

#### **P274: ABSTRACT WITHDRAWN**

#### **P275: EFFECT OF AGE ON FIREFIGHTER FITNESS IN A DEPARTMENT WITH ANNUAL FITNESS ASSESSMENTS**

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**BACKGROUND:** The firefighter (FF) profession is a demanding job that includes high-intensity physical work. As a result, maintaining appropriate levels of fitness are encouraged for FFs to perform occupational duties, prevent health issues and musculoskeletal injuries. The purpose of the present study was to examine the effect of age on fitness in a large cohort of professional FFs required to complete an annual fitness assessment. **METHODS:** Retrospective fitness assessment and body composition data was obtained from 1076 professional FFs (males=955, females=121) who completed an annual fitness assessment. The fitness assessment included maximum pull-ups, maximum push-ups, maximum curl-ups, and a 3-minute step test to estimate aerobic fitness. Fat mass percentage (FM%) was assessed using bioelectric impedance analysis. Participants were categorized into 4 age groups (20-29, 30-39, 40-49, 50-59 years). Analyses of variance and Tukey's Post-hoc test were used to assess the effect of age on fitness measures. All statistics were conducted with R software and a significance level of  $p = 0.05$ . **RESULTS:** A total of 170 (15.8%), 332 (30.9%), 357 (33.2%) and 217 (20.2%) FFs were in the 20-29, 30-39, 40-49, 50-59 age groups, respectively. There was a significant difference between age groups for pull-ups ( $F(3,1072) = 52.11, p < 0.001, \eta^2 = 0.13$ ), curl-ups ( $F(3,1072) = 57.56, p < 0.001, \eta^2 = 0.14$ ), push-ups ( $F(3,1072) = 50.74, p < 0.001, \eta^2 = 0.12$ ) and FM% ( $F(3,1072) = 22.82, p < 0.001, \eta^2 = 0.06$ ). Post-hoc testing revealed that pull-ups, curl-ups and push-ups significantly ( $p < 0.05$ ) declined each decade except when comparing the 20-29 to 30-39 age groups. FM% was significantly worse ( $p < 0.05$ ) each decade except for the 40-49 compared to 50-59 year age group. There was no significant main effect for age on aerobic capacity ( $F(3,1072) = 0.55, p = 0.649$ ,

$\eta^2=0.001$ ). CONCLUSION: The current findings indicate that muscular fitness and FM% generally declined with age while aerobic fitness was preserved in professional FF. Muscular fitness did not decline until FF were older than 40 years, while FM% increased in younger age groups then was unchanged after the age of 40. Fire departments implementing health and fitness programs could consider tailoring programs to prevent increases in FM% in younger FFs (<40 years) and maintaining muscular fitness in older FFs (>40 years).

#### **P276: PHYSICAL FITNESS IN FIREFIGHTERS DIFFERS ACROSS YEARS OF SERVICE**

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**INTRODUCTION:** Firefighters (FFs) require adequate fitness levels to safely perform their professional tasks. Accordingly, fire departments assess their physical fitness (PF) annually during the work performance test. In the general population, PF levels - specifically muscular and cardiovascular fitness - decline as one ages. However, due to the physical nature of the profession, this decline in PF may not be as prominent in FFs. Therefore our purpose was to investigate the effect of years of service (YOS) on FF PF levels. **METHODS:** We analyzed retrospective data from 1364 professional FF(M: 88%, age: 40±8.82 yrs, YOS: 11.98±6.87 yrs). PF assessments consisted of maximum pull-ups (PL), curl-ups completed in 60 s(CU), push-ups completed in 60 s (PS). The 3-minute step test (ST) was used to estimate peak oxygen consumption (VO<sub>2peak</sub>). Participants were separated in to 3 groups based on YOS, (0-10, 11-20, 20+ years). Separate Analyses of Variance (ANOVA) followed by Turkey's Post-hoc Tests, as appropriate, examined differences in outcome measures between groups using R environment (R Core Team, Vienna, Austria)  $p \leq 0.05$ . **RESULTS:** PL, CU, and PS differed across groups of YOS (PL;  $F(2, 2852) = 70.3, p < 0.001, \eta^2 = 0.05$ ), (CU;  $F(2, 2852) = 67.5, p < 0.001, \eta^2 = 0.05$ ), (PS;  $F(2, 2852) = 38.5, p < 0.001, \eta^2 = 0.03$ ). FF with 0-10 YOS performed greater PL, CU, and PS than those with 11-20 ( $p < 0.05$ ) and 20+ ( $p < 0.05$ ). FF with 11-20 YOS performed more PL, CU, and PS than FF with 20+ YOS ( $p < 0.05$ ). There was no significant effect for YOS ( $F(2, 2852) = 1.568, p = 0.21, \eta^2 = 0.001$ ) on VO<sub>2peak</sub>. **CONCLUSION:** The findings support prior observations that PF and ability to perform occupational duties are related in firefighters. Specifically, FF with greater YOS display declines in occupational tasks performance. Given the previously described decreases in PF with age in the literature, future researchers should examine whether YOS mediates relationships between age and PF in professional FF. The current evidence suggests that fire departments should consider YOS in addition to age when providing additional resources to support maintenance of PF in their FF.

#### **P277: THE EFFECT OF A STRUCTURED PHYSICAL CONDITIONING PROGRAM ON RECRUITS AT LAW ENFORCEMENT ACADEMIES**

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**BACKGROUND:** Law enforcement academies frequently utilize physical training (PT) methods that may not optimally translate to occupational tasks beyond academy graduation. Traditionally PT programs have focused on calisthenic exercises, including high-volume running and endurance exercises. The purpose of this study was to evaluate performance outcomes between a traditionally designed PT program and an evidenced-based conditioning program for law enforcement recruits. **METHODS:** Two metropolitan state law enforcement training centers in the southeast United States participated in this investigation. Each academy program consisted of PT for five days each week for 12 weeks. The experimental group ( $n = 46$ ) was provided with an evidence-based PT program that consisted of elements to enhance anaerobic and aerobic conditioning, agility, power, movement quality, defensive tactics, and muscular endurance. The control group ( $n = 18$ ) was assigned a traditional instructor-led PT program which consisted of defensive tactics, calisthenics, and running. Following completion of the 12-week program, Pre-Post independent samples t-tests ( $\alpha = 0.05$ ) were run on all variables of interest. **RESULTS:** Of the 14 fitness variables measured, the intervention group displayed significant improvements in 10 variables compared to the control. Post Waist Circumference was significantly lower ( $p = 0.03$ ; Mean Difference [MD]:  $-1.61 \pm 2.84$  cm) than Pre with a moderate effect ( $d = -0.57$ ). Post Weight was significantly lower ( $p = 0.01$ ; MD:  $-1.94 \pm 2.69$  kg) than Pre with a moderate effect ( $d = -0.73$ ). Post BMI was significantly lower ( $p = 0.01$ ; MD:  $-0.64 \pm 0.90$  kg/m<sup>2</sup>) than Pre with a moderate effect ( $d = -0.72$ ). Post pushup

performance was significantly improved ( $p = 0.01$ ; MD:  $6.44 \pm 7.34$  reps) than Pre with a large effect ( $d = 0.88$ ). Post Plank was significantly improved ( $p < 0.01$ ; MD:  $47.33 \pm 36.01$  sec) compared to Pre with a large effect ( $d = 1.32$ ). Post 300-yard Shuttle was significantly improved ( $p = 0.01$ ; MD:  $-2.61 \pm 3.70$  sec) compared to Pre with a moderate effect ( $d = -0.71$ ). **CONCLUSION:** The current investigation supports the advantage of utilizing holistic, evidence-based PT programs rather than traditional programming. Therefore, law enforcement academies are encouraged to adopt occupationally specific and efficient training frameworks for improving cadet body composition and physical performance.

#### **P278: PHYSICAL ACTIVITY LEVELS AND CARDIOVASCULAR HEALTH RISK IN FIRST RESPONDERS**

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**BACKGROUND:** The occupational physiological stress encountered by first responders may be further exacerbated with inadequate regular physical activity. Tactical athletes have a greater risk for cardiovascular disease than the normal population and thus should meet physical activity recommendations to assist in reducing this risk. Therefore, the aims of this pilot study were to compare cardiovascular health parameters to the general population, classify disease risk, and determine if first responders are meeting physical activity recommendations. **METHODS:** 15 first responders (13 being firefighters) participated in this cross-sectional study. Body mass, waist and hip circumferences, resting heart rate, and blood pressure were measured. An activity monitor was worn for six days to assess physical activity. One-sample t-tests were used to compare results to the general population based on large sample data sets with statistical significance at  $p < 0.05$ . The mean values for waist circumference and BMI were used to classify disease risk according to ACSM. **RESULTS:** Hip circumference ( $108.9 \pm 12.1$  vs  $105.0 \pm 14.8$  cm, respectively) and systolic blood pressure ( $128.4 \pm 13.4$  vs  $121.3 \pm 20$  mmHg, respectively) were not different in the first responders compared to the general population. However, BMI ( $31.6 \pm 6.0$  vs  $26.6 \pm 8.2$ , respectively), waist circumference ( $104.3 \pm 17.5$  vs  $89.9 \pm 22.8$  cm, respectively), and diastolic blood pressure ( $79.0 \pm 14.5$  vs  $67.8 \pm 16.3$  mmHg, respectively) were higher in the first responders compared to the general population. According to ACSM's classification of disease risk, the mean BMI of 31.6 and waist circumference of 104.3cm categorizes the first responders as "very high" in cardiovascular disease risk. Over a 6-day period, the first responders took 70,860±3905 steps which met ACSM's recommendation of 60,000 steps over a 6-day period. **CONCLUSION:** Although the first responders met ACSM's physical activity recommendation of 10,000 steps per day, they are still categorized as "very high" for cardiovascular disease risk according to ACSM. When compared to the general population, they have a higher BMI, waste circumference, and diastolic blood pressure. Data is still being collected in this population. **Grant information:** Augusta University Provost's Student Research Program

#### **P279: ASSESSING THE EFFECTIVENESS OF FITNESS EDUCATION TO PROMOTE WELLNESS AMONG RURAL FIREFIGHTERS: A PILOT STUDY**

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**BACKGROUND:** The National Fire Protection Organization (NFPA) recommends that fire departments (FD) complete health and fitness assessments for all firefighters (FF) to promote physical fitness and monitor wellness variables. A growing number of FDs are allocating resources to build facilities and hire exercise professionals to further help promote wellness. However, small and rural FDs are challenged to provide similar access to their FFs. This pilot study aimed to determine the effectiveness of fitness education to promote FF wellness following annual health and fitness assessment screenings. **METHODS:** A quasi-experimental design was employed with a convenience sample of 8 rural FFs from a single department. Skilled exercise professionals conducted a health and fitness assessment screening on all FFs in accordance with NFPA 1583 standards. Variables collected included: Weight (WT); Systolic Blood Pressure (SBP); Diastolic Blood Pressure (DBP); Resting Heart Rate (RHR); Bone Mineral Density via DEXA (BMD); Vertical Jump (VJ); Hand Grip Strength (HGS); Push-Ups (PU); Isometric Plank Hold (PL); 3-Repetition Maximum Bench Press (3RM); and Functional Movement Screen (FMS). Following completion of the assessment screening, FFs were given individual feedback by the exercise professionals on their values and provided educational material on corrective exercises to improve health and fitness. FFs were then tested using the same assessment protocol 12-months later. Paired-samples t-tests were run ( $\alpha = 0.05$ ) on all tested variables using a pre-post design. **RESULTS:** There were no significant

differences among any of the health and fitness variables between pre and post-testing: WT (Mean Difference [MD]: -11.3 lbs,  $p = 0.12$ ); SBP (MD: -1.5 mmHg,  $p = 0.80$ ); DBP (MD: -1.2 mmHg,  $p = 0.74$ ); RHR (MD: 8.0 bpm,  $p = 0.33$ ); BMD (MD: -0.1 g/cm<sup>3</sup>,  $p = 0.76$ ); VJ (MD: -0.2 in,  $p = 0.83$ ); HGS (MD: 2.75 lbs,  $p = 0.59$ ); PU (MD: 2.0 reps,  $p = 0.46$ ); 3RM (MD: -7.5 lbs,  $p = 0.51$ ); PL (MD: -20.8 sec,  $p = 0.39$ ); FMS (MD: 0.3 au,  $p = 0.76$ ). **CONCLUSION:** The results suggest that providing fitness education may be sufficient to help FFs maintain health and fitness status. It does not appear that education alone is enough to promote improvements in health or fitness variables in rural FFs. However, this pilot study represents one small rural FD and more robust testing is needed to see if these results hold with a larger sample size.

#### **P280: PREDICTING FIREFIGHTERS' PHYSICAL ABILITY TEST SCORES FROM ANAEROBIC FITNESS PARAMETERS**

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**BACKGROUND:** The physical ability test (PAT) evaluates firefighters' (FF) fitness to execute occupational tasks. The aerobic system's contribution to PAT performance is extensive; however, research is inconclusive regarding the involvement of the anaerobic system during PAT. This study aimed to identify relationships between specific anaerobic fitness (AF) tests' and PAT's time scores and to create a model to best predict PAT using these AF parameters. **METHODS:** A preliminary convenience sample of 14 male FFs (Age: 29.0±7.0yrs; Height: 1.7±0.1m; Weight: 79.9±13.0kg; Occupational-Weight: 102.6±13.0kg; BF%: 17.9±5.6%) from two fire departments was used. Data collection took place over two separate days. On day one, FFs completed a PAT composed of occupationally-specific tasks in full gear. On day two, FFs performed a series of anaerobic fitness assessment in full gear: handgrip-dynamometry, maximal vertical-jump, Margaria-Kalamen staircase test, and 300-yard shuttle run (300YD). Pearson-product moment correlation coefficients were used to examine associations between dependent variables and PAT. Multiple backward regression analysis was used to model the PAT using AF parameters (i.e., HG: Handgrip dynamometer absolute strength; VJAPP: Vertical jump absolute peak power; MKAP: Margaria-Kalamen staircase test absolute power; 300YD: 300-yard [274 m] shuttle run test). All statistical analyses were performed with IBM SPSS 27.0, with a significance level of  $p \leq 0.05$ . **RESULTS:** PAT was significantly correlated with HG ( $r = -0.71$ ,  $p \leq 0.01$ ), VJ ( $r = -0.73$ ,  $p \leq 0.01$ ), MK ( $r = -0.75$ ,  $p \leq 0.01$ ), and non-significantly with 300YD ( $r = 0.60$ ,  $p \leq 0.05$ ). A 78% proportion of variation observed in PAT was explained by the aforementioned AF parameters ( $F_{2,13} = 20.2$ ,  $p \leq 0.05$ ). **CONCLUSION:** The examined anaerobic subsystems significantly contribute to PAT performance. FFs should optimize AF training, which would allow for potentially enhanced occupational performance in PAT. Further investigation into anaerobic physiological determinants of FFs with larger sample size is recommended.

#### **P281: NAVAL RESERVE OFFICERS' TRAINING CORPS MILITARY PERFORMANCE AND FITNESS CHARACTERISTICS ACROSS ACADEMIC YEARS**

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**BACKGROUND:** Navy Reserve Officer Training Corps (NROTC) prepares midshipmen (MIDN) for roles as future military officers. To ensure body composition and fitness standards are maintained, MIDN participate in weekly group physical training. The purpose of this analysis was to determine if there were any differences in MIDN performance across academic years as an estimation of progress during their four years in the NROTC program. **METHODS:** MIDN ( $n=63$ , age=19.8 ± 1.7) completed a battery of tests to assess their physical fitness. Waist-to-hip ratio was calculated from waist and hip circumferences and BMI was calculated from height and weight metrics. MIDN completed maximal countermovement vertical jumps (CMJ) with and without arm swing to determine peak anaerobic power via a digital contact mat. Following, MIDN performed the 20-meter shuttle run test as a field-based estimate of aerobic capacity. Military-specific performance assessments were done as a part of regular NROTC training. To determine changes across class years, a one-way ANOVA was run on each variable with significance set at  $p < 0.05$ . Cohen's  $d$  ( $d$ ) effect size assessed the magnitude of the difference between only the freshmen and senior academic years. **RESULTS:** No significant differences were found between the academic years for any of the variables assessed: BMI ( $p=0.274$ ;  $d=0.259$ ), waist-to-hip ratio ( $p=0.4237$ ;  $d=0.629$ ), CMJ with arm swing ( $p=0.949$ ;  $d=0.130$ ), CMJ

with hands on hips ( $p=0.927$ ;  $d=0.830$ ), and aerobic capacity ( $p=0.753$ ;  $d=0.063$ ). In the Marine Corp NROTC physical readiness test (PRT), there were no significant differences found for pullups ( $p=0.106$ ) and 3-mile run time ( $p=0.079$ ). No significant differences were found in the Navy physical fitness test (PFT), pushups ( $p=0.473$ ), and 1.5-mile run times ( $p=0.868$ ). **CONCLUSIONS:** These findings show that for Fall 2021 the more senior MIDN did not have greater fitness than less senior MIDN. This indicates the current NROTC training model may not effectively improve fitness over the course of a college career, as it would be expected that fitness measures increase throughout four years of training. However, it is possible anaerobic power improves, as shown by the large effect size, but a larger sample size is needed to further investigate this. These results warrant future studies with a larger sample size of NROTC MIDN and longitudinal studies to assess changes over time.

#### **P282: INFLUENCE OF PERCEIVED INTENSITY IN THE POLICE ACADEMY ON EXERCISE INTENTION POST-ACADEMY**

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**BACKGROUND:** Police academies are typically the first job task oriented exercise training for law enforcement officers (LEOs) ranging 12 to 36 weeks in duration. Research has demonstrated that cadets are at higher risk of injury during the academy. Physical fitness training is a critical component of LEO academy efforts to build occupational skills to meet job demands. Although research is beginning to investigate the efficacy of different training modalities, more research is needed to better understand the impact of academy training load and modality on occupational readiness and interest in maintaining exercise behaviors post-academy. Therefore, the purpose of this study was to investigate the relationship between cadets' perceived intensity of training modalities and intention to continue physical training after the academy. **METHODS:** A cross sectional design was utilized with a convenience sample of 121 graduating LEO cadets (28.47±8.12 y; 84.1% male, 14.3% female). Participants completed a 5-Point Likert Scale for perceived intensity for each exercise modality (formation run day, circuit training, agility training, and defensive tactics). Cadets then rated their intention to continue physical training efforts after academy graduation (ranging from 1=Extremely Unlikely to 5=Extremely Likely). Spearman-Rho correlations were used to determine the relationship of each training modality and cadets' intention to continue physical training after the academy. **RESULTS:** 88% of respondents agreed or strongly agreed that they would continue training after the academy. Formation runs demonstrated a negative, moderate correlation with intention to continue exercising post-academy ( $r = -0.34$ ,  $p < 0.01$ ). No significant correlations were found between intention and circuit training ( $r = -0.16$ ,  $p = 0.09$ ), agility training ( $r = -0.08$ ,  $p = 0.37$ ) or defensive training ( $r = -0.04$ ,  $p = 0.69$ ). **CONCLUSIONS:** Formation run exertion ratings demonstrated significant intentions to not continue physical training after graduation from the law enforcement academy. These findings indicate that cadets do not favor a running modality and this approach may negatively influence future exercise adherence. Additional research is warranted to explore the relationship between specific exercise modalities and post-academy exercise adherence.

#### **P283: COMPARISON OF FITNESS CHARACTERISTICS BETWEEN FIREFIGHTERS AND POLICE OFFICERS**

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**BACKGROUND:** Firefighters and police officers are emergency responders who perform divergent occupational tasks that require above-average physical capabilities. Each are also at high cardiovascular disease (CVD) risk. The purpose of this study was to compare CVD risk factors and fitness characteristics between the occupations. **METHODS:** Seventeen police officers (11 men) and 15 firefighters (13 men) participated in two separate laboratory sessions. At the first visit, participants conducted a lipid and blood glucose analysis, resting heart rate and blood pressure, body composition analysis, and a Wingate anaerobic cycling test. The second visit consisted of a treadmill maximal aerobic capacity (VO<sub>2</sub>max) test. **RESULTS:** Firefighters (age: 38.8±7.9y, experience: 13.8±7.8y) and police officers (age: 39.0±10.6y, experience: 13.3±8.9y) had similar experience and rank in the respective departments. Compared with police officers, firefighters had greater total body mass ( $p=.01$ ), lean mass ( $p<.001$ ), bone mineral density ( $p=.007$ ), and diastolic blood pressure ( $p=.008$ ). No other differences in lipids or blood glucose were observed ( $p>0.05$ ). Firefighters also had a higher relative peak ( $7.1±1.6W/kg$  vs.  $5.9±1.5W/kg$ ,  $p=.04$ ) and mean power ( $523±137W$  vs.  $371±118W$ ,  $p=.002$ ), and maximal absolute VO<sub>2</sub>max

( $3.2 \pm 0.6$  L/min vs.  $2.3 \pm 0.8$  L/min,  $p = .005$ ) compared to police officers. Relative  $VO_{2max}$  was similar in firefighters ( $35.6 \pm 6.5$  mL/kg/min) and police officers ( $30.1 \pm 9.9$  mL/kg/min). **CONCLUSIONS:** Firefighters were significantly heavier, with greater lean mass and bone mineral density, which may lead to misclassification of obesity in this population. Anaerobic capacity was greater in firefighters, which may be a result of training for fitness challenges and occupational tasks like hose carry or stair climbing. The differences in the  $VO_{2max}$  test are likely due to different body weights between the occupations but was lower than current recommendations for the occupations. More exercise training may benefit this population to improve aerobic capacity and cardiovascular risk factors.

#### **P284: INFLUENCE OF CALL VOLUME ON FIREFIGHTERS' PHYSICAL ACTIVITY LEVEL AND TRAINING LOAD**

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**BACKGROUND:** Firefighters must perform regular physical activity (PA) to enhance occupational readiness and reduce the risk of sudden cardiac events, which are the leading cause of on-duty fatalities. Despite the recommendation for firefighters to exercise on-duty, greater call volumes may reduce the time available to exercise. Therefore, the purpose of this study was to evaluate the relationship between emergency call volume versus achievement of PA guidelines and training loads among firefighters. **METHODS:** A convenience sample of 126 (118 male, 7 female, 1 not provided; Age:  $40.4 \pm 9.3$  yr) career structural firefighters volunteered to complete an anonymous online survey describing the typical endurance (ET) and resistance training (RT) frequency, duration, and perceived exertion performed on- and off-duty. Session training load (SL; Arbitrary Units: AU) was calculated as: Session duration x rating of perceived exertion (0-10 category-ratio scale). Weekly training load (WL; AU) was calculated as: SL x weekly training frequency. Achieving PA guidelines was reflected by performing  $\geq 2$  RT sessions per week and  $\geq 75$  vigorous or  $\geq 150$  moderate intensity minutes of ET per week. Typical call volume per shift was stratified into the following categories: <1, 1-4, 4-8, 8-12, >12 hr. Cross-tabulation analyses examined the call volume-stratified proportion of firefighters achieving (met vs. did not meet) PA guidelines for ET and RT independently and collectively. The effects of call volume on SL and WL for RT and ET were determined via one-way ANOVA. Descriptive values are presented as mean  $\pm$  standard deviation. Significance was set at  $p < 0.05$ . **RESULTS:** 23% of firefighters met global PA guidelines, 62% met RT, and 33% met ET guidelines. Call volume strata was not associated with status of meeting the PA guidelines for ET ( $n=124$ ,  $\chi^2=0.94$ ,  $p=0.920$ ), RT ( $n=126$ ,  $\chi^2=3.15$ ,  $p=0.533$ ), or global guidelines ( $n=124$ ,  $\chi^2=2.54$ ,  $p=0.637$ ). There were no differences between call volume strata for SL (ET:  $n=97$ ,  $159 \pm 133$  AU,  $p=0.779$ ,  $\eta^2=0.019$ ; RT:  $n=81$ ,  $230 \pm 178$  AU,  $p=0.327$ ,  $\eta^2=0.058$ ) or WL (ET:  $n=97$ ,  $490 \pm 562$  AU,  $p=0.560$ ,  $\eta^2=0.032$ ; RT:  $n=81$ ,  $870 \pm 989$  AU,  $p=0.391$ ,  $\eta^2=0.052$ ). **CONCLUSION:** Emergency call volume was not associated with achievement of PA guidelines and training loads were similar among firefighters with varied call volumes.

#### **P285: INFLUENCE OF AGE ON FIREFIGHTERS' PHYSICAL ACTIVITY LEVEL AND TRAINING LOAD**

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**BACKGROUND:** Regular participation in exercise is critical to enhance occupational readiness and decrease risk of sudden cardiac events among firefighters. Age is associated with decreased occupational performance and risk of cardiac event due to decreased cardiorespiratory fitness, however, this decline may be attenuated with exercise participation. There is a lack of research evaluating the influence of age on firefighters' exercise behaviors. Therefore, the purpose of this investigation was to determine if age relates to the proportion of firefighters meeting American College of Sports Medicine physical activity (PA) guidelines and reported endurance (ET) and resistance training (RT) loads. **METHODS:** A convenience sample of 126 (118 male, 7 female, 1 not provided; Age:  $40.4 \pm 9.3$  yr) career structural firefighters volunteered to complete an anonymous online

survey describing the typical ET and RT frequency, duration, and perceived intensity. Session training load (SL) was calculated as: Session duration x rating of perceived exertion (0-10 category-ratio scale). Weekly training load (WL) was calculated as: SL x weekly training frequency. Achieving PA guidelines equated to performing  $\geq 2$  RT sessions per week and  $\geq 75$  vigorous or  $\geq 150$  moderate intensity minutes of ET per week. Age was stratified into quartiles. Cross-tabulation analyses examined the age-stratified proportion of firefighters meeting PA guidelines for ET and RT independently and collectively. The effects of age on SL and WL for RT and ET were determined via one-way ANOVA. Significance was set at  $p < 0.05$ . **RESULTS:** 23% of firefighters met global PA guidelines, 39% of firefighters met RT, and 34% met ET guidelines. Age strata was not associated with status of meeting the PA guidelines for ET ( $n=122$ ,  $\chi^2=0.48$ ,  $p=0.923$ ), RT ( $n=124$ ,  $\chi^2=0.97$ ,  $p=0.808$ ), or global guidelines ( $n=122$ ,  $\chi^2=1.76$ ,  $p=0.625$ ). There were no differences between age strata for SL (ET:  $n=97$ ,  $159 \pm 133$  AU,  $p=0.961$ ,  $\eta^2=0.003$ ; RT:  $n=81$ ,  $230 \pm 178$  AU,  $p=0.500$ ,  $\eta^2=0.031$ ) or WL (ET:  $n=97$ ,  $490 \pm 562$  AU,  $p=0.953$ ,  $\eta^2=0.004$ ; RT:  $n=81$ ,  $871 \pm 989$  AU,  $p=0.450$ ,  $\eta^2=0.034$ ). **CONCLUSIONS:** Age was not related to achievement of PA guidelines and the majority of firefighters were not meeting ACSM PA guidelines due to a lack of ET. Therefore, fire department PA initiatives should facilitate participation in ET throughout the career span.

#### **P286: EFFECTS OF IMPLEMENTING A CONSEQUENTIAL ANNUAL FITNESS ASSESSMENT IN A LARGE COUNTY FIRE DEPARTMENT**

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**INTRODUCTION:** To become a firefighter (FF) individuals must pass physically demanding exams, which assess ability to perform job tasks prior to entering a training academy. Despite the importance of health and fitness for FF only about 30% of US fire departments have health and wellness programs. Recently, a fire department in the US implemented mandatory annual fitness testing with punitive consequences for substandard performance. The purpose of the study is to report the effects of implementing a consequential fitness assessment (FA) within a fire department. **METHODS:** Retrospective data was provided from 1364 professional FF (Males: 88%, Females: 12%, age:  $40.0 \pm 8.8$  yrs, years of service:  $11.9 \pm 6.8$  yrs) from 2019, 2020 and 2021. The FA consisted of maximum pull-ups (PL), maximum curl-ups (CU) within 60 seconds, maximum push-ups (PS) within 60 seconds, and 3-minute step test (ST) to estimate peak oxygen consumption. To examine the effect of exam year (EY) on fitness outcomes (FO) analyses of covariance (ANCOVA) were conducted while controlling for age and sex. Tukey's Post-hoc Test were used to determine any significance differences between exam year ( $p < 0.05$ ). **RESULTS:** The sample size for 2019, 2020, and 2021 were 1013, 777, and 1084, respectively. There were no significant differences between sex distribution and age by EY. The ANCOVA revealed there was a significant small effect of EY on FO (PL:  $F(2, 2848) = 5.92$ ,  $p < 0.01$ ,  $\eta^2 = 0.003$ ; CU:  $F(2, 2848) = 17.57$ ,  $p < 0.001$ ,  $\eta^2 = 0.01$ ; PS:  $F(2, 2848) = 18.50$ ,  $p < 0.001$ ,  $\eta^2 = 0.01$ ; ST:  $F(2, 2848) = 26.19$ ,  $p < 0.001$ ,  $\eta^2 = 0.02$ ). FF performance in 2021 was significantly better on CU, PS, and ST compared to 2019 ( $p < 0.001$ ). PL performance in 2021 was significantly better than 2020 ( $p < 0.01$ ). FF performed significantly better on CU and ST in 2020 than 2019 ( $p < 0.01$ ). **CONCLUSION:** The results suggest the implementation of a consequential FA may be a plausible method for FF to maintain sufficient fitness to meet occupational demands. Although there was a significant difference between FO by EY it is not evident whether the small FO changes lead to increased performance of occupational tasks. Future research should explore whether changes in fitness lead to improvements in ability to perform occupational tasks.

#### **P287: INFLUENCE OF SECONDARY JOB STATUS ON FIREFIGHTERS' PHYSICAL ACTIVITY LEVEL AND TRAINING LOAD**

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**BACKGROUND:** The leading cause of on-duty fatality among firefighters is sudden cardiac event. Regular physical activity (PA) is associated with a decreased risk of cardiovascular disease. Unfortunately, a host of factors may affect firefighters' participation in PA, including working a second job. The purpose of this study was to identify the proportion of firefighters achieving PA guidelines, the proportion working secondary jobs, and assessment of the relationship between secondary job status and achievement of PA guidelines and

training loads. **METHODS:** A convenience sample of 126 (118 male, 7 female, 1 not provided; Age: 40.4±9.3 yr) career structural firefighters volunteered to complete an online survey describing the typical endurance (ET) and resistance training (RT) frequency, duration, and perceived exertion performed on- and off-duty. Session training load (SL; Arbitrary Units: AU) was calculated as: Session duration x rating of perceived exertion (0-10 category-ratio scale). Weekly training load (WL; AU) was calculated as: SL x weekly training frequency. Achieving PA guidelines equated to performing ≥2 RT sessions per week and ≥75 vigorous or ≥150 moderate intensity minutes of ET per week. Job status was stratified into firefighters who worked a second job vs. those who did not. Chi-square analyses examined the job status stratified proportion of firefighters achieving (met vs. did not meet) PA guidelines for ET and RT independently and collectively. The effects of job status on SL and WL for RT and ET were determined via independent samples t-tests. Descriptive values are presented as mean±standard deviation. Significance was set at  $p < 0.05$ . **RESULTS:** 23% of firefighters met global PA guidelines, 62% met RT, and 34% met ET guidelines. 61% of firefighters worked a secondary job. Job status strata was not associated with meeting the PA guidelines for ET ( $n=124$ ,  $\chi^2 < 0.001$ ,  $p=0.99$ ), RT ( $n=126$ ,  $\chi^2=0.07$ ,  $p=0.79$ ), or global guidelines ( $n=124$ ,  $\chi^2=0.15$ ,  $p=0.70$ ). There were no differences between job status strata for SL (ET:  $n=97$ ,  $159 \pm 133$  AU,  $p=0.84$ , Cohen's  $d=0.04$ ; RT:  $n=81$ ,  $230 \pm 178$  AU,  $p=0.16$ , Cohen's  $d=0.32$ ) or WL (ET:  $n=97$ ,  $490 \pm 562$  AU,  $p=0.62$ , Cohen's  $d=0.10$ ; RT:  $n=81$ ,  $870 \pm 989$  AU,  $p=0.17$ , Cohen's  $d=0.32$ ). **CONCLUSION:** Secondary job status was not associated with achievement of PA guidelines and training loads were similar among firefighters with varied job statuses.

#### **P288: EFFECT OF LAW ENFORCEMENT LOAD-BEARING EQUIPMENT ON PHYSICAL AND JOB-SPECIFIC TASK PERFORMANCE**

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**BACKGROUND:** The purpose of this study was to compare acute job-specific skill and physical performance between two forms of law enforcement load-bearing equipment. **METHODS:** Ten Cadets from a senior military college participated in the study. A randomized cross-over design was used. Participants completed a series of seven (four general performance and three law enforcement job-specific skill) physical performance tests. Tests were performed under three equipment conditions: 1) traditional load-bearing police belt, 2) load-bearing vest system, and 3) uniform only (control). A series of ANOVAs were used to compare performance between equipment conditions. As a measure of practical significance, control trials were used to estimate a smallest worthwhile change ( $SWC = sd \times 0.2$ ). Finally, following each test and equipment condition, participants were asked to provide a subjective rating of their performance between conditions. **RESULTS:** No statistically significant ( $p > 0.05$ ) differences were found when comparing performance between equipment conditions in any test. Additionally, no differences observed between conditions were large enough to be considered practically "meaningful" (i.e.,  $>$  the smallest worthwhile change). **CONCLUSIONS:** These results indicate no distinct performance advantage from either style of load-bearing equipment. Interestingly, when performance was expressed categorically for each participant (i.e., "better in vest", "better in belt", or "no change") the vest outperformed the belt. Finally, the majority of participants perceived their performance to be better using the vest in addition to rating the vest as more comfortable. Although no meaningful acute performance differences were found between load-bearing equipment, the vest system may be preferable given its positive influence on perceived performance and comfort.

#### **P289: ENDURANCE EXERCISE TRAINING IMPROVES THE ANTI-OXIDATIVE PROPERTIES OF HIGH-DENSITY LIPOPROTEINS (HDL)**

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**BACKGROUND:** The functional properties of high-density lipoproteins (HDL), such as reduced antioxidant function that is linked to increased HDL lipid peroxidation (HDLox), may be more indicative of cardiovascular risk than HDL cholesterol (HDL-C) concentrations. Although exercise is well known to improve HDL-C, the effects of chronic exercise on HDLox are less understood. **PURPOSE:** To

examine changes in HDLox in response to exercise training and how these changes relate to concomitant changes in other HDL-related traits. **METHODS:** HDLox was quantified in apoB-depleted serum before and after 20 weeks of endurance exercise training in 149 subjects (age 34.3±13.3 years, 60% female, 30% self-identified Black) from the HERITAGE Family study using the Amplex Red cholesterol assay (Invitrogen). A lower HDLox indicates improved HDL function. Exercise induced changes were calculated as the difference between post-training and baseline values. Exercise response was examined via paired t-tests in the total sample and stratified by sex. Partial correlations controlling for age, sex, and race were performed to investigate associations between HDLox and HDL traits in response to exercise training. **RESULTS:** HDLox significantly decreased following exercise training (mean -3.1%, standard error (SEM) 2.0,  $p=0.004$ ). HDLox training response differed by sex ( $p=0.01$ ), with females showing a significant decrease (-7.3%, SEM 2.6%,  $p=0.0006$ ), while males exhibited no change (3.2%, SEM 3.0%,  $p=0.87$ ). Exercise-induced changes in HDLox were inversely correlated with concomitant changes in HDL-C ( $r = -0.57$ ,  $p < 0.0001$ ), apoA-I ( $r = -0.30$ ,  $p < 0.0001$ ), and HDL-TG ( $r = -0.20$ ,  $p = 0.03$ ). Additionally, changes in HDL particle size ( $r = -0.33$ ,  $p = 0.002$ ) and the concentrations of total ( $r = -0.20$ ,  $p = 0.03$ ), large ( $r = -0.27$ ,  $p = 0.002$ ), and medium ( $r = -0.19$ ,  $p = 0.03$ ) HDL particles were inversely correlated with change in HDLox. **CONCLUSION:** Endurance exercise training improved HDL function with respect to its anti-oxidative properties. Improvements in HDLox appear stronger in women and related to increases in HDL-C, HDL size, and the concentration of medium and large HDL subclasses. Further studies are needed to identify the mechanisms underlying sex differences, including differences in endogenous hormone levels.

#### **P290: FACTORS THAT INFLUENCE PHYSICAL FITNESS PARTICIPATION IN OLDER ADULTS IN A METROPOLITAN COUNTY**

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**BACKGROUND:** Around 10% of deaths among adults ages 40-69 and 7.8% of deaths among adults ages 70 and older are attributed to physical inactivity as only 28-34% of adults ages 65-74 are physically active. (CDC, Behavioral Risk Factor Surveillance System, 2020). Considering these statistics, A local county parks and recreation centers connected with a local university that offer senior fitness classes decided to determine factors that influence participants physical activity commitment. **METHODS:** The participants were 150 volunteers, ≥ 65 years and had participated in fitness classes recreation center for six months or more. Participants completed a consent form and completed a modified version of Group Health Clinics in Kings County, Washington (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4453303/>) questionnaire. **RESULTS:** The questionnaire consisted of eight questions and a selected summary is shared below. 1. When considering your daily tasks how important is physical activity? Response 140 stated especially important. 2. What can your program do to support you to do more physical activity? 135 stated to continue and add classes. 3. How often do you attend fitness classes at this facility? 107 of the older adults stated ≥ 3 days a week. 4. Would you be interested in using technology within your classes? 76 stated yes and 61 said no. 5. Giving a choice would you desire a physical activity class only or a more comprehensive class (i.e... Nutrition, wellness, and healthy aging)? 122 of the participants stated a comprehensive program. **CONCLUSIONS:** The results from this study indicate that the participants, value physical activity, enjoy and are committed to class participation three or more days a week and would prefer a class that include overall wellness as opposed to a physical activity class only. The results from this survey are only for older participants in this community but provide a protocol that may be of value in helping other communities determine fitness needs of their older adults.

#### **P291: ATTENUATION OF VO<sub>2</sub> SLOW COMPONENT DURING HEAVY-INTENSITY INTERVAL EXERCISE**

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**Background:** The VO<sub>2</sub> slow component (VO<sub>2sc</sub>) is a slow, exponential increase in VO<sub>2</sub> that takes place during constant load exercise above the ventilatory threshold (VT). **Purpose:** This study aimed to examine the amplitude of the VO<sub>2sc</sub> during various heavy intensity interval exercise protocols when controlling the VO<sub>2</sub> on-kinetics. **Methods:** Six males (24 ± 5 yrs.) participated in a total of 7 visits. The first visit consisted of a graded exercise test (20 W/min) until volitional fatigue.

$VO_{2peak}$  was determined as the highest  $VO_2$  averaged over a 15-second interval, and was used to determine the subject's work rates for each experimental condition that corresponded with 50% of the difference between  $VO_{2peak}$  and VT ( $\Delta 50\%$ ). The three experimental conditions were: continuous (CON), intermittent (INT), and extended intermittent (EXT), two trials were completed for each condition. Pulmonary gas exchange ( $VO_2$ ,  $VCO_2$ ) and minute ventilation ( $V_E$ ) were measured through breath-by-breath analysis. Each experimental condition consisted of a 4-minute warm-up (20W), followed by heavy intensity exercise. To control on-transition kinetics, the work rate during the initial 3 min for each condition was kept the same. During CON, work rate was unchanged for 3 additional min. During INT, the remaining 3 min consisted of 3 s rest intervals interspersed every 10 s. For the EXT condition, 3 s recovery intervals were inserted every 10 s until the total work performed matched the total work performed for the CON condition. Phase II  $VO_2$  responses (time constant,  $\tau VO_2$ ) were analyzed using either a 2- or 3-component exponential model after interpolating to 1 s and ensemble averaging each trial. One-way ANOVAs were computed to assess the difference in means for each condition. Significance was established if  $p < 0.05$ . **Results:**  $\tau VO_2$  was similar (CON:  $32.5 \pm 1.7$  s; INT:  $36.6 \pm 1.8$  s; EXT:  $36.1 \pm 2.6$  s,  $p=0.50$ ) as expected. The amplitude of  $VO_{2SC}$ , as measured by  $\Delta VO_{2(6-3)}$ , was decreased in both INT and EXT compared to the CON condition ( $-8 \pm 35$  mL/min;  $-39 \pm 43$  mL/min;  $367 \pm 50$  mL/min,  $p < 0.001$ ).  $\Delta HR_{(6-3)}$  was lower in INT and EXT ( $3 \pm 2$  bpm;  $3 \pm 1$  bpm, respectively) compared to CON ( $15 \pm 2$  bpm,  $p < 0.001$ ). **Conclusion:** These findings suggest that the  $VO_{2SC}$  was abolished with the addition of 3 s recovery intervals (INT and EXT). This is possibly due to myocardial work, as evidence by  $\Delta HR_{(6-3)}$ , being lower in INT and EXT compared to CON.

#### P292: ABSTRACT WITHDRAWN

#### P293: RELATIONSHIP BETWEEN HEART RATE VARIABILITY DERIVED FROM FINAPRES SOFTWARE AND KUBIOS

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Background: There are various tools and techniques used to measure and quantify heart rate variability (HRV) in both applied and clinical settings. Traditionally, in applied settings, measures derived from a particular device will be evaluated using the online software Kubios. In the clinical setting, the Finapres (Fin) is commonly used and has its own software to provide a measure of HRV. The purpose of this study is to determine if the Fin provides a comparable HRV measure to that of Kubios. Methods: Ten healthy individuals (6 males, 4 females, ages  $23 \pm 2$  yrs) volunteered in this study. Participants were asked to visit the lab three times in a 10-day span. On each visit, participants' resting HRV was collected via electrocardiogram (ECG). Participants were then placed in a supine position in a dimly lit room for a 10-

minute recording. The final five minutes of each tracing was used. Each file was evaluated directly from the Fin software (Finapres, NOVA) for analysis of HRV metrics: root mean square of successive differences (RMSSD), standard deviation of normal-to-normal sinus beats (SDNN), high frequency (HF), and low frequency (LF). Data files were then transferred to the online software Kubios HRV Standard (version 3.5.1) for analysis of the same HRV metrics. Using the Kubios software, tracings were evaluated with no correction (NC), very low correction (VLC), and low correction (LC). SPSS was used and alpha was set to 0.05. Results: A total of 30 recordings were analyzed. A two-tail Pearson correlation was used to determine relationships between HRV markers derived from the Fin versus Kubios (NC, VLC, LC). The Pearson correlations Fin vs NC: RMSSD ( $r=.798$ ,  $p<.001$ ), SDNN ( $r=.76$ ,  $p<.001$ ), HF ( $r=.821$ ,  $p<.001$ ), LF ( $r=.701$ ,  $p<.001$ ). Fin vs VLC: RMSSD ( $r=.873$ ,  $p<.001$ ), SDNN ( $r=.767$ ,  $p<.001$ ), HF ( $r=.868$ ,  $p<.001$ ), LF ( $r=.71$ ,  $p<.001$ ). Fin vs LC: RMSSD ( $r=.881$ ,  $p<.001$ ), SDNN ( $r=.762$ ,  $p<.001$ ), HF ( $r=.869$ ,  $p<.001$ ), LF ( $r=.719$ ,  $p<.001$ ). Conclusions: The primary finding of this study suggest that Fin derived HRV measures rely on a proprietary correction factor that most reflects that of the VLC of Kubios. This is well within the acceptable correction of beat-to-beat intervals, and therefore may be considered comparable to measures derived from Kubios.

#### P294: RELIABILITY OF MULTIPLE ORAL GLUCOSE TOLERANCE TESTS WITHIN A 10-DAY PERIOD

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Background: An oral glucose tolerance test (OGTT) is a standard marker used to indicate glucose regulation and metabolic health. Often, these are performed at a single time point. However it is not known if there are natural variations that may occur independent of physiological changes or adaptations. Therefore, the purpose of this project was to evaluate the variation between 2-hour OGTT. Methods: Ten (6 males, 4 females) healthy participants (ages  $23 \pm 2$  yrs), volunteered for this study. Participants visited the lab on three separate occasions over a 10-day span. During each visit, participants' body composition (BF%) via bioelectrical impedance analysis (BIA), and hydration status via urine specific gravity (USG), were collected upon arrival. Immediately following, participants underwent a two-hour OGTT, consuming a 75g glucose (GLU) beverage. Plasma GLU measurements were taken via finger stick at resting (PRE), 30-minute post (30-P), 1 hour post (1h-P), and 2-hour post (2h-P) using a glucometer (Contour Next One). Area under the curve (AUC) was calculated for visit 1 (AUC1), visit 2 (AUC2) and visit 3 (AUC3). SPSS version 28.0 was used for all calculations and alpha was set to 0.05. Results: Average body mass ( $77 \pm 15$  kg), BF% ( $22 \pm 11\%$ ), and USG ( $1.023 \pm 0.02$ ). A 3 (trial) by 4 (time) Repeated Measures Analysis of Variance (RM-ANOVA) was performed and found no significant trial differences ( $p = 0.132$ ), but there was a significant time difference ( $p = <.001$ ), and a trending time by trial interaction ( $p = 0.078$ ). A one-way repeated-measures ANOVA found a significant difference among AUC measures ( $p = 0.027$ ). A post hoc paired samples t-test reported that AUC1 was significantly different from AUC2 ( $p = 0.022$ ), but there were no differences between AUC1 and AUC3 ( $p = 0.055$ ), or between AUC2 and AUC3 ( $p = 0.461$ ). Conclusions: The primary finding of this study suggest that OGTT results show deviations within a 10-day period that are independent of physiological alterations known to alter metabolic regulation (i.e., BF%). Interestingly, AUC1 was larger than AUC2, and trended larger than AUC3. Therefore, multiple OGTTs may be necessary to avoid an artificially elevated score.

#### P295: ARE RECRUITMENT STRATEGIES BIASED DURING BILATERAL ECCENTRIC HAMSTRING EXERCISES? - A REPEATED MEASURES DESIGN

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Recent evidence has questioned the utility of eccentric exercise in the prevention of hamstring (HS) strains. Recruitment strategies between limbs may influence eccentric HS exercise. **PURPOSE:** The purpose of this investigation is to examine whether the bilateral eccentric HS displays unilateral bias and whether that bias can be attributed to strength asymmetries. **METHODS:** Thirty college-aged participants (weight:  $77.91 \pm 12.76$  kg; height:  $172.82 \pm 7.74$  cm) with prior resistance training performed dynamic mobility drills targeting the posterior chain prior to maximum voluntary contractions (MVC). Isometric dynamometry determined peak torque for the gluteus

maximus and medial gastrocnemius in prone. Seated Isokinetic dynamometry at 60° and 120° per second determined concentric and eccentric peak torque of the quadriceps (Q) and HS. Ipsilateral strength ratios (Qcon60°/HSecc120°) were examined with a paired t-test,  $\alpha = 0.05$ . Surface electromyographic (sEMG) was bilaterally recorded from the medial gastrocnemius (MG), semitendinosus (ST), biceps femoris (BF), and gluteus maximus (GMax) and was normalized to peak torque output during MVCs (%MVC). Eccentric HS exercise was normalized to MVCs and reported as mEMG within each variation; Flat Nordic Hamstring Exercise (F-NHE), Razor Curl (RC), NHE at 7° Decline (D-NHE), and Ab-Wheel Assisted NHE (A-NHE) ( $n = 3$  reps each). Heart rate (HR) was obtained prior to each exercise variation in conjunction with verbal confirmation of exercise readiness. Separate 3-way (variation, side, rep) RM-ANOVAs were conducted for mEMG on each muscle and are presented relative to EMG collected at peak force during Isokinetic MVC (ST, BF) and Isometric MVC (Gmax, MG). **RESULTS:** Left ( $M = 1.21$ ,  $SD = 0.45$ ) and right ( $M = 1.12$ ,  $SD = 0.50$ ) Qcon60°/HSecc120° did not differ,  $p = 0.24$ ,  $d = 0.18$ . Separate Greenhouse-Geisser corrected RM-ANOVAs did not detect a 3-way interaction between variation, side, and rep on MG mEMG,  $F(2.53, 70.75) = 1.16$ ,  $p = 0.329$ ,  $\eta^2 = 0.040$  or BF,  $F(1.38, 37.34) = 1.55$ ,  $p = 0.226$ ,  $\eta^2 = 0.054$ . However, a main effect of the side was detected for Gmax,  $F(1, 27) = 22.753$ ,  $p < 0.001$ ,  $\eta^2 = 0.46$ . The pairwise comparison found an 18.54 %MVC (95% CI: 10.57 to 26.52) difference between the right ( $M = 56.27$  %MVC, 95% CI: 44.20 to 68.34) and left ( $M = 37.73$  %MVC, 95% CI: 28.54 to 46.92) sides,  $p < 0.001$ . A main effect of the side was also detected for ST,  $F(1, 28) = 7.46$ ,  $p < 0.011$ ,  $\eta^2 = 0.210$ . Left ST ( $M = 60.39$  %MVC, 95% CI: 45.86 to 74.92) was 15.95 %MVC (95% CI: 3.99 to 27.92) greater than the right ( $M = 44.44$  %MVC, 95% CI: 37.26 to 51.62),  $p < 0.011$ . **CONCLUSIONS:** Despite no difference in strength ratios, these data support biased recruitment in the GMax the contralateral ST across eccentric HS variations.

#### P296: THE EFFECT OF ONE NIGHT OF SLEEP FRAGMENTATION ON SUBSEQUENT AEROBIC PERFORMANCE

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Sleep is a vital component of health and wellness. Poor sleep has been shown to significantly impact athletic performance. Most research, however, has focused on several days or more of sleep deprivation. Sleep fragmentation is defined as multiple arousals during the night, which may impact an athlete before an important event due to pre-competition anxiety.

**PURPOSE:** To examine the effect of one night of sleep fragmentation (SF) on cycle time trial (TT) performance compared to a night of normal sleep (NS).

**METHODS:** Eight active individuals [age = 20.4 ± 1.7 yr.; body mass index (BMI) = 22.0 ± 2.1;  $\dot{V}O_{2max} = 41.1 \pm 9.8$  mL·kg<sup>-1</sup>·min<sup>-1</sup>] completed 3 performance trials (1 familiarization and 2 experimental) consisting of a 3-kilometer time trial (TT) on a cycle ergometer. Trials were performed after NS (6-8 hours) or SF. The SF condition consisted of being awakened at least one time per hour of sleep for 8 hours. The trials were performed at the same time of day (8:00 - 10:00 am), with randomly counter-balances sleep conditions. Diet was replicated prior to each trial and physical activity was monitored for 48 hours prior to each trial with accelerometer. Sleep was monitored via accelerometry the night of the experimental trials to confirm sleep duration. Data are presented as means ± SD.

**RESULTS:** There was no difference in peak power (294 ± 107 vs. 306 ± 123 Watts for SF and NS, respectively;  $P = 0.7$ ), average heart rate (162 ± 16 vs. 168 beats·min<sup>-1</sup> ± 12;  $P = 0.5$ ), or TT finish time (5.6 ± 1.0 vs. 5.5 ± 1.0 minutes;  $P = 0.1$ ) between the experimental trials. Average TT power trended towards significance (211 ± 83 vs. 228 ± 100 Watts for SF and NS, respectively;  $P = 0.08$ ). Peak TT oxygen consumption was lower during the SF trial (43.6 ± 12.3 mL·kg<sup>-1</sup>·min<sup>-1</sup>) compared to the NS trial (47.9 ± 11.5 mL·kg<sup>-1</sup>·min<sup>-1</sup>;  $P = 0.017$ ), while average oxygen consumption trended lower during the SF trial (37.0 ± 11.5 mL·kg<sup>-1</sup>·min<sup>-1</sup>) compared to NS (44.6 ± 14.2 mL·kg<sup>-1</sup>·min<sup>-1</sup>,  $P = 0.07$ ).

**CONCLUSION:** Results showed that SF may impact subsequent 3-km TT performance, reflected by a lower peak  $\dot{V}O_2$  and a trend towards lower average power output and oxygen consumption, although there were no differences in TT finish time. Further research with a larger sample size is needed to make more definitive conclusions about the potential consequences of SF.

#### P297: THE VALIDITY OF THE VMAXPRO DURING COUNTERMOVEMENT JUMP AND BACK SQUAT PERFORMANCE

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**Background:** Advances in technology have resulted in an increase in the utilization of velocity-based training in the strength and conditioning field while utilization of inertia measurement units (IMUs) shows promise. **Methods:** Recreationally trained participants ( $N=25$ ,  $28.3 \pm 2.9$  years) were recruited to determine the validity of the VmaxPro device for measuring performance variables in the back squat and countermovement jump (CMJ) against a gold standard forceplate. Squat variables assessed included mean concentric velocity (MCV), mean concentric power (MCP), depth, and duration while CMJ variables assessed included MCV, MCP, depth, duration, and jump height. Squat variables were assessed across 3 conditions: BW, 50% BW, and 100% BW. **Results:** MCV demonstrated strong correlations in the BW, 50% and 100% conditions ( $r = 0.965$ ;  $r = .907$ ;  $r = 0.827$ ,  $p < 0.001$ ). MCP demonstrated strong correlations across all 3 squat conditions ( $r = 0.979$ ,  $0.960$ , and  $0.887$ , respectively). MCV and jump height demonstrated strong correlation ( $r = 0.6-0.79$ ) in the countermovement jump ( $r = 0.728$   $p < 0.001$  and  $r = 0.796$   $p < 0.001$ , respectively). Bland-Altman analysis demonstrated that all measurements fell within the 95% confidence interval between devices. Mean differences between measures showed a consistent overestimation produced by the VmaxPro device. **Conclusion:** The VmaxPro is a reasonably valid device for assessing duration, and jump height when assessing CMJ performance as compared to the force plate while demonstrating overestimation bias. For back squat performance variables, the VmaxPro proves as a reasonably valid device for assessing MCV, MCP, depth, and duration while demonstrating overestimation bias in MCV and MCP.

#### P298: AN EXPLORATION OF ACL RECONSTRUCTION COSTS AND SOCIAL DETERMINANTS OF HEALTH

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**Background:** Recent investigations have turned their attention to outcomes associated with various social determinants of health (SDOH) such as race, ethnicity, income and payor in patients that undergo ACL reconstruction (ACLR). It is imperative that we examine relevant SDOH in relation to ACLR costs and procedures to develop meaningful policies or procedures that address inequities in post-surgical outcomes. Therefore, this study examined the relationships between patient SDOH characteristics, costs, and number of in-scope procedures associated with ACLR encounter data from the Nationwide Ambulatory Surgery Sample (NASS), Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality.

**Methods:** Data from the 2019 NASS and IRB approval were obtained. Patient encounters with a diagnosis code for ACL sprain and CPT code for ACLR, along with all SDOH variables were included ( $n=57,666$ ). The total charges, number of concomitant in-scope procedures performed, and SDOH variables (race and ethnicity and expected primary payor) were explored. Descriptive statistics were calculated, and chi-square tests and separate analyses of variance were performed. **Results:** The average total charges for the included patient encounters was \$41,572.38±\$24,444.13. The average number of CPT codes was 1.8 (range 1-13). Almost 75% of the patients were privately insured ( $n=41,052$ ). Patients with private insurance had less (1.78±0.77) in-scope CPT codes compared to patients with Medicaid (1.84±0.83,  $p < 0.001$ ) and patients with "other" as their expected payor (1.87±0.82,  $p < 0.001$ ). Patients of white race were more likely to have private insurance and non-white patients were more likely to have Medicaid ( $p < 0.001$ ). White patients had significantly lower total charges compared to non-white patients ( $p < 0.001$ ), and patients with private insurance had lower total charges than patients with Medicaid insurance ( $p < 0.001$ ). **Conclusions:** Patients of non-white race had more additional surgical procedures performed, were more likely to have Medicaid insurance, and had higher total charges. The literature suggests that these patients are more likely to have poor outcomes than white patients or patients with private insurance. Future research should continue to identify these relationships in post-operative outcomes to support policies to address post-outcome inequities in patient care.

#### P299: IMPACT OF CANNABIDIOL (CBD) OIL AFTER ECCENTRIC LOADING ON PHYSICAL PERFORMANCE AND PAIN

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**BACKGROUND:** The use of CBD as an alternative for pain management has increased in the last few years. CBD is purported to contain anti-inflammatory properties, decrease exercise induced muscle soreness, and reduce anxiety. Research has shown promising results in animal subjects; however, research with human participants is limited. Therefore, the purpose of this investigation was to evaluate the impact of two doses of CBD oil on performance and pain after an eccentric loading protocol. **METHODS:** Participants ( $n = 4$ ) participated for three

weeks, with a washout period between weeks. Baseline measurements included strength using handgrip dynamometry and bicep curl dynamometry and pain using a visual analog scale. At the beginning of each week, participants were subjected to a loading protocol of six sets of ten bicep curl eccentric only repetitions using a cable column. Participants consumed capsules of either a placebo, low dose (2mg/kg) or high dose (10mg/kg) of CBD oil immediately following the session and again twelve hours later. CBD supplementation continued every twelve hours for 48 hours. Outcome measures (handgrip strength, bicep curl strength, and pain) were repeated 24, 48, and 72 hours after each initial session. Data were analyzed using three by four repeated measure ANOVAs for condition and time. RESULTS: There were no differences in handgrip strength between conditions ( $F(2,6)=0.542, p=0.607, \eta_p^2=.153$ ) or across time ( $F(3,9)=2.235, p=.153, \eta_p^2=.427$ ). There were no differences in bicep curl strength between conditions ( $F(2,6)=0.675, p=0.554, \eta_p^2=.184$ ) or across time ( $F(3,9)=3.513, p=.150, \eta_p^2=.539$ ). There were no differences in pain between conditions ( $F(2,6)=0.495, p=0.633, \eta_p^2=.142$ ), but there was a difference across time ( $F(3,9)=7.028, p=.010, \eta_p^2=.701$ ). There were no significant interactions to note. CONCLUSIONS: The chosen eccentric loading protocol was sufficient to cause delayed pain in participants. The CBD supplementation did not appear to make functional or pain related differences when compared to the placebo. However, observed effect sizes may indicate larger sample sizes are needed to identify differences between conditions. Future research should include larger sample sizes and implement eccentric exercise across a larger part of the body.

### **P300: DISCORDANCE OF SEDENTARY TIME REPORTING IN ADULTS WITH TOTAL KNEE REPLACEMENT**

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Background: Excess sedentary behavior, defined as waking behavior in a sitting/reclining/lying posture  $\leq 1.5$  metabolic equivalents, is associated with risk for types of cancers, cardiovascular disease, and type 2 diabetes. Due to the habitual nature of sedentary behavior, it is difficult to obtain an accurate estimate of sedentary time (ST), particularly among those who spend the majority of waking hours sitting. The purpose of this study was to compare differences and level of agreement between adults self-reported ST and objectively measured ST. Methods: As part of a sedentary reduction intervention for adults following knee replacement (TKR), participants ST was self-reported (screening item and SIT-Q) and objectively measured (activPAL). The screening item asked hours per day (h/d) that participants spend sitting. The SIT-Q-7d is a self-administered questionnaire that quantifies ST in the last 7 days by assessing behavior across five domains of daily life activities and calculates weekday and weekend SIT-Q scores (h/d). For 7 days, participants wore an activPAL on their thigh, the gold standard for assessing sedentary behavior, to measure ST (h/d). Paired samples t-test compared mean differences in ST between the self-reported measures and activPAL. Interclass correlation coefficient (ICC) measured the extent of agreement between self-reported and objectively measured ST. Results: Participants ( $n=32$ ) were 62.5% female, 90.6% White,  $64.2 \pm 9.5$  yrs,  $32.8 \pm 6.3$  kg/m<sup>2</sup> BMI. Self-reported ST via screener ( $8.9 \pm 2.1$  h/d) was significantly lower ( $p < 0.001$ ) than activPAL ST ( $12.1 \pm 2.3$  h/d). There were no differences ( $p=0.976, p=0.083$ ) in ST between SIT-Q weekday ( $12.1 \pm 3.4$  h/d) or weekend ( $10.7 \pm 3.4$  h/d) compared to activPAL. ICC between the activPAL and screener was 0.355, 95% CI 0.008 - 0.626, between the activPAL and SIT-Q weekday was 0.075, 95% CI -0.281 - 0.413, and between the activPAL and SIT-Q weekend was -0.068, 95% CI -0.407 - 0.287. Conclusion: Overall, the level of agreement in ST was low between the self-reported and objective measures in adults after TKR. The one-item screener question resulted in significantly lower estimates of ST than that measured by the activPAL. Caution is warranted on future use of this one item to obtain an accurate measure of ST in this population. If objective measures are not available, the SIT-Q would provide a closer estimate of ST. Funding: This research was supported by NIAMS R21AR074780