AMERICAN COLLEGE of SPORTS MEDICINE®

Southeast Chapter

2021 Annual Meeting

Program

Conference Information

Schedule and Presentation Listing

Abstracts

February 18-19, 2021

Welcome to the 2021 Annual Meeting!

We are pleased to present our 49th Annual Meeting and first *virtual* Annual Meeting this year! At a time when so many events have been postponed or cancelled, we are grateful that we are able to meet again this year. We are also thankful to our members for registering for the meeting, submitting their research, and volunteering to help organize the conference. Most of all, we appreciate your patience as we moved our meeting to a virtual platform.

The conference consists of over 250 presentations including 218 posters, 6 review/symposia, 24 student award competition posters, 5 invited lectures, and 5 clinical case presentations in the Sports Medicine Physician Track program. We also have three special events: the Emily Haymes Mentoring "Breakfast", the Biomechanics special interest group meeting, and the awards ceremony for the Student Award Poster Competition. Throughout the meeting, the virtual Graduate School Fair and Exhibit Hall will be open.

We are hosting our meeting using the Symposium by ForagerOne platform. The conference will include posters, review/symposia, clinical case presentations, and invited lectures. Most presentations will be an online poster format, some of which include a short video explanation from the author, and a mechanism for engagement and discussion with attendees. Poster presentations and symposia will be available throughout the conference with scheduled sessions to interact with presenters. Invited lectures will be pre-recorded with live chat with presenters during those sessions. The Sports Medicine Physician program, Emily Haymes Mentoring event, and the awards ceremony will be streamed live.

We hope you will find that this meeting captures most of what makes our annual meeting such an important event. Hopefully, we can meet in person again next year for the 50th Annual Meeting in Greenville, SC on February 17–19, 2022!

Wishing you a successful meeting,

The SEACSM Executive Board

How to Access the Virtual SEACSM Annual Meeting

All sessions for the 2021 Southeast ACSM Annual Meeting are available through the Symposium by ForagerOne platform. To access the meeting content, you must log in using the same email address you used to register for the conference.

LOGIN HERE: **https://symposium.foragerone.com/seacsm2021**

Once you log in, you can see all presentations by clicking the **Presentations** link at the top of the page. You can use the checkboxes along the left side to filter by session, presentation topic category, and presentation type. This is the easiest way to find specific sessions or topics, as well as the Graduate School Fair and Exhibitor presentations. You can also search for specific authors, titles, and keywords using the search bar at the top of the page. Once you select a presentation you can read the abstract, view the poster and/or video, and leave comments for the presenter.

Links to the ACSM Presidential Address, Keynote Address, Basic Science Lecture, Clinical Crossover Lecture, Montoye Award Lecture, Sports Medicine Physician program, Emily Haymes Mentoring event, Biomechanics Interest Group, and the awards ceremony are available under the **Live Sessions** link.

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 2021 Annual Meeting is approved for 15 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.

2021 Annual Meeting Planning Committee

The Annual Meeting is planned by the SEACSM Executive Board:

John Petrella, *President*. Samford University, jkpetrel@samford.edu

Rebecca Battista, *Past-President*. Appalachian State University, battistara@appstate.edu

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

Yuri Feito, *At-Large Member*. Kennesaw State University, yfeito@kennesaw.edu

Jennifer Bunn, *At-Large Member*. Sam Houston State University, jab229@shsu.edu

Eric Plaisance, *At-Large Member*. University of Alabama-Birmingham, plaisep@uab.edu

Kim Reich, *At-Large Member*. High Point University, kreich@highpoint.edu

Jonathan Ruiz-Ramie, *Student Representative*. Augusta University, jruizramie@augusta.edu

Dulce Gomez, *Student Representative*, Auburn University, dhg0008@auburn.edu

Brent Messick, *Clinical Representative*. Atrium Health Musculoskeletal, brent.messick@atriumhealth.org

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

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

Kevin McCully, *Representative to ACSM*. University of Georgia, mccully@uga.edu

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

Sports Medicine Physician Track Program

Program Description

The Physician Track Program this year is focused on the latest evidence based sports medicine and how it is influencing current clinical practice. We are honored to have nationally recognized speakers and fellowship Program Directors in the field of Sports Medicine. We appreciate your attendance at our 49th Annual Sports Medicine Physician Track Program. The program will be held on Friday, February 19 from 8:00 am–1:00 pm.

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 though 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 4.0 AMA PRA Category 1 Credits. 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.

CME Objectives

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

1. Understand the evidence surrounding concussions and return to play
2. Learn which injuries and musculoskeletal conditions respond best to physical therapy
3. Understand what the latest evidence shows for use of musculoskeletal ultrasound and PRP
4. Confidently manage the spine injured athlete and learn the latest techniques for cervical spine immobilization
5. Learn the latest cardiac recommendations including return to play after COVID-19 infection

Sports Medicine Physician Track Officers

Brent Messick, MD, FACSM SEACSM Executive Board Clinical Representative

Ryan Draper, DO. Chair, Physician Track Meeting

Leonardo Oliveira, MD. Vice Chair, Physician Track Meeting

Clinical Case Reviewers

Ken Barnes, MD, FACSM. Miami University

Brent Messick, MD, FACSM. Atrium Health Musculoskeletal Institute

Ryan Draper, DO. Cone Health Sports Medicine Center

Sports Medicine Physician Track Program

Evidence Based Sports Medicine: Practice Changing Research

Friday, Feb. 19

8:00–8:15 am	**Opening Remarks**
8:15–8:45 am	**PRP** Leonardo Oliveira, MD *Cleveland Clinic Florida*
8:45–9:15 am	**PT** John Kiel, DO *University of Florida–Jacksonville*
9:15–9:45 am	**Concussions** Andrew Gregory, MD *Vanderbilt University*
9:45–10:00 am	**Discussion**
10:00–10:30 am	**Break**
10:30–11:00 am	**C-Spine** Kim Kaiser, MD *University of Kentucky*
11:00–11:30 am	**Ultrasound** Shane Hudnall, MD *Cone Health Sports Medicine Center*
11:30–11:45am	**Discussion**
11:45 am–12:00 pm	**Break**
12:00–1:00 pm	**Clinical Crossover Lecture** Dermot Phelan, MD *Sanger Heart and Vascular Center*

All times are EST

How to Access the Sports Medicine Physician Track Program

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LOGIN HERE: **https://symposium.foragerone.com/seacsm2021**

Once you log in, select the **Live Sessions** link at the top of the page. The link to the presentations will be posted here.

Emily Haymes Mentoring Event

The 2021 "Breakfast for Dinner" Event

Emily Haymes Mentoring Event is typically a breakfast meeting on Friday morning at the Annual Meeting. This year, the event will be held on **Thursday, February 18 at 6:00 pm**. Attendees will be able to engage with one another on several topics related to career development and the benefits of involvement in SEACSM and ACSM. After an opening panel discussion that will include a history of the mentoring breakfast and a keynote speaker, attendees will attend smaller break out rooms and discuss mentorship within industry, clinical, research, and academic spaces. The event is open to students and professionals.

Keynote Speaker: Dixie Thompson, PhD, FACSM

Dr. Thompson has been a member of the UTK faculty since 1994 and is currently the Vice Provost and Dean of the Graduate School. She holds the rank of Professor in the Department of Kinesiology, Recreation, and Sport Studies where she served as the Department Head from 2008 until 2012. She served as the Associate Dean for Research and Academic Affairs in the College of Education, Health and Human Sciences from 2012 until 2016. In 2008, she attended the HERS Summer Institute at Bryn Mawr College for intensive leadership training in higher education administration. She also participated in the Southeastern Conference Academic Leadership Development Program (2009-2010). Dr. Thompson earned B.A. (Physical Education) and M.A. (Exercise Physiology) degrees from the University of North Carolina at Chapel Hill. She earned a Ph.D. (Exercise Physiology) from the University of Virginia. Dr. Thompson focuses most of her research on the health impact of regular physical activity, particularly in women. Dr. Thompson is a Fellow and former Board of Trustees Member of the American College of Sports Medicine, a Past-President of the Southeast Chapter of the American College of Sports Medicine, and a Fellow of the National Academy of Kinesiology.

2021 Mentoring Breakfast Committee

Amy Knab, PhD, FACSM (Chair)
Queens University of Charlotte

L. Jerome Brandon, PhD, FACSM
Georgia State University

Samuel Buckner, PhD
University of South Florida

Jody L. Clasey, PhD, FACSM
University of Kentucky

Judith A. Flohr PhD, FACSM
James Madison University

Erin Kishman, MS
University of South Carolina

Trudy Moore-Harrison, PhD
University of North Carolina-Charlotte

Leanna Ross, PhD
Duke University

Jonathan Ruiz-Ramie, PhD
Augusta University

Erica Taylor, PhD, FACSM
Columbus State University

Lee Franco, PhD
Virginia Commonwealth University

Liz Edwards, PhD, FACSM
James Madison University

Danielle Wadsworth, PhD, FACSM
Auburn University

Katherine Collins, PhD
Duke University

Becka Kappus, PhD
Appalachian State University

Jordan Taylor
University of Memphis

Emily Haymes Mentoring Event

History of the 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

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.

How to Access the Emily Haymes Mentoring Event

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Virtual Graduate School Fair and Exhibit Hall

Graduate School Fair

This annual event is an excellent opportunity for students to learn about graduate programs in our region. The virtual meeting this year is no exception! Information about institutions and graduate programs are available as poster presentations and will be available throughout the meeting. The Graduate school fair is coordinated by Kim Reich, SEACSM Executive Board member.

2021 Graduate School Fair Participants

Barry University
Emory & Henry College
Florida Gulf Coast University
Gannon University
Georgia Southern University
Georgia State University
Kennesaw State University
Mercer University
Nova Southeastern University
Old Dominion University
Piedmont College
Troy University
University of Alabama
University of Alabama at Birmingham
University of Louisiana at Lafayette
University of North Carolina at Charlotte
University of St. Augustine
University of Tennessee
Wake Forest University
Western Kentucky University

Supporters and Exhibitors

SEACSM 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.

2021 Program Supporters

The Southeast ACSM chapter gratefully acknowledges program support from:

Hologic for their support of body composition presentations

Gatorade Sports Science Institute

American College of Sports Medicine

2021 Exhibitors

Cosmed USA
Creative Health Products
Dairy Alliance
Help Our Wounded
Hologic
Kennesaw State University
Nova Southeastern University
Parker University
Piedmont College
Saint Francis University
University of West Florida

How to Access the Virtual Graduate School Fair and Exhibitors

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Once you log in, select the **Presentations** link at the top of the page. Use the checkboxes along the left side to select **Graduate School Fair** or **SEACSM Exhibitor.** You can also search for a specific program type (MS, DPT, etc.) or product (BodPod). There is also an option to leave comments or questions.

Schedule

Thursday, Feb. 18

12:00–1:00 pm	**Andrew Kozar ACSM Presidential Address** Weight Loss Disparities among Black and White Women – Twenty Years of Clinic Partnerships, Research Recruitment, Enrollment, Randomization, and Outcomes. *NiCole Keith, PhD, FACSM*
1:00–2:00 pm	**Poster and Review/Symposium Sessions I** Psychology/Psychiatry/Behavior Biomechanics Fitness/Testing/Assessment
2:00–3:00 pm	**Poster and Review/Symposium Sessions II** Competitive Athletes Cardiovascular Physiology
3:00–4:00 pm	**Keynote Address** Preventing Sudden Death in the Realm of Sport and Physical Activity. *Douglas Casa, PhD, FACSM*
4:00–5:00 pm	**Student Award Poster Competition** Doctoral Masters Undergraduate
6:00–7:00 pm	**Emily Haymes Mentoring Event**

All times are EST

Share your #SEACSM21 experience

Share your Annual Meeting experience using the #SEACSM21 hashtag. And follow SEACSM on our social media platforms!

@SEACSM Chapter **@SEACSM** **@southeastern_acsm**

Schedule

Friday, Feb. 19

10:00–11:00 am	**Basic Science Lecture** What can basic science teach us about exercise prescription and the treatment of cardiovascular disease? *John Quindry, PhD, FACSM*
11:00 am–12:00 pm	**Poster and Symposium Sessions III** Connective Tissue | Fitness/Testing/Assessment | Exercise Evaluation Chronic Disease & Disability | Environmental Physiology Respiratory Physiology | Epidemiology and Preventative Medicine
12:00–1:00 pm	**Clinical Crossover Lecture** Return to Exercise after Covid-19. *Dermot Phelan, MD*
12:00–2:00 pm	**Biomechanics Interest Group Meeting**
1:00–2:00 pm	**Poster and Symposium Sessions IV** Epidemiology & Preventative Medicine | Psychology/Psychiatry/Behavior Growth/Development/Aging | Pedagogy & Professional Development Connective Tissue | Motor Control and Learning Development
2:00–3:00 pm	**Henry J. Montoye Award Lecture** Prescribing Exercise for Patients with Failing Hearts ..... Is There a Limit? *Peter Brubaker, PhD, FACSM*
3:00–4:00 pm	**Poster and Symposium Sessions V** Respiratory Physiology | Competitive Athletes | Athletic Care/Trauma and Rehabilitation | Metabolism/Carbohydrates/Lipids | Hematology/Immunology | Reproduction
4:00–5:00 pm	**Poster and Review/Symposium Sessions VI** Epidemiology & Preventative Medicine | Nutrition & Exercise/Sport Body Composition
5:00 pm	**Awards ceremony for the Student Award Poster Competition**

All times are EST

Presentation listing

Thursday, February 18, 2021

12:00 - 1:00 ANDREW KOZAR ACSM PRESIDENTIAL ADDRESS

WEIGHT LOSS DISPARITIES AMONG BLACK AND WHITE WOMEN – TWENTY YEARS OF CLINIC PARTNERSHIPS, RESEARCH RECRUITMENT, ENROLLMENT, RANDOMIZATION, AND OUTCOMES.
NiCole R Keith, Ph.D., President ACSM, *Indiana University–Purdue University Indianapolis*.
Presiding: John K. Petrella, SEACSM President, *Samford University*

1:00 - 2:00 SESSION I: REVIEW/SYMPOSIA

COMPONENTS OF THE 24-HOUR ACTIVITY CYCLE AND FEELINGS OF ENERGY AND FATIGUE IN COLLEGE STUDENTS
Ginny M. Frederick, Patrick J. O'Connor, FACSM, Michael D. Schmidt, Ellen M. Evans, FACSM. *University of Georgia, Athens, GA*.

1:00 - 2:00 SESSION I: POSTER FREE COMMUNICATION

SEQUENCE-SPECIFIC IMPLICIT MOTOR LEARNING USING THE NON-DOMINANT LEFT ARM IN A THREE-DIMENSIONAL VIRTUAL ENVIRONMENT
Charles R. Smith[1], Joelle Via[1], Hannah Roark[1], Macie Watkins[1], Jessica F. Baird[2], Jill C. Stewart[1]. *[1]University of South Carolina, Columbia, SC. [2]University of Alabama Birmingham, Birmingham, AL.*

GROUND REACTION FORCES ASSOCIATED WITH THE WIND-UP MOTION IN HIGH SCHOOL BASEBALL PITCHERS
Anthony W. Fava, Jessica L. Downs, Hillary A. Plummer, Gretchen D. Oliver, Nicole Bordelon, Adam Nguyen. *Auburn University, Auburn, AL.*

ROLE OF OCCUPATIONAL FOOTWEAR AND WORKLOAD ON LOWER EXTREMITY MUSCLE ACTIVATION DURING MAXIMAL EXERTIONS AND POSTURAL STABILITY TASKS
Hannah Freeman[1], Harish Chander[1], Alana J. Turner[1], Sachini N.K. Kodithuwakku Arachchige[1], Adam C. Knight[1], Chip Wade[2], John C. Garner[3]. *[1]Neuromechanics Laboratory, Department of Kinesiology, Mississippi State University, Mississippi State, MS. [2]Department of Industrial Systems and Engineering, Auburn University, Auburn, AL. [3]Department of Kinesiology and Health Promotion, Troy University, Troy, AL.*

GROUND REACTION FORCE COMPARISON BETWEEN BAREFOOT AND SHOD SINGLE LEG LANDING AT VARIED HEIGHTS
Jocelyn E. Arnett[1], Cameron D. Addie[2], Hillary A. Plummer[3], Ludmila M. Cosio-Lima, FACSM[1], Lee E. Brown, FACSM[1]. *[1]University of West Florida, Pensacola, FL. [2]Middle Tennessee State University, Murfreesboro, TN. [3]Andrews Institute of Orthopedics and Sports Medicine, Gulf Breeze, FL.*

IMPACT OF PROLONGED EXPOSURE TO SLIPPERY SURFACE ON STATIC POSTURAL STABILITY.
Sachini N K Kodithuwakku Arachchige, Harish Chander, Alana J. Turner, Adam C. Knight. *Mississippi State University, Starkville, MS.*

Thursday, February 18, 2021

1:00 - 2:00 SESSION I: POSTER FREE COMMUNICATION (CONTINUED)

USING VIRTUAL REALITY TO RECREATE THE CLASSICAL "MOVING ROOM" EXPERIMENT TO ASSESS POSTURAL CONTROL
Stephen Luke Ramsey, Sachini N K Kodithuwakku Arachchige, Harish Chander, Alana J. Turner, Adam C. Knight. *Mississippi State University, Starkville, MS.*

TRUNK MUSCLE ACTIVATION AND KINEMATICS DURING BAREFOOT AND SHOD TREADMILL RUNNING
Tania S. Flink, Marianne Spacht, Jeanelle M. Gandia. *Gannon University, Ruskin, FL.*

ASSOCIATIONS BETWEEN A BASEBALL PITCHER'S ARM SLOT AND SHOULDER JOINT LOADS
Luke Maddox, Kyle Wasserberger, Kevin Giordano, Gretchen Oliver, FACSM. *Auburn University, Auburn, AL.*

RUNNING BIOMECHANICS OF YOUTH WITH AUTISM SPECTRUM DISORDER
Hunter J. Bennett, Justin A. Haegele, Taylor K. Jones. *Old Dominion University, Norfolk, VA.*

UPPER EXTREMITY AND PELVIS SEGMENT ENERGY FLOW DURING THE SOFTBALL SWING
Nicole Bordelon[1], Kyle Wasserberger[1], Jessica Downs[1], Kenzie Friesen[1], Kevin Giordano[1], Anthony Fava[1], Abby Brittain[1], Jessica Washington[2], Gretchen Oliver, FACSM[1]. *[1]Auburn University, Auburn, AL. [2]Berry College, Mt Berry, GA.*

ACUTE EFFECTS OF SUBJECTIVELY- VS OBJECTIVELY-REGULATED HIGH INTENSITY INTERVAL EXERCISE ON MOTOR FUNCTION
Randall Booker, Madelyn G. Smith, Madison E. Smith, Elizabeth A. Hubbard. *Berry College, Mount Berry, GA.*

EVIDENCE FOR THE USE OF DYNAMIC MAXIMUM NORMALIZATION METHOD OF MUSCLE ACTIVATION DURING WEIGHT BACK SQUATS
Eva M.U. Maddox, Hunter J. Bennett. *Old Dominion University, Norfolk, VA.*

COMPARISON OF MEAN MUSCLE ACTIVITY DURING THE SQUAT AND COUNTERMOVEMENT JUMPS
Paul T. Donahue[1], Samuel Wilson[2], Charles Williams[3], Christopher Hill[4], John Garner[5]. *[1]University of Southern Mississippi, Hattiesburg, MS. [2]Georgia Southern University, Statesboro, GA. [3]University of North Florida, Jacksonville, FL. [4]Northern Illinios University, DeKalb, IL. [5]Troy University, Troy, AL.*

LONGITUDINAL CHANGES OF A SINGLE SUBJECT IN YOUTH PITCHING
Lori Ann Leineke. *Methodist University, Fayetteville, NC.*

INFLUENCE OF AN ATHLETIC SHOE WITH A COMPRESSION SOCK ON STATIC BALANCE
Hunter C. Derby. *Mississippi State University, Starkville, MS.*

RELATIONSHIP BETWEEN KINEMATICS IN DOMINANT AND NON-DOMINANT HAND TOUCHES DURING THE CKCUEST WITH OVERALL SCORE
Christina Welmaker, Jeff Barfield. *Lander University, Greenwood, SC.*

Thursday, February 18, 2021

1:00 - 2:00 SESSION I: POSTER FREE COMMUNICATION (CONTINUED)

PREDICTING KNEE JOINT CONTACT FORCES USING ONLY 6-KINEMATIC MEASURES AND A NEURAL NETWORK
Kaileigh Estler, Hunter Bennett, FACSM. *Old Dominion University, Norfolk, VA.*

A BIOMECHANICAL ANALYSIS OF THE KNEE DURING THE SUMO AND CONVENTIONAL DEADLIFT
Nicholas A. Lee, Kevin Hall, Michael Dewitt, Amanda Ransom. *Methodist University, Fayetteville, NC.*

DISTANCE RUNNING HIP AND KNEE JOINT PLOTS CHANGE SIGNIFICANTLY DURING A TREADMILL PROGRESSION RUN
Ryan Sloan[1], Jeffrey Wight[1], Jaclyn O'Laughlin[1], Jordon Garman[1], David Hooper[1], Michelle Boling[2], George Pujalte, FACSM[3]. *[1]Jacksonville University, Jacksonville, FL. [2]University of North Florida, Jacksonville, FL. [3]Mayo Clinic, Jacksonville, FL.*

BASEBALL PITCHING MAXIMUM THROWING ARM LOADS POTENTIAL PREDICTORS OF ELBOW VALGUS AND SHOULDER DISTRACTION
Jeff T. Wight[1], Brittany Dowling[2], Chris J. Rodriguez[1], George G.A. Pujalte, FACSM[3]. *[1]Jacksonville University, Jacksonville, FL. [2]Midwest Orthopaedics at Rush, Oak Brook, IL. [3]Mayo Clinic, Jacksonville, FL.*

DOES BASEBALL PITCHING PELVIS ROTATION STYLE INFLUENCE ARM COCKING AND ARM ACCELERATION TEMPORAL AND KINEMATIC VARIABLES
Chris Rodriguez[1], Jeff T. Wight[1], Brittany Dowling[2], George G.A. Pujalte, FACSM[3]. *[1]Jacksonville University, Jacksonville, FL. [2]Midwest Orthopedics at Rush, Oak Brook, IL. [3]Mayo Clinic, Jacksonville, FL.*

A TAEKWONDO INTERVENTION IN ADULTS WITH DOWN SYNDROME
Angela Dolan, Scott Arnett, Kayla Baker, Whitley Stone. *Western Kentucky University, Bowling Green, KY.*

THE EFFECT OF DIVIDED ATTENTION ON RUNNING BIOMECHANICS IN RECENTLY CONCUSSED COLLEGIATE ATHLETES
Natalie S. Hanno[1], Thomas G. Bowman[1], Robert C. Lynall[2]. *[1]University of Lynchburg, Lynchburg, VA. [2]University of Georgia, Athens, GA.*

ELECTROMYOGRAPHIC ANALYSIS OF SHOULDER ROTATION STRENGTH TESTING POSITIONS
Molly M. Cassidy, Nicole Bordelon, Kyle Wasserberger, Kevin Giordano, Gretchen Oliver, FACSM. *Auburn University, Auburn, AL.*

AFFECTIVE RESPONSES FOLLOWING REPETITIONS TO FAILURE AT 30% VERSUS 80% ONE-REPETITION MAXIMUM IN UNTRAINED WOMEN
Caleb C. Voskuil[1], Taylor K. Dinyer[1], Pasquale J. Succi[1], M. Travis Byrd[2], M. J. Garver[3], A. J. Rickard[3], W. M. Miller[4], S. Burns[3], Haley C. Bergstrom[1]. *[1]University of Kentucky, Lexington, KY. [2]Department of Cardiovascular Disease, Mayo Clinic, Scottsdale, AZ. [3]University of Central Missouri, Warrensburg, MO. [4]University of Mississippi, Oxford, MS.*

Thursday, February 18, 2021

1:00 - 2:00 SESSION I: POSTER FREE COMMUNICATION (CONTINUED)

INTER- AND INTRA-INDIVIDUAL DIFFERENCES IN NEUROMUSCULAR RESPONSES DURING LEG EXTENSION EXERCISE PERFORMED AT 70% 1RM
Taylor K. Dinyer[1], Evangeline P. Soucie[2], Pasquale J. Succi[1], Caleb C. Voskuil[1], M. Travis Byrd[3], Haley C. Bergstrom[1]. [1]University of Kentucky, Lexington, KY. [2]University of North Carolina at Chapel Hill, Chapel Hill, NC. [3]Department of Cardiovascular Disease, Mayo Clinic, Scottsdale, AZ.

EFFECTS OF PREFERRED AND NON-PREFERRED WARM-UP MUSIC ON RESISTANCE EXERCISE PERFORMANCE
Georgia Cook, Zachary Hester, Rebecca Rogers, Thomas Kopec, Tyler Williams, Christopher Ballmann. *Samford University, Birmingham, AL.*

EFFECTS OF SELF-SELECTED RESPITE MUSIC ON RESISTANCE EXERCISE PERFORMANCE
Jonathan Lehman, Brooklyn Whitmire, Rebecca Rogers, Thomas Kopec, Tyler Williams, Christopher Ballmann. *Samford University, Birmingham, AL.*

ACCURACY OF PREDICTING ONE-REPETITION MAXIMUM FROM SUBMAXIMAL VELOCITY IN THE BACK SQUAT AND BENCH PRESS
Christian T. Macarilla. *University of South Alabama, Mobile, AL.*

DIFFERING ALTERATIONS IN FORCE PERCEPTION AND STRENGTH FOLLOWING SHORTENING AND LENGTHENING CONTRACTIONS
Katie G. Kennedy[1], Ryan J. Colquhoun[1], Mitchel A. Magrini[2], Sydnie R. Fleming[1], Nile F. Banks[3], Joshua L. Keller[1], Nathaniel D.M. Jenkins[3]. *[1]University of South Alabama, Mobile, AL. [2]Creighton University, Omaha, NE. [3]University of Iowa, Iowa City, IA.*

INDIVIDUAL AND COMPOSITE MUSCLE OXYGEN SATURATION RESPONSES OF THE QUADRICEPS TO FATIGUING DCER EXERCISE
Evangeline P. Soucie, Taylor K. Dinyer, Pasquale J. Succi, Caleb C. Voskuil, Haley C. Bergstrom. *University of Kentucky, Lexington, KY.*

COLLEGE BASKETBALL RECREATIONAL AND CLUB LEVEL POWER AND AGILITY SCORES VS. 2019 NBA DRAFT
Charles Bell[1], Andreas Stamatis[2], Zacharias Papadakis[1]. *[1]Barry University, Miami Shores, FL. [2]SUNY Plattsburgh, Plattsburgh, NY.*

RELIABILITY OF ISOKINETIC KNEE FLEXION AND EXTENSION TOTAL WORK AND UNILATERAL ENDURANCE RATIOS
Matthew D. Watson, George J. Davies, Bryan L. Riemann. *Georgia Southern University - Armstrong Campus, Savannah, GA.*

HEART RATE VARIABILITY PRIOR TO MATCHES DOES NOT DIFFER BETWEEN WINS AND LOSSES IN COLLEGIATE BEACH VOLLEYBALL
Harry P. Cintineo[1], Brittany N. Bozzini[2], Bridget A. McFadden[1], Alexa J. Chandler[1], Thomas D. Cardaci[1], Shawn M. Arent, FACSM[1]. *[1]University of South Carolina, Columbia, SC. [2]United States Army Research Institute for Environmental Medicine, Natick, MA.*

Thursday, February 18, 2021

1:00 - 2:00 SESSION I: POSTER FREE COMMUNICATION (CONTINUED)

A ROADMAP- SOCIAL DISTANCED PHYSICAL ACTIVITY DATA COLLECTION TO PROTECT THOSE WITH INTELLECTUAL DISABILITIES
Whitley Stone, Kayla Baker. *Western Kentucky University, Bowling Green, KY.*

SLOW MOTION VIDEO PHONE APPROACH OF MEASURING FOREARM MUSCLE ENDURANCE
Megan C. Schwinne, Chuan Zhang, Kevin McCully, FACSM. *University of Georgia, Athens, GA.*

SLOW-MOTION VIDEO PHONE ANALYSIS OF MUSCLE CONTRACTION ACCELERATION: THE EFFECT OF VARIATION IN CURRENT
Sushana P. Sudhi, Chuan Zhang, Kevin McCully, FACSM. *University of Georgia, Athens, GA.*

LOWER EXTREMITY STRENGTH AND FATIGUE FOLLOWING MULTI-MODAL EXERCISE AS A POSSIBLE PREDICTOR OF KNEE RE-INJURY
Alexander W. Parsons, Emily Clifton, Kristin M. Mendez, Carol Beatty, Kevin K. McCully, FACSM. *University of Georgia, Athens, GA.*

TEST-RETEST RELIABILITY OF A MAXIMAL VOLUNTARY CONTRACTION FOR THE BILATERAL LEG EXTENSION EXERCISE
Chloe M. Ditka, Taylor K. Dinyer, Pasquale J. Succi, Caleb C. Voskuil, Haley C. Bergstrom. *University of Kentucky, Lexington, KY.*

2:00 - 3:00 SESSION II: REVIEW/SYMPOSIA

TRAINING CONSIDERATIONS FOR OPTIMAL SPORTS PERFORMANCE FOR THE MIDDLE AND ELEMENTARY SCHOOL ATHLETE
Andy Mark Bosak. *Liberty University, Lynchburg, VA.*

2:00 - 3:00 SESSION II: POSTER FREE COMMUNICATION

EFFECT OF ACUTE PROLONGED SITTING, WITH AND WITHOUT INTERRUPTION, ON CARDIO-AUTONOMIC FUNCTION, A META-ANALYSIS
Lauren C. Bates[1], Abdullah Alansare[3],[2], Bethany Barone Gibbs[2], Erik D. Hanson, FACSM[1], Lee Stoner, FACSM[1]. *[1]The University of North Carolina Chapel Hill, Chapel Hill, NC. [2]The University of Pittsburgh, Pittsburgh, PA. [3]King Saud University, Riyadh, Saudi Arabia.*

INTERVAL EXERCISE PRECONDITIONING AND CARDIAC FUNCTION FOLLOWING DOSE-DENSE DOXORUBICIN THERAPY IN BREAST CANCER - PRELIMINARY RESULTS
Nathan Weeldryer[1], Albert G. Wendt[2], Alisia G.T.T. Tran[3], Theresa M. Jorgensen[3], Shannon W. Wilson[3], Nathan Serrano[3], Kathleen Casey[3], Ian Villanueva[3], Corey Mazo[3], Jared M. Dickinson, FACSM[4], Siddhartha S. Angadi, FACSM[1]. *[1]University of Virginia, Charlottesville, VA. [2]University of Arizona Cancer Center, Phoenix, AZ. [3]Arizona State University, Phoenix, AZ. [4]Central Washington University, Ellensburg, WA.*

Thursday, February 18, 2021

2:00 - 3:00 SESSION II: POSTER FREE COMMUNICATION (CONTINUED)

ASSOCIATIONS BETWEEN CAROTID-FEMORAL AND ESTIMATED PULSE WAVE VELOCITY IN OLDER ADULTS: THE ATHEROSCLEROSIS RISK IN COMMUNITIES (ARIC) STUDY

Patricia Pagan Lassalle[1], Michelle L. Meyer[1], Kevin S. Heffernan, FACSM[2], Adam W. Kiefer[1], Lauren C. Bates[1], Erik D. Hanson[1], Masahiro Horiuchi[3], Erin Michos[4], Anna Kucharska-Newton[1], Kunihiro Matsushita[4], Timothy Hughes[5], Hirofumi Tanaka[6], Lee Stoner, FACSM[1]. *[1]The University of North Carolina at Chapel Hill, Chapel Hill, NC. [2]Syracuse University, Syracuse, NY. [3]Mount Fuji Research Institute, Fujikawaguchiko. [4]Johns Hopkins University, Baltimore, MD. [5]Wake Forest School of Medicine, Wake Forest, NC. [6]The University of Texas at Austin, Austin, TX.*

AGREEMENT OF SEATED AND SUPINE PULSE WAVE VELOCITY MEASUREMENTS WITH PROLONGED SITTING

Nathan T. Adams[1], Jillian Poles[1], Elizabeth Kelsch[1], Kevin Heffernan[2], Michelle L. Meyer[1], Kathryn Burnet[1], Robert J. Kowalsky[3], Bethany Barone Gibbs[4], Lee Stoner[1]. *[1]University of North Carolina at Chapel Hill, Chapel Hill, NC. [2]Syracuse University, Syracuse, NY. [3]Texas A&M University-Kingsville, Kingsville, TX. [4]University of Pittsburgh, Pittsburgh, PA.*

EVALUATING SEX DIFFERENCES IN THE CORRELATION BETWEEN PULSE WAVE VELOCITY AND AORTIC SYSTOLIC BLOOD PRESSURE

Rithika Jonnalagadda[1], Anna Boone[2], Arshi Das[3], Joshitha Leo Charles[4], Nicholas Tocci[5], Marco Meucci[5]. *[1]The Early College at Guilford, Greensboro, NC. [2]Southern Lee High School, Sanford, NC. [3]The STEM Early College at NC A&T, Greensboro, NC. [4]Green Hope High School, Cary, NC. [5]Appalachian State University, Boone, NC.*

PHOTOPLETHYSMOGRAPHY PULSE WAVE VELOCITY RELIABILITY AND AGREEMENT WITH A REFERENT DEVICE

Gabriel Zieff[1], Keeron Stone[2], Craig Paterson[2], Simon Fryer[2], Jake Diana[1], Jade Blackwell[1], Michelle L. Meyer[1], Lee Stoner, FACSM[1]. *[1]The University of North Carolina at Chapel Hill, Chapel Hill, NC. [2]University of Gloucestershire, Gloucester.*

SYMPATHETIC NEURAL AND CARDIOVASCULAR RESPONSES TO PHYSIOLOGICAL STRESS IN INDIVIDUALS PREVIOUSLY DIAGNOSED WITH COVID-19

Abigail Stickford, Nina Stute, Valesha Province, Marc Augenreich, Jonathon Stickford, Stephen Ratchford. *Appalachian State University, Boone, NC.*

ALTERATIONS TO ARTERIAL ARCHITECTURE IN YOUNG ADULTS WITH SARS-COV-2

Rachel E. Szeghy, Valesha M. Province, Laurel K. Koontz, Landry K. Bobo, Marc A. Augenreich, Nina L. Stute, Abigail S. Stickford, Jonathon L. Stickford, Stephen M. Ratchford. *Appalachian State University, Boone, NC.*

THE EFFECTS OF EXHAUSTIVE RESISTANCE EXERCISE ON BLOOD PRESSURE AND AUTONOMIC FUNCTION IN RESISTANCE-TRAINED MALES

Makena Clark[1], Ward Dobbs[2], Danilo Tolusso[3], Michael Esco[1], Hayley MacDonald[1]. *[1]The University of Alabama, Tuscaloosa, AL. [2]The University of Wisconsin-La Crosse, La Crosse, WI. [3]Western Kentucky University, Bowling Green, KY.*

Thursday, February 18, 2021

2:00 - 3:00 SESSION II: POSTER FREE COMMUNICATION (CONTINUED)

CHANGES IN ORTHOSTATIC CHALLENGE FOLLOWING MAXIMAL EXERCISE IN YOUNG ADULTS
Emily Bechke[1], Lilly Shanahan[2], Susan D. Calkins[1], Susan P. Keane[1], Laurie Wideman, FACSM[1]. *[1]University of North Carolina-Greensboro, Greensboro, NC. [2]University of Zurich, Zurich, Switzerland.*

VASCULAR DYSFUNCTION IN YOUNG ADULTS WITH SARS-COV-2
Laurel Kaitlyn Koontz, Valesha M. Province, Nina Stute, Marc Augenreich, Landry K. Bobo, Abigail S. Stickford, Jonathan Stickford, Stephan M. Ratchford. *Appalachian State University, Boone, NC.*

THE EFFECT OF EXERCISE ON CHANGE IN ARTERIAL STIFFNESS OVER TIME, A META-ANALYSIS
Jacklyn Rojas, Brisa Barajas, Patricia Pagan Lassalle, Gabriel Zieff, Lauren Bates, Michelle L. Meyer, Lee Stoner. *University of North Carolina at Chapel Hill, Chapel Hill, NC.*

EFFECTS OF BIOLOGICAL SEX ON CARDIAC DYSFUNCTION DURING CANCER CACHEXIA
Louisa Tichy. *University of North Carolina at Greensboro, Greensboro, NC.*

FUNCTIONAL BALANCE AMOUNT MIDDLE-AGED ADULTS AS A RISK FACTOR FOR CARDIOVASCULAR DISEASE.
Hannah M. Twiddy, Leryn J. Reynolds, Patrick B. Wilson. *Old Dominion University, Norfolk, VA.*

BLOOD FLOW RESTRICTION STIMULUS DIFFERS BETWEEN ABSOLUTE AND RELATIVE PRESSURES
Matthew B. Jessee, Daphney M. Stanford, Matthew A. Chatlaong, William M. Miller. *University of Mississippi, University, MS.*

APPLYING RELATIVE AND ABSOLUTE BLOOD FLOW RESTRICTION ALTERS BLOOD FLOW VELOCITY BUT NOT BLOOD PROFILES
Daphney M. Stanford, Matthew A. Chatlaong, William M. Miller, Matthew B. Jessee. *University of Mississippi, Oxford, MS.*

IMPACT OF ACUTE ANTIOXIDANT SUPPLEMENTATION ON NEURAL CARDIOVASCULAR CONTROL IN PSORIATIC SUBJECTS
Nina L. Stute, Stephen M. Ratchford, Kevin A. Zwetsloot, Abigail S.L. Stickford. *Appalachian State University, Boone, NC.*

THE IMPACT OF COVID-19 ON STEP COUNT AND HEART RATE VARIABILITY IN ADULTS.
Brisa Barajas Gomez, Lauren C. Bates, Erik D. Hanson, FACSM, Lee Stoner, FACSM. *UNC Chapel Hill, Chapel Hill, NC.*

Thursday, February 18, 2021

3:00 - 4:00 KEYNOTE ADDRESS

PREVENTING SUDDEN DEATH IN THE REALM OF SPORT AND PHYSICAL ACTIVITY.
Douglas J. Casa, Ph.D. *University of Connecticut*
Opening Remarks: Courteney L. Benjamin, Ph.D., *Samford University*
Presiding: John K. Petrella, SEACSM President, *Samford University*

4:00 - 5:00 POSTER AWARDS: DOCTORAL STUDENTS

PRELIMINARY EVALUATION OF POTENTIAL DETERMINANTS OF EXERCISE TOLERANCE IN EARLY BREAST CANCER SURVIVORS
Chad W. Wagoner, Jordan T. Lee, Claudio L. Battaglini, FACSM. *UNC Chapel Hill, Chapel Hill, NC.*

CARDIORESPIRATORY FITNESS AT BASELINE AND IN RESPONSE TO TRAINING ACROSS METABOLIC HEALTH AND WEIGHT PHENOTYPES
Alexis Jones[1], Jacob L. Barber[1], Emmanuel J. Ayala[1], Charles S. Schwartz[1], William A. Clarkson[1], James S. Skinner, FACSM[2], Claude Bouchard, FACSM[3], Mark A. Sarzynski, FACSM[1]. *[1]University of South Carolina, Columbia, SC. [2]Indiana University, Bloomington, IN. [3]Pennington Biomedical Research Center, Baton Rouge, LA.*

INDIVIDUAL COVID-19 RESPONSE POLICIES' EFFECTS ON UNIVERSITY EMPLOYEES' DAILY STEPS
Jake H. Hudgins, M. Ryan Mason, Marilyn S. Campbell, Martha J. Biddle, Melinda J. Ickes, Lance M. Bollinger. *University of Kentucky, Lexington, KY.*

LIPOPROTEIN-INSULIN RESISTANCE (LPIR) SCORES DECREASED FOLLOWING AN OPTIFAST AND AEROBIC EXERCISE PROGRAM
Emily Grammer[1], Joshua McGee[1], Taylor Brown[1], Marie Clunan[1], Anna Huff[1], Briceida Osborne[1], Laura Matarese[1], Walter Pories[1], Joseph Houmard[1], Robert Carels[1], Mark Sarzynski, FACSM[2], Damon Swift[1]. *[1]East Carolina University, Greenville, NC. [2]University of South Carolina, Columbia, SC.*

THE RELATIONSHIP BETWEEN CELL FREE DNA AND VOLUME LOAD
Henry M. Lang[1], Michelle M. Duffourc[2], Caleb D. Bazyler[3], Michael W. Ramsey[3], Jeremy A. Gentles[3]. *[1]University of Mary, Department of Exercise Physiology, Bismarck, ND. [2]East Tennessee State University Quillen College of Medicine, Department of Biomedical Sciences, Molecular Biology Core Facility, Johnson City, TN. [3]East Tennessee State University, Department of Sport, Exercise, Recreation, and Kinesiology, Johnson City, TN.*

NRF2/KEAP1 PATHWAY CHANGES IN MUSCLE ASSOCIATED WITH EXERCISE TRAINING
Kerry Martin, Traci Parry, Allan Goldfarb, FACSM. *University of North Carolina at Greensboro, Greensboro, NC.*

Thursday, February 18, 2021

4:00 - 5:00 POSTER AWARDS: DOCTORAL STUDENTS (CONTINUED)

EARLY-ONSET PHYSICAL INACTIVITY IN TUMOR-BEARING MICE IS ASSOCIATED WITH ACCELERATED CACHEXIA
Brittany Counts-Franch, Jessica Halle, James Carson, FACSM. *University of Tennessee Health Science Center, Memphis, TN.*

COMPARISON OF LEISURE TIME PHYSICAL ACTIVITIES OF METABOLIC SYNDROME POSITIVE AND GENERAL POPULATIONS
Robert Booker, Megan E. Holmes. *Mississippi State University, Mississippi State, MS.*

4:00 - 5:00 POSTER AWARDS: MASTERS STUDENTS

ASSOCIATION OF BONE MINERAL DENSITY AND LOWER-BODY POWER IN DIVISION-I COLLEGIATE SOCCER PLAYERS
Hannah Elizabeth Ramirez, Ronald L. Snarr. *Georgia Southern University, Statesboro, GA.*

AGREEMENT BETWEEN ACUTE CHANGES IN CAROTID-FEMORAL AND BRACHIAL-FEMORAL PULSE WAVE VELOCITY
Jillian Poles[1], Nathan Adams[1], Elizabeth Kelsch[1], Kevin Heffernan[2], Michelle L. Meyer[1], Kathryn Burnet[1], Robert J. Kowalsky[3], Bethany Barone Gibbs[4], Lee Stoner, FACSM[1]. *[1]University of North Carolina at Chapel Hill, Chapel Hill, NC. [2]Syracuse University, Syracuse, NY. [3]Texas A&M University- Kingsville, Kingsville, TX. [4]University of Pittsburgh, Pittsburgh, PA.*

CLINICAL PREDICTORS OF VO_2MAX RESPONSE TO ENDURANCE TRAINING: HERITAGE FAMILY STUDY
Emanuel J. Ayala[1], Jacob L. Barber[1], Charles S. Schwartz[1], Jeremy M. Robbins[2], Robert E. Gerszten[2], Xuewen Wang[1], James S. Skinner, FACSM[3], Claude Bouchard, FACSM[4], Mark A. Sarzynski, FACSM[1]. *[1]University of South Carolina, Columbia, SC. [2]Beth Israel Deaconess Medical Center, Boston, MA. [3]Indiana University, Bloomington, IN. [4]Pennington Biomedical Research Center, Baton Rouge, LA.*

EFFECTS OF CLEAR, TINTED, AND MIRROR TINTED FOOTBALL HELMET VISORS ON REACTION TIME AND TARGET-DETECTION
Rachel Miller[1],[2], Anna Covington[1], Rebecca Rogers[1], Justin Moody[1], Christopher Ballmann[1]. *[1]Samford University, Birmingham, AL. [2]University of West Alabama, Livingston, AL.*

THE EFFECTS OF PREVIOUS AMENORRHEA ON VASCULAR FUNCTION
Katherine T. Williford, Emma Frye, Erin Bouldin, Denise Martz, Rebecca Kappus. *Appalachian State University, Boone, NC.*

MUSCLE CONTRACTION BY HIGH-FREQUENCY ELECTRICAL STIMULATION INDUCES HIPPO SIGNALING EFFECTOR YAP RESPONSE IN $APC^{MIN/+}$ MICE
Richard Thomas Yongue, Shuichi Sato, Emily Walker. *University of Louisiana at Lafayette, Lafayette, LA.*

SLEEP DURATION AND ARTERIAL STIFFNESS, A META ANALYSIS
Alex N. Pomeroy[1], Patricia Pagan Lassalle[1], Christopher E. Kline, FACSM[2], Kevin S. Heffernan[3], Lee Stoner, FACSM[1]. *[1]University of North Carolina at Chapel Hill, Chapel Hill, NC. [2]University of Pittsburgh, Pittsburgh, PA. [3]Syracuse University, Syracuse, NY.*

Thursday, February 18, 2021

4:00 - 5:00 POSTER AWARDS: MASTERS STUDENTS (CONTINUED)

THE EFFECTS OF PRE-EXERCISE GLYCEROL HYPERHYDRATION ON SUBSEQUENT EXERCISE PERFORMANCE: A META-ANALYSIS
Nicholas T. Barefoot[1], Tori Stone[2],[3], Danilo Tolusso[4], Jonathan Wingo, FACSM[1], Hayley MacDonald[1]. [1]University of Alabama, Tuscaloosa, AL. [2]Yale School of Medicine, New Haven, CT. [3]The John B. Pierce Laboratory, New Haven, CT. [4]Western Kentucky University, Bowling Green, KY.

ASSOCIATIONS BETWEEN BASIC PSYCHOLOGICAL NEEDS AND PHYSICAL ACTIVITY IN UNDERGRADUATE SENIORS DURING THE COVID-19 PANDEMIC
Molly K. Clounch, Elizabeth D. Hathaway. *University of Tennessee at Chattanooga, Chattanooga, TN.*

4:00 - 5:00 POSTER AWARDS: UNDERGRADUATE STUDENTS

AGEISM IN EXERCISE PRESCRIPTION IN THE SOUTHEASTERN UNITED STATES
William K. Kamenicky, Tara M. Prairie. *Tennessee Wesleyan University, Athens, TN.*

EFFECTS OF ACUTE FEEDING ON RESTING METABOLIC RATE AND RESPIRATORY QUOTIENT
Alyson G. Nelson[1], Gabrielle J. Brewer[2], Lacey M. Gould[1], Hannah E. Saylor[1], Malia N.M. Blue[3], Katie R. Hirsch[4], Amanda N. Gordon[1], Andrew T. Hoyle[1], Abbie E. Smith-Ryan, FACSM[1]. *[1]University of North Carolina - Chapel Hill, Chapel Hill, NC. [2]University of Connecticut, Storrs, CT. [3]High Point University, High Point, NC. [4]University of Arkansas for Medical Sciences, Little Rock, AR.*

EFFECTS OF LIMB DOMINANCE AND IMMOBILIZATION ON HEART RATE AND MUSCLE ACTIVATION USING AXILLARY CRUTCHES
Kara Brooke Bellenfant, Gracie Robbins, Rebecca Rogers, Thomas Kopec, Christopher Ballmann. *Samford University, Birmingham, AL.*

PHYSICAL ACTIVITY AND DEPRESSIVE SYMPTOMS DURINGTHECOVID-19STAY AT HOME ORDERIN NORTH CAROLINA
Madison Gill, Meir Magal, FACSM, Danielle F. Braxton, Shannon K. Crowley. *North Carolina Wesleyan College, Rocky Mount, NC.*

EFFECTS OF THE COVID-19 PANDEMIC ON THE FITNESS ROUTINES OF COLLEGE STUDENTS AND FACULTY
Case Jackson, Lauren Adlof, Dr. Ludmila Cosio-Lima, FACSM. *University of West Florida, Pensacola, FL.*

CARDIAC ABNORMALITIES AMONG YOUNG ADULTS WITH SARS-COV-2
Sophie Osada, Rachel Szeghy, Valesha Province, Laurel Koontz, Landry Bobo, Nina Stute, Marc Augenreich, Jonathon Stickford, Abigail Stickford, Stephen Ratchford. *Appalachian State University, Boone, NC.*

A COMPARISON OF INTERNAL AND EXTERNAL TRAINING LOADS BETWEEN OBJECTIVELY- VERSUS SUBJECTIVELY-PRESCRIBED HIGH-INTENSITY INTERVAL TRAINING
Madelyn G. Smith, Madison E. Smith, Randall Booker, Elizabeth A. Hubbard. *Berry College, Mount Berry, GA.*

Thursday, February 18, 2021

4:00–5:00 POSTER AWARDS: UNDERGRADUATE STUDENTS (CONTINUED)

EFFECTS OF VERBAL FEEDBACK ON ANAEROBIC EXERCISE PERFORMANCE AND MOTIVATION
Emily Deskin, Grace Hardiman, Thomas Kopec. *Samford University, Birmingham, AL.*

6:00–7:00 EMILY HAYMES MENTORING EVENT

ONLINE MENTORING EVENT
Chair: Amy Knab, Ph.D., *Queens University of Charlotte*

Friday, February 19, 2021

10:00–11:00 BASIC SCIENCE LECTURE

WHAT CAN BASIC SCIENCE TEACH US ABOUT EXERCISE PRESCRIPTIONS AND THE TREATMENT OF CARDIOVASCULAR DISEASE?
John C. Quindry, Ph.D., *University of Montana*
Opening Remarks: Christopher G. Ballmann, Ph.D., *Samford University*
Presiding: John K. Petrella, SEACSM President, *Samford University*

11:00–12:00 SESSION III: REVIEW/SYMPOSIA

CARDIOVASCULAR CONSEQUENCES OF SKELETAL MUSCLE IMPAIRMENTS IN BREAST CANCER
Prashil R. Thaker[1], Gabriel Zieff[1], Emily Draper[1], Craig Paterson[2], Chad Wagoner[1], Patricia P. Lassalle[1], Jordan T. Lee[1]. *[1]University of North Carolina at Chapel Hill, Chapel Hill, NC. [2]University of Gloucestershire, Gloucestershire.*

11:00–12:00 SESSION III: POSTER FREE COMMUNICATION

INTER- AND INTRA-INDIVIDUAL VO_2 RESPONSES ABOVE CRITICAL POWER
Pasquale J. Succi[1], Taylor K. Dinyer[1], Caleb C. Voskuil[1], M. Travis Byrd[2], Haley C. Bergstrom[1]. *[1]University of Kentucky, Lexington, KY. [2]Department of Cardiovascular Disease, Mayo Clinic, Scottsdale, AZ.*

RELATIONSHIP BETWEEN PHYSICAL FITNESS, COGNITIVE FUNCTION, SLEEP QUALITY, AND SEDENTARY TIME IN OLDER ADULTS.
Violet Wray, Jeffrey E. Herrick, Sean Collins. *University of Lynchburg, Lynchburg, VA.*

EXERCISE RESPONSES DURING REPEATED SUPRAMAXIMAL EXERCISE WHILE LISTENING TO SELF-SELECTED MUSIC: THE ROLE OF GENDER
Kendall Rhoads, Sierra Sosa, Rebecca Rogers, Thomas Kopec, Christopher Ballmann. *Samford University, Birmingham, AL.*

Friday, February 19, 2021

11:00–12:00 SESSION III: POSTER FREE COMMUNICATION (CONTINUED)

SEX DIFFERENCES IN OXYGEN CONSUMPTION RELATIVE TO FAT FREE MASS IN ADOLESCENTS AND YOUNG ADULTS
Rohan Kalelkar[1], Asha Coltrane[2], Aakash Chigurupati[3], Dana Morris[4], Chloe Bell[4], Marco Meucci[4]. *[1]Durham School of the Arts, Durham, NC. [2]Jordan High School, Durham, NC. [3]Ardrey Kell High School, Charlotte, NC. [4]Appalachian State University, Boone, NC.*

SEX DIFFERENCES IN OXYGEN UPTAKE EFFICIENCY SLOPE ADJUSTED FOR FAT FREE MASS IN ADOLESCENT CHILDREN
Aditi Kumar[1], Kaylah Barrios[2], Claire Cai[3], Joshua Cai[4], Lavinia Falcioni[5], Marco Meucci[6]. *[1]Panther Creek High School, Cary, NC. [2]Northwest Guilford High School, Greensboro, NC. [3]Green Level High School, Cary, NC. [4]Ardrey Kell High School, Charlotte, NC. [5]University of Rome "Foro Italico", Rome. [6]Appalachian State University, Boone, NC.*

EFFECTS OF A VIRTUAL REALITY PACER ON CYCLING PERFORMANCE
Lauren G. Killen, Tara Boy, James M. Green, FACSM, Lee G. Renfroe. *University of North Alabama, Florence, AL.*

VALIDITY OF FITBIT VERSA 2 HEART RATE
Cameron D. Addie. *Middle Tennessee State, Murfreesboro, TN.*

VALIDITY OF FITBIT VERSA 2 ENERGY EXPENDITURE
Zachary R. Norred. *Middle Tennessee State University, Murfreesboro, TN.*

RELATIVELY-DEFINED MODERATE INTENSITY ASSOCIATED CADENCE (STEPS/MIN) THRESHOLDS ACROSS THE ADULT LIFESPAN: THE CADENCE-ADULTS STUDY
Cayla R. McAvoy[1], Christopher C. Moore[2], Elroy J. Aguiar[3], Scott W. Ducharme[4], John M. Schuna Jr.[5], Tiago V. Barreira[6], Colleen J. Chase[7], Zachary R. Gould[8], Marcos A. Amalbert-Birriel[8], Stuart R. Chipkin[8], John Staudenmayer[8], Catrine Tudor-Locke, FACSM[1], Jose Mora-Gonzalez[1]. *[1]University of North Carolina - Charlotte, Charlotte, NC. [2]University of North Carolina, Chapel Hill, NC. [3]The University of Alabama, Tuscaloosa, AL. [4]California State University, Long Beach, CA. [5]Oregon State University, Corvallis, OR. [6]Syracuse University, Syracuse, NY. [7]University of Massachusetts Amherst, Amhert, MA. [8]University of Massachusetts Amherst, Amherst, MA.*

THE INFLUENCE OF GRADED EXERCISE PROTOCOL ON VO_{2PEAK} ESTIMATION USING PERCEPTUAL EXERTION
Danilo V. Tolusso, Brett Gibson, Mark Schafer, Griffin Green, Scott Lyons, FACSM. *Western Kentucky University, Bowling Green, KY.*

EFFECTS OF WATCHING TV ON EXERCISE DURATION AT 60% VO2MAX (MODERATE INTENSITY) IN COLLEGE RECREATIONAL MALE ATHLETES
Corey Smith, Marissa Gatto, Chandler Posey, Catalina Casaru, FACSM. *Georgia Southwestern State University, Americus, GA.*

VALIDITY OF WAIST-WORN STEP-COUNTING WEARABLE TECHNOLOGIES IN ADULTS 21-40 YEARS OLD: THE CADENCE-ADULTS STUDY
Jose Mora-Gonzalez[1], Cayla R. McAvoy[1], Elroy J. Aguiar[2], Christopher C. Moore[3], Scott W. Ducharme[4], Catrine Tudor-Locke[1]. *[1]University of North Carolina at Charlotte, Charlotte, NC. [2]The University of Alabama, Tuscaloosa, AL. [3]University of North Carolina at Chapel Hill, Chapel Hill, NC. [4]California State University, Long Beach, CA.*

Friday, February 19, 2021

11:00–12:00 SESSION III: POSTER FREE COMMUNICATION (CONTINUED)

COMPARISON OF WEARABLE TECHNOLOGY AT QUANTIFYING POWER/MUSCLE LOAD OF ENDURANCE RUNNERS AGAINST VARYING WIND RESISTANCE
Marissa L. Bello, Derick A. Anglin, Zachary M. Gillen, Brandon D. Shepherd, JohnEric W. Smith. *Mississippi State University, Mississippi State, MS.*

OXYGEN CONSUMPTION NORMALIZED BY FAT FREE MASS IN NORMAL WEIGHT AND OVERWEIGHT ADOLESCENTS
Srijan Oduru[1], Gautham Ravindran[2], Kartik Nagaraj[3], Anvi Charvu[3], Sarean G. Metzinger[4], Marco Meucci[4]. *[1]Green Hope High School, Cary, NC. [2]Panther Creek High School, Cary, NC. [3]Raleigh Charter High School, Raleigh, NC. [4]Appalachian State University, Boone, NC.*

LOWER BODY BLOOD FLOW RESTRICTION TRAINING ON AEROBIC ADAPTATIONS IN MINIMALLY ACTIVE ADULTS
Austin Bennett, Caitlyn Harper, Kaitlyn King, Jeffery Herrick, Jill Lucas, Sean Collins. *University of Lynchburg, Lynchburg, VA.*

WELLNESS OF COLLEGE STUDENTS DURING A GLOBAL PANDEMIC AND THEIR RETURN TO CAMPUS
Matthew Arnold, Megan Twiddy, Logan Bemis, Shawn Casebolt, Bryan LaChance, Victor Romano, Kimberly Smith, FACSM. *Catawba College, Salisbury, NC.*

ASSESSMENT OF MUSCLE MASS IN TRANSCATHETER AORTIC VALVE REPLACEMENT PATIENTS OVER ~ MONTHS POST-PROCEDURE.
Christopher M. Schattinger[1], Gregory Rodriguez[2], Teresa C. Gonzalez[1], Emily K. Hill[1], Morgan Pleasants[1], Cristina Huber[1], Thomas E. Noel[3], Wayne B. Batchelor[4], Lynn B. Panton, FACSM[1]. *[1]Florida State University, Tallahassee, FL. [2]Florida State University College of Medicine, Tallahassee, FL. [3]Tallahassee Memorial Hospital, Tallahassee, FL. [4]INOVA-Fairfax Hospital, Falls Church, VA.*

COMPARISON OF THE 'SEATTLE' AND 'INTERNATIONAL' CRITERIA ELECTROCARDIOGRAM INTERPRETATION IN DIVISION II FEMALE COLLEGE ATHLETES
Ludmila Cosio Lima, FACSM, Lauren Adlof, Amy Crawley, Jeffrey Simpson, Youngil Lee. *University of West Florida, Pensacola, FL.*

EFFECTS OF CHEWING GUM WITH AND WITHOUT CAFFEINE ON SLEEP QUANITITY AND QUALITY IN COLLEGE STUDENTS
Hannah Ferrari, Rebecca Rogers, Thomas Kopec, Christopher Ballmann. *Samford University, Birmingham, AL.*

SURFACE EMG COMPARISON OF ISOMETRIC POSTERIOR CHAIN EXERCISE IN TORQUE-MATCHED CONDITIONS
Hogan Jones, Alexander Lambert, Nicholas McGarry, Blake Justice, John Fox. *Methodist University Doctor of Physical Therapy Program, Fayetteville, NC.*

Friday, February 19, 2021

11:00–12:00 SESSION III: POSTER FREE COMMUNICATION (CONTINUED)

THE EFFECTS OF MANUAL THERAPY ON STROKE PATIENTS WITH UPPER EXTREMITY IMPAIRMENT
Madeline Elder, Kayla Baker, Mark Schafer. *Western Kentucky University, Bowling Green, KY.*

PHYSICAL ACTIVITY DURING PREGNANCY: GUIDELINES VERSUS ADHERENCE
Ami Eho, FACSM[1], Katherine H. Ingram, FACSM[1], Juliana Meireles, FACSM[1], Janeen Amason, FACSM[1], Nicole Carlson, FACSM[2], Raine Morris, FACSM[1]. *[1]Kennesaw State University, Kennesaw, GA. [2]Emory University, Atlanta, GA.*

THE VALIDITY OF THE "JUMP HEIGHT" MOBILE APPLICATION WHEN MEASURING ASPECTS OF A COUNTERMOVEMENT JUMP AND A DROP JUMP
Ashlyn Moody, Abbie Jones, Thomas Kopec. *Samford University, Birmingham, AL.*

A NOVEL METHOD OF MEASURING FATIGUE OF THE STERNOCLEIDOMASTOID MUSCLE USING ELECTRICAL STIMULATION AND ACCELEROMETER
Carol Beatty, Kevin McCully, FACSM. *University of Georgia, Athens, GA.*

PHYSICAL ACTIVITY PATTERNS AMONG ADULTS WITH ARTHRITIS AND DIABETES WHO RECEIVE SELF-MANAGEMENT EDUCATION
Alana M. Hall[1], Tammie M. Johnson[2], Daniela S. Charry[1], Michael R. Richardson[1], James R. Churilla[1]. [1]University of North Florida, Jacksonville, FL. [2]Florida Agricultural and Mechanical University, Tallahassee, FL.

BODY FAT DISTRIBUTION AND PHYSICAL FUNCTIONING IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE PATIENTS
Christa Todoroff, Michael Berry, FACSM. *Wake Forest University, Winston-Salem, NC.*

EXERCISE PRESCRIPTION FOR A MIDDLE-AGED SEDENTARY WOMAN WITH MULTIPLE COMORBIDITIES: A CASE REPORT
Caitlin A. D. Kayser, India Washington, Mark Erickson, PT, DScPT, MA, OCS, Patricia Bauer, PhD, EP-C, CSCS. *Florida Gulf Coast University, Fort Myers, FL.*

TISSUE OXYGENATION, ANKLE BRACHIAL INDEX, AND SUBJECTIVE MEASURES OF PERFORMANCE IN PERIPHERAL ARTERY DISEASE PATIENTS
Matthew Martenson, Judy Muller-Delp, Jacob Caldwell, Lynn Panton, FACSM. *Florida State University, Tallahassee, FL.*

THE EFFECTS OF LONG-TERM PARTICIPATION IN FOUR DIFFERENT SPORTS ON CARDIOVASCULAR RISK FACTORS AMONG CHINESE ADULTS
Peixuan Zheng[1], Lei Zhang[2], Feng Shi[2], Kaiwen Man[1], Elroy Aguiar[1]. *[1]The University of Alabama, Tuscaloosa, AL. [2]Zhengzhou University, Zhengzhou, China.*

EVIDENCE-BASED CLASSIFICATION TO IDENTIFY DOMAINS OF POWERCHAIR SOCCER
Stephanie Williams, Mae Fensterer, J.P. Barfield, FACSM. *Emory & Henry College, Marion, VA.*

Friday, February 19, 2021

11:00–12:00 SESSION III: POSTER FREE COMMUNICATION (CONTINUED)

THE TRANSITION FROM IN-PERSON TO REMOTE JUDO DURING COVID-19 IN ADOLESCENTS WITH AUTISM SPECTRUM DISORDER
Ana Valentina Garcia, Jeanette Garcia. *University of Central Florida, Orlando, FL.*

EFFECTS OF AROMATASE INHIBITORS AND ARTHRALGIA ON RANGE OF MOTION IN POSTMENOPAUSAL BREAST CANCER PATIENTS
Margaret Moran, Christian Talbert, Edward Levine, Marissa Howard-McNatt, Shannon L. Mihalko. *Wake Forest University, Winston-Salem, NC.*

RELATIONSHIPS OF CHANGES IN BODY COMPOSITION WITH PHYSICAL PERFORMANCE IN OBESE OLDER ADULTS WITH KNEE OSTEOARTHRITIS
Peixi Jiang[1], Gary D. Miller[1], Shannon L. Mihalko[1], Daniel P. Beavers[2], Stephen P. Messier, FACSM[1]. *[1]Wake Forest University, Winston Salem, NC. [2]Wake Forest Baptist Health, Winston Salem, NC.*

OCCUPATIONAL THERAPY AS A MEANS TO COMBAT FOOD INSECURITY IN OLDER ADULTS WITH FUNCTIONAL IMPAIRMENTS
Lindsey Lewallen, Kristin Riggsbee. *Maryville College, Maryville, TN.*

EFFECT OF WORK-TO-REST CYCLES ON CARDIOVASCULAR DRIFT AND MAXIMAL OXYGEN UPTAKE DURING HEAT STRESS
Anne M. Mulholland, Hillary A. Yoder, Elizabeth Brooke Titshaw, Jonathan E. Wingo, FACSM. *University of Alabama, Tuscaloosa, AL.*

ASSOCIATIONS BETWEEN BUILT ENVIRONMENT AND PHYSICAL ACTIVITY LEVELS IN YOUTH WITH OBESITY IN THE MID-SOUTH
Katherine W. N. Purdham[1], J. Jackson Taylor[1], Collette E. Connor[2], Dana Kimberly[3,4], E. Thomaseo Burton[5,4], Joan C. Han[5,4], Webb A. Smith[5,4]. *[1]University of Tennessee Health Science Center, College of Medicine, Memphis, TN. [2]School of Public Health, University of Memphis, Memphis, TN. [3]Le Bonheur Children's Hospital, Memphis, TN. [4]Pediatric Obesity Program, Department of Pediatrics, College of Medicine, University of Tennessee Health Science Center, Memphis, TN. [5]Children's Research Foundation, Le Bonheur Children's Hospital, Memphis, TN.*

AFFECTIVE DIMENSIONS OF DYSPNEA AT MAXIMUM EXERCISE IN COVID-POSITIVE AND HEALTHY ADULTS
Valesha M. Province, Marc A. Augenreich, Nina L. Stute, Abigail S.L. Stickford, Steve M. Ratchford, Jonathon L. Stickford. *Appalachian State University, Boone, NC.*

EPIDEMIOLOGY OF AXIAL SKELETON FRACTURES IN CHEERLEADING AND GYMNASTICS FROM 2010-2019
Melissa C. Kay[1], Avinash Chandran[2]. [1]University of Southern Mississippi, Hattiesburg, MS. [2]Datalys Center for Sports Injury Research and Prevention, Indianapolis, IN.

CHANGES IN FIRST-YEAR COLLEGE STUDENTS' OBJECTIVELY MEASURED DIETARY AND PHYSICAL ACTIVITY BEHAVIORS.
YongJu Hwang, Yangyang Deng, Taewoo Kim, Sara Campbell, Sami Yli-Piipari. *University of Georgia, Athens, GA.*

Friday, February 19, 2021

11:00–12:00 SESSION III: POSTER FREE COMMUNICATION (CONTINUED)

THE EFFECT OF WALKING A COMPANION VERSUS UNFAMILIAR DOG ON MOOD, HEART RATE, AND EXERCISE ENJOYMENT
Anna Covington, Rebecca Rogers, Thomas Kopec, Christopher Ballmann. *Samford University, Birmingham, AL.*

INFLUENCE OF WEATHER ON DIRT AND GRAVEL TRAIL USE IN AN URBAN WILDERNESS TRAIL SYSTEM
Douglas A. Gregory[1],[2], Eugene C. Fitzhugh[1]. *[1]University of Tennessee, Knoxville, TN. [2]Tennessee Wesleyan University, Athens, TN.*

EVALUATING THE AWARENESS OF AND PARTICIPATION IN EXERCISE IS MEDICINE ON CAMPUS (EIM-OC)
Jeremy A. Steeves, Sarah McFann, Traci Haydu, Jennifer F. Oody. *Maryville College, Maryville, TN.*

CHANGES IN UNIVERSITY EMPLOYEES' PHYSICAL ACTIVITY DURING THE COVID-19 PANDEMIC
M. Ryan Mason, Jake H. Hudgins, Marilyn S. Campbell, Martha J. Biddle, Melinda J. Ickes, Lance M. Bollinger. *University of Kentucky, Lexington, KY.*

ASSOCIATION BETWEEN COMMUNITY CRIME AND PHYSICAL ACTIVITY LEVELS IN CHILDREN WITH OBESITY IN THE MID-SOUTH
John Jackson Martin Taylor. *UTHSC - COM, Memphis, TN.*

PHYSICAL ACTIVITY IN A UNIVERSITY COMMUNITY BEFORE AND AFTER A COVID-19 SHUT DOWN
Brynn Hudgins. *James Madison University, Harrisonburg, VA.*

DESCRIBING MODES OF PHYSICAL ACTIVITY AMONG HIGH AND LOW SOCIOECONOMIC STATUS ADOLESCENTS
Caroline C. Sims, Jason Fanning. *Wake Forest University, Winston-Salem, NC.*

CONSUMER WEARABLE DEVICE OWNERSHIP AND COMPONENTS OF THE 24-HOUR ACTIVITY CYCLE IN UNIVERSITY STUDENTS
Benjamin Donald Boudreaux, Ginny M. Frederick, Ellen M. Evans, FACSM, Patrick J. O'Connor, FACSM, Michael D. Schmidt. *University of Georgia, Athens, GA.*

RELATIONSHIPS BETWEEN SEX, RACE, ETHNICITY, AND COMPONENTS OF THE 24-HOUR ACTIVITY CYCLE IN COLLEGE STUDENTS
Laura Faye Hildreth, Benjamin D. Boudreaux, Ginny M. Frederick, Ellen M. Evans, FACSM, Michael D. Schmidt, FACSM. *University of Georgia, Athens, GA.*

12:00–1:00 CLINICAL CROSSOVER LECTURE

RETURN TO EXERCISE AFTER COVID-19
Dermot M. Phelan MD, *Atrium Health, Sports Cardiology*
Chair: Brent H. Messick, MD, *Atrium Health, Sports Medicine*

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12:00–2:00 BIOMECHANICS INTEREST GROUP

Chair: Hunter J. Bennett, Ph.D., *Old Dominion University*.
Please contact Dr. Bennett at hjbennet@odu.edu if interested.

1:00–2:00 SESSION IV: REVIEW/SYMPOSIA

TARGETING SEDENTARY BEHAVIOR AS A FEASIBLE HEALTH STRATEGY DURING COVID-19
Josh P. Causey[1], Emily Draper[1], Gabriel Zieff[1], Lauren Bates[1], Zachary Y. Kerr[1], Justin B. Moore[2], Erik D. Hanson[1], Claudio Battaglini[1], Lee Stoner, FACSM[1]. *[1]University of North Carolina at Chapel Hill, Chapel Hill, NC. [2]Wake Forest University, Winston-Salem, NC.*

1:00–2:00 SESSION IV: POSTER FREE COMMUNICATION

MENTAL HEALTH SELF-EFFICACY IN COLLEGE ATHLETIC TRAINERS: AN EXPLORATORY STUDY
Martha Dettl-Rivera. *Winthrop University, Rock Hill, SC.*

EXAMINATION OF FEELING STATES AFTER AN ACUTE BOUT OF FOAM ROLLING AND HIGH INTENSITY EXERCISE
Lauren M. Biscardi, Debra A. Stroiney. *George Mason University, Manassas, VA.*

PHYSICAL ACTIVITY, SEDENTARY BEHAVIOR, SMARTPHONE USE, AND SLEEP PATTERNS OF YOUNG ADULTS DURING COVID-19 QUARANTINE
Tara Kaitlyn Whiddon[1], Borja Sañudo[2], Antonio J Sánchez-Oliver[2], Curtis Fennell[1]. *[1]University of Montevallo, Montevallo, AL. [2]Universidad de Sevilla, Seville.*

COPING METHODS UTILIZED BY COLLEGIATE ATHLETES SUFFERING FROM SEASON-ENDING INJURY
Lucas Jacob Wagoner. *Lee University, Cleveland, TN.*

EXPLORING FACTORS UNDERLYING PERFORMANCE SATISFACTION OF AN ACUTE RECREATIONAL EXERCISE SESSION
Cory T. Beaumont, Paula-Marie M. Ferrara, Kelley Strohacker, FACSM. *University of Tennessee, Knoxville, Knoxville, TN.*

THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY, WEIGHT STATUS STRESS, AND DEPRESSION IN HBCU STUDENTS
Jordan Taylor[1],[2], Erica Taylor, FACSM[3], Angela Shorter[4], Kiayona Grimes[5]. *[1]University of Memphis, Memphis, TN. [2]University of Tennessee Health Science Center, Memphis, TN. [3]Columbus State, Columbus, GA. [4]Delaware State, Dover, DE. [5]Values into Action, Clementon, NJ.*

PERCEIVED STRESS, RESILIENCY, AND PHYSICAL ACTIVITY IN COLLEGE STUDENTS DURING COVID-19 REMOTE LEARNING
Karissa L. Peyer, Elizabeth D. Hathaway, Kevin Doyle. *University of Tennessee at Chattanooga, Chattanooga, TN.*

SUCCESSFUL PHYSICAL ACTIVITY MAINTAINERS: STRATEGIES AND CHARACTERISTICS OF YOUNG, PROFESSIONAL AFRICAN AMERICAN WOMEN
Chloe S. Jones, Cristina S. Barroso, Eugene Fitzhugh, Lindsey A. Miossi, Lyndsey M. Hornbuckle, FACSM. *University of Tennessee, Knoxville, TN.*

Friday, February 19, 2021

1:00–2:00 SESSION IV: POSTER FREE COMMUNICATION (CONTINUED)

ASSOCIATIONS BETWEEN OBJECTIVELY-MEASURED SMARTPHONES, PHYSICAL ACTIVITY, SEDENTARY BEHAVIOR, MOOD, AND SLEEP IN YOUNG ADULTS
Claudia Chisolm[1], Moisés Grimaldi-Puyana[2], José María Fernández-Batanero[2], Borja Sañudo[2], Curtis Fennell[1]. *[1]University of Montevallo, Montevallo, AL. [2]University of Sevilla, Seville, Spain.*

ACUTE EFFECTS OF SUBJECTIVELY- VS OBJECTIVELY-REGULATED HIGH-INTENSITY INTERVAL EXERCISE ON COGNITION
Madison E. Smith, Ashlinn Garner, Randall Booker, Madelyn G. Smith, Elizabeth A. Hubbard. *Berry College, Mount Berry, GA.*

EFFECTS OF INTERRUPTED ROUTINE DUE TO COVID-19 ON CIRCADIAN CHRONOTYPE AND LEISURE TIME PHYSICAL ACTIVITY
Justine M. Renziehausen, David H. Fukuda. *University of Central Florida, Orlando, FL.*

THE EFFECT OF EXERCISE INTENSITY LEVEL AND SEX ON SUBJECTIVE TIMING DURING CYCLING
Andrew R. Moore, Madeline Olson. *Augusta University, Augusta, GA.*

ACUTE AFFECTIVE AND LYMPHEDEMA RESPONSES TO RESISTANCE EXERCISE AT VARIOUS INTENSITIES IN BREAST CANCER SURVIVORS
Kyra R. VanDoren, Rodrigo Salazar, Eric E. Hall, Takudzwa A. Madzima. *Elon University, Elon, NC.*

THE EFFECT OF EXERCISE-RELATED FATIGUE ON SUBJECTIVE TIMING
Madeline Olson, Andrew R. Moore. *Augusta University, Augusta, GA.*

THE RELATIONSHIP BETWEEN BODY IMAGE AND MENTAL HEALTH IN UNDERGRADUATE STUDENTS
Emily E. Tufford, Eric E. Hall, Caroline J. Ketcham. *Elon University, Elon, NC.*

AFFECTIVE RESPONSES BEFORE AND AFTER TWO COMPETITIVE MATCHES IN NCAA DIVISION I MEN'S SOCCER ATHLETES
Madeleine F. August, Eric E. Hall, FACSM, Svetlana Nepocatych, Takudzwa A. Madzima. *Elon University, Elon, NC.*

DIVISION III ATHLETES' ACADEMIC PERFORMANCE, TIME COMMITMENT, AND STRESS IN-SEASON VERSUS OUT OF SEASON
Emilie Boone, Jeremy Steeves. *Maryville College, Maryville, TN.*

THE NOCEBO EFFECT ON REACTION TIME PERFORMANCE
Kailee Marasco, Krista Masters, Thomas Kopec. *Samford University, Birmingham, AL.*

VIRTUALLY ENGAGING SOCIALLY WITH PHYSICAL ACTIVITY: THE VESPA REMOTE GROUP-MEDIATED ACTIVITY INTERVENTION
Kyle Kershner, Jason Fanning. *Wake Forest University, Winston-Salem, NC.*

COMPARISON OF ONLINE VERSUS FACE-TO-FACE PHYSICAL ACTIVITY INTERVENTIONS ON UNDERGRADUATES' AUTONOMY AND PHYSICAL ACTIVITY LEVELS
Isaac White, Bhibha M. Das. *East Carolina University, Greenville, NC.*

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1:00–2:00 SESSION IV: POSTER FREE COMMUNICATION (CONTINUED)

THE EFFECTS OF A BUDDY WALKING PROGRAM ON PHYSICAL ACTIVITY IN ADULTS WITH LOWER-BODY DISABILITIES
Isabella Peralta, Kayla Baker. *Western Kentucky University, Bowling Green, KY.*

AGE-RELATED REDUCTION IN POWER AND MYOFIBER MORPHOLOGY AND COMPOSITION
Benjamin E. Dalton[1], Trisha A. VanDusseldorp[1], Kaveh Kiani[1], Phuong L. Ha[2], Alex A. Olmos[3], Alyssa R. Bailly[1], Anton Bryantsev[1], Garrett M. Hester[1]. *[1]Kennesaw State University, Kennesaw, GA. [2]University of British Columbia, Kelowna, BC. [3]Oklahoma State University, Stillwater, OK.*

HYDROTHERAPY VS. LAND BASED EXERCISES ON DUAL TASK STATIC & DYNAMIC BALANCE IN A GERIATRIC POPULATION
Alana Joy Turner, Harish Chander, Adam Knight, Sachini Kodithuwakku Arachchige, Zhujun Pan, Chih-Chia Chen. *Mississippi State University, Mississippi State, MS.*

AGE RELATED DIFFERENCES IN ABSOLUTE AND RELATIVE MAXIMAL STRENGTH AT DIFFERENT VELOCITIES
Michael Cooper[1], Phuong Ha[2], Alex Olmos[3], Ben Dalton[1], Alyssa Bailly[1], Trisha VanDusseldorp[1], Anton Bryantsev[1], Garrett Hester[1]. *[1]Kennesaw State University, Kennesaw, GA. [2]University of British Columbia, Okanagan, BC. [3]Oklahoma State University, Stillwater, OK.*

BIRTH WEIGHT, EARLY GROWTH, AND GLUCOSE REGULATION IN YOUNG ADULTS BORN PRETERM
Thrandia Dong[1], Patricia Nixon, FACSM[1], Lisa Washburn[2]. *[1]Wake Forest University, Winston-Salem, NC. [2]Wake Forest University School of Medicine, Winston-Salem, NC.*

COMPLETING TWENTY-EIGHT UNDERGRADUATE-LED STUDIES WITH ZERO REPORTED COVID-19 EVENTS: THRIVING DURING TIMES OF SCIENTIFIC SURVIVAL
Christopher Ballmann, Courteney Benjamin, Thomas Kopec, Mallory Marshall, Joeseph Pederson, John Petrella, FACSM, Tyler Williams, Rebecca Rogers. *Samford University, Birmingham, AL.*

EMPOWERING FUTURE PROFESSIONALS WITH DESIGN THINKING IN A CLINICAL EXERCISE PHYSIOLOGY COURSE
Eric P. Plaisance, FACSM, Jennifer M. Ponder. *University of Alabama at Birmingham, Birmingham, AL.*

DETERMINATION OF PREDICTIVE FACTORS OF BONE MINERAL DENSITY IN FEMALE COLLEGIATE ATHLETES
Maisie Estelle Davis, Ronald L. Snarr. *Georgia Southern University, Statesboro, GA.*

BIOLOGICAL SEX MEDIATES CANCER CACHEXIA ASSOCIATED MUSCLE WEAKNESS
Jason T. Brantley. *University of North Carolina Greensboro, Greensboro, NC.*

Friday, February 19, 2021

1:00–2:00 SESSION IV: POSTER FREE COMMUNICATION (CONTINUED)

MECHANISMS MEDIATING INCREASED ENDURANCE FOLLOWING HIGH- AND LOW-LOAD TRAINING WITH AND WITHOUT BLOOD FLOW RESTRICTION
Matthew A. Chatlaong[1], J Grant Mouser[2], Samuel L. Buckner[3], Kevin T. Mattocks[4], Scott J. Dankel[5], Jeremy P. Loenneke, FACSM[1], Matthew B. Jessee[1]. [1]University of Mississippi, University, MS. [2]Troy University, Troy, AL. [3]University of South Florida, Tampa, FL. [4]Lindenwood University, St. Charles, MO. [5]Rowan University, Glassboro, NJ.

EFFECT OF MILD MUSCLE SORENESS ON RESTING MUSCLE METABOLISM
Matthew A. Lynch, Lauren K. Lindsey, Mckenley J. Corbitt, Kevin K. McCully, FACSM. *University of Georgia, Athens, GA.*

SLOW MOTION VIDEO PHONE ANALYSIS OF MUSCLE TWITCH CONTRACTION VELOCITY: THE EFFECT OF PIXEL QUANTITY
Nicholas M. Yanek, Chuan Zhang, Kevin K. McCully, FACSM. *University of Georgia, Athens, GA.*

VALIDITY OF ULTRASOUND MEASUREMENTS USING HUMAN CADAVERS
Erin Major, Alexa Reilly, Ted Eaves, Michael Berry, FACSM. *Wake Forest University, Winston-Salem, NC.*

RELIABILITY OF ULTRASOUND MEASUREMENTS OF SKELETAL MUSCLE THICKNESS IN CADAVERS
Alexandra K. Reilly, Erin Major, Michael Berry, FACSM, Ted Eaves. *Wake Forest University, Winston Salem, NC.*

EFFECT OF RISEDRONATE ON BONE TURNOVER IN POST-SLEEVE GASTRECTOMY PATIENTS
Rui Lyu, Kristen M. Beavers. *Wake Forest University, Winston-Salem, NC.*

EFFECTS OF VARYING FACEMASK REINFORCEMENT ON REACTION TIME AND TARGET DETECTION IN NCAA FOOTBALL PLAYERS
Justin Moody[1], Rachel Miller[1],[2], Anna Covington[1], Rebecca Rogers[1], Christopher Ballmann[1]. *[1]Samford University, Birmingham, AL. [2]University of West Alabama, Livingston, AL.*

EFFECTS OF PEPPERMINT OIL ON COGNITIVE AND PHYSICAL ABILITY DURING DUAL-TASKING CONDITIONS
Kathryn Kizziah, Alysson Smith, Rebecca Rogers, Thomas Kopec, Christopher Ballmann. *Samford University, Birmingham, AL.*

PHYSICAL ACTIVITY, FUNDAMENTAL MOTOR SKILL DEVELOPMENT, AND SELF-REGULATION IN PRESCHOOL-AGED CHILDREN
Aaron P. Wood[1], Vince G. Nocera[1], Tyler J. Kybartas[2], Dawn P. Coe, FACSM[1]. *[1]University of Tennessee, Knoxville, Knoxville, TN. [2]Illinois State University, Normal, IL.*

A PRELIMINARY REPORT OF THE NONLOCAL REPEATED BOUT EFFECT OF THE ELBOW FLEXOR MUSCLES
William Miller[1], Xin Ye[2], Sunggun Jeon[3], Jun Seob Song[1], Jonathan T. West[1], Robjert J. Benton[1]. *[1]University of Mississippi, University, MS. [2]University of Hartford, West Hartford, CT. [3]Oklahoma State University, Stillwater, OK*.

Friday, February 19, 2021

1:00–2:00 SESSION IV: POSTER FREE COMMUNICATION (CONTINUED)

GENDER DIFFERENCES IN FIFTH GRADERS' SELF-CONFIDENCE IN PHYSICAL ACTIVITY AND FITNESS ABILITIES
Tenesha M. McDuffie[1], Mikaela A. Brooks[1], Anna K. Leal[2]. *[1]Bridgewater College, Bridgewater, VA. [2]Centenary College of Louisiana, Shreveport, LA.*

DOES AN EMPLOYEE MOVEMENT CHALLENGE ENHANCING PHYSICAL ACTIVITY LEVELS AND ATTITUDES IN A COLLEGE WORKFORCE
Madison Faulkner, Robyn M. York. *Montreat College, Montreat, NC.*

THE MOTIVATING FACTORS AND BARRIERS OF PHYSICAL ACTIVITY DURING PREGNANCY AND CHILDBIRTH
Cari Jayne Barrett. *University of North Georgia, Dahlonega, GA.*

PHYSIOLOGICAL AND PERCEPTUAL RESPONSES TO VARIOUS DURATIONS OF BLOOD FLOW RESTRICTION
Nathen A. Andrews, Chase P. Harris, Jakob D. Lauver. *Coastal Carolina University, Conway, SC.*

THE IMPACT OF A DUAL GENERATION SWIM INTERVENTION TO REDUCE UNINTENTIONAL DROWNINGS IN AFRICAN AMERICANS
Aniya .L Bettis, Nadarria Inge, Jermaine B. Mitchell. *University of Montevallo, Montevallo, AL.*

ATHLETIC TRAINING EDUCATION MOVING FORWARD. WHERE DOES THE PROFESSION GO FROM HERE?
Dennis Cobler, Beth Funkhouser. *Emory & Henry College, Emory, VA.*

2:00–3:00 HENRY J. MONTOYE AWARD LECTURE

PRESCRIBING EXERCISE FOR PATIENTS WITH FAILING HEARTS…IS THERE A LIMIT?
Peter H. Brubaker, Ph.D., *Wake Forest University*
Presiding: Becki Battista, Ph.D., SEACSM Past President, *Appalachian State University*

3:00–4:00 SESSION V: REVIEW/SYMPOSIA

MEASURING DIAPHRAGMATIC ENDURANCE AND ASSESSING RESPIRATORY DYSFUNCTION
Kristin M. Mendez, Alexander W. Parsons, Kevin McCully, FACSM. *University of Georgia, Athens, GA.*

Friday, February 19, 2021

3:00–4:00 SESSION V: POSTER FREE COMMUNICATION

BODY COMPOSITION OF NCAA DIVISION I FOOTBALL PLAYERS PRE AND POST COVID-19 QUARANTINE
Amanda N. Gordon[1], Malia N.M Blue[2], Hannah E. Saylor[1], Lacey M. Gould[1], Katie R. Hirsch[3], Andrew T. Hoyle[1], Abbie E. Smith-Ryan, FACSM[1]. [1]University of North Carolina at Chapel Hill, Chapel Hill, NC. [2]High Point University, High Point, NC. [3]University of Arkansas for Medical Sciences, Little Rock, AR.

PREDICTING DIVISION I LACROSSE GAME PERFORMANCE THROUGH MICROTECHNOLOGY
Libby L. Bynum[1], Jenna Carter[1], Charli Rosenberg[1], Bradley J. Myers[1], Jennifer A. Bunn, FACSM[2]. *[1]Campbell University, Buies Creek, NC. [2]Sam Houston State University, Huntsville, TX.*

THE ACUTE EFFECT OF HEAVY SQUATS AND FOAM ROLLING ON VERTICAL JUMP PERFORMANCE
TingYen Yeh, FACSM, Hailey Wimmenauer, FACSM, Hugh Lamont, FACSM, Chad Smith, FACSM. *Coastal Carolina University, Conway, SC.*

RELATIONSHIP BETWEEN WELLNESS SCORES AND INTERNAL AND EXTERNAL TRAINING LOADS IN A DIVISION I WOMEN'S LACROSSE TEAM
Alma K. Crouch[1], Michael Jiroutek[1], Ronald Snarr[2], Jennifer Bunn, FACSM[3]. *[1]Campbell University, Buies Creek, NC. [2]Georgia Southern University, Statesboro, GA. [3]Sam Houston State University, Huntsville, TX.*

THE ASSOCIATION BETWEEN BIOMARKERS OF RESILIENCE AND READINESS WITH FITNESS CHANGES IN COLLEGE SOCCER PLAYERS
Travis Anderson, Nathaniel T. Berry, John R. Cone, Andrew Scheck, Laurie Wideman, FACSM. *University of North Carolina at Greensboro, Greensboro, NC.*

SALIVARY CORTISOL ANALYSIS IN COLLEGIATE FEMALE LACROSSE ATHLETES
Jenna Leigh Carter[1], Stephanie L. Mathews[1], Bradley J. Myers[1], Jennifer A. Bunn, FACSM[2]. *[1]Campbell University, Buies Creek, NC. [2]Sam Houston State University, Huntsville, TX.*

SPRINT ZONE ANALYSIS BY POSITION OF DIVISION I WOMEN'S LACROSSE
Charli Rosenberg, Libby Bynum, Jenna Carter, Bradley Myers, Jennifer Bunn, FACSM. *Campbell University, Buies Creek, NC.*

EFFECTS OF TRAINING CESSATION ON ISOMETRIC MAXIMAL STRENGTH
S. Kyle Travis[1], Iñigo Mujika[2],[3], Kevin A. Zwetsloot[4], Jeremy A. Gentles[1], Michael H. Stone[1], Caleb D. Bazyler[1]. *[1]East Tennessee State University, Johnson City, TN. [2]University of the Basque Country, Leioa, Basque Country. [3]Universidad Finis Terrae, Santiago, Chile. [4]Appalachian State University, Boone, NC.*

CHANGES IN PERFORMANCE AND SUBJECTIVE MEASURES ACROSS A COLLEGIATE FIELD HOCKEY SEASON
Alexa J. Chandler[1], Harry P. Cintineo[1], David J. Sanders[2], Marissa L. Bello[3], Bridget A. McFadden[1], Shawn M. Arent, FACSM[1]. *[1]University of South Carolina, Columbia, SC. [2]Loyola University Chicago, Chicago, IL. [3]Mississippi State University, Starkville, MS.*

Friday, February 19, 2021

3:00–4:00 SESSION V: POSTER FREE COMMUNICATION (CONTINUED)

BRIDGING THE GAP BETWEEN ACADEMICS AND ATHLETICS: DEVELOPING A MUTUALLY BEFENICIAL RESEARCH AND SERVICE RELATIONSHIP
Greg A. Ryan, Drew S. DeJohn. *Georgia Southern University, Statesboro, GA.*

EFFECT OF WARM-UP ON THE PREVALENCE OF MEDIAL TIBIAL STRESS SYNDROME IN HIGHSCHOOL CROSS-COUNTRY ATHLETES
Makayla Mack, Kayla Baker, Rachel Tinius. *Western Kentucky University, Bowling Green, KY.*

CHRONICITY OF SYMPTOMS IN TREATMENT OF LATERAL EPICONDYLITIS WITH BLOOD FLOW RESTRICTION
Blake D. Justice. *Methodist University, Fayetteville, NC.*

NCAA PERSONNEL'S PERCEPTIONS OF FORMER ATHLETES' PHYSICAL ACTIVITY AND KNOWLEDGE OF THE PHYSICAL ACTIVITY GUIDELINES
Paula-Marie Martinez Ferrara, Jessica Smith, Megan Hightower, Kelley Strohacker, FACSM. *The University of Tennessee, Knoxville, Knoxville, TN.*

ASSOCIATION OF UPPER EXTREMITY PAIN AND PREPARATORY SOFTBALL PITCH KINEMATICS
McLain Skinner, Kevin Giordano, Kenzie Friesen, Kyle Wasserberger, Jessica Downs, Gretchen Oliver. *Auburn University, Auburn, AL.*

EXPLORING HOW NCAA PERSONNEL DISCUSS POST-SPORT PHYSICAL ACTIVITY MAINTENANCE WITH COLLEGIATE ATHLETES: A QUALITATIVE ANALYSIS
Jessica Smith, Paula-Marie M. Ferrara, Megan Hightower, Kelley Strohacker, FACSM. *University of Tennessee, Knoxville, Knoxville, TN.*

MASSAGE IT OUT. PHYSIOLOGICAL RESPONSES TO MYOFASCIAL RELEASE INTRA-EXERCISE
Daniel R. Greene, Jakob Nelson, Adrian Stone. *Augusta University, Augusta, GA.*

COMPARING SELF-REPORTED AND FUNCTIONAL OUTCOMES BETWEEN OSSEOINTEGRATED AND SOCKET PROSTHESES
Jacob Lonowski. *Georgia State University, Atlanta, GA.*

KETONE SUPPLEMENTATION TO IMPROVE FUNCTIONAL OUTCOMES IN ADOLESCENTS POST SPORTS-RELATED CONCUSSION
Kelsey A. Rushing, Allyn Abadie, Gregor W. Jenkins, Kaitlyn G. Willis, Maggie C. Steen, Ervin Watson III, Eric P. Plaisance, FACSM, Cody E. Morris. *University of Alabama at Birmingham, Birmingham, AL.*

RELATIONSHIP BETWEEN CONCUSSION HISTORY AND REACTION TIME IN COLLEGIATE ATHLETES
Spencer Ann M. Mitchell, Lori A. Schmied, Chad Schrock, Jeremy A. Steeves. *Maryville College, Maryville, TN.*

Friday, February 19, 2021

3:00–4:00 SESSION V: POSTER FREE COMMUNICATION (CONTINUED)

RELATIONSHIP BETWEEN MAXIMAL FAT OXIDATION AND VENTILATORY THRESHOLD IN ENDURANCE TRAINED MALES
Hannah E. Saylor[1], Casey E. Greenwalt[2], Lacey M. Gould[1], Amanda N. Gordon[1], Andrew T. Hoyle[1], Abbie E. Smith-Ryan[1]. *[1]The University of North Carolina, Chapel Hill, NC. [2]Florida State University, Tallahassee, FL.*

ACUTE EXERCISE LOWERS BLOOD GLUCOSE AND METABOLIC LOAD POST-HIGH-FAT MEAL INDEPENDENT OF AGE
Stephanie P. Kurti[1], Hannah Frick[1], William S. Wisseman[1], Steven K. Malin, FACSM[3],[2], David Edwards[4], Sam R. Emerson[5], Elizabeth S. Edwards, FACSM[1]. *[1]James Madison University, Harrisonburg, VA. [2]Rutgers University, New Brunswick, NJ. [3]University of Virginia, Charlottesville, VA. [4]University of Virginia, Charlottesvile, VA. [5]Oklahoma State University, Stillwater, OK.*

ENDURANCE EXERCISE PREVENTS METABOLIC DISTRESS-MEDIATED HEPATIC SENESCENCE VIA PROMOTING AUTOPHAGY
Joshua Cook, Madeline Wei, Benny Segovia, Ludmila Cosio-Lima, FACSM, Youngil Lee. *University of West Florida, Pensacola, FL.*

ASSOCIATIONS BETWEEN PHYSICAL ACTIVITY LEVEL AND METABOLIC DYSFUNCTION IN YOUTH WITH SEVERE OBESITY
Collette E. Connor, Webb Smith. *LeBonheur Children's Hospital, Memphis, TN.*

METABOLIC AND VENTILATORY RESPONSES TO EXERCISE IN YOUNG ADULTS FOLLOWING SARS-COV-2 INFECTION
Marc A. Augenreich, Valesha M. Province, Nina L. Stute, Abigail S. Stickford, Stephen M. Ratchford, Jonathon L. Stickford. *Appalachian State University, Boone, NC.*

INTENSITY OF ACTIVITY AND METABOLIC HEALTH
Mitchell Johnson, Hannah Sandstrom, Grace Alexander, Brian Kliszczewicz, FACSM, Katherine H. Ingram. *Kennesaw State University, Kennesaw, GA.*

ELEVATED MATERNAL LIPID METABOLISM IS ASSOCIATED WITH EXCEEDING GESTATIONAL WEIGHT GAIN GUIDELINES
Jill M. Maples[1], Courtney J. Riedinger[1], Samantha F. Ehrlich[2], Maire Blankenship[3], Nikki B. Zite[1], Rachel A. Tinius[3]. *[1]The University of Tennessee Graduate School of Medicine, Knoxville, TN. [2]The University of Tennessee, Knoxville, TN. [3]Western Kentucky University, Bowling Green, KY.*

THE EFFECT OF A SPINACH DERIVATIVE SUPPLEMENT, SOLARPLAST, ON INFLAMMATION BLOOD BIOMARKERS
Michaela G. Alesi[1], Alyssa R. Bailly[1], Jacqueline C. Easter[1], Constantine H. Katsoudas[1], Matthew T. Stratton[2], Katie Tran[1], Matthew Lee[1], Garrett M. Hester[1], Trisha A. VanDusseldorp[1]. *[1]Kennesaw State University, Kennesaw, GA. [2]Texas Tech University, Lubbock, TX.*

INFLUENCE OF PRENATAL YOGA ON MENTAL HEALTH IN PREGNANCY DURING THE COVID-19 PANDEMIC
Cathryn Duchette, Maire Blankenship, Rachel Tinius. *Western Kentucky Univeristy, Bowling Green, KY.*

Friday, February 19, 2021

3:00–4:00 SESSION V: POSTER FREE COMMUNICATION (CONTINUED)

METABOLIC FLEXIBILITY, INSULIN RESISTANCE, AND OBESITY DURING PREGNANCY ARE ASSOCIATED WITH NEONATAL ADIPOSITY
Rachel A. Tinius[1], Karen Furgal[1], Maire M. Blankenship[1], W. Todd Cade[2], Cathryn Duchette[1], Kevin J. Pearson[3], Jill M. Maples[4]. *[1]Western Kentucky University, Bowling Green, KY. [2]Duke University, Durham, NC. [3]University of Kentucky, Lexington, KY. [4]University of Tennessee Graduate School of Medicine, Knoxville, TN.*

THE ASSOCIATION OF PHYSICAL ACTIVITY WITH LIPID LEVELS IN PREGNANT WOMEN WITH OVERWEIGHT AND OBESITY
Bethany G. Rand[1], Assiamira Ferrara[2], Paul Hibbing[3], Monique Hedderson[2], Susan Brown[4], Sylvia Badon[2], Scott Crouter, FACSM[1], Samantha Ehrlich[1]. *[1]University of Tennessee Knoxville, Knoxville, TN. [2]Division of Research, Kaiser Permanente Northern California, Oakland, CA. [3]Children's Mercy, Kansas City, MO. [4]Department of Internal Medicine, University of California Davis, Davis, CA.*

COMPARISON OF DUAL TASK COST DURING OVERGROUND WALKING IN POSTPARTUM VERSUS CONTROL WOMEN
Amy Giboney, Juli Kunzman, Rebecca R. Rogers, Mallory R. Marshall. *Samford University, Birmingham, AL.*

CHANGES IN DUAL TASKING FROM ACROSS PREGNANCY AND POSTPARTUM
Anna Tankersley, Ashleigh Davis, Rebecca R. Rogers, Mallory R. Marshall. *Samford University, Birmingham, AL.*

MATERNAL LIPID METABOLISM IS LINKED TO NEONATAL ANTHROPOMETRIC OUTCOMES
Charlotte McCarley[1], Jill M. Maples[1], Maire Blankenship[2], Kimberly B. Fortner[1], Rachel A. Tinius[2]. *[1]The University of Tennessee Graduate School of Medicine, Knoxville, TN. [2]Western Kentucky University, Bowling Green, KY.*

IMPACT OF PARTIAL AND COMPLETE FLUID RESTRICTION ON INFLAMMATORY BIOMARKERS
William M. Adams, Mitchell E. Zaplatosch, Travis Anderson, Emily E. Bechke, Hanna M. Gardner, Samantha J. Goldenstein, Logan K. Brooks, Laurie Wideman, FACSM. *University of North Carolina at Greensboro, Greensboro, NC.*

THE EFFECTS OF BLOOD FLOW RESTRICTION TIMING ON MUSCLE ACTIVATION AND OXYGENATION DURING RESISTANCE TRAINING
Chase P. Harris, Nathen A. Andrews, Jakob D. Lauver. *Coastal Carolina University, Conway, SC.*

4:00–5:00 SESSION VI: REVIEW/SYMPOSIA

EXERCISE IS STILL MEDICINE DURING COVID-19: ADAPTATIONS TO EXERCISE IS MEDICINE ON CAMPUS AT UNC
Kathleen Stanford[1], Alexander Pomeory[1], Lauren C. Bates[1], Kyle Tamminga[2], Thevy Chai[2], Justin C. Moore[3], Lindsay Brookey[4], Lee Stoner, FACSM[1]. *[1]University of North Carolina at Chapel Hill, Chapel HIll, NC. [2]UNC Campus Health Services, Chapel HIll, NC. [3]Wake Forest School of Medicine, Winston-Salem, NC. [4]UNC Campus Recreation, Chapel HIll, NC.*

Friday, February 19, 2021

4:00–5:00 SESSION VI: POSTER FREE COMMUNICATION

PRIOR ATHLETIC INVOLVEMENT RESULTS IN BETTER WALKING SCORE ON THE MUSCULOSKELETAL HEALTH QUESTIONNAIRE
Jessica Downs, Abigail Cramer, Kenzie Friesen, Kevin Giordano, Nicole Bordelon, Abigail Brittain, Gretchen Oliver, FACSM. *Auburn University, Auburn, AL.*

HEAT-TREATED MONTMORENCY CHERRY SUPPLEMENT DOES NOT SIGNIFICANTLY AFFECT REACTIVE HYPEREMIA OR HEART RATE VARIABILITY
Greggory R. Davis[1], Alana G. Hoffpauir[1], David M. Bellar, FACSM[2]. *[1]-University of Louisiana at Lafayette, -Lafayette, LA. [2]-University of North Carolina - Charlotte, -Charlotte, NC.*

RESIDUAL EFFECTS OF PLAYING AN OVERHEAD SPORT ON HUMERAL RETROVERSION AND RANGE OF MOTION
Abigail M. Cramer, Jessica L. Downs, Kevin A. Giordano, Gretchen D. Oliver, FACSM. *Auburn University, Auburn, AL.*

INJURY HISTORY, SPORTS PARTICIPATION, AND CURRENT PHYSICAL ACTIVITY AMONG YOUNG ADULTS
Noah Gadd, Chloe McKay, Johanna Hoch, Deirdre Dlugonski. *University of Kentucky, Lexington, KY.*

EFFECTS OF BEETROOT JUICE SUPPLEMENTATION ON DIURNAL FLUCTUATIONS IN SUPRAMAXIMAL EXERCISE PERFORMANCE IN TRAINED SPRINTERS
Amanda M. Dumar, Anna F. Huntington, Rebecca R. Rogers, Thomas J. Kopec, Tyler D. Williams, Christopher G. Ballmann. *Samford University, Birmingham, AL.*

MASS SPECTROPHOTOMETRY VERSUS BLOOD METERS IN THE ASSESSMENT OF BETA-HYDROXYBUTYRATE LEVELS FOLLOWING KETONE SUPPLEMENTATION
Angelia Maleah Holland, Jenna K. Ansley, Andrew R. Moore. *Augusta University, Augusta, GA.*

THE INFLUENCE OF MACRONUTRIENT DISTRIBUTION ON URINARY HYDRATION MARKERS, THIRST, AND FLUID INTAKE
Mitchell E. Zaplatosch, Travis Anderson, Emily E. Bechke, Hanna M. Gardner, Samantha J. Goldenstein, Logan K. Brooks, Laurie Wideman, FACSM, William M. Adams. *University of North Carolina at Greensboro, Greensboro, NC.*

ASSOCIATIONS BETWEEN PHYSICAL ACTIVITY, 24-HOUR URINARY HYDRATION MARKERS AND TIMING OF FLUID INTAKE
Ji Yeon Choi, Mitchell E. Zaplatosch, Travis Anderson, Emily E. Bechke, Logan K. Brooks, Hanna M. Gardner, Samantha J. Goldenstein, Laurie Wideman, FACSM, William M. Adams. *University of North Carolina at Greensboro, Greensboro, NC.*

THE EFFECTS OF CAFFEINE ON JUMPING PERFORMANCE AND MAXIMAL STRENGTH IN FEMALE COLLEGIATE ATHLETES
Benjamin Burke[1], Kyle Travis[1], Jeremy Gentles[1], Kimitake Sato[2], Caleb Bazyler[1]. [1]East Tennessee State University, Johnson City, TN. [2]National Taiwan University of Sport, Taichung, Taiwan.

Friday, February 19, 2021

4:00–5:00 SESSION VI: POSTER FREE COMMUNICATION (CONTINUED)

INFLUENCE OF KETTLEBELL SWING STYLE AND LOAD ON PEAK KETTLEBELL VELOCITY AND TOTAL SYSTEM POWER
Cullun Watts, Bryan L. Riemann. *Georgia Southern University–Armstrong Campus, Savannah, GA.*

THE EFFECTS OF TART CHERRY JUICE AND WHEY PROTEIN ON RECOVERY FOLLOWING EXERCISE INDUCED MUSCLE DAMAGE
Hailey Jurgens, Svetlana Nepocatych, Takudzwa A. Madzima. *Elon University, Elon, NC.*

THE EFFECTS OF PROTEIN TIMING ON PERFORMANCE MEASURES IN ATHLETES
Heath Colton Byrd. *Winthrop University, Rock Hill, SC.*

PERSPECTIVES ON THE RELATIONSHIP BETWEEN NUTRITION AND MENTAL HEALTH WITHIN NCAA DIVISION I COLLEGIATE ATHLETIC PROGRAMS
Emma M. McCabe, Caroline J. Ketcham, Eric E. Hall. *Elon University, Elon, NC.*

MONITORING COMPETITION JUMP LOAD IN DIVISION I FEMALE COLLEGIATE VOLLEYBALL ATHLETES
Chad H. Herring, Michael J. Redd, David H. Fukuda. *University of Central Florida, Orlando, FL.*

THE EVALUATION OF LOWER BACK PAIN IN COLLEGE STUDENTS
Alisa Soloveva, Joni M. Boyd. *Winthrop University, Rock Hill, SC.*

NEITHER CAFFEINE NOR CYP1A2 GENOTYPE INFLUENCE FATIGUABILITY OR FORCE STEADINESS OF THE KNEE EXTENSORS
Sydnie R. Fleming[1], Ryan J. Colquhoun[1], Mitchel A. Magrini[2], Matthew C. Ferrell[3], Nile F. Banks[4], Nathaniel D.M. Jenkins[4]. *[1]University of South Alabama, Mobile, AL. [2]Creighton University, Omaha, NE. [3]Oklahoma State University Center for Health Sciences, Tulsa, OK. [4]University of Iowa, Iowa City, IA.*

EVALUATION OF AN IN-PERSON AND REMOTE-BASED LEARNING OF A NUTRITION PROGRAM FOR ADOLESCENTS WITH AUTISM SPECTRUM DISORDER (ASD):A COVID-19 PILOT STUDY
Riley H. Shurack. *University of Central Florida, Orlando, FL.*

PHYSIOLOGICAL OUTCOMES OF MOTIVATIONAL INTERVIEWING FOR WEIGHT MANAGEMENT AMONG COLLEGE STUDENTS DURING COVID-19
Kameron Suire, Jan Kavookjian, Danielle Wadsworth. *Auburn University, Auburn, AL.*

EFFECT OF ACUTE FEEDING ON BIOELECTRICAL IMPEDANCE VECTOR ANALYSIS CALCULATED PHASE ANGLE IN HEALTHY SUBJECTS
Andrew T. Hoyle[1], Gabrielle J. Brewer[2], Lacey M. Gould[1], Hannah E. Saylor[1], Amanda N. Gordon[1], Abbie E. Smith-Ryan[1]. *[1]University of North Carolina Chapel Hill, Chapel Hill, NC. [2]University of Connecticut, Mansfield, CT.*

RELIABILTY OF QUADRICEP AND HAMSTRING SOFT TISSUE MEASURES USING DUAL ENERGY X-RAY ABSORPTIOMETRY (DXA) SCANS
Cameron J. Elder, Taylor K. Dinyer, M. Travis Byrd, Haley C. Bergstrom, Jody L. Clasey, FACSM. *University of Kentucky, Lexington, KY.*

Friday, February 19, 2021

4:00–5:00 SESSION VI: POSTER FREE COMMUNICATION (CONTINUED)

THE IMPACT OF A FUNDAMENTAL MOTOR SKILL INTERVENTION ON BODY COMPOSITION OUTCOMES IN PRESCHOOL CHILDREN
Katherine E. Spring[1], Jerraco Johnson[2], Alexandra Carroll[1], Julia Sassi[1], Melissa Pangelinan[1], Mary Rudisill[1], Danielle D. Wadsworth[1]. *[1]Auburn University, Auburn, AL. [2]Ohio State University, Columbus, OH.*

EXPLAINING DISCREPANCIES IN BODY FAT PERCENTAGE VALUES BETWEEN LABORATORY CRITERION MEASURES IN COLLEGIATE ATHLETES
Sarah N. Lanham, Ronald L. Snarr. *Georgia Southern University, Statesboro, GA.*

IMPACT OF MENSTRUAL CYCLE ON BODY COMPOSITION MEASURES AND RESTING METABOLISM
Lacey Gould[1], Gabrielle Brewer[2], Malia Blue[3], Katie Hirsch[4], Hannah Saylor[1], Amanda Gordon[1], Andrew Hoyle[1], Abbie Smith-Ryan, FACSM[1]. *[1]University of North Carolina at Chapel Hill, Chapel Hill, NC. [2]University of Connecticut, Storrs, CT. [3]High Point University, High Point, NC. [4]University of Arkansas for Medical Sciences, Little Rock, AR.*

BODY VOLUME DERIVED FROM A 2 DIMENSIONAL DIGITAL IMAGE ACCURATELY MEASURES ADIPOSITY IN A THREE-COMPARTMENT MODEL
Katherine Sullivan, Bjoern Hornikel, Michael R. Esco, Michael V. Fedewa. *University of Alabama, Tuscaloosa, AL.*

PREDICTORS OF CLINICALLY MEANINGFUL GAIT SPEED RESPONSE AMONG OLDER ADULTS PARTICIPATING IN WEIGHT LOSS INTERVENTIONS
Ka Ki Tse[1], Rebecca Neiberg[2], Daniel Beavers[2], Stephen Kritchevsky[2], Barbara Nicklas[2], Dalane Kitzman[2], Jack Rejeski[1], Steve Messier[1], Kristen Beavers[1]. *[1]Wake Forest University, Winston Salem, NC. [2]Wake Forest School of Medicine, Winston Salem, NC.*

LIFESTYLE INTERVENTION FOR TREATMENT OF DIABETES: RANDOMIZED TRANSLATIONAL TRIAL IMPROVING CONTROL OF CVD RISK FACTORS
Olivia Bond, Jeffrey Katula. W*ake Forest University, Winston Salem, NC.*

FRUIT AND VEGETABLE INTAKE INFLUENCED BY SELF-EFFICACY IN ULTRA-ENDURANCE ATHLETES
Bayley Wade, Lauren Masden, Ally Tripure, Sara E. Mahoney, FACSM. *Bellarmine University, Louisville, KY.*

5:00–7:00 AWARDS CEREMONY

AWARD WINNERS ANNOUNCED FOR DOCTORAL, MASTERS, AND UNDERGRADUATE POSTER COMPETITIONS.

ANNOUNCEMENT OF SEACSM EXECUTIVE BOARD ELECTIONS
Presiding: John Petrella, PhD, SEACSM President, *Samford University*

SESSION I: REVIEW/SYMPOSIA Thursday, Feb. 18, 1:00–2:00 pm EST

COMPONENTS OF THE 24-HOUR ACTIVITY CYCLE AND FEELINGS OF ENERGY AND FATIGUE IN COLLEGE STUDENTS

Ginny M. Frederick, Patrick J. O'Connor, FACSM, Michael D. Schmidt, Ellen M. Evans, FACSM. *University of Georgia, Athens, GA.*

The recently established 24-Hour Activity Cycle (24-HAC) is a paradigm that integrates the behaviors of 1) sleep, 2) sedentariness (SED), 3) light-intensity physical activity (LIPA), and 4) moderate-to-vigorous intensity physical activity (MVPA), all of which are known to exert independent effects on health and well-being. However, the interactive effects of the four components of the 24-HAC on distinct aspects of health are less well established. A cohort known to have altered and variable 24-HAC patterns are college students given their competing time and energy demands (e.g., academic, work, social, etc.) within the unique physical and social environment of a college campus. Moreover, with respect to well-being, many college students report a high level of mental and emotional exhaustion, likely in part due to altered sleep behaviors and SED requirements for academic work. Literature assessing relationships between 24-HAC behaviors and feelings of energy and fatigue in college students exist to date; however, the extant literature is robust for some components (e.g. MVPA and sleep) yet nearly non-existent for others (e.g. SED and LIPA). Given the increasingly variable patterns in the typical 24-HAC of college students and the emerging paradigm that both the independent and interactive effects of the 24-HAC components influence health and well-being it will become increasingly important to understand the relationships between and among the 24-HAC behaviors, and feelings of energy and fatigue. In this context, the purpose of this symposium is to: 1) review the available evidence on bivariate relationships between 24-HAC components and feelings of energy and fatigue in the college student cohort, 2) identify gaps in the current literature regarding this topic, and 3) present ideas for future research to more fully characterize the relationship between the 24-HAC and feelings of energy and fatigue in this population.

SESSION I: POSTER/FREE COMMUNICATION Thursday, Feb. 18, 1:00–2:00 pm EST

SEQUENCE-SPECIFIC IMPLICIT MOTOR LEARNING USING THE NON-DOMINANT LEFT ARM IN A THREE-DIMENSIONAL VIRTUAL ENVIRONMENT

Charles R. Smith[1], Joelle Via[1], Hannah Roark[1], Macie Watkins[1], Jessica F. Baird[2], Jill C. Stewart[1]. *[1]University of South Carolina, Columbia, SC. [2]University of Alabama Birmingham, Birmingham, AL.*

BACKGROUND: Implicit motor learning is essential to the acquisition of new motor skills. The examination of implicit learning, thus far, has been predominantly limited to single-finger button presses or two-dimensional movements of a computer mouse or joystick. Recently, we investigated implicit motor learning during three-dimensional (3D) reach movements with the dominant right arm. The nondominant left arm typically exhibits a different control strategy during the execution of whole-arm movements. Therefore, the purpose of this study was to examine sequence-specific implicit learning during practice of a 3D reach task with the nondominant left arm. **METHODS:** Sixteen young, non-disabled individuals completed a target task presented in a 3D virtual environment with the nondominant left arm on two consecutive days. Targets were displayed one at a time alternating between an eight-target repeated sequence and an eight-target random sequence. Performance was measured by the time to complete a sequence (response time) and analyzed by sequence type (random, repeated). Kinematic data determined how movement control changed over time. Separate repeated measures ANOVAs assessed changes over time for both Random and Repeated sequences with $\alpha = 0.05$. **RESULTS:** On day 1, response time improved regardless of sequence type ($p<0.001$); however, the repeated sequence was faster than the random sequence ($p<0.001$) indicating sequence-specific learning. Response time improvements and differences between random and repeated sequences were retained on Day 2. With no significant changes in peak velocity over practice or differences by sequence type ($p>0.1$), performance improvements were driven by shorter total hand path distances ($p<0.01$) on both days. Time to peak velocity also decreased over practice ($p<0.001$), regardless of sequence type, indicating an increased reliance on feedforward movement control. **CONCLUSIONS:** Similar to our previous study with the right arm, sequence-specific learning in the left arm was characterized by decreased response times and shorter hand path distances. However, peak velocities were higher and hand path distances longer in the current study than those observed with the dominant right arm, suggesting differences related to hemispheric specialization for the control of multi-joint arm movements. The current study provides novel information on the control and learning of skilled movements in the nondominant arm that may have functional implications.

GROUND REACTION FORCES ASSOCIATED WITH THE WIND-UP MOTION IN HIGH SCHOOL BASEBALL PITCHERS

Anthony W. Fava, Jessica L. Downs, Hillary A. Plummer, Gretchen D. Oliver, Nicole Bordelon, Adam Nguyen. *Auburn University, Auburn, AL.*

BACKGROUND: Ground reaction forces developed on the drive leg during the wind-up motion of a pitch may influence pitching mechanics. During the wind-up, the drive leg and hip are loaded requiring stability and trunk control to effectively generate momentum in the direction of the pitch. Inefficient energy production and transfer can impair performance by leaking energy across proximal segments of the kinetic chain lessening distal joint moments. Therefore, thi s study aimed to analyze the association between performance and ground reaction forces for the drive and stride legs during the pitching motion. METHODS: Kinematic and kinetic data were captured on twenty-three high school baseball pitchers (16.6±3.1yr; 180.1±6.1cm; 75.9±10.5kg) throwing fastballs from a mound. The pitching motion was broken into three phases: 1) stride foot off to peak knee height, 2) peak knee height to stride foot contact, 3) stride foot contact to maximal shoulder external rotation. Ground reaction forces in all three directions (vertical, anterior/posterior, medial/lateral) and the magnitude of both the drive and stride legs were measured using force plates, while ball speed was assessed using a radar gun. Linear regression was used to determine a relationship between ground reaction forces and ball speed. RESULTS: Linear regression revealed the magnitude of drive leg ground reaction force during phase two significantly predicted ball speed ($B = .009$, $p = .042$). No other variables were included in the regression. CONCLUSIONS: Adolescent pitchers with a larger magnitude of drive leg ground reaction forces were associated with faster ball speeds. Increased performance is affiliated with how a pitcher can dynamically load the drive leg to produce greater ground reaction forces that generate momentum for the pitch.

ROLE OF OCCUPATIONAL FOOTWEAR AND WORKLOAD ON LOWER EXTREMITY MUSCLE ACTIVATION DURING MAXIMAL EXERTIONS AND POSTURAL STABILITY TASKS

Hannah Freeman[1], Harish Chander[1], Alana J. Turner[1], Sachini N.K. Kodithuwakku Arachchige[1], Adam C. Knight[1], Chip Wade[2], John C. Garner[3]. *[1]Neuromechanics Laboratory, Department of Kinesiology, Mississippi State University, Mississippi State, MS. [2]Department of Industrial Systems and Engineering, Auburn University, Auburn, AL. [3]Department of Kinesiology and Health Promotion, Troy University, Troy, AL.*

Background: Occupational footwear and simulated occupational workloads have been reported to play a role in maintaining postural stability. As such, three occupational footwear (steel-toed work boots-ST, tactical work boot-TB; low-top slip-resistant shoe-LT) were previously tested for postural stability during sensory organization test (SOT) when exposed to a 4-hour low-intensity walking workload, with testing repeated at 30-minute increments. Postural stability decrements were reported in LT and over the workload attributed to the footwear design and localized muscular fatigue. Purpose: The role of occupational footwear and workload on lower extremity muscle activity hasn't been analyzed yet. This paper reports previously unreported electromyography (EMG) muscle activity from four lower extremity muscles during this experiment. Methods: EMG from vastus medialis (VM), medial hamstrings (MH), tibialis anterior (TA) and medial gastrocnemius (MG) was recorded during maximal voluntary isometric contractions (MVIC) and during SOT for every 30 minutes over the 4-hour simulated workload while wearing three different occupational footwear (ST, TB, LT). Mean MVIC, mean and percent MVIC during each SOT condition from each muscle was analyzed individually using a 3 (Footwear) x 9 (Time) repeated measures ANOVA at alpha level of 0.05. Results: Significant differences for MVICs were evident but was limited to only time main effect with no significant differences between the occupational footwear. Additionally, there were no significant differences between footwear and time for any EMG measures during the SOT postural tasks. Conclusion: The findings from the current analysis suggest that occupational footwear type does not influence lower extremity muscle activity both during maximal exertions and during postural stability tasks. The 4-hour occupational workload only influenced lower extremity muscle activity during maximal exertions leading to significantly lower muscle activity over the time course of the workload, but did not influence the muscle activity during postural stability tasks. The current findings add to the body of literature of occupational footwear biomechanics and offer design suggestions for occupational footwear when exposed to simulated occupational workloads.

GROUND REACTION FORCE COMPARISON BETWEEN BAREFOOT AND SHOD SINGLE LEG LANDING AT VARIED HEIGHTS

Jocelyn E. Arnett[1], Cameron D. Addie[2], Hillary A. Plummer[3], Ludmila M. Cosio-Lima, FACSM[1], Lee E. Brown, FACSM[1]. *[1]University of West Florida, Pensacola, FL. [2]Middle Tennessee State University, Murfreesboro, TN. [3]Andrews Institute of Orthopedics and Sports Medicine, Gulf Breeze, FL.*

BACKGROUND: Landing is a common movement that occurs in many sports. Barefoot research has gained popularity in examining how shoes alter natural movements. However, it is unknown how a single leg landing under barefoot conditions, as well as landing height, affects ground reaction forces (GRF). PURPOSE: The purpose of this research was to examine the differences in GRF during a single leg landing under barefoot and shod conditions from various heights. METHODS: Sixteen female Division II collegiate athletes, 8 basketball (age: 19.88 ± 0.64 yrs; height: 1.77 ± 0.09 m; mass: 75.76 ± 12.97 kg) and 8 volleyball (age: 20.00 ± 1.07 yrs; height: 1.74 ± 0.08 m; mass: 72.41 ± 5.41 kg), performed single leg landings from 12, 18, 24, and 30 inches barefoot and shod. An AMTI AccuGait force plate was used to record GRF. A 2 (condition) x 4 (box height) x 2 (sport) repeated measures ANOVA was performed to determine any GRF differences. RESULTS: There were no significant three way or two-way interactions ($p > 0.05$). There was also no main effect for sport ($p > 0.05$). There were main effects for footwear and box height ($p = 0.000$) where shod (2295.121 ± 66.025 N) had greater impact than barefoot (2090.233 ± 62.684 N). CONCLUSIONS: Single leg barefoot landings resulted in less vertical GRF than shod landings. This could be due to increased flexion at the joints which aids in force absorption.

IMPACT OF PROLONGED EXPOSURE TO SLIPPERY SURFACE ON STATIC POSTURAL STABILITY.

Sachini N K Kodithuwakku Arachchige, Harish Chander, Alana J. Turner, Adam C. Knight. *Mississippi State University, Starkville, MS.*

Background: Falls and fall-related injuries are extremely common in occupational settings. Intrinsic factors such as overexertion and extrinsic factors such as the nature of the standing or walking surface are causative factors of such falls. Postural stability during acute exposure to a slippery surface and prolonged exposure to a dry surface have been studied before. However, the impact of prolonged exposure to a slippery surface on static balance has not been studied previously. **Purpose:** To analyze the impact of extended exposure to a dry surface and a slippery surface on static postural stability during a simulated load-carrying task. **Methods:** Eighteen young, healthy males (age: 21.17 ± 3.38 years; height: 1.77 ± 0.08 m; mass: 89.81 ± 14.23 kg) were recruited. The participants were subjected to a one-hour walking with an anterior load-carrying task on a dry surface and a slippery surface on two different days. Participants' static balance (3 trails of 20 seconds) was assessed using a force platform in stable and unstable eyes open conditions at 0 minute, 30 minutes, and 60 minutes of walking time. Postural sway variables were analyzed using a 2 (surface) X 3 (time) repeated measures analysis of variance (ANOVA) for stable and unstable eyes open conditions. **Results:** Significant time main effects were observed in stable eyes open condition with greater balance decrements at 30 minutes and 60 minutes. Additionally, greater balance decrements were observed on the slippery surface compared to the dry surface in unstable eyes open condition. **Conclusion:** Physiological workload causing overexertion and slippery surface negatively impact static postural stability. The study indicates that fatigue is unavoidable during work-related tasks, especially during prolonged tasks, hence the importance of rest-time scheduling among workers to prevent ergonomic falls. **Acknowledgment:** This study was funded by Grant #2T42OH008436 from NIOSH. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of NIOSH.

USING VIRTUAL REALITY TO RECREATE THE CLASSICAL "MOVING ROOM" EXPERIMENT TO ASSESS POSTURAL CONTROL

Stephen Luke Ramsey, Sachini N K Kodithuwakku Arachchige, Harish Chander, Alana J. Turner, Adam C. Knight. *Mississippi State University, Starkville, MS.*

Background: The "moving room" paradigm was developed by Lee and Aronson in 1974 to analyse the impact of visual and proprioceptive input in the control of posture. Postural perturbations can be provided to the visual system, using a modified "moving room/wall" paradigm, using virtual reality (VR). **Purpose:** Hence, the purpose of the study was to analyse the impact of an unexpected and expected moving wall in a virtual environment on postural stability. **Methods:** Nineteen participants (age: 25±6 years; height: 166.13±11 cm; mass: 67.86±12 kg) were tested for static postural stability using a force platform under three conditions: baseline (BL) with no perturbation and no VE, unexpected visual perturbations (UP) and expected visual perturbation (EP) in a custom built VE through a head mounted display. A one-way repeated measures ANOVA was used to analyse postural sway variables derived from centre of pressure (COP) excursions at alpha level of 0.05. COP length (COP-L), COP radial displacement (COP-RD), maximum anterior-posterior (COP AP-Max) and medial-lateral (COP ML-Max) COP excursion are reported in this paper. **Results:** Significant differences between testing conditions existed for COP ML-Max [$F(2,36) = 5.093$, $p = 0.011$, $\eta_p^2 = 0.221$] and for COP-RD [$F(2,36) = 7.506$, $p = 0.002$, $\eta_p^2 = 0.294$]. Post-hoc pairwise comparisons for both the variables revealed that baseline exhibited significantly lower postural sway compared to UP, with no significant differences between baseline and EP. COP-L and COP AP-Max did not exhibit any significant differences. UP demonstrated significantly higher postural sway parameters compared to BL, suggesting decreased postural stability when exposed to unexpected moving of the virtual wall. **Conclusion:** Hence, with visual perturbations experienced without anticipation, participants were relying on compensatory postural responses (CPRs) to make postural adjustments. However, no significant difference existed between EP and BL, suggesting no change in postural stability, even with visual perturbations in a VE, as long as they are anticipated so the anticipatory postural responses (APRs) can make proactive responses to maintain postural stability. Based on the current findings, there is evidence of both CPRs and APRs during visual perturbations in the "virtual moving wall" paradigm could potentially serve as a low-cost and feasible fall prevention-training program.

TRUNK MUSCLE ACTIVATION AND KINEMATICS DURING BAREFOOT AND SHOD TREADMILL RUNNING

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BACKGROUND: Previous research on barefoot versus shod running has focused on the examination of biomechanics of the lower extremity, with observed increases in mid/forefoot striking and increased plantar flexion of the ankle. This study aimed to determine whether acute changes in trunk biomechanics occurred when participants ran barefoot versus shod. METHODS**:** Habitually minimalist (*N*=4) and habitually shod (*N*=6) runners were recruited. Participants each ran a barefoot and shod running protocol for five minutes on a treadmill at his or her desired speed; the first condition always matched with the runner's experience. Data were collected for 10s at the end of the fourth and fifth minutes and included peak muscle activation using electromyography of the rectus abdominus, external oblique, and erector spinae (T6 and T12 regions). Torso ankle, ankle angle, turnover rate, and vertical movement of the center of gravity were determined using Dartfish software. Four 2x2 ANOVAs were used to determine the effects of runner type and condition on peak muscle activation of each individual muscle, while a 2x2 MANOVA was performed to determine the effects of runner type and condition on the kinematic variables. RESULTS: Peak muscle activation was significantly greater for the minimalist runners compared to shod runners for the rectus abdominus muscle (+0.034 mV, $F(1, 36) = 7.31$, $p < 0.05$), external oblique muscle (+0.035 mV, $F(1, 36) = 9.35$, $p < 0.05$), and the erector spinae at region T6 (+0.044mV, $F(1, 36) = 9.47$, $p < 0.05$). Torso angle was significantly greater in the minimalist runners (160.47°) compared with the shod runners (149.58°), indicating a more upright posture, $F(1, 36) = 12.86$, $p < 0.05$. There was no significant main effect or interactions for running condition for any variable measured. CONCLUSIONS: Running condition (barefoot vs. shod) did not acutely change the control of trunk muscle activation or biomechanics in either group tested. Significant observations were observed with the habitually minimalist runners, who ran with a more upright posture and greater corresponding muscle activation in the abdominal and upper back regions. It is suggested that these biomechanical modifications are a product of long-term adaptations made by training with minimalist footwear, which were not affected by an acute bout of running with alternative footwear.

ASSOCIATIONS BETWEEN A BASEBALL PITCHER'S ARM SLOT AND SHOULDER JOINT LOADS

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BACKGROUND: The shoulder is one of the most commonly injured areas among pitchers. A pitcher's arm slot, a combination of the orientation of a pitcher's arm relative to his trunk and the trunk relative to his pelvis, has been shown to influence the loads placed on the pitching arm. Examining the relationship between a pitcher's arm slot and shoulder joint loads could provide additional insight into whether specific arm slots place pitchers at a greater risk of injury. Therefore, the purpose of this study was to investigate the associations between arm slot and peak shoulder joint loads during the baseball pitch.**METHODS:** An electromagnetic motion capture system collected the kinematics of 22 youth baseball pitchers (75.0±7.9kg; 1.8±0.05m; 16.2±0.8yrs) at 240 Hz. Arm slot was the combination of arm angle and trunk angle. Arm angle was 1) the angle of elevation between the pitching arm, and 2) the angle of elevation between the pitching arm and the global reference frame. The trunk angle was the lateral flexion angle between the trunk and the pelvis. Arm and trunk angles were examined at the pitching events of foot contact (FC), maximum shoulder external rotation (MER), and ball release (BR). Shoulder joint loads were quantified using peak shoulder rotation torque and peak shoulder anterior force, defined as the torque exerted by the trunk on the humerus at the shoulder about the longitudinal humeral axis and the component of the force exerted by the trunk on the humerus at the shoulder parallel to the anterior trunk axis, respectively. Spearman's rank-order correlations examined the associations between arm slot, trunk angle, and shoulder joint loads.**RESULTS:** Correlation analysis revealed no associations between shoulder joint loads and arm angle or trunk angle at FC, MER, or BR (all $p > .212$).**CONCLUSIONS:** The lack of association between shoulder joint loads and arm slot was surprising and in contradiction with previous research reporting that sidearm pitchers experience less shoulder anterior force than ¾ and overhand pitchers. In the current study, neither the relative orientation between the pitcher's arm and his body nor the absolute orientation of the pitcher's arm in the global reference frame were associated with shoulder joint loads. These findings suggest that there is no specific arm slot that consistently increases the loads placed on the shoulder. Pitchers should choose the arm slot that allows them to perform their best.

RUNNING BIOMECHANICS OF YOUTH WITH AUTISM SPECTRUM DISORDER

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BACKGROUND: Research examining gait biomechanics of persons with autism spectrum disorder (ASD) has grown significantly in recent years and has demonstrated that persons with ASD walk at slower self-selected speeds and with shorter strides, wider step widths, and reduced lower extremity biomechanics compared to neurotypical controls. In contrast to walking, running has yet to be examined in persons with ASD. The purpose of this study was to examine lower extremity running biomechanics in adolescents (13-18 year-olds) with ASD and matched (age, sex, and body mass index) neurotypical controls. METHODS: Three-dimensional kinematics and ground reaction forces (GRF) were recorded while participants ran at two matched speeds: self-selected speed of adolescents with ASD and at a standardized 3.0m/s. Sagittal and frontal plane ankle, knee, and hip biomechanics along with vertical ground reaction force (GRF) waveforms were normalized to the stance phase of running. Waveforms were compared using two-way ANOVAs group x speed) via statistical parametric mapping (alpha at 0.04). RESULTS: Adolescents with ASD ran with reduced GRFs (by 14.5%), plantarflexion moments (18.5%), hip abduction moments (44.4%), and knee abduction moments (69.4%), each surrounding their respective peaks (all $p<0.001$). Running at 3.0m/s increased sagittal plane hip and knee moments surrounding initial contact (both 10.4%; $p<0.004$) and frontal plane knee angles during mid (2.9 deg; $p=0.003$) and late stance (2.8 deg; $p=0.003$) compared to self-selected speeds. CONCLUSIONS: This study illustrates that adolescents with ASD run with reduced contributions from the plantarflexors and hip abductor musculature, which contribute to vertical GRFs. Educators and therapists should consider examining running mechanics, in addition to walking, of adolescents with ASD to determine if muscular or neural deficiencies contribute to reduced hip and ankle involvement.

UPPER EXTREMITY AND PELVIS SEGMENT ENERGY FLOW DURING THE SOFTBALL SWING

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BACKGROUND: Energy flow through the kinetic chain is a foundational concept in softball injury prevention and performance literature; however, research has yet to measure energy flow during the softball swing. The purpose of the study was to compare front and back-side upper extremity and pelvis energy flow during the acceleration phase of the softball swing. **METHODS**: Twenty-five NCAA D1 collegiate softball athletes (20.4±1.7yr; 166.7±22.0cm; 74.9±15.9kg) active on a playing roster and injury free for the past six months participated. Participants performed three full effort swings off a stationary tee. Kinematic and kinetic data were collected using an in-ground forceplate and electromagnetic motion capture system. Energy flow data were analyzed during the acceleration phase, defined as the period from stride foot contact to ball contact. The front and back-side upper extremities were defined as closer to the pitcher and catcher, respectively. Peak rates of energy flow were measured for (a) pelvis inflow from the hip (b) humerus inflow from the shoulder, (c) humerus outflow to the elbow, (d) forearm inflow from the elbow, (e) forearm outflow to the wrist, and (f) hand inflow from the wrist. A one-way MANOVA examined effect of side (front and back) on the energy flow variable. **RESULTS**: MANOVA revealed a significant effect of side on energy flow [F(6, 41),=18.05, p<0.001], Wilk's Λ = 0.275, partial η2 =0.725]. Pairwise comparisons revealed a significant difference for pelvis energy inflow from the hip (p=0.009), where the front-side (1,616 SD±1,040 W) had greater energy inflow than the back-side (745±1,183 W). There were no significant differences for upper extremity energy flow variables. **CONCLUSIONS**: Pelvis rate of energy inflow was significantly greater from the front-side hip during the acceleration phase of the softball swing. The finding suggests a large breaking force is applied by the front-side lower extremity to stop linear translation of the body at foot contact may be a significant source of kinetic energy contribution in softball hitting. A lack of significance between upper extremity segments may indicate neither extremity has a dominant contribution during the acceleration phase of the swing.

ACUTE EFFECTS OF SUBJECTIVELY- VS OBJECTIVELY-REGULATED HIGH INTENSITY INTERVAL EXERCISE ON MOTOR FUNCTION

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BACKGROUND: High-intensity interval training (HIIT) has been proposed as a mechanism for improving overall health outcomes across the lifespan. However, the acute effects of ecologically-valid HIIT as compared to traditional HIIT prescriptions on motor function have yet to be identified. These data will be crucial for developing effective therapeutic interventions for preserving mobility and independence among aging adults. **METHODS:** Thirteen participants (mean age = 36 ± 13 yrs) completed a graded maximal exercise test to determine aerobic capacity and peak heart rate followed by single sessions of objectively-(OBJ) and subjectively-regulated (SUB) HIIT exercise sessions. Both HIIT sessions consisted of 10 x 60s work intervals, interspersed with 60s recovery intervals on a treadmill. The order of the HIIT sessions was randomized and participants selected treadmill speed and incline to match the prescribed intensity levels based on either heart rate (OBJ; 80-90% peak heart rate) or ratings of perceived exertion (SUB; 8-9). Before (PRE), immediately after (PT0), and thirty minutes (P30) after the OBJ and SUB sessions, participants completed three mobility assessments. The 2-Minute Walk Test (2MWT) evaluates walking endurance as participants walk as fast as possible around a 50-ft course for two minutes. Total distance traveled(ft) is reported. The 9-Hole Pegboard Test (9HPT) assesses hand dexterity where participants place and remove nine pegs into a board one at a time as quickly as possible. Total time (s) is reported for the dominant hand. The Standing Balance Test (SBT) measures postural sway via a standardized theta score using an accelerometer under five different conditions. Data analysis was completed via SPSS using a repeated-measures, 2-Factor ANOVA with time (PRE, PT0, P30) and condition (OBJ, SUB) as factors. **RESULTS:** There were no significant interaction or main effects of condition or time for walking endurance or hand dexterity as measured via the 2MWT (p > 0.05) and 9HPT (p > 0.05), respectively. There was a significant main effect of time (F = 3.562, p = 0.04, ES = 0.229) for the SBT wherein balance scores significantly decreased from PRE (0.792 ± 0.099 a.u.) to PT0 (0.582 ± 0.120 a.u.), but non-significantly rebounded at P30 (0.706 ± 0.113 a.u.). No significant interaction or main effects of condition were evident for SBT (p > 0.05). **CONCLUSIONS:** Overall, neither OBJ or SUB HIIT had a significant effect on walking endurance or hand dexterity. Engaging in a HIIT session may temporarily reduce balance performance, but this reduction could rebound following quiet rest. These data indicate that SUB HIIT is a safe and viable method for engaging in exercise without deleterious effects to motor function.

EVIDENCE FOR THE USE OF DYNAMIC MAXIMUM NORMALIZATION METHOD OF MUSCLE ACTIVATION DURING WEIGHT BACK SQUATS

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BACKGROUND: The purpose of this study was to evaluate intra and inter-participant variability and reliability of muscle activations when analyzed using maximum voluntary isometric contractions (MVIC) and dynamic maximum (DMVC) normalization methods. METHODS: Muscle activations were collected on twenty-seven participants (13 females, 14 males) performing one-repetition maximum (1RM) and submaximum (80%) back squats. Data from submaximum squats were normalized to MVICs and DMVC. Data were compared using intra-class correlations over two testing days, variance ratio, and coefficients of variation. Mixed-model ANOVAs were used to elucidate the influence on intra-(method) and inter- (sex) subject variability. RESULTS: Reliability levels were good for rectus femoris (RF) (Interclass correlation coefficient (ICC): 0.776), vastus medialis (VM) (ICC: 0.820), and biceps femoris (BF) (ICC: 0.822) for DMVC across testing sessions. Reliability levels were also good for RF (ICC: 0.735) and BF (ICC: 0.795) during MVIC across testing sessions. Reliability of VM during MVICs was moderate, reaching an ICC of 0.660. Variance Ratio, peak coefficient of variation (CV), and mean CV for all muscles were reduced by 24%, 48%, and 56% in DMVC compared to MVIC, respectively. A significant normalization method by sex interaction was found for both peak and mean BF activation levels (p=0.005 and p=0.007, respectively). Post hoc tests revealed that differences between normalization methods were more pronounced in females than males for both peak (T=3.043, p=0.005, d=1.171) and mean (T=2.821, p=0.013, d=1.103) activations. Post hoc tests also found greater sex differences when normalizing to MVIC than DMVC for both peak (T=2.541, p=0.026, d=0.757) and mean (T=2.629, p=0.022, d=0.920) BF activations. Lastly, there were significant normalization method main effects for peak and mean activations for muscle (all p<0.001). CONCLUSIONS: We provide evidence for the use of the peak muscle activation measured during the 1RM test as the denominator when normalizing/assessing submaximal tests of the same movement. Although these findings hold for both sexes, outcomes of muscle activations in females were more susceptible to normalization method compared to males. As such, this study clearly illustrates the need for exercising caution when considering results from multiple studies that implement different normalization schemes.

COMPARISON OF MEAN MUSCLE ACTIVITY DURING THE SQUAT AND COUNTERMOVEMENT JUMPS

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BACKGROUND: While the squat (SJ) and countermovement jumps (CMJ) have gained popularity in the assessment of neuromuscular function, inherent differences between the jumping techniques contribute to differences seen in results of the test. This is interesting as both techniques have the goal of achieving the greatest jump height possible. This has led to the present examination of the differences in mean muscle activity of the knee extensors during the propulsive phase of each jump technique. METHODS: Twenty-two recreationally trained males between 18-35 years of age performed three CMJ and three SJ in during a single visit. Trials were completed with a wooden dowel placed across the upper back in a high bar squat position. Participants used a self-selected foot position and depth for each of the trials. If a countermovement was visually detected during the SJ, an additional trial was collected. Each trial was performed using a force platform to determine phases of the jumps. The propulsive phase of the CMJ was defined as the point of zero velocity at the end of the braking phase through the point of take-off. In the SJ the propulsive phases was defined as the initiation of movement through take off. EMG data was 4th order Butterworth band pass filtered with full wave rectification prior to data analysis. Mean muscle activity was calculated as the mean rectified signal across the entire propulsive phase. The mean of the trials of each strategy was then compared using a paired samples t-test. RESULTS: No differences were seen between jumping strategies in the vastus lateralis (CMJ 1.25 ± 0.4 mV vs SJ 1.17 ± 0.38 mV), vastus medialis (CMJ 1.09 ± 0.44 mV vs SJ 1.07 ± 0.54 mV), and medial gastrocnemius (CMJ 0.768 ± 0.36 mV vs SJ 0.67 ± 0.37 mV). Significant increase was seen in the semitendinosus during the CMJ (CMJ 0.27 ± 0.11 vs SJ 0.23 ± 0.09). CONCLUSIONS: The findings of no differences between the knee extensors and plantar flexors, supports previous investigations. The differences seen in the knee flexors is in contrast to previous findings, by the differences in the musculature that was examined (semitendinosus vs biceps femoris). As the knee extensors are the primary musculature involved in executing the jumping tasks of the ones included in this study, differences in jump height seen between the two strategies appear to be the result of other mechanisms then muscle activity during the task.

LONGITUDINAL CHANGES OF A SINGLE SUBJECT IN YOUTH PITCHING

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BACKGROUND: Much of the research related to the biomechanical analysis of pitchers has been done on adult athletes, and few studies follow athletes longitudinally to assess changes as the pitcher grows. The purpose of this study is to assess changes in pitch speed, wrist velocity, accuracy, and stride length, in a youth pitcher from the ages 11 to 13. METHODS: Data was collected on a youth right-handed pitcher with no prior right elbow or shoulder injuries. After a warm up, the pitching kinematics were assessed using 14 Vicon Bonita cameras integrated with The Motion Monitor software. The participant pitched five, 15-pitch simulated innings with a 3-minute rest between innings. Data was collected when the participant was 11, 12, and 13 years old. RESULTS: The average pitch speed increased from 55.4 MPH (sd 1.74) at age 11 to 61.96 MHP (sd. 1.61) at age 13, average stride length increased from 110 cm (height 160 cm) for a stride length to height ratio of .6875 at age 11 to 129 cm (height 175 cm) for a stride length to height ratio of .7571 at age 13, and wrist velocity from 13.78 m/s (sd 1.74) at age 11 to 18.62 m/s (sd 2.19) at age 13. The greatest percentage gain was in wrist velocity at 35%. Accuracy improved, with the participant throwing 40 strikes and 35 balls at age 11, progressing to 56 strikes and 19 balls at age 13. CONCLUSION: This participant showed a steady increase in biomechanical markers expected of an increasingly skilled youth pitcher, with improved accuracy, stride length to height ratio, and increased speed.

INFLUENCE OF AN ATHLETIC SHOE WITH A COMPRESSION SOCK ON STATIC BALANCE

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BACKGROUND: Footwear that includes a compression sock has recently been developed to help provide support to the ankle and potentially lower the risk of an ankle injury. This shoe with the built-in compression sock could provide increased proprioception and therefore improve balance, but this has not been examined. The purpose of this study was to evaluate the effects of a compression sock built into a shoe on static single leg balance. METHODS: Thirteen healthy participants (male = 5; female = 8; mass = 56.27 ± 14.19 kg ; height = 1.58 ± 0.06 m; age = 21.08 ± 2.69 years) served as volunteers for the study. The participant's single leg balance was assessed for both legs (dominant, non-dominant) on an AMTI force platform under eyes open and eyes closed conditions. The participants were tested while wearing the Nike Hypervenom X indoor soccer shoe with the compression sock built into the shoe, and the Nike Hypervenom X indoor soccer shoe without the compression sock. The order for shoe assignment was randomized among participants. The participant's average sway velocity and 95% ellipse area were analyzed using Bioanalysis software. A 2 (footwear: sock vs. no-sock) x 2 (leg: dominant vs. non-dominant) repeated measures ANOVA was conducted for both dependent variables. The eyes open and eyes closed conditions were analyzed separately. RESULTS: The results revealed no significant differences in average sway velocity and 95% ellipse area between the different types of shoes and the dominant and non-dominant legs (p > .05) for both the eyes open and eyes closed conditions. For the eyes open trials with the shoe with the compression sock, the average sway velocity for the non-dominant leg was 5.88 ± 2.65 cm/s, and for the dominant leg it was 5.85 ± 2.85 cm/s. For the eyes open trials with the shoe without the compression sock, the average sway velocity for the non-dominant leg was 4.83 ± 1.28 cm/s, and for the dominant leg it was 5.20 ± 1.47 cm/s. CONCLUSIONS: The shoe with the compression sock may have provided the participants with increased proprioceptive feedback, but this did not result in an improvement in balance performance when compared to the traditional soccer shoe. There were also no differences in balance between the dominant and non-dominant legs. Additional research is needed to examine the effects that this type of shoe has on both dynamic balance and ankle stability.

RELATIONSHIP BETWEEN KINEMATICS IN DOMINANT AND NON-DOMINANT HAND TOUCHES DURING THE CKCUEST WITH OVERALL SCORE

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Every athlete has a slight variation in pelvic kinematics when performing dynamic activities. The closed kinetic chain upper extremity stability test (CKCUEST) is an easy to perform dynamic movement assessment that requires proximal stability for distal mobility. **Purpose:** To examine the relationship between anterior/posterior pelvic tilt, pelvic axial rotation, and CKCUEST score in a group of competitive baseball pitchers. **Methods:** Fourteen baseball pitchers (18.32±1.85yrs; 185.01±6.90cm; 83.77±14.42kg) currently playing competitive baseball participated. Kinematics were collected at 240Hz via an electromagnetic tracking system. After being connected and digitized, each participant assumed a push up position with their hands 36 inches apart. While in the push up position, the participants were instructed to swing one arm and touch the hand of the supporting arm in alternating fashion as many times as possible for 15 seconds. Three sets were performed with 45 second rest in-between. The data from all three trials were averaged and analyzed from the middle touch as dictated by previously established protocol. **Results:** Pearson product moment correlations revealed a moderate significant relationship between decreased anterior pelvic tilt during the dominant hand touch with increased CKCUEST score (r[14]=0.61,p=0.020). Also, a moderate significant relationship between decreased anterior pelvic tilt during the dominant hand touch and increased dominant side pelvic axial rotation during the non-dominant hand touch (r[14]=-0.55,p=0.042). Additionally, a large significant relationship was observed between posterior pelvic tilt with non-dominant axial rotation during the non-dominant touch(r[14]=0.91,p<0.001). **Conclusion:** Participants exhibiting more neutral pelvic tilt during the middle touch of the CKCUEST scored higher on the assessment. These results support the idea that lumbo-pelvic hip complex (LPHC) kinematics during the CKCUEST are related to shoulder stability, as defined by CKCUEST score. In addition, different relationships observed between pelvic tilt and pelvic axial rotation during dominant and non-dominant hand touches in this group of baseball pitchers indicate bilateral LPHC kinematic discrepancy. This is important to know when training and treating them. Future research should examine lumbo-pelvic hip complex muscle activity during the CKCUEST to determine its relationship with shoulder stability.

PREDICTING KNEE JOINT CONTACT FORCES USING ONLY 6-KINEMATIC MEASURES AND A NEURAL NETWORK

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BACKGROUND: Knee joint contact (bone on bone) forces are commonly estimated using surrogate measures such as external knee adduction moments (with limited success) or musculoskeletal modeling (more successful). Despite its capabilities, modeling is not optimal for clinicians or persons with limited experience and knowledge. Therefore, the purpose of this study was to design a novel prediction method for knee joint contact forces that is equal or more accurate than modeling, yet simplistic in terms of required inputs. METHODS: This study included all six subjects' (71.3±6.5kg, 1.7±0.1m) data from the freely available "Grand Challenge" datasets (simtk.org), consisting of motion capture and in-vivo instrumented knee prosthesis data (e.g. true knee joint contact forces). Inverse kinematics were used to derive three-dimensional hip, two-dimensional knee (sagittal & frontal), and one-dimensional ankle (sagittal) kinematics during the stance phase of normal walking for all subjects. Resultant knee joint contact forces (normalized to body weight) and inverse kinematics were imported into MATLAB and normalized to 101 datapoints. A long-short term memory network, with 2-input delays and 12-hidden layers, was created to predict knee forces with the kinematics inputs. Five subjects' data were used for training (via Bayesian regularization). One subjects' data was held out for testing. Mean squared error was used as the criterion for early stoppage. Success of the network was measured using root mean square errors and correlations with the in-vivo knee joint contact forces data. RESULTS: The network completed training in 4-seconds and reached a low mean square error of 0.029 body weights on the training data. Performance on testing data reached an average root mean square error of only 0.213 body weights (range 0.175-0.318) and an excellent correlation of 0.950 (range: 0.866-0.981). CONCLUSIONS: The network designed in this study was trained using measured in-vivo knee joint contact forces and produces highly accurate predictions. The root mean squared errors and correlation coefficients of the neural network outperformed most musculoskeletal models reported in the literature yet required only 6-kinematic waveforms. The neural network created here will be widely distributed for usage by researchers and clinicians alike.

A BIOMECHANICAL ANALYSIS OF THE KNEE DURING THE SUMO AND CONVENTIONAL DEADLIFT

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BACKGROUND: The deadlift is a compound lift that involves gluteal, hamstring, quadricep and lower back muscles essential for athletes. The deadlift can be performed in a variety of ways with the sumo and conventional variations being popular among weightlifters. The main difference between these lifts is the starting stance position. During the sumo deadlift the stance is wider than shoulder width and your grip is inside your knees; with the conventional deadlift your stance is shoulder width or narrower and your grip is outside of your knees. The purpose of this study was to analyze the effects of altering stance between the sumo (SUM) and conventional (CON) deadlifts on peak knee moment and angle. METHODS: 5 prescreened healthy collegiate students with over a year of weightlifting experience participated (age: 23.6 ± 3.55 yrs; BMI: 29.43 ± 3.09 kg/m^2; height: 173.54 ± 5.30 cm). A 3D motion capture system was used (Vicon, Centennial, CO) to collect kinematic and kinetic data. RESULTS: No significant differences were found between variables of interest between the tasks. However, the following results are trending towards significance. Peak frontal plane knee moment was 0.62 Nm/kg vs. 0.64 for Nm/kg for the dominant vs. non-dominant legs respectively during CON and 0.33 Nm/kg vs. 0.38 Nm/kg for the dominant vs. non-dominant legs respectively during SUM. Peak knee extension moment was 1.35 Nm/kg vs. 1.27 Nm/kg for the dominant vs. non-dominant legs respectively during CON and 1.39 Nm/kg vs. 0.95 Nm/kg for the dominant vs. non-dominant legs during SUM. Peak knee abduction angle was 17.28º vs. 21.32º for the dominant vs. non-dominant legs respectively during CON and 11.67º vs. 18.08º for the dominant vs. non-dominant legs respectively during SUM. DISCUSSION: The preliminary results of this study show interesting results as there were no differences in knee frontal plane moments and angle between the two deadlifts. Previous studies have focused on the force produced or the lower extremity muscle activation during the lifts. Therefore, the goal of this study was to determine which stance produces the highest moment at the knee and how this applies to athletes' exercise prescription or injury prevention. However, further research is warranted with regards to understanding the effect stance width has on the knee moments.

DISTANCE RUNNING HIP AND KNEE JOINT PLOTS CHANGE SIGNIFICANTLY DURING A TREADMILL PROGRESSION RUN

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In distance running, fatigue may cause subtle changes to kinematics that reduce efficiency and predispose individuals to injury. Most previous fatigue studies have limited kinematic analysis to assessing discrete joint angles only. More sensitive kinematic analyses are needed to better detect subtle changes. In this study we analyze entire joint plots. **PURPOSE**: Determine if stance phase sagittal joint plots (knee and hip) change significantly during a 16-minute progression run. **METHODS**: Nineteen runners (18-45 years, 15+ miles per week) participated in the study. Five VICON Bonita motion-capture cameras and 3D GAIT software were used to collect treadmill running kinematic data. First, baseline data was collected at self-selected marathon pace. Two sets of 10 strides were analyzed and a joint plot was generated for each set (normalized to 100 data points). Then, the two joint plots were compared for consistency by calculating the mean difference score (for the 100 data points). Two sets of 10 strides were also collected during the final minute of the 16-minute progression run and analyzed using the same procedures. Last, baseline joint plots were compared to final joint plots (1st 10 strides baseline vs. 1st 10 strides final) to determine if the joint plot changed significantly. A one-way ANOVA was used to test for significant differences among the intra and inter-trial comparisons (p<0.05). Bonferroni post-hoc tests were used for follow-up testing. **RESULTS**: For the intra-trial analyses, there were no significant differences between baseline and final for both the hip (0.49°±0.32° vs. 0.62°±0.58°) and knee (0.62°±0.34° vs. 0.74°±0.56°) joint plots. The inter-trial analyses (baseline vs. final) revealed significant joint plot changes for both the knee (1.82°±0.98°) and hip (1.94°±1.50°). **CONCLUSION**: The moderately challenging progression run appeared to cause slight changes to the joint plots from baseline to the end of

the run but no changes to the repeatability of kinematics. This study reveals the need to thoroughly test for kinematic change with fatigue.

BASEBALL PITCHING MAXIMUM THROWING ARM LOADS POTENTIAL PREDICTORS OF ELBOW VALGUS AND SHOULDER DISTRACTION

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BACKGROUND: Baseball pitching biomechanical studies have revealed two critical throwing arm loads to study: elbow valgus torque (EVT) and shoulder distraction force (SDF). The predictors of these loads remain poorly understood. Also, it remains unclear if pitchers who have high EVT magnitudes also tend to also have high SDF magnitudes. **PURPOSE**: The primary purpose was to determine if correlations exist between the two critical loads and important potential predictors including: throwing velocity, shoulder rotation during the pitch, and duration of the pitch phases. The secondary purpose was to determine if there was a correlation between EVT and SDF. **METHODS**: 200 professional pitchers (25.8±6.0 yrs) were evaluated using 8-camera motion capture system (Motion Analysis Corporation, Santa Rosa CA) at 480 Hz. Each pitcher threw approximately 10 fastball pitches and the fastest strike was analyzed. EVT was normalized to body height and body weight and SDF was normalized to body weight. Pearson correlation was used to determine the strength of correlations between critical throwing arm loads and variables of interest. **RESULTS**: There were weak correlations between the duration of the arm cocking phase (134 ± 22 ms) and EVT (5.13 ± 0.80) (r=0.02), between the duration of the arm acceleration phase (33 ± 4 ms) and SDF (116.8 ± 16.4) (r=0.06), between shoulder maximum external rotation (165.8° ± 9.8°) and EVT (r=0.03), between MER and SDF (r=0.05), between throwing velocity (38.99 ± 1.82 m/s) and EVT (r=0.03).. There was a weak to moderate correlation between throwing velocity and SDF (r=0.44). The correlation was weak (r=0.22) between EVT and SDF. **CONCLUSION**: In this large group of elite pitchers, we revealed surprisingly weak correlations between the critical loads and potential predictors including throwing velocity, shoulder range of motion, and phase durations. Further, EVT and SDF appear to be independent; this suggests that pitchers with high elbow loads do not necessarily have high shoulder loads, and vice versa.

DOES BASEBALL PITCHING PELVIS ROTATION STYLE INFLUENCE ARM COCKING AND ARM ACCELERATION TEMPORAL AND KINEMATIC VARIABLES

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BACKGROUND: Pelvis rotation style is highly variable among pitchers. Some pitchers initiate pelvis rotation prior to stride foot contact (SFC) while others wait until after SFC. It is important to determine if pelvis rotation style influences shoulder kinematics and pitch delivery time. **PURPOSE**: To determine the correlation between pelvis rotation and 1) shoulder external rotation and 2) duration pitch phases (arm-cocking and arm-acceleration).**METHODS**: 200 professional pitchers (25.8±6.0 years) threw approximately 10 fastball pitches. Full body mechanics were collected using 3D motion capture (Motion Analysis Corporation, Santa Rosa, CA) at 480 Hz. The fastest pitch that was thrown for a strike was used in the analysis. Pelvis rotation style was operationalized using pelvis orientation at SFC. Pearson correlation was used to determine correlation between pelvis orientation at SFC and shoulder external rotation (at SFC and maximum shoulder external rotation, MER), phase duration (arm cocking and arm acceleration) and ball velocity. **RESULTS**: For shoulder kinematics, pelvis orientation had a weak/moderate correlation with external rotation at SFC (r=0.44) but not at MER (r=0.03). There was no significant correlation between pelvis orientation and throwing velocity (r=0.04). For phase durations, there was a strong correlation between pelvis orientation and the arm-cocking phase (r=0.71) but not the arm-acceleration phase (r=0.03). **CONCLUSION**: Pitchers who initiated pelvis rotation early (prior to SFC) tended to have increased ER at SFC and a shorter arm-cocking phase. Pelvis rotation style does not appear to influence MER or throwing velocity.

A TAEKWONDO INTERVENTION IN ADULTS WITH DOWN SYNDROME

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BACKGROUND: Individuals with Down Syndrome (DS) can experience a functional deficit in motor execution of gait (e.g. shuffling gait), which may increase fall risk. The Korean martial art of Taekwondo has led to improvements in physical fitness in individuals with DS, but there is little evidence on the efficacy of this type of intervention on factors impacting fall risk. The dynamic kicks utilized in Taekwondo involve high levels of hip and knee flexion which are important aspects of the gait cycle. Martial arts, in general, have also been shown to be an effective method for improving gait and balance in typically developing populations. The purpose of the study was to investigate the effects of a Taekwondo intervention on gait and balance in individuals with DS. It is hypothesized that this intervention will improve gait characteristics and balance in individuals with DS. **METHODS**: Individuals with DS (aged 18-55 years old) will be recruited from local community centers that serve this population. Participants will complete a 12-week intervention consisting of traditional Moo Duk Kwan style Taekwondo. Each class will last 60 minutes and will consist of stretching and warm-up, kicking, and poomsae practice. Gait and balance will be assessed pre-, mid-, and post-intervention and will include walking over a GAITRite walkway system to collect spatio-temporal variables of gait and completing single- and double-leg balance tests with eyes open and closed. A one-way ANOVA with repeated measures will be used to determine if differences exist between pre-, mid-, and post- intervention gait and balance measures. **EXPECTED RESULTS**: Improvements in spatio-temporal gait variables and standing balance are expected after a 12-week Taekwondo intervention for individuals with DS. No grants or funding were obtained for this study.

THE EFFECT OF DIVIDED ATTENTION ON RUNNING BIOMECHANICS IN RECENTLY CONCUSSED COLLEGIATE ATHLETES

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BACKGROUND: Following a concussion, athletes are at an elevated risk of sustaining a lower extremity musculoskeletal injury after returning to play compared to matched healthy controls. Evidence suggests that current neuropsychological tests and return to play protocols may not fully identify neurocognitive and motor deficits. Several studies have identified deficits during walking dual task, however no study has examined the effect of a dual task on running biomechanics in recently concussed athletes. Utilizing a device that can be easily implemented in clinical practice, we seek to examine running with constant cognitive input since it is the basis of most athletic activities. The purpose of this study is to examine running biomechanics with and without the addition of a cognitive task in recently concussed athletes to determine if deficits remain after the athlete is asymptomatic, has returned to baseline in all common clinical tests, and has been cleared for full contact play. METHODS: We plan to recruit 20 recently concussed collegiate athletes and 20 matched healthy controls. Each participant will complete three sessions: within 24-72 hours of full game clearance, 1 week post-clearance, and 1 month post-clearance. The participants' gait biomechanics will be analyzed under four conditions: (1) walking alone (single task), (2) walking while simultaneously completing simple mental tasks (dual task), (3) running alone (single task), and (4) running while simultaneously completing simple mental tasks (dual task). Participants will complete a total of 8 walking trials, followed by a total of 8 running trials while alternating between single and dual task conditions. Runscribe™ wearable shoe sensors (Scribe Labs, Inc., Half Moon Bay, CA, USA) will be utilized to assess gait velocity (m/s), cadence (steps/min), and stride length (m). Results will be analyzed using mixed model ANOVAs to evaluate changes in gait and mental performance across group (concussed, control), time (24-72 hour, 1 week, 1 month), and task (single, dual). ANTICIPATED RESULTS: We predict that recently concussed athletes will exhibit slower velocity, shorter stride length, and decreased dual task performance at 24-72 hours and 1 week post-clearance compared to their matched healthy control, with deficits resolved by 1 month post-clearance. Funded by the Schewel Student-Faculty Research Fund

ELECTROMYOGRAPHIC ANALYSIS OF SHOULDER ROTATION STRENGTH TESTING POSITIONS

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BACKGROUND: Shoulder strength is essential for upper extremity function during overhand sports tasks. Clinicians perform shoulder rotational strength tests in various positions to examine shoulder function; however, shoulder function may vary across positions. The purpose of this study was to compare measures of shoulder function (peak torque and muscle activation) between two shoulder rotational strength testing positions. **METHODS:** Nine physically active participants (6 females, 3 males, age: 21.4±2.4 y, height: 170.4±7.9 cm, weight: 71.6±10.1 kg) performed isometric shoulder internal and external rotation strength tests using an isokinetic dynamometer in the following positions: (1) supine with arm abducted at 90° in the frontal plane, and (2) seated with arm abducted at 90° in the frontal plane and internally rotated 45°. The elbow was flexed 90° in both positions. Electromyographic data were collected on the posterior (PD) and anterior deltoid (AD). Maximum voluntary contraction (MVC) testing established baseline muscle activity to which subsequent trials were normalized. A 2 (position) x 2 (direction) repeated measures analysis of variance (RM·ANOVA) compared torque values between testing positions for external and internal rotation tests. A second 2 (muscle) x 2 (position) RM·ANOVA compared muscle activation (%MVC) between testing positions for AD and PD muscles. **RESULTS:** The first RM·ANOVA did not reveal a significant position by direction interaction. The second RM·ANOVA did reveal a significant muscle by position interaction [$F(1, 8) = 8.700$, $p = 0.018$]. Post hoc analysis showed a difference between supine (mean: 20.4, SD: ± 2.6 %MVIC) and seated (mean: 32.6, SD: ± 2.4 %MVIC) positions for AD activation, where greater activation was measured in the seated position ($p = 0.011$). **CONCLUSIONS:** Although peak torque differences were not observed between positions, clinicians should note that the AD may have a greater contribution to overall shoulder strength in the seated position versus supine.

AFFECTIVE RESPONSES FOLLOWING REPETITIONS TO FAILURE AT 30% VERSUS 80% ONE-REPETITION MAXIMUM IN UNTRAINED WOMEN

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This study examined the affective responses (like vs. dislike; pleasant vs. unpleasant) and the perceptual responses (rating of perceived exertion [RPE]) immediately after (IMMED) and 60-min after (POST) a single session of resistance training to failure. Twenty women (age: 21.4 yrs; height: 167 cm;

weight: 64.7 kg) completed two sets of repetitions to failure for the leg extension, seated military press, leg curl, and lat pull down at either 30% one-repetition maximum (1RM) (n=10) or 80% 1RM (n=10). A Likert scale ranked from 1 (dislike/unpleasant) to 7 (like/pleasant) was used to assess session enjoyment, and the Borg 6-20 scale was used to assess RPE. Independent t-tests were used to compare total volume accumulation and session RPE between groups. A 2 (group: 30% 1RM, 80% 1RM) x 2 (time: IMMED, POST) mixed-model ANOVA was used to determine differences in affective responses (like/dislike; pleasant/unpleasant). The 30% 1RM group (3,174 ± 942 kg) accumulated more total volume than the 80% 1RM group (1,893 ± 345 kg) ($p < 0.001$). There was no difference in session RPE ($p=0.852$) between the 30% 1RM group (RPE = 16.5 ± 1.9) and 80% 1RM (RPE = 16.3 ± 1.9) group. There was no two-way (group x time) interaction ($p=0.811$-1.00) and no main effects for group ($p=0.077$-0.411) or time ($p=0.168$-0.726) in session enjoyment (like vs. dislike [5.80±0.95]; pleasant vs. unpleasant [5.08±1.09]). Despite differences in training volume, the perception of enjoyment (like vs. dislike; pleasant vs. unpleasant) and effort (RPE) were not different between the 30% and 80% 1RM groups. This may suggest training load does not dictate exercise enjoyment or perceptions of effort in untrained women when repetitions are completed to failure.

INTER- AND INTRA-INDIVIDUAL DIFFERENCES IN NEUROMUSCULAR RESPONSES DURING LEG EXTENSION EXERCISE PERFORMED AT 70% 1RM

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This study examined the inter- and intra-individual differences in the electromyographic (EMG) and mechanomyographic (MMG) amplitude (AMP) and mean power frequency (MPF) responses during the bilateral leg extension (LE) exercise. Eleven men (Age: 23±3 years; height: 175.7±7.2 cm; body mass: 79.9±8.7 kg) completed a one-repetition maximum (1RM) for the LE (87±16 kg) and repetitions to failure at 70% 1RM (61±11 kg; 15±2 repetitions), on separate days. The EMG and MMG signals were measured from the vastus lateralis of the right and left limbs. Polynomial regression analyses were used to determine the individual (IND) and composite (COMP), normalized EMG and MMG, AMP and MPF response (linear, quadratic, cubic) vs. percent of total repetitions completed (10-100%). For the COMP EMG AMP, there was a positive, quadratic relationship for the right ($R=0.992$, $p<0.001$) and left limbs ($R=0.984$, $p=0.044$). For the COMP EMG MPF, there was a negative, cubic relationship for the right limb ($R=-0.982$, $p=0.001$) and a negative, quadratic relationship for the left limb ($R=-0.950$, $p=0.008$). For the COMP MMG AMP, there was a positive, quadratic relationship for the right limb ($R=0.982$, $p=0.004$) and a positive, linear relationship for the left limb ($r=0.942$, $p<0.001$). Both the right ($r=-0.842$, $p=0.001$) and left limbs ($r=-0.901$, $p<0.001$) demonstrated a negative, linear relationship for the COMP MMG MPF. For the IND EMG AMP and MPF, 9-27% of the subjects demonstrated the same response as the COMP, 36-55% demonstrated different patterns, and 36-45% demonstrated no relationship. For the IND MMG AMP and MPF, 27-45% of the subjects demonstrated the same response as the COMP, 9-36% demonstrated different patterns, and 36-55% demonstrated no relationship. Individual responses should be considered when making inferences about the patterns of neuromuscular responses during fatiguing resistance exercise.

EFFECTS OF PREFERRED AND NON-PREFERRED WARM-UP MUSIC ON RESISTANCE EXERCISE PERFORMANCE

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BACKGROUND: Listening to warm-up music has been repeatedly shown to induce ergogenic benefits during endurance, sprint, and resistance exercise performance. Previous evidence has shown that music preference mediates warm-up music benefits during endurance-based exercise. However, it is currently unknown how preference of warm-up music influence explosive resistance exercise. **PURPOSE:** The purpose of this study was to examine the effects of listening to preferred and non-preferred warm-up music on explosive resistance exercise performance. **METHODS:** Resistance trained males (ages 18-24) participated in two separate bench press trials each with a different music condition: Preferred warm-up music (PREF) or Non-preferred warm-up music (NON-PREF). In each trial, participants listened to PREF or NON-PREF music during a standardized bench press warm-up. Following the warm-up, motivation to exercise was measured using a visual analog scale followed by 2 sets × Repetitions to failure (RTF) at 75% of 1-RM separated by 1 minute of rest. A linear position transducer was used to measure mean barbell velocity throughout each set. Rate of perceived exertion (RPE) was obtained after each set. Total RTF, velocity, RPE, and motivation were compared and analyzed. **RESULTS:** Total RTF were significantly higher during the PREF versus NON-PREF trail ($p=0.049$) while mean barbell velocity remained unchanged ($p=0.684$). RPE was not significantly different between PREF and NON-PREF trials ($p=0.539$). Motivation to exercise was significantly higher during the PREF versus NON-PREF trial ($p< 0.001$). 2**CONCLUSIONS:** Listening to PREF music during a warm-up improves subsequent RTF performance during bench press exercise. However, barbell velocity is largely unaffected. While perceived exertion was similar between trials, motivation to exercise was markedly increased during the PREF music trial. These findings suggest that competitors listening to warm-up music before giving maximal effort during resistance exercise could optimize performance by ensuring self-selection of their own preferred music.

EFFECTS OF SELF-SELECTED RESPITE MUSIC ON RESISTANCE EXERCISE PERFORMANCE

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BACKGROUND: Listening to music has been repeatedly shown to induce ergogenic benefits during endurance, sprint, and resistance exercise performance. Previous evidence has shown that listening to respite music (i.e. during recovery) improves subsequent sprint performance during Wingate cycling tests. However, it is currently unknown if listening to respite music between sets of resistance exercise is advantageous for explosive performance. **PURPOSE:** The purpose of this study was to examine the effects of listening to self-selected respite music on explosive resistance exercise performance. **METHODS:** Resistance trained males (ages 18-24) participated in two separate bench press trials each with a different music condition: No music (NM) or respite music (RM). Following a warm-up, participants completed 3 sets × Repetitions to failure (RTF) at 75% of 1-RM separated by 2 minutes of rest. During the 2-minute rest, participants either listened to NM or RM until the next subsequent set. A linear position transducer was used to measure mean barbell velocity throughout each set. Rate of perceived exertion (RPE) and motivation were obtained after each set. Mean velocity, power output, RPE, and motivation were compared and analyzed. **RESULTS:** Mean barbell velocity ($p= 0.015$) and mean power output ($p= 0.050$) were significantly higher during the RM condition versus NM. RPE was not different between conditions ($p= 0.116$). Motivation to exercise ($p= 0.002$) was significantly higher over the exercise session during the RM condition versus NM. **CONCLUSIONS:** Listening to RM in between sets increases explosive performance through improvements in barbell velocity and power output. While RPE remained unchanged, RM resulted in increased motivation to exercise. These findings indicate listening to music during recovery may enhance explosive resistance performance and suggest that listening to music in between bouts of maximal effort could possibly be an effective tool for optimizing performance during competition.

ACCURACY OF PREDICTING ONE-REPETITION MAXIMUM FROM SUBMAXIMAL VELOCITY IN THE BACK SQUAT AND BENCH PRESS

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BACKGROUND: Predicting one-repetition maximum (1RM) in resistance training allows athletes to gauge progress and prescribe relative intensities without the cumbersome and fatiguing process of testing 1RM strength. One approach to predicting 1RM is through using submaximal velocity. Indeed, the accuracy of submaximal velocity predict 1RM has been established on machine-based resistance exercises, conflicting evidence exists regarding the accuracy of velocity to predict 1RM on free-weight barbell exercises. METHODS: Therefore, this study examined the accuracy of predicting free-weight back squat and bench press one-repetition maximum (1RM) using both 2- and 4-point submaximal average concentric velocity (ACV) methods. Seventeen resistance trained men performed a warm-up and 1RM test on the squat and bench press, in which ACV was assessed on all repetitions. The ACVs during the warm-up closest to 1.0 and 0.5 $m \cdot s^{-1}$ were used in the 2-point linear regression forecast of 1RM and the ACVs established at the loads closest to 20, 50, 70, and 80% of 1RM were used in the 4-point 1RM prediction. A repeated measures ANOVA, Bland-Altman Plots, and Mountain plots were used to analyze the agreement between predicted and actual 1RMs. RESULTS: The ANOVA indicated significant differences between predicted and actual 1RM for both the 2- and 4-point equations in both exercises ($p < 0.001$). The 2-point squat prediction overestimated 1RM by 29.12±0.07kg and the 4-point squat prediction overestimated 1RM by 38.53±5.01kg. Bench press 1RM was overestimated by 9.32±4.68kg when using the 2-point method and by 7.15±6.66kg using the 4-point method. Both Bland-Altman and Mountain plots confirmed the findings of the ANOVA as data were not tightly conformed to the respective zero difference lines and the Bland-Altman plots showed wide limits of agreement. CONCLUSIONS: These data demonstrate that both the 2- and 4-point velocity methods predicted bench press 1RM more accurately than squat 1RM; however, a lack of agreement between predicted and actual 1RM was observed for both velocity methods in both exercises.

DIFFERING ALTERATIONS IN FORCE PERCEPTION AND STRENGTH FOLLOWING SHORTENING AND LENGTHENING CONTRACTIONS

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BACKGROUND: While differences in fatigue following shortening and lengthening contractions have previously been investigated, further research is needed to understand the impact of fatigue on force perception and its relation to muscle activation. The purpose of this study was to examine the effects of maximal concentric (CON) and eccentric (ECC) contractions on force perception, strength and muscle activation of the elbow flexors. METHODS: Eighteen young males (Age: 24 ± 3 y) completed 2 experimental conditions, consisting of 6 sets of 10 repetitions of maximal ECC or CON contractions of the elbow flexors. Each visit was separated by 6 ± 1 days and the order of conditions and arm utilized were randomized and counter-balanced. Testing was completed prior to the exercise bouts, and at 24-, 48-, and 72-hours post-exercise. During each visit, subjects were asked to perform 3 contractions at 50% of their perceived maximal voluntary isometric contraction (MVIC) strength, which was subsequently recorded. Electromyographic signals from the biceps brachii were recorded during each submaximal and maximal contraction and the root mean square (RMS) amplitude was calculated offline. Force (nF) and RMS (nRMS) from the perceived 50% MVIC contractions were averaged and normalized to MVIC.

RESULTS: Interactions were observed for both nF (p = 0.025) and MVIC (p<0.001). The nF decreased from pre (54.3 ± 17.7% MVIC) to 24- (p<0.01; 47.2% ± 15.2%) and 48-h (p=0.001; 45.1 ± 16.5% MVIC) in the CON condition, but did not change (p = 0.994) in the ECC condition. In addition, MVIC decreased from pre (425.6 ± 66.6 N) to 24-h (p=0.025; 394.2 ± 85.3 N), recovered at 48-h (p=0.05; 408.4 ± 69.4 N), but remained depressed from pre at 72-h (p=0.029; 406.7 ± 69.9 N) in CON. In ECC, MVIC decreased from pre (420.7 ± 97.3 N) to 24-h (p<0.001; 310.2 ± 97.2 N), before progressively recovering at 48- (p<0.001; 339.1 ± 106.2 N) and 72-h (p=0.029; 356.1 ± 109.8 N), but remaining depressed from pre (p<0.001). Further, ECC MVIC was lower at 24- (p=0.007) and 48-h (p=0.023) relative to CON. No changes were observed in nRMS across either condition. CONCLUSIONS: These findings suggest that acute bouts of maximal concentric and eccentric contractions differentially affect force perception and MVIC strength independent of muscle activation. These data may provide evidence that there are contraction specific effects on force perception and output.

INDIVIDUAL AND COMPOSITE MUSCLE OXYGEN SATURATION RESPONSES OF THE QUADRICEPS TO FATIGUING DCER EXERCISE

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This study examined the individual and composite responses of local muscle tissue oxygen saturation (SmO_2; %) during submaximal, bilateral leg extension (LE) exercise to failure as well as the test-retest reliability of resting SmO_2 values. Thirteen subjects (age: 24±3.1 years; height: 171.4±7.7 cm; weight: 77.7±12.4 kg) completed a one-repetition maximum (1RM) for the LE (68±18.5 kg) on Day 1 and repetitions (reps) to failure at 50% 1RM (34±9.2 kg; 26±4.5 reps) on Day 2. The SmO_2 was measured using continuous wave near-infrared spectroscopy placed on the vastus lateralis of the dominant limb, two thirds the distance between the suprailiac spine and lateral side of the patella. On both days, resting SmO_2 was recorded for 1-min prior to completing reps to failure to examine the test-retest reliability of the resting values. The total time to failure for the reps at 50% 1RM was recorded (55.8±10.0 sec). Polynomial regression analyses were used to determine individual (IND) and composite (COMP) SmO_2 responses (linear, quadratic, and cubic) vs. percent time to failure (5-100%) for reps completed at 50% 1RM. A one-way repeated measures ANOVA ($p \leq 0.05$), intra-class correlation coefficient ($ICC_{2,1}$), standard error of the measurement (SEM), coefficient of variation (CoV), and the minimal difference (MD) was used to determine the test-retest reliability of resting SmO_2 (Day 1 vs. Day 2). For the COMP SmO_2 response, there was a negative, cubic relationship (R=0.987, p<0.001). The IND responses were consistent with the COMP response as all 13 of the subjects also demonstrated a negative, cubic relationship (R=0.88-0.99). There was no difference (p=0.343) in resting SmO_2 values between Day 1 (60.0±13.9%) and Day 2 (56.0±11.7%). The resting SmO_2 values demonstrated "poor" to "fair" reliability (ICC: 0.300, 95% CI: -0.265-0.716; SEM: 10.6%; CoV: 18.2%; MD: 29.4%). The negative, cubic SmO_2 response may suggest a compromise in local blood flow due to increased intramuscular pressure during LE reps performed to failure at 50% 1RM. The "poor" to "fair" reliability may be due to high adipose tissue thickness (ATT) (9.3±4.1 mm), concentration of melanin in the skin, or external pressure applied on the device which can influence the SmO_2 response. Although the IND responses were consistent with the COMP responses, recruiting subjects with lower ATT measurements may provide more reliable test-retest resting SmO_2 values.

COLLEGE BASKETBALL RECREATIONAL AND CLUB LEVEL POWER AND AGILITY SCORES VS. 2019 NBA DRAFT

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BACKGROUND: During COVID-19, university campus recreation and wellness centers (CRW) keep encouraging the remaining-on-campus students to live active and healthy lifestyles through exercise/competition events. A common activity is the NBA Draft edition combine test, which students have a brief experience of the NBA draft. Results are usually compared to the actual NBA-ones to encourage participants to stay fit. This study investigated differences among recreational (R), club (C) level basketball experience, and NBA draftees (NBA). METHODS: A CRW, while adhering to university-related pandemic policies, organized an NBA combine test for 10 male college students (75.57kg±10.55SD; 1.81m±.13SD; R=5; C=5). Due to unforeseen complications, only the Standing Vertical Jump (m), Lane Agility (s), Shuttle Run (s) and ¾ Sprint (s) tests were performed following NBA's related protocols. R and C power and agility scores were compared with the respective scores from 58 athletes (controls), who participated in the 2019 NBA Draft Combine (Weight: 96.36kg±11.39SD; Height:2.01m±.09SD). NBA-related data were obtained from https://www.nba.com/stats/draft/combine-strength-agility. A multivariate analysis of covariance (MANCOVA) based on the experience level with weight (kg), height (m), wingspan (m), and standing reach (m) as covariates was performed in SPSS (v.27) to examine differences between variables on R, C, and NBA. RESULTS: Using Pillai's trace, there was a significant effect of experience on the examined variables (V=1.13, $F_{8,118}$=19.25, p<.001, η^2=.57). Pairwise comparisons revealed that R jumped higher than the C (p=.16) and lower than NBA (p=.75), while C jumped lower than NBA (p=.01). R in lane agility were faster than C (p<.001) and slower than NBA (p=.001), while C were slower than NBA (p<.001). In shuttle run, R were faster both than C (p<.001) and NBA (p<.001), while C were similar with NBA (p=.68). R were faster on ¾ sprint from C (p=.07) and NBA (p=1), while C were slower than NBA (p=.07). CONCLUSION: Due to small R and C sample size, we cannot determine whether or not these estimates are significant. However, the results describe the relationship in the sample. This preliminary evidence provides support for the continuation of data collection. Such power and agility score differences may encourage students to stay fit, therefore CRW administrators should continue organizing similar events.

RELIABILITY OF ISOKINETIC KNEE FLEXION AND EXTENSION TOTAL WORK AND UNILATERAL ENDURANCE RATIOS

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BACKGROUND: Isokinetic assessment of unilateral knee flexor and extensor functionality is almost exclusively evaluated through the hamstrings-quadriceps (H:Q) strength ratio, measured in units of peak torque. Clinical use of an isokinetic unilateral H:Q endurance ratio, measured in units of total work, may provide a supplementary perspective of knee flexor and extensor functionality, yet the reliability of this measure has not yet been established. Therefore, the purpose of this study was to determine the intersession reliability of knee flexion (KF) and extension (KE) total work, and the unilateral H:Q endurance ratio. **METHODS:** Twenty-eight healthy young adults (14 males, 14 females) volunteered for two isokinetic (60°/s, 6 repetitions) testing sessions (48hr apart). Dominant (DOM) and nondominant (NDOM) KF and KE testing was conducted in a random limb testing order; KE and KF total work was computed across the 6 repetitions, as well as the unilateral H:Q endurance ratio (KF ÷ KE). Following normality and heteroscedasticity exploration, relative reliability of the total work measures was assessed by interclass correlation coefficients (ICC, model: 2,1) while dependent *t* tests were used to evaluate systematic bias between the two testing sessions. Additionally, absolute reliability was assessed by calculating coefficients of variation (CV). **RESULTS:** ICCs were excellent for KF and KE of both limbs, ranging from .892 to .911, with NDOM extension being the lowest (95% confidence interval: .780-.949). The unilateral H:Q endurance ratio displayed good relative reliability for the DOM (.709) and NDOM (.719) limbs. No significant systematic biases were noted for any KF and KE total work, or unilateral H:Q endurance ratio measures ($P \geq .167$) and all CVs for KF and KF were below 15%, ranging from 7.89% (DOM, KE) to 13.1% (NDOM, KF). Lastly, unilateral H:Q endurance ratios CVs for both limbs were below 10% (DOM, 9.08%; NDOM, 8.66%). **CONCLUSION:** These results demonstrate that DOM and NDOM KF and KE total work and unilateral H:Q endurance ratios have acceptable intersession reliability in healthy young adults. Future work will examine clinical utilization of isokinetic unilateral H:Q endurance ratios, in addition to H:Q strength ratios, to gain a more comprehensive evaluation of patient KF and KE functionality.

HEART RATE VARIABILITY PRIOR TO MATCHES DOES NOT DIFFER BETWEEN WINS AND LOSSES IN COLLEGIATE BEACH VOLLEYBALL

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BACKGROUND: Heart rate (HR) monitoring is common in many sports. Recently, HR monitoring systems have incorporated R-R data, from which HR variability (HRV) can be calculated. The secondary HRV data from HR monitoring provide measures of parasympathetic and sympathetic activation within the autonomic nervous system. This has been proposed to be useful for managing athlete readiness and recovery status. Typically, lower HRV is associated with a more stressed state while higher HRV is associated with a more recovered state. The purpose of this analysis was to determine whether HRV was related to match outcome in collegiate beach volleyball players. It was hypothesized that HRV would be higher prior to wins compared to losses. METHODS: Ten female beach volleyball athletes who competed in all matches of the 2020 season were analyzed (age: 21.3±1 y; BMI: 22.6±1.5 kg/m^2, %BF: 21.8±3.0%). All methods were approved by the IRB, and participants provided written informed consent. Athletes wore a HR monitor during all matches (TeamPro, Polar Electro Inc., Woodbury, NY, USA). HRV metrics (standard deviation of R-R intervals [SDRR] and root mean square of successive differences in R-R intervals [RMSSD]) and average HR were calculated during the initial ~10 min of athletes wearing their monitors. This time period was selected as HRV assessments should occur when HR is below ~120 beats/min due to full vagal withdrawal above this HR. Within-subjects linear mixed effects models were used to determine differences in HRV by match outcome with an α-level of 0.05. Analyses were conducted using R. RESULTS: Average HR during this time, which occurred before the start of competition warm-up, was 103±14 beats/min. No differences in SDRR or RMSSD at this time were observed between wins and losses (P>0.15). CONCLUSIONS: Though HRV is easy to measure during activities in which HR monitoring is already occurring, the utility of this metric in this setting is unclear based on these inconclusive findings. Previous researchers have commonly measured HRV during periods of rest (i.e., upon waking), though this assessment would require additional time from athletes and coaches in a collegiate team sport setting. Future research should continue to analyze HRV derived from HR monitoring systems during team activities, preferably when athletes are at rest (i.e., during non-training meetings) to assess changes in and other uses for this metric.

A ROADMAP- SOCIAL DISTANCED PHYSICAL ACTIVITY DATA COLLECTION TO PROTECT THOSE WITH INTELLECTUAL DISABILITIES

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The novel coronavirus may impact exercise habits of those with varying exceptionalities (e.g. Down Syndrome, autism spectrum disorder); however, due to the directed discontinuation of face-to-face research, investigators must adapt projects to protect all involved when collecting objective physical activity metrics.

The purpose of this presentation is to outline the modification process of these research methods to adhere to social distancing mandates present during COVID-19. Attendees of this presentation should be able to translate methodological adaptations provided and apply similar techniques in their own project. Such adaptations include delivery of electronic consent and assent forms, electronic surveys, and mailing of research devices. This presentation will also detail potential barriers to recruitment not typically seen outside of a pandemic. The amended research methods were implemented without risk for virus transmission or undue burden on the research team, participant, or caregiver and in accordance with the institutional review board. Objective physical activity data collection can be sufficiently modified to protect those with varying exceptionalities and investigators. Future research designs may require greater participant incentives and the creation of in-home participation mechanisms.

SLOW MOTION VIDEO PHONE APPROACH OF MEASURING FOREARM MUSCLE ENDURANCE

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BACKGROUND: Previous studies have used an accelerometer to measure muscle specific endurance. The muscle endurance test will be altered so that slow-motion video can be used to measure muscle movement using an iPhone video camera. The purpose of this study is to compare muscle endurance index measurements from an iPhone video camera with results from an accelerometer. METHODS: I plan to recruit about 10 male and female participants between the ages of 18 to 45 yrs for participation in this study. Each participant will complete 1 trial of 5 Hz, 5-minute forearm muscle stimulation. Measurements will be made on the ulnar side of the participant's forearm muscle. Twitch contractions will be produced by placing two 2 x 1.5 cm electrodes on the muscle. The forearm muscle will be stimulated with a muscle stimulator that produces a submaximal current adequate to produce a visible and strong contraction, without producing pain. Videos will be collected with an iPhone (Apple, Inc., Cupertino, CA) using slow motion video at 240 frames per second. Eight slow motion videos will be taken, to capture the maximal values in the first minute and the end values at five minutes. The videos will be analyzed using a MATLAB software. The MATLAB analysis uses consecutive image correlations to plot the rate of change of the correlation, which indicates the muscle contraction speed. The resultant vector from a tri-axial accelerometer will be collected simultaneously. Correlations between the endurance index values for the phone and accelerometer data will be made. ANTICIPATED RESULTS: Endurance index values from the phone are expected to correlate with values from the accelerometer. This study will help determine the practicability of measuring muscle endurance using video phones. This will allow the study of small muscles as well as reduce the amount of equipment needed to study muscle specific endurance.

SLOW-MOTION VIDEO PHONE ANALYSIS OF MUSCLE CONTRACTION ACCELERATION: THE EFFECT OF VARIATION IN CURRENT

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BACKGROUND: Previous studies have used an accelerometer to measure decreases in muscle acceleration during muscle specific endurance tests. Recently it has been proposed to use slow-motion videos via an iPhone video camera to measure muscle acceleration during the endurance test. The aim of this study is to compare the change in acceleration of low, medium, high current muscle contractions from an iPhone video camera to that of an accelerometer. **METHODS**: I plan to recruit 15 healthy participants of both genders between the ages of 18 to 45 for participation of this study. All participants will complete two 20 minute sessions of 8 second increments of stimulation for each 15 different current intensities. Measurements will be made on the rectus femoris muscle of healthy control subjects. Twitch contractions will be induced on the muscle by using 2x4cm electrodes connected to an electrical stimulator. The rectus femoris muscle will be stimulated with a range of submaximal currents from 15 to 100 mA to produce a visible contractions at various intensities. Stimulation currents will produce pain ratings less than 3 out of 10 for all conditions. Slow-motion videos will be collected with iPhone (Apple, Inc., Cupertino, Ca) at 240 frames per second. Two 8 second slow-motion videos will be taken for each of fifteen different current levels, ranging from 15 mA to 100 mA. Contraction intensity will be simultaneously measured using a tri-axial accelerometer (Ambient). The videos will be analyzed using a MATLAB software. The contraction speed is determined from the MATLAB analysis through consecutive image correlations for every 2 video frames in order to plot the rate of change of the correlation. The faster the contraction acceleration is the lower the correlation between the pixels. All data collected from both MATLAB and the accelerometer will be juxtaposed on Microsoft Excel. **ANTICIPATED RESULTS:** As the intensity of the current of the muscle stimulus increases, the acceleration of the muscle contraction should increase. Analysis from the accelerometer should reflect the same values and direct trend pattern between intensity and acceleration as the analysis through MATLAB. This study will determine the practicality of using slow motion videos via an iPhone for measuring muscle acceleration in order to establish a more accessible method of musculoskeletal medicinal evaluation.

LOWER EXTREMITY STRENGTH AND FATIGUE FOLLOWING MULTI-MODAL EXERCISE AS A POSSIBLE PREDICTOR OF KNEE RE-INJURY

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BACKGROUND: Knee injuries are widespread in athletes, and despite efforts to return to pre-injury status, deficiencies can remain. This research explores the connection between the hamstring-to-quadricep strength ratio, fatigue in lower extremity muscles (specifically the hamstrings) following multi-modal exercise, and their roles in potential knee re-injury. **METHODS**: Healthy individuals with a prior knee injury will be compared to those without one. *Day 1:* Measurements of a subject's hamstring and quadricep endurance will be measured using tri-axial accelerometry during neuromuscular electrical stimulation at 5Hz. Stimulation will elicit a vigorous contraction for 5 minutes with electrodes placed on the subject's hamstring and quadricep muscles. The tri-axial accelerometer is placed between the two electrodes on the subject's skin. The decline in contraction acceleration will allow for the calculation of the endurance index. The leg with the lower hamstring endurance index will be used for Day 2 strength testing. Near-Infrared Spectroscopy will measure muscle mitochondrial capacity to compare to the muscular endurance data. *Day 2:* Before the exercise protocol, strength will be measured by the peak isometric knee extension repetition for the quadriceps and the peak isometric knee flexion repetition for the hamstrings using a Biodex ergometer. Subjects will undergo a 45-minute multi-modal exercise protocol incorporating intervals of jogging, running, and walking with intermittent sprints, agility drills, and plyometric movements leading to variations in speed and direction. Throughout the protocol, heart rate and overall distance will be measured. Following the protocol, there will be a second round of Biodex strength testing. **ANTICIPATED RESULTS**: We hypothesize both the hamstrings and quadriceps will show losses in strength following exercise, with the hamstrings showing a greater degree of fatigue. We believe those with a prior knee injury will display a more significant decrease in hamstring strength following the protocol in comparison to their non-injured counterparts. Combining strength data with endurance data collected on Day 1, we also hypothesize the lower the muscle endurance index, the more that muscle will fatigue. This data could shift current rehabilitation protocols, placing additional focus on restoring muscular endurance in the hamstrings.

TEST-RETEST RELIABILITY OF A MAXIMAL VOLUNTARY CONTRACTION FOR THE BILATERAL LEG EXTENSION EXERCISE

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The purpose of this study was to determine the day to day reliability of the average (Avg) and peak maximal voluntary contraction (MVC) force for isometric, bilateral leg extension (LE) exercise. Twelve subjects (7 women, 5 men; age: 24.17 ± 2.95 years; height: 172.36 ± 7.37 cm; weight: 74.50 ± 7.54 kg) completed 3 visits for this study, separated by a minimum of 24-48 hours. On the first visit, the subjects completed a familiarization trial consisting of two, 6-second MVC trials at a knee-joint angle of 120°. On visits 2 and 3, the subjects completed 2-5 MVC trials to obtain 2 trials with peak force values that were within 5% of one another. The MVC that resulted in the highest peak torque (of the 2 trials within 5% of one another) was used for analyses. The Avg MVC was determined as the mean of the middle 33% of the 6-second contraction. The peak MVC was determined as the highest instantaneous peak value from the middle 33% of the 6-second contraction. Statistical analyses included one-way repeated measures ANOVAs ($p \leq 0.05$), intra-class correlation coefficients ($ICC_{2,1}$), standard errors of the measurement (SEM), coefficients of variation (CoV), and minimal differences (MD). There was no difference between Day 1 and Day 2 Avg ($p=0.554$; Day 1: 365.35 ± 86.62 Newtons [N]; Day 2: 380.04 ± 85.37 N) or peak ($p=0.694$; Day 1: 431.86 ± 100.08 N; Day 2: 441.74 ± 93.58 N) MVCs. The ICC for the Avg MVC demonstrated "moderate" to "good" reliability (ICC = 0.543; SEM = 59.99 N; CoV = 15.83%; MD = 163.51 N), while peak MVC demonstrated "good" reliability (ICC = 0.635; SEM = 59.84 N; CoV = 13.70%; MD = 165.87 N). Further, none of the subjects exhibited a change in the MVC value from Day 1 to Day 2 that exceeded the MD for either Avg (range = -153.1 - 96.5 N) or peak (range = -152.1 - 103 N) values. Thus, both average and instantaneous peak MVC values obtained from the middle 33% of a 6-second contraction provided reliable measures of isometric, bilateral strength of the lower limbs. However, the peak MVC may provide a more reliable measure due to a lower CoV compared to the Avg MVC.

SESSION II: REVIEW/SYMPOSIA Thursday, Feb. 18, 2:00–3:00 pm EST

TRAINING CONSIDERATIONS FOR OPTIMAL SPORTS PERFORMANCE FOR THE MIDDLE AND ELEMENTARY SCHOOL ATHLETE

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The performance of collegiate and high school athletes is important to sports performance professionals. However, an area of great interest is the performance of elementary and middle school athletes. With some strength training and conditioning performance centers and summer sport camps geared towards younger athletes, many career and research opportunities have become available working with pediatric athletes. While pediatric athletes can train hard, training these athletes poses interesting challenges as they are not just "little high school or collegiate" athletes. Yet, it is crucial that elementary and middle school athletes are trained in a somewhat similar manner as high school athletes, but also with important training program differences due to the demands of their sport as well as their physiological capabilities and potential adaptations to training. Therefore, this presentation's purpose and objective will be to 1) emphasize the importance of physical training for the elementary and middle school athlete, 2) discuss the unique challenges of training and assessing these special athletes, 3) review relevant research and outline future research opportunities, and 4) suggest appropriate training programs principles with reliance on sports science concepts specific to the pediatric athlete. This

presentation is intended for students and faculty who are interested in various aspects (ie. strength training and conditioning, physiology, etc.) associated with training elementary and middle school athletes. Since interest is increasing in regards to how sports science can improve pediatric athletes' performance, more research is needed that will assist coaches and pediatric athletes in meeting the demands of their sport, but with a focus on trying to avoid overtraining and burnout later in their athletic careers.

SESSION II: POSTER/FREE COMMUNICATION Thursday, Feb. 18, 2:00–3:00 pm EST

EFFECT OF ACUTE PROLONGED SITTING, WITH AND WITHOUT INTERRUPTION, ON CARDIO-AUTONOMIC FUNCTION, A META-ANALYSIS

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BACKGROUND: Sedentary behavior, particularly prolonged sitting, is associated with increased cardiovascular disease (CVD) risk. However, the mechanisms linking repeated prolonged sitting exposure to CVD risk are not well-understood. This meta-analysis reports on cardio-autonomic responses, using heart rate (HR) and heart rate variability (HRV), to acute prolonged sitting with and without interruption. **METHODS:** Electronic databases were searched from inception to August 2020. Inclusion criteria were i) experimental studies ii) examining acute prolonged (≥1 hour) sitting with and/or without interruption; iii) adults (≥18years). Initially, 2,283 studies were identified and 21 articles (27 trials, *n=537*) met inclusion criteria. Inverse variance heterogeneity modelling was used and adjusted for study quality. HR was expressed as weighted mean difference (WMD) and standardized mean difference (SMD) and HRV as SMD. The SMD was also used to determine the magnitude of the effect (trivial:<0.2, small: 0.2, moderate: 0.5, and large: 0.8). **RESULTS:** Prolonged uninterrupted sitting had a non-significant trivial effect on HR (P=0.827) and HRV (P=0.228). Interrupting prolonged sitting resulted in a small increase in HR, with P=0.052 [WMD= 3.6 bpm, (95% CI -0.04, 7.3), SMD= 0.38]. The effects of sitting interruptions on HRV could not be analyzed due to the availability of only 2 studies. Subgroup analyses revealed moderate increases in HR in healthy adults [WMD= 5.6 bpm, (95% CI 1.5, 9.8), SMD= 0.60], females [WMD= 6.9 bpm, (95% CI 1.9, 12.0), SMD= 0.69], and ≥ 4 hour sitting bouts [WMD= 4.7 bpm, (95% CI 1.3, 8.0), SMD= 0.48]. Furthermore, walking was the only interruption strategy associated with a significant effect on HR [WMD= 6.8 bpm, (95% CI 2.8, 11.0), SMD= 0.48]. **CONCLUSION:** Acute prolonged uninterrupted sitting does not alter HR or HRV. It is possible that parasympathetic-sympathetic co-activation results in a null effect. However, a trivial increase in HR during uninterrupted prolonged sitting may serve to compensate for decreased stroke volume as a result of blood pooling and reduced venous return. The increased HR with sitting interruptions was expected and may reflect increased metabolic demand. Future studies should consider including measures of sympathetic activation to improve our understanding of parasympathetic-sympathetic co-activation.

INTERVAL EXERCISE PRECONDITIONING AND CARDIAC FUNCTION FOLLOWING DOSE-DENSE DOXORUBICIN THERAPY IN BREAST CANCER - PRELIMINARY RESULTS

Nathan Weeldryer[1], Albert G. Wendt[2], Alisia G.T.T. Tran[3], Theresa M. Jorgensen[3], Shannon W. Wilson[3], Nathan Serrano[3], Kathleen Casey[3], Ian Villanueva[3], Corey Mazo[3], Jared M. Dickinson, FACSM[4], Siddhartha S. Angadi, FACSM[1]. *[1]University of Virginia, Charlottesville, VA. [2]University of Arizona Cancer Center, Phoenix, AZ. [3]Arizona State University, Phoenix, AZ. [4]Central Washington University, Ellensburg, WA.*

BACKGROUND: About 1 in 8 women will develop breast cancer during their lifetime, and as treatments have progressed, cancer survivorship has continued to improve. However, breast cancer survivors treated with doxorubicin (DOX) based chemotherapy are at increased risk for developing cardiomyopathies and heart failure. Exercise preconditioning has been shown to mitigate DOX toxicity in animal models, but its value in humans remains unknown. Measurements of cardiac function, such as ejection fraction (EF) and left ventricular global longitudinal strain (LVGLS), have been shown to be predictive of mortality risk. Therefore, the purpose of this ongoing trial is to test the hypothesis that HIIE preconditioning and exercise continued throughout treatment can be used to prevent the decline in EF and LVGLS in women treated with dose-dense DOX chemotherapy. Here, we present preliminary data from the first 8 participants (HIIE n=5, Control n=3). METHODS: Breast cancer patients (n=8; 50±10y; 168±4cm; 94±35kg; 32.6±11.5 BMI) who were scheduled to undergo dose-dense chemotherapy were randomized into one of two interventions i) control (physical activity advice) or ii) exercise preconditioning (3 days/week supervised exercise). Baseline testing occurred 1-2 weeks prior to the start of DOX treatment while interventions started 1 week prior to treatment and continued throughout DOX treatment (4 doses with bi-weekly dosing). Post testing occurred within 3-7 days after the last DOX treatment. Deltas from between group differences were analyzed using independent samples t-tests. RESULTS: A reduction in EF was observed in control versus HIIE (-4.3±6.5 vs. 2.0±3.2% respectively; p=0.11, d=1.17) after the intervention. Similarly, there was reduced LVGLS in the control group while the HIIE group saw improvement (2± 0.0% vs. -1.2±2.6% respectively; p= 0.05,d= 1.21). Additionally, measures of physical function showed the control group had a decrease in peak power output versus HIIE (-8.3±5.7 vs. 1.4±14.9 Watts respectively; p=0.33, d=0.76) and in VO_2peak (-0.21±0.03 vs. -0.02±0.09 L/min respectively; p=0.02, d= 1.52). CONCLUSION: These preliminary data show that HIIE preconditioning prior to DOX based chemotherapy may serve as a strategy to preserve both cardiac and physical function in breast cancer patients undergoing dose-dense DOX chemotherapy.

ASSOCIATIONS BETWEEN CAROTID-FEMORAL AND ESTIMATED PULSE WAVE VELOCITY IN OLDER ADULTS: THE ATHEROSCLEROSIS RISK IN COMMUNITIES (ARIC) STUDY

Patricia Pagan Lassalle[1], Michelle L. Meyer[1], Kevin S. Heffernan, FACSM[2], Adam W. Kiefer[1], Lauren C. Bates[1], Erik D. Hanson[1], Masahiro Horiuchi[3], Erin Michos[4], Anna Kucharska-Newton[1], Kunihiro Matsushita[4], Timothy Hughes[5], Hirofumi Tanaka[6], Lee Stoner, FACSM[1]. *[1]The University of North Carolina at Chapel Hill, Chapel Hill, NC. [2]Syracuse University, Syracuse, NY. [3]Mount Fuji Research Institute, Fujikawaguchiko. [4]Johns Hopkins University, Baltimore, MD. [5]Wake Forest School of Medicine, Wake Forest, NC. [6]The University of Texas at Austin, Austin, TX.*

BACKGROUND: Carotid to femoral pulse wave velocity (cfPWV), the gold-standard measure of aortic stiffness, is associated with the incidence of cardiovascular disease (CVD) events. Most cfPWV measurements depend on technical proficiency, which limit broader implementation in clinical settings. Recently, an estimated pulse wave velocity (ePWV) measure derived from age and mean arterial pressure (MAP) has been shown to be associated with the risk of CVD events and all-cause mortality and may be a simple alternative to cfPWV. However, ePWV is poorly predictive in non-White individuals, possibly because it was originally developed from European Cohorts. Consequently, our purpose was to estimate the strength of association between cfPWV and ePWV, and determine whether agreement was consistent across race. We hypothesized that cfPWV and ePWV are in good agreement and association would be consistent across race. **METHODS:** We included Black and White older adults (n= 4,478; 75.2 [5.0] years) from visit 5 (2011-13) of the community-based Atherosclerosis Risk in Communities Study (ARIC). cfPWV was measured using an automated cardiovascular screening device. ePWV was calculated as follows: $ePWV = 9.587 - 0.402 \times age + 4.560 \times 10^{-3} \times age^2 - 2.621 \times 10^{-5} \times age^2 \times MAP + 3.176 \times 10^{-3} \times age \times MAP - 1.832 \times 10^{-2} \times MAP$. Association between cfPWV and ePWV was determined using Pearson's correlation coefficient (r) and Bland-Altman plots. **RESULTS:** Linear models were used to determine the association between cfPWV and ePWV. There was a weak (r=0.35) correlation between cfPWV and ePWV for the total population, with similar correlations when stratified by Blacks (r=0.31) and Whites (r=0.36). Bland-Altman plots indicated significant systematic differences between cfPWV and ePWV (-0.17 m/s, 95% confidence interval: -0.25 to -0.09 m/s, P <.001), which was consistent by race. **CONCLUSION:** In older adults, there was weak correlation between cfPWV and ePWV and systematic differences in agreement. Our results do not support ePWV as a surrogate measure of cfPWV in a sample of older White and Black adults.

AGREEMENT OF SEATED AND SUPINE PULSE WAVE VELOCITY MEASUREMENTS WITH PROLONGED SITTING

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BACKGROUND: During prolonged sitting research, measuring pulse wave velocity (PWV) in the seated posture would minimize participant burden and preserve the detrimental vascular effects of inactivity. However, PWV is validated in the supine position and it is unknown how supine and seated PWV measures compare. This study evaluated agreement between the following seated and supine measures of PWV: carotid-femoral (cf), brachial-femoral (bf), and femoral-ankle (fa). We evaluated: (i) the overall agreement between seated and supine measures (i.e., whether both measures reflect the same physiological construct); and (ii) the repeated measures agreement (i.e., whether change in one measure agrees with change in the other measure). METHODS: cfPWV, bfPWV, and faPWV were recorded while supine and then seated, and then following a three-hour period of uninterrupted sitting, all measurements were repeated. Mixed model regression was used to calculate agreement between the supine and seated measures. For each PWV outcome, the supine measures were regressed against the seated measures and nested within subject and time (pre vs. post sitting), with subject and time specified as random. The random variance components were used to calculate intraclass correlation coefficients (ICC) with 95% confidence intervals. Overall agreement and repeated-measures ICCs were calculated. An ICC ≥ 0.70 represented strong agreement, and ICC ≥ 0.90 represented a very strong agreement. RESULTS: A total of 18 subjects were included in the final analysis (age: 22.6±3.1 years, female: 6, cfPWV: 6.1±0.9 m/s). The overall agreement between seated and supine measures was strong for cfPWV (ICC: 0.77, 95%CI: 0.63-0.86), weak but significant for bfPWV (ICC: 0.37, 95%CI: 0.11-0.58), and non-significant and weak for faPWV (ICC: 0.26, 95%CI: -0.02-0.49). The cfPWV measurement had strong repeated-measure (i.e., change in pre-sit vs change in post-sit) agreement (ICC: 0.87, 95%CI: 0.78-0.92). There was a very strong repeated measures agreement in bfPWV (ICC: 0.96, 95%CI: 0.93-0.98) and faPWV (ICC: 0.93, 95%CI: 0.88-0.96). CONCLUSIONS: There was strong overall seated and supine agreement for cfPWV but weak overall agreement for bfPWV and faPWV, which indicated that seated and supine measurements are only comparable for cfPWV. Strong to very-strong repeated-measures agreement for all measures suggest that change in PWV is comparable regardless of posture.

EVALUATING SEX DIFFERENCES IN THE CORRELATION BETWEEN PULSE WAVE VELOCITY AND AORTIC SYSTOLIC BLOOD PRESSURE

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BACKGROUND: The purpose of this study is to assess if sex differences are present in the correlation between arterial stiffness, as measured by pulse wave velocity (PWV), and central arterial pressure in children, adolescents and young adults. METHODS: 127 healthy participants (60 male, 67 female), aged 7-30 years participated in this study. The sample was composed of 43 children (20 male, 23 female), 48 adolescents (25 male, 23 female), and 36 adults (15 male, 21 female). Cardiovascular measurements including carotid-femoral pulse wave velocity (cf-PWV) and aortic systolic blood pressure (ASBP) were assessed using the Sphygmocor XCEL. RESULTS: The correlation between cf-PWV and ASBP was moderate in males of all ages (r = 0.63) and fair in females of all ages (r = 0.43). cf-PWV and ASBP each increased with age for all age groups in both males (cf-PWV: r = 0.67; ASBP: r = 0.53) and females (cf-PWV: r = 0.62; ASBP: r = 0.30). ASBP was not significantly different between male and female children (92 ± 7 mmHg vs 94 ± 7 mmHg) but was significantly higher in adolescent males than in adolescent females (102 ± 10 mmHg vs 95 ± 9 mmHg, p < 0.05) and significantly higher in adult males than in adult females (109 ± 5 mmHg vs 99 ± 7 mmHg, p < 0.05). cf-PWV and ASBP each increased with age for all age groups of males, with p < 0.01 for both measures, and all age groups of females, with p < 0.01 for cf-PWV and p < 0.05 for ASBP. Mean cf-PWV values did not differ significantly between females and males at any age range. CONCLUSION: Sex differences in the correlation between central arterial stiffness and aortic systolic pressure are not present in childhood but appear in adolescence and become more prominent in adulthood. Moreover, fair to moderate correlations between cf-PWV and ASBP are observed from childhood to adulthood.

PHOTOPLETHYSMOGRAPHY PULSE WAVE VELOCITY RELIABILITY AND AGREEMENT WITH A REFERENT DEVICE

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Pulse wave velocity (PWV) is a common measure of arterial stiffness. Photoplethysmography (PPG) permits continuous measurement of PWV at multiple arterial segments simultaneously.To determine whether a simple, non-invasive PPG PWV method agrees with a referent measure, and to determine whether a posture-mediated change in PPG PWV agrees with change in the referent. PPG, with electrocardiogram, measured heart-toe (htPWV) and heart-finger (hfPWV) PWV. Referent measurements were carotid-ankle PWV (caPWV) and carotid-wrist PWV (cwPWV) determined using the Vicorder device. In 30 adults, three measurements were made: i) two baseline measurements and ii) one measurement 5 minutes after a modified head-up tilt test (mHUTT, 78°). Baseline measurements were used to calculate measurement reliability via intraclass coefficient correlation (ICC). Mixed-models were used to calculate between-measure (overall agreement between PPG and referent), and between-condition (change in PPG versus change in referent) agreement between devices. All measures were reliable (ICC $\geq$ 0.75). For hfPWV there was strong (ICC 0.7-0.9) between-measure agreement (ICC: 0.78, 95%CI: 0.67 - 0.85), but negligible (ICC < 0.2) and non-significant between-condition agreement (ICC: 0.10, 95%CI: 0.12 - 0.31). The lack of between-condition agreement may be attributable to the non-change in hfPWV and cwPWV with mHUTT. For htPWV, there was moderate (ICC 0.4-0.7) between-measure agreement (ICC:0.51, 95%CI: 0.32 - 0.65) and very strong between-condition agreement (ICC: 0.90, 95%CI: 0.85 - 0.94). PPG can be used to continuously measure PWV at multiple arterial segments with acceptable reliability and agreement with a referent.

SYMPATHETIC NEURAL AND CARDIOVASCULAR RESPONSES TO PHYSIOLOGICAL STRESS IN INDIVIDUALS PREVIOUSLY DIAGNOSED WITH COVID-19

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BACKGROUND: Individuals infected with the novel coronavirus SARS-CoV-2 exhibit a wide variety of symptoms, indicating potential systemic effects of the virus. Anecdotally, many patients - even those who experience only mild cases initially - continue to suffer from symptoms months after diagnosis, including indicators of potential autonomic dysfunction like tachycardia upon standing. However, the long-term impact of COVID-19 on autonomic and cardiovascular function in otherwise healthy individuals remains largely unclear at this point. **METHODS:** Otherwise healthy young adults (n=10, 6F) who had tested positive for SARS-CoV-2 (COV+) came to the laboratory approximately three weeks post-diagnosis. Muscle sympathetic nerve activity (MSNA; n=2) via microneurography, beat by beat systolic (SBP) and diastolic (DBP) arterial blood pressure via finger photoplethysmography, and heart rate (HR) were continuously measured in subjects during resting conditions, during a 2 min cold pressor test (CPT), and during 5 min each at 30° and 60° head up tilt (HUT). **RESULTS:** Resting SBP (COV+: 124 ± 18 *vs.* CON: 128 ± 13 mmHg) and DBP (74 ± 16 *vs.* 75 ± 8 mmHg), HR (62 ± 11 *vs*. 66 ± 9 bpm), and MSNA (13 ± 1 *vs.* 12 ± 5 bursts/min) were similar between COV+ subjects and other healthy subjects (CON; n=8) undergoing the same protocol in our laboratory. HR responses to CPT were similar between groups. There was or tended to be a group-by-time interaction in SBP (p=0.042) and DBP (p=0.087) responses to CPT, with COV+ subjects exhibiting a greater increase over time (baseline-to-peak ΔSBP: +33 ± 16 *vs.* +19 ± 11 mmHg, ΔDBP: +23 ± 9 *vs.* +16 ± 9 mmHg). Preliminary data also indicate the MSNA response to CPT is not impaired in COV+ subjects compared with healthy young adults. Blood pressure, HR, and MSNA responses to orthostatic stress were also similar between groups. **CONCLUSION:** Resting autonomic and hemodynamic parameters appear normal in individuals who have previously contracted SARS-CoV-2. However, the transduction of MSNA into vascular responses may be exaggerated during physiological stress, given the similar MSNA but differential blood pressure responses between COV+ and healthy young adults observed during CPT.

ALTERATIONS TO ARTERIAL ARCHITECTURE IN YOUNG ADULTS WITH SARS-COV-2

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INTRODUCTION: SARS-CoV-2 is a rapidly spreading virus with widespread health implications. Downstream of the lung, SARS-CoV-2 may be inflicting direct effects on the vasculature, secondary to initiating an inflammatory cascade. PURPOSE: The purpose of this study was to determine if SARS-CoV-2 had an impact on arterial architecture- specifically, pulse wave analysis (PWA), and carotid stiffness, in subjects 4-weeks after SARS-Cov-2 contraction. We hypothesized the arterial architecture would be negatively impacted by SARS-CoV-2. METHODS: Using a cross-sectional study design, we compared young healthy adults (5M/18F, 23±1y, 23±2 $kg \cdot m^{-1}$) and young adults who recently tested positive for SARS-CoV-2 (5M/7F, 20±1y, 24±3 $kg \cdot m^{-1}$). Doppler ultrasound was utilized to assess carotid distensibility, intima media thickness (IMT) and carotid-femoral pulse wave velocity (cfPWV); Sphygmocor was utilized for pulse wave analysis assessing central aortic augmentation index. RESULTS: Differences were observed in cfPWV (Control: 5.2±0.7$m \cdot s^{-1}$; SARS-CoV-2: 5.9±0.6$m \cdot s^{-1}$, *P*=0.01), aortic systolic pressure (Control: 111±13mmHg; SARS-CoV-2: 133±12mmHg, *P*=0.0004), and central aortic augmentation pressure (Control: 1.8±6.1mmHg; SARS-CoV-2: 6.7±4.5mmHg, *P*=0.02) between groups. However, IMT (Control: 0.5±0.1mm; SARS-CoV-2: 0.4±0.1%, *P*=0.44), carotid aortic index standardized to 75bpm (Control: 0.0±17.0%; SARS-CoV-2: 9.8±7.1%, *P*=0.06) were not different between groups. CONCLUSION: Initial evidence suggests two measures of arterial stiffness increased weeks after contracting SARS-CoV-2. These data support the notion that SARS-CoV-2 has lasting effects on the vasculature.

THE EFFECTS OF EXHAUSTIVE RESISTANCE EXERCISE ON BLOOD PRESSURE AND AUTONOMIC FUNCTION IN RESISTANCE-TRAINED MALES

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BACKGROUND: It is generally well-accepted that a single bout of resistance exercise can acutely lower blood pressure (BP), a phenomenon known as post-exercise hypotension (PEH). However, the occurrence of PEH following exhaustive resistance exercise (RE) and its relationship with changes in autonomic function have yet to be fully elucidated. Therefore, we investigated changes in BP and autonomic function, i.e., several different measures of heart rate variability (HRV), acutely and over 72h of recovery following exhaustive RE. METHODS: Seven resistance-trained males ([M±SD]: age=23±3.9 years, body mass index=27.8±3.3 $kg \cdot m^{-2}$, resting systolic BP [SBP]/diastolic BP [DBP]: 111.1±7.7/70.8±8.2 mmHg) completed five laboratory visits (V) within a 7-d period (V1 and V2 were separated by 48h). V1: Familiarization, one-repetition maximum test of the back squat, resting BP and short-term HRV recording. V2: Pre-RE BP and HRV measurements, immediately followed by the exhaustive RE protocol (8 sets of 10 repetitions at 70% of one-repetition maximum with 2-min rest between sets). BP and HRV measurements were replicated immediately (0.5h), and 24, 48, and 72 h post-RE (V3-V5). Repeated-measures analysis of variance (ANOVA) and for each BP (SBP, DBP, and mean arterial pressure [MAP]; 3 total) and HRV (frequency domain, time domain, and Poincaré plotting; 6 total) metric was computed. Repeated-measures correlation analysis of change scores between BP and HRV metrics was also performed. RESULTS: Repeated measures ANOVA revealed non-significant reductions in SBP and DBP over 72h of recovery (111.7±8.3 mmHg and 73.5±7.7 mmHg, p>.05), while reductions in MAP trended towards significance (86.2±7.7 mmHg, p=.08). In contrast, all six log-transformed (ln) HRV metrics were reduced immediately post-RE until 24h of recovery (p<.05 for all). Furthermore, repeated-measures correlational analyses showed no significant intraindividual associations between changes in BP and HRV metrics over time (p>.05 for all). CONCLUSIONS: A single bout of heavy, exhaustive RE did not induce PEH among our sample of young resistance-trained men with normal BP. HRV was significantly reduced immediately following RE but recovered to baseline values after 24h. Changes in BP and HRV acutely and over 72h were unrelated. Caution is warranted when interpreting the clinical and practical utility of our results given our sample size and normotensive subjects.

CHANGES IN ORTHOSTATIC CHALLENGE FOLLOWING MAXIMAL EXERCISE IN YOUNG ADULTS

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BACKGROUND: Autonomic nervous system (ANS) function can be assessed by heart rate variability (HRV) at rest or in response to an external stimulus, such as an orthostatic challenge (OC) or exercise. The response of HRV following OC reflects the functional capacity of the ANS, where depressed responses are linked to increased risk for various diseases. Additionally, HRV measures at rest and following OC have been shown to differ by sex, but this response has yet to be evaluated following an exercise bout. Thus, the purpose of this study was to determine the impact of maximal exercise on changes in OC between males and females. METHODS: Young adult males (M) (N=77; Age=19.1±0.8 yrs, Ht=178.9±8.2cm, Wt=81.1±21.6kg) and females (F) (N=90; Age=18.9±0.7yrs, Th=165.1±7.4cm, Wt=72.8±18.4kg) completed an OC prior to (PRE) and following (PST) a maximal treadmill exercise test. The OC consisted of 6-minutes in the supine, seated, and standing positions, with HRV analysis performed in the last 5-minutes of each segment. Measures of HRV included a linear metric (root mean square of successive R-R intervals; rMSSD), frequency metric (high frequency; HF), and non-linear (complexity) metric (sample entropy; SampEn). Relative change scores were calculated for the OC between supine to seated (S1), seated to standing (S2), and supine to standing (S3) positions at PRE and PST exercise for each HRV metric. A two-way repeated measures ANOVA (sex x PRE-PST) was used to determine differences in S1, S2, S3 for each HRV metric. RESULTS: Exercise significantly altered S1, S2, S3 for all HRV metrics, except for SampEn at S2 ($p=0.233$), and there were no significant sex differences in any HRV metrics for S1, S2 or S3 ($p\geq0.05$). CONCLUSION: These results suggest that non-linear measures may recover more quickly than linear or frequency metrics of HRV and that certain positional changes within the OC challenge test may be more sensitive to exercise. This is important since research including nonlinear measures of HRV are limited and may provide more nuanced information about ANS function than other HRV metrics. No sex differences were observed in the current study, but the combination of OC and maximal exercise should be investigated further in other populations, as it may reflect subtle sex differences and exercise-induced changes in ANS function.

VASCULAR DYSFUNCTION IN YOUNG ADULTS WITH SARS-COV-2

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Background: While SARS-CoV-2 primarily affects the lungs, the virus may be inflicting detriments to the cardiovascular system, both directly through angiotensin converting enzyme 2 receptor, as well as initiating systemic inflammation. Persistent systemic inflammation can attenuate nitric oxide (NO) bioavailability and endothelial dysfunction, an early indication of cardiovascular disease risk.
Purpose: To determine if prolonged effects on the systemic vasculature, among otherwise healthy young adults, occur after contracting SARS-CoV-2. Methods: In order to establish the potential effects of SARS-CoV-2 on the systemic vasculature in the arms and legs, we performed a cross-sectional analysis of young healthy adults (Control: 15F/5M, 23.0±1.3y, 167±9cm, 63.0±7.4kg) and young adults who, 3-4 weeks prior to testing, had tested positive for SARS-CoV-2 (SARS-CoV-2: 6F/4M, 19.8±1.2y, 172±13cm, 68.4±14.0kg) (mean±SD). Using Doppler ultrasound, brachial artery flow-mediated dilation (FMD) in the arm and single passive limb movement (sPLM) in the leg were assessed as functional biomarkers of nitric oxide bioavailability. Results: FMD was significantly reduced in the COVID-19 group (2.48±1.33%) compared to the Control group (8.59±3.27%) ($P<0.01$) and when made relative to the shear stimulus (COVID-19: 0.3±0.02AU, Control: 0.12±0.06AU, $P<0.01$). The femoral arterial blood flow response, as evidenced by the area under the curve, from the sPLM was reduced in the COVID-19 group (-18±102ml) compared to the Control group (118±114ml) ($P<0.01$). Conclusion: Contracting SARS-CoV-2 is associated with a significant decrement in systemic vascular function among otherwise young healthy adults which is evident weeks after testing positive for SARS-CoV-2. Funding: Partially funded by internal COVID-19 Research Cluster Award at Appalachian State University.

THE EFFECT OF EXERCISE ON CHANGE IN ARTERIAL STIFFNESS OVER TIME, A META-ANALYSIS

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BACKGROUND: Cardiovascular disease (CVD) is the number one cause of death in the U.S., taking one life every 36 seconds. Sedentarism and insufficient physical activity are CVD risk factors as they contribute to arterial stiffness. Arterial stiffness is the compromised ability of blood vessels to expand and recoil. This can be assessed by pulse wave velocity (PWV), the velocity at which pulse pressure waves are propagated down the arterial tree. The purpose of this meta-analysis is to investigate the effect of aerobic (AE) and resistance (RE) exercise on PWV as a measure of arterial stiffness over time. **METHODS:** Electronic databases (PubMed, SPORTDiscus) were searched from inception to July 2020. Extracted data was used to determine the change effects of time (change in PWV with weeks of training) and group (exercise intervention vs. control). To account for effect-size dependency, a 3-level model was conducted with restricted maximum likelihood estimation. The 3 sources of variance taken into account included: variance at the level of the subject (Level 1), variance between effect sizes extracted from the same study (Level 2), and variance between studies (Level 3). **RESULTS:** Initially, 110 studies were identified. After evaluation of study eligibility, data from 6 studies involving 246 participants were extracted for analysis. The 6 studies included 12 experimental arms (AE=5, RT=2, control=5). Compared across all studies and exercise and control groups, PWV changed by -2.87 cm/s per week (95%: -6.73 to 0.99, P=0.139). The majority of the variance was at levels 3 (I^2=56%) and 2 (I^2=25%). Compared to the control group, for the exercise group PWV changed by -5.10 cm/s per week (95%: -12.65 to 2.44, P=0.177). When the exercise groups were categorized by exercise modality, compared to control group the AE group changed by -5.35 cm/s per week (95%CI: -13.10 to 2.38, P=0.167), and the RT group by -3.23 cm/s per week (95%CI: -33.99 to 27.54, P=0.831). **CONCLUSIONS:** The findings were inconclusive. With an exercise intervention PWV did decrease each week, but the change did not reach significance. The effects do appear to be stronger for AE compared to RE. Considering the study design differences, small number of studies, and the inability to identify whether the change in PWV is non-linear, further research is warranted. **Source of funding:** NONE

EFFECTS OF BIOLOGICAL SEX ON CARDIAC DYSFUNCTION DURING CANCER CACHEXIA

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Background: Cancer cachexia is a complex metabolic wasting disease that occurs in up to 80% of cancer patients and is responsible for about 20% of deaths in cancer patients. While research is growing, cancer cachexia remains a vastly underestimated and untreated condition. Current research shows that cardiac muscle is depleted during cancer cachexia, but little research has been conducted examining the effects of sex on this phenomenon. **Purpose:** The purpose of this study was to examine the effects of sex on cardiac dysfunction during cancer cachexia and determine the underlying mechanisms responsible for this phenomenon. **Methods:** Male and female LC3 Tg+ mice underwent a 3-week Lewis Lung Carcinoma (LLC; $1x10^6$ in flank) protocol. Cardiac function was assessed via conscious echocardiography, and autophagic and inflammatory proteins were investigated for their possible role in cancer-mediated cardiac wasting. **Results:** Echocardiography revealed that there was a significant ($p<0.05$) reduction in the fractional shortening in both males and females when comparing pre- and post-inoculation values. Furthermore, males exhibited a significantly greater degree of cardiac dysfunction compared to females after 3 weeks of tumor bearing (fractional shortening: males, -29% vs. female, -8%; $P< 0.01$). Autophagic flux analysis showed both male and female hearts exhibited a significant increase in late phase autolysosomes, with females exhibiting significantly ($P< 0.05$) more late phase puncta ($P< 0.05$). Similarly, tumor bearing females expressed significantly more cardiac LC3-II and FoxO3a compared to male tumor bearing mice. Interestingly, while both male and female tumor bearing groups showed increased NF-kB expression (not significant), only female tumor bearing mice exhibited a significant ($P< 0.05$) increase in IL-1beta expression. No significant difference in TNF-alpha levels was found when comparing tumor bearing males and females. **Conclusion:** Our data supports the idea that cardiac dysfunction is mediated by cancer cachexia and that certain autophagy and inflammatory pathways respond differently based on sex. This data can serve an important role in understanding how cancer cachexia presents and progresses differently based off sex and helps identify sex specific targets for therapeutic intervention.

FUNCTIONAL BALANCE AMOUNT MIDDLE-AGED ADULTS AS A RISK FACTOR FOR CARDIOVASCULAR DISEASE.

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Objective. Heart disease is the leading cause of death in the U.S. Thus, assessing the extent of this disease is a high priority in preserving health throughout the lifespan. Cardiovascular disorders are now classified as a risk factor for falls, which is the leading cause of unintentional injury in middle age and older adults; often requiring hospitalization. This investigation aimed to measure balance in adults ages 40-64 years with poor ankle brachial pressure index (ABPI) compared to those with good ABPI. **Methods**. Data were collected from the 1999-2000 and 2001-2002 National Health and Nutrition Examination Surveys, which included 2,145 middle-aged adults (age 40-64 years). Measurements evaluated were functional assessments of vestibular balance through the Romberg Balance Test and cardiovascular disease risk through right-sided ABPI. Right-sided ABPI was categorized into poor (≤0.90) or normal (>0.90). Balance was categorized into pass or fail of the Romberg Balance Test. **Results.** Normal ABPI was found in 2,094 (51.07 ± 0.16 years) participants and poor ABPI in 51 participants (57.08 ± 0.85 years). In middle-aged adults, good balance was determined from those who passed all 4 conditions (n=1,574) compared to those who failed one or more conditions (n=571). Individuals with poor ABPI had a greater odds ratio of having poor balance compared to individuals with good ABPI. Those with poor ABPI had 3.50 (95%CI:1.69, 7.27; p=0.001) higher odds of poor balance. **Discussion.** Poor balance is more prevalent in individuals at risk for cardiovascular disease as assessed by poor ABPI. Thus, functional balance may serve as a risk indicator of cardiovascular disease for middle-aged adults, although future studies should assess whether these associations are independent of traditional cardiovascular disease risk factors.

BLOOD FLOW RESTRICTION STIMULUS DIFFERS BETWEEN ABSOLUTE AND RELATIVE PRESSURES

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Background: Guidelines suggest blood flow restriction (BFR) be made relative to individuals' arterial occlusion pressure (AOP) versus using one absolute pressure for all individuals, however, the resultant stimulus has not been compared. **Purpose:** To compare the BFR stimulus between absolute and relative pressures. **Methods:** Using pulsed wave Doppler ultrasonography, 42 participants' brachial arterial blood flow was measured twice at rest, then once each at 40% AOP, 80% AOP, and 100 mmHg (randomized, all separated by 1-min). Blood flow measures were preceded by 10-min seated rest (AOP determined mid-rest). Changes in blood flow [mL min^{-1}= time-averaged mean velocity (TA_{mean})*πr^2)], shear rate (s^{-1}=TA_{mean}*8/diameter), and oscillatory shear index [AU=|retrograde shear rate|/(|antegrade shear rate|+|retrograde shear rate|)] were calculated as differences from rest measure 1 to: rest 2 (ΔREST), 40% AOP (Δ40%), 80% AOP (Δ80%), and 100 mmHg (Δ100), then analyzed [presented as mean (SD)] using one-way RMANOVAs (p<.05). Results: Changes in total [ΔREST=0.20 (26.65); Δ40%=-34.07 (28.98); Δ80%=-45.45 (34.78); Δ100=-40.23 (31.23); all p≤.018] and antegrade blood flow [ΔREST=1.50 (26.49); Δ40%=-29.78 (29.56); Δ80%=-42.18 (34.25); Δ100=-34.14 (31.32); all p≤.003] differed across all conditions. However, retrograde [ΔREST=-1.63 (7.39); Δ40%=-4.89 (6.56); Δ80%=-3.58 (6.31); Δ100=-5.94 (6.61)] only differed comparing ΔREST to Δ40% (p=.015) and Δ80% (p=.006), and Δ80% to Δ100 (p=.009). Changes in total [ΔREST=6.55 (87.91); Δ40%=-145.07 (119.17); Δ80%=-200.02 (149.62); Δ100=-180.74 (140.08); all p≤.009], and antegrade [ΔREST=9.88 (85.41); Δ40%=-124.61 (117.89); Δ80%=-182.89 (142.05); Δ100=-154.56 (132.42); all p≤.001] shear rate differed across all conditions. However, retrograde shear rate [ΔREST=-6.84 (30.38); Δ40%=-22.31 (30.05); Δ80%=-17.89 (32.22); Δ100=-25.05 (28.95)] only differed comparing ΔREST to Δ40% (p=.011) and Δ100 (p=.005), and Δ80% to Δ100 (p=.010). Oscillatory shear index changes [ΔREST=.02 (.15); Δ40%=.12 (.14); Δ80%=.20 (.15); Δ100=.19 (.17)] differed across all conditions (all p≤.009), except Δ80% and Δ100 (p=.812). **Conclusion:** The blood flow restriction stimulus differs between absolute and relative pressures in the upper body. Whether these differences alter acute and/or chronic responses to blood flow restriction should be investigated.

APPLYING RELATIVE AND ABSOLUTE BLOOD FLOW RESTRICTION ALTERS BLOOD FLOW VELOCITY BUT NOT BLOOD PROFILES

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BACKGROUND: It is recommended that blood flow restriction (BFR) be applied relative to an individual rather than applying one absolute pressure. It is unclear how the different applications alter blood flow characteristics. The purpose of this study was to compare blood flow velocities and profiles with relative and absolute pressures. METHODS: Over one visit, after 5-min of seated rest, arterial occlusion pressure (AOP) was measured with a 5-cm wide nylon pneumatic cuff at the upper arm. After a second 5-min rest, using pulse wave Doppler ultrasonography, time averaged mean (TA_{mean}) and max (TA_{max}) brachial blood flow velocities were measured over 5 cardiac cycles twice at rest (R1; R2), then again with each BFR condition (randomized and counter balanced, all separated by 1-min): 100mmHg (ABS), 40% AOP (40%), and 80% AOP (80%). Blood flow velocities (cm/s) and profiles (TA_{mean}/TA_{max}), presented as mean±SD, were compared across conditions using one-way RMANOVAs (SPSS 27, alpha level =.05). RESULTS: 26 females and 17 males (age:27±7 years, BMI:24.8±4.1 kg/m^2, AOP:157±26 mmHg) participated. Antegrade TA_{max} was different across all conditions (40%:8.3±3.0, 80%:4.8±1.9, ABS:6.4±2.6; all:p≤.001) except R1 compared to R2 (R1:15.6±8.4, R2:16.0±8.4; p=.75). Antegrade TA_{mean} was different across pressures (40%:5.2±1.8, 80%:3.0±1.2, ABS:4.1±1.7; all:p≤.001) compared to rest (R1:10.0±5.6; R2:10.2±5.5; p=.76), which again did not differ. Retrograde TA_{max} was lower than R1 when pressures (40%:-2.8±2.0, 80%:-2.3±1.6, ABS:-3.0±1.8; all:p≤.007) were applied, but resting conditions did not differ (R1:-1.3±1.7, R2:-1.7±2.1; p=.29). However, retrograde TA_{max} at 80% was not different from R2 (p=.17) and 40% did not differ from 80% (p=.09) nor ABS (p=.57). Retrograde TA_{mean} decreased from R1 with restriction (40%:-1.7±1.2, 80%:-1.4±1.0, ABS:-1.8±1.1; all:p≤.003), while resting conditions did not differ (R1:-.8±.9, R2:-1.0±1.2; p=.25). However, retrograde TA_{mean} did not differ from 80% to R2 (p=.12) or 40% from 80% (p=.11) and ABS (p=.57). Neither antegrade (R1:.6±.1; R2:.6±.1; 40%:.7±.2; 80%:.6±.1; ABS:.7±.2; p=.23) nor retrograde (R1:.6±.1; R2:.6±.1; 40%:.7±.2; 80%:.6±.1; ABS:.7±.2; p=.42) blood velocity profiles were different. CONCLUSIONS: While blood flow velocity changes are dependent upon the absolute or relative BFR pressures applied, blood flow velocity profiles are unaltered.

IMPACT OF ACUTE ANTIOXIDANT SUPPLEMENTATION ON NEURAL CARDIOVASCULAR CONTROL IN PSORIATIC SUBJECTS

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BACKGROUND: Recent studies indicate psoriasis not only affects the skin and joints, but, as a systemic inflammatory disorder, is associated with increased risk of vascular complications leading to myocardial infarction and cerebrovascular stroke. Individuals with psoriasis have been shown to have altered cardiovascular regulation; however, the underlying mechanisms are yet to be fully elucidated. There is a great deal of hypothesized interplay between systemic inflammation, oxidative stress, and autonomic function in psoriasis. **PURPOSE:** Therefore, the purpose of this proposed study is to elucidate these mechanisms by modulating inflammation and oxidative stress, via antioxidant supplementation, and monitor the subsequent impact on muscle sympathetic nerve activity (MSNA) and vascular function. **METHODS:** Subjects diagnosed with psoriasis will be recruited from local dermatologists in the Boone, NC area. A repeated measures design will be accompanied with a placebo-control group (CON). Visits 1 and 2 will take place 2 weeks apart, where the experimental group (AOx) will supplement with vitamin C 1000mg, vitamin E 600IU, alpha lipoic acid 600mg, and CON will take placebo tablets. Visits will consist of: anthropometrics, blood biomarkers, autonomic function testing battery using microneurography to evaluate MSNA, and vascular function testing. **ANTICIPATED RESULTS:** We hypothesize that MSNA, oxidative stress, and inflammation will be increased in subjects with psoriasis when compared to previously collected healthy, age-matched data, and will decrease post antioxidant supplementation in the AOx group. We also suspect that subjects with psoriasis will show decreased arterial compliance and endothelium-dependent flow mediated dilation when compared to previously collected healthy, age-matched data.

THE IMPACT OF COVID-19 ON STEP COUNT AND HEART RATE VARIABILITY IN ADULTS.

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BACKGROUND**:** The COVID-19 pandemic was deemed a public health emergency by the World Health Organization and has since impacted billions of lives globally. To prevent widespread transmission, school closures, virtual learning, and social distancing regulations were implemented. An unintended consequence of these closures is an increased sedentary behavior among adults (≥18 years). High rates of sedentary behavior are associated with cardiovascular disease (CVD) risk, which can be noninvasively tracked using heart rate variability (HRV). The purpose of this proposed retrospective observational study is to investigate the impact COVID-19 is having on sedentary behavior (step count) and HRV among adults. METHODS: In Spring 2021, male and female adults (n=≥50) associated with a large university (The University of North Carolina and Duke University students and employees) who wear a smartwatch will be asked to self-report their step count and monthly average HRV before COVID-19 (February 2020), immediately after school closure (March 2020), and then during COVID-19 (September 2020). Measurements will be obtained from smartwatch technology including Apple Watch (version 4, 5, or 6), Polar watch, or Garmin watch devices. Less than 5,000 steps per day will be considered a sedentary lifestyle. Additionally, questionnaires will be issued to participants to access the context of sedentary behavior engagement including questions about time spent sedentary at work/school, leisure time watching television, leisure-time computer use, leisure screen time (phone/iPad), transportation sitting, or other sitting. Changes in sedentary behavior and HRV across the three time points will be analyzed using repeated measures ANOVA, and the relationship between step count and HRV will be analyzed using mixed-model regression. ANTICIPATED RESULTS: We hypothesize that sedentary behavior will increase and HRV will decrease following COVID-19 and that sedentary behavior is inversely associated with HRV. This study will potentially allow us to understand more about COVID-19 related sedentary behavior in adults as well as objectively quantify associated CVD risk via HRV measurement. Furthermore, investigating the context of sedentary behavior engagement will allow us to improve our understanding and success of future interventions.

POSTER AWARDS: DOCTORAL STUDENTS Thursday, Feb. 18, 4:00–5:00 pm EST

PRELIMINARY EVALUATION OF POTENTIAL DETERMINANTS OF EXERCISE TOLERANCE IN EARLY BREAST CANCER SURVIVORS

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Background: Early breast cancer survivors (EBC) have a marked decrease in physical activity and an impairment in their ability to tolerate exercise as reflected in their reduced cardiorespiratory fitness (VO_{2peak}). Previous literature has attributed low VO_{2peak} to impairments along the oxygen cascade, which prevents proper delivery and utilization of oxygen. However, little information is available regarding the impact that skeletal muscle function, body composition, and patient-reported outcomes may have on influencing exercise tolerance in this population. **Purpose:** The purpose of this preliminary evaluation was to identify the potential role of skeletal muscle function, body composition, and patient-reported outcomes in exercise tolerance for EBC. **Methods:** 33 early-stage (I-III) EBC were recruited. Exercise tolerance was assessed via an incremental maximal cardiopulmonary exercise test (CPET) on a cycle ergometer to obtain VO_{2peak}. Determinants of exercise tolerance included lower body muscle strength assessed via isometric leg extension, lean body mass (LBM) / body fat percentage (BF%) via DEXA, self-reported cancer-related fatigue (CRF) via questionnaire, and treatment type. **Results:** Univariate regression analyses revealed both lower body strength (R^2 = 0.166; p < 0.03) and greater BF% (R^2 = 0.332; p < 0.01) were associated with lower VO_{2peak}. When considering treatment type, those who only received radiation showed a significant association between VO_{2peak} and lower body strength (R^2 = 0.284; p < 0.05) and greater BF% (R^2 = 0.594; p < 0.01). Those who received chemotherapy and radiation displayed an association between VO_{2peak} and CRF (R^2 = 0.495; p < 0.03). **Conclusions:** Lower body muscular strength and body composition are possible determinants of exercise tolerance in EBC as they were associated with decreased VO_{2peak}. Considering combination therapy, greater CRF also showed significant associations with decreased VO_{2peak}. Provided that VO_{2peak} is commonly assessed on a cycle ergometer, it plausible to consider lower body muscle function playing a pivotal role in the premature termination of a CPET. Future

research should explore whether these factors being improved with exercise training could possibly lend to improved exercise tolerance. Funded by the Breast Cancer Research Foundation

CARDIORESPIRATORY FITNESS AT BASELINE AND IN RESPONSE TO TRAINING ACROSS METABOLIC HEALTH AND WEIGHT PHENOTYPES

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Background. Cardiorespiratory fitness has been proposed to be included as part of the metabolic health and weight status phenotype. Few studies have examined how metabolic health/weight status is associated with changes in fitness in response to exercise training. Thus, the present study examined VO_2max before and after endurance training across four metabolic risk and BMI categories in the HERITAGE Family Study.**Methods**. Participants (n=718) from HERITAGE completed a 20-week training program and four groups based on baseline BMI and metabolic risk were created: metabolically healthy normal weight, MHNW; metabolically unhealthy normal weight, MUNW; metabolically healthy overweight/obese, MHO; and metabolically unhealthy overweight/obese, MUO. Unhealthy was defined as having ≥2 metabolic syndrome components: high blood pressure, fasting triglycerides, fasting glucose, and low HDL-C. VO_2max was measured during two maximal exercise tests on a cycle ergometer at baseline and post-training. General linear models were used to examine differences at baseline and change in VO_2max after adjusting for age, sex, and ethnicity (and baseline VO_2max in change models only). **Results**. There were no differences in baseline VO_2max/kg between the normal weight groups (adjusted mean±SEM: ~33.9±0.5), which were higher than the values for the obese groups ($p<0.0001$); MHO had higher VO_2max/kg compared to MUO (28.8±0.3 vs 27.5±0.4, $p=0.004$). The MUO group had a significantly ($p\leq0.03$) lower baseline VO_2max/kg lean mass (41.2±0.4) compared to values for all other groups, whose mean values were similar (~43.2±0.5). All four groups experienced significant increases in VO_2max with training. The MUO group showed the smallest increase in both VO_2max/kg (4.2±0.2) and VO_2max/kg lean mass (5.9±0.3), which was significantly different compared to values for all other groups for VO_2max/kg (~5.6±0.3). The MHO group showed the largest increase in VO_2max/kg lean mass (7.4±0.2), which was different ($p\leq0.01$) from values for the MHNW (6.6±0.2) and MUO groups. **Conclusions**. Metabolically unhealthy obese adults had the lowest baseline values and experienced the smallest improvements in relative VO_2max with training of any metabolic health/weight group. These findings support the notion that cardiorespiratory fitness may not be a distinguishing characteristic of only metabolic health, but also a potential target of treatment, particularly in obese adults.

INDIVIDUAL COVID-19 RESPONSE POLICIES' EFFECTS ON UNIVERSITY EMPLOYEES' DAILY STEPS

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BACKGROUND: Many policies and suggestions enacted by governments and employers in response to the COVID-19 pandemic decreased access to common places of physical activity. The purpose of the study was to assess the impact of individual COVID-19 response policies on objectively measured daily steps (steps·d^{-1}) of university employees. METHODS: To determine the impact of the specific policies chosen, objectively measured steps·d^{-1} were examined from commercial triaxial accelerometers (N=559). The average steps·d^{-1} for the three-day period immediately preceding and following new pandemic response policy announcements were compared using paired t-tests. RESULTS: Steps·d^{-1} were not significantly different before and after Kentucky's "State of Emergency" declaration (10,675±167 vs. 10,472±178 steps·d^{-1}, $p=0.110$). Steps·d^{-1} significantly decreased after the announcement of the World Health Organization's worldwide pandemic and social distancing recommendation announcement (10,348±171 v. 9551±156 steps·d^{-1}, $p<0.001$) as well as after the cessation of in-person classes at the university being examined (10,100±160 vs. 9,186±167 steps·d^{-1}, $p<0.001$). Conversely, there was a significant increase after both the halt of non-essential research at the university (9,186±167 vs. 9,590±175 steps·d^{-1}, $p<0.001$) and after Kentucky's "Healthy at Home" order went into effect (9,693±177 vs. 10,156±185 steps·d^{-1}, $p<0.001$). Lastly, a non-significant 1.8% increase in steps·d^{-1} was seen after the statewide ban on mass gatherings (9,523±171 vs. 9,693±177 steps·d^{-1}, $p=0.154$). CONCLUSION: These results indicate there may be positive or negative unintended consequences on daily steps depending on the nature of the pandemic policy implemented. Moreover, the effect of later withdrawing or relaxing these policies is still unclear. Governments and employers may need to consider not only pandemic policy effectiveness in reducing community disease transmission but also the potentially detrimental effects on health behaviors such as physical activity. FUNDING: National Center for Research Resources and the National Center for Advancing Translational Sciences, National Institutes of Health, supported this research through Grant UL1TR001998. The content is solely the responsibility of the authors and does not necessarily represent the official views of the NIH. The authors declare no conflict of interest.

LIPOPROTEIN-INSULIN RESISTANCE (LPIR) SCORES DECREASED FOLLOWING AN OPTIFAST AND AEROBIC EXERCISE PROGRAM

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BACKGROUND: Early detection of insulin resistance may be effective in combatting the type 2 diabetes mellitus (T2DM) global crisis. The lipoprotein insulin resistance index (LPIR) quantifies T2DM risk based on lipoprotein particle size parameters in relation to insulin levels. However, a lack of data exists on the effect of weight loss and aerobic exercise on LPIR score. METHODS: Thirty sedentary overweight and obese adults (Age: 46.2 ± 10.7 yrs.; Weight: 95.4 ± 12.6 kg; BMI: 34.4 ± 3.3 kg/m^2) completed a 10-week OPTIFAST weight loss program and supervised aerobic exercise training with the goal of achieving clinical weight loss (≥7% body weight). The OPTIFAST program involved consuming meal-replacement products totaling ~800 kcals per day. Participants attended weekly classes on behavior modification and nutrition. The weekly aerobic exercise volume was 300 MET min and increased by 50 MET min each week until 700 MET min per week was reached. Plasma blood samples were analyzed using high-throughput nuclear magnetic resonance (NMR) spectroscopy (LabCorp, NC) at baseline and at follow-up, LPIR score was calculated through the summation of selected lipoprotein parameters and scaled between 0 (most insulin sensitive) and 100 (least insulin sensitive). RESULTS: Participants had an average reduction in weight (-8.4 kg or 9.9%, $p < 0.001$), % fat mass (-2.1 %, $p < 0.001$), and waist circumference (-7.7 cm, $p < 0.001$), but no change in absolute peak oxygen uptake (0.02 L/min, $p = 0.737$), after the intervention. Additionally, there was a reduction in LPIR score (-12.1, $p < 0.001$), insulin (-8.9 uIU/mL, $p = 0.002$), and glucose (-11.2 mg/dL, $p < 0.001$), along with an average decrease in blood lipid levels: triglycerides (-27.2 mg/dL, $p = 0.001$), and lipoproteins: very-low-density lipoprotein (-5.5 mg/dL, $p = 0.001$) and low-density lipoprotein (-7.9 mg/dL, $p = 0.013$). Changes in LPIR were associated with changes in triglycerides ($r = 0.41$, $p = 0.025$). No significant associations were observed between changes in LPIR and body composition, fitness, or blood pressure changes ($p > 0.05$). CONCLUSIONS: LPIR improved following an OPTIFAST program with aerobic exercise, suggesting a reduction in T2DM risk independent of traditional glycemic measures. Future research should investigate how to maintain improvements in LPIR after obtaining weight loss.

THE RELATIONSHIP BETWEEN CELL FREE DNA AND VOLUME LOAD

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BACKGROUND: Cell free DNA (cf-DNA) is a biomarker used to track immune response to different stimuli including post-trauma organ failure, quantifying cell necrosis following myocardial infarction, and monitoring tumor metastasis in cancer patients. Neutrophil extracellular traps (NETs), rather than cell necrosis or apoptosis, are thought to be the primary source of cf-DNA following exercise training. The primary purpose of this study was to assess the sensitivity of cf-DNA to different resistance training volume-loads, within a heterogenous group of participants. The secondary purpose was to examine the ability of relative strength to predict cf-DNA response to resistance training. **METHODS:** Thirty participants were recruited for this study, 15 males and 15 females. Participants' back squat (BS) 1 repetition maximum (1RM) were obtained with a mean 1RM of 153.5 ± 34.0kg for males and 71.2 ± 14.6 for females. Relative strength was calculated by dividing 1RM by body mass (male relative strength = 1.7 ± 0.3 kg/kgBW, female relative strength = 1.1 ± 0.2 kg/kgBW). Participants abstained from exercise for 48hrs after 1RM testing followed by a BS session consisting of 6 sets of 10 repetitions at 60% of the participants' 1RM. Blood was collected via venous draws into 4ml EDTA vacutainers at 3 time points; immediately before (T1), after 3 sets (T2), and after 6 sets (T3) of the BS. **RESULTS:** A repeated measures ANOVA showed that cf-DNA increased significantly from T1 (407.72 ± 320.83) to T2 (1244.6 ± 875.83) ($p < 0.001$, Cohen's $d = 0.96$) and T1 (407.72 ± 320.83) to T3 (1331.15 ± 1141.66) ($p < 0.001$, Cohen's $d = 1.06$), while no statistical difference was found between T2 and T3. The linear regression model to predict %Δ cf-DNA from T1 to T3 from relative strength was found to be significant ($p = 0.04$; $R^2 = 0.15$). **CONCLUSIONS:** This study demonstrates that cf-DNA increases as the resistance training volume load increases. This study also illustrates that individuals with greater relative strength may experience a greater relative cf-DNA increase when relative intensity is constant. The current study builds on the body of research illustrating cf-DNA provides insights into the immune response following resistance training.

NRF2/KEAP1 PATHWAY CHANGES IN MUSCLE ASSOCIATED WITH EXERCISE TRAINING

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Exercise is known to increase oxidative stress (OS), which has the potential to signal change in the cells, often leading to cell protection when OS is manageable. This OS-induced protection has been implicated in many diseases, including cancer, CVD, neurodegenerative diseases, diabetes, etc. Cells have the capacity to respond to OS and also control OS by antioxidant enzymes, such as superoxide dismutase (SOD) and heme oxygenase (HO). When OS occurs, reactive molecules interact with kelch-like ECH associated protein 1 (KEAP1),

which leads to the release of nuclear erythroid-related factor 2 like-2 (Nrf2). Nrf2 can translocate to the nucleus to bind to regions of DNA to induce antioxidants, promoting cytoprotection. Acute exercise of sufficient intensity can up-regulate Nrf2 into the nucleus. However, changes in response to exercise training on these two proteins in the pathway are not well defined. **Purpose:** The purpose of this study was to examine the changes that occur in response to exercise training in the KEAP1/Nrf2/antioxidant pathway in skeletal muscle. **Methods:** Fourteen mice (C57BL) exercised for 8 wks, 5x/day for 45-60 min., using a protocol designed to elicit OS, and were compared to sedentary control mice (n=9). Mice were sacrificed 72 hrs after the last exercise session, and hindlimb gastrocnemius, soleus, and quadriceps (superficial and deep) were collected and flash frozen using liquid nitrogen. Samples were thawed, homogenized, and separated into nuclear and cytosolic fractions. Each fraction was analyzed by multiplexed western blotting, using fluorescent primary antibodies (anti-: KEAP1, Nrf2, SOD1, HO1, GAPDH), imaged using a GE Typhoon scanner, corrected to GAPDH. A repeated measures MANOVA was conducted followed with univariate rm-ANOVAs. **Results:** Exercise training increased total Nrf2 by 31.9% ($p < .001$) and nuclear Nrf2 by 69.2% ($p << .001$), avg. across all muscles, compared to sedentary mice. Additionally, the soleus muscle demonstrated an 89% increase in KEAP1 in trained mice. HO1 increased in the nucleus only (74.5%, $p < .001$), while SOD1 increased in both nuclear and cytosolic fractions (N: 32.9%, $p < .001$; C: 18%, $p = .048$). **Conclusion:** Exercise training appears to increase total and nuclear-located Nrf2, as well as a modest increase of KEAP1 in the cytosol. In addition, there were increases in HO1 and SOD1 in the nucleus of these muscles, that may be due to increased pathway activation. These findings shed light on exercise-induced changes in the KEAP1/Nrf2 pathway, and how it might contribute to protecting cells, which would be beneficial for a number of diseases. Further investigations should examine other aspects of this pathway, such as NRF2 binding to DNA, other down-stream redox molecules, and the degradation pathway for Nrf2/KEAP1 molecules.

EARLY-ONSET PHYSICAL INACTIVITY IN TUMOR-BEARING MICE IS ASSOCIATED WITH ACCELERATED CACHEXIA

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BACKGROUND: Inactivity and skeletal muscle mass loss are critical characteristics of cancer cachexia. Physical inactivity is beginning to be examined for its role in exacerbating cancer cachexia progression. While the Lewis lung carcinoma (LLC) model is a widely used pre-clinical cancer cachexia model, the degree of cachexia exhibits considerable variability. Many studies using the LLC cachexia model report only pre- or mild cachexia and have not examined the physical activity level during the initiation and progression of cachexia. Therefore, we examined if the early-onset of physical inactivity was associated with accelerated cachexia development in tumor-bearing mice. **METHODS:** Male C57BL/6J (12 wks. age) were injected with 1 x 10^6 LLC cells (n=28) or PBS (n=23) subcutaneously in the right flank, and tissue was collected 26-28 days post cell injection. Tumor volume and body weight were measured every 5 days throughout the study to calculate the tumor growth rate. Fifteen days post tumor inoculation, a subset of mice (PBS n=10, LLC n=11) were individually housed in metabolic cages for 5 days. Plasma Interleukin-6 (IL-6) concentrations were measured by Elisa at the end of the study. **RESULTS:** We report a wide range of tumor mass at the end of the study (N= 28; 0.39-5.48g), which coincided with a large variation in bodyweight loss (-20% to 6.2%). Mice with high growth rate large tumors (HGLT) (n=10) exhibited significantly greater bodyweight loss (-7.8%), decreased muscle mass (-17%) and fat mass (-42%) compared to low growth rate small tumors (LGST) (n=9). Total cage activity was decreased (day 15) in tumor-bearing mice; before measurable differences to tumor volume, HGLT tumor mice exhibited significantly reduced cage activity compared to LGST. Tumor mass was associated with decreases in cage activity (r = -0.865; p=0.001). Metabolically, HGLT had significantly greater lipid oxidation compared to LGST. Plasma IL-6 was significantly elevated in LLC mice and was increased in HGLT compared to LGST tumor mice. Interestingly, end of study plasma IL-6 concentrations was associated to early declines in cage activity (r= -0.823; p=0.004) and increased lipid oxidation (r= 0.745, p=0.013). **CONCLUSION:** Early-onset inactivity and systemic metabolic dysfunction were associated with a greater degree of cachexia severity at the end of the study. Future studies should investigate if tumor-derived factors are driving the early suppression of physical activity. **Acknowledgments:** NCI R01-CA121249

COMPARISON OF LEISURE TIME PHYSICAL ACTIVITIES OF METABOLIC SYNDROME POSITIVE AND GENERAL POPULATIONS

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The constellation of cardiometabolic indices elevating risk of morbidity and mortality is referred to as metabolic syndrome (MetS). Engaging in physical activity (PA) has a beneficial impact on MetS. However, it is unclear what specific types of PA MetS-positive individuals are engaging in and how this compares with the general population. **PURPOSE:** This study aimed to identify how self-reported engagement in types of PA of MetS-positive individuals compared to the general population. **METHODS:** Using 2015-2016 National Health and Nutritional Examination Survey data, individuals with no missing cardiometabolic data were classified as MetS positive using ATP-III criteria (obesity, dysglycemia, dyslipidemia, and hypertension). Participants reported the types of PA engaged in the past seven days. Expected reported types of PA for the general population was gathered from the 2011 Behavioral Risk Factor Surveillance System. A Chi-Square Goodness of Fit was used to examine if MetS-positive individuals engage in the same types of PA at the same prevalence as the general population. **RESULTS:** MetS-positive individuals reported engaging only in active video gaming, aerobics, basketball, bike riding, football, roller blading, running, soccer, and walking. The general population had a greater prevalence for all nine types of PA with a significant difference in the observed and expected prevalence of types of PA among MetS-positive individuals and the general population (χ^2= 91.71, p<0.001). Active video gaming and walking the most prevalent types of PA among MetS-positive individuals and the general population, respectively. **CONCLUSIONS:** Overall, the distribution of the types of PA MetS-positive individuals engaged in is different from the general population. MetS-positive individuals engaged in a lower prevalence of all reported PAs. The low levels of PA in tandem with MetS increase risk of morbidity and mortality. Understanding which types of PA are prevalent among MetS-positive individuals, such as active video gaming, may help to guide future efforts on how to increase PA engagement and subsequently improve health.

POSTER AWARDS: MASTERS STUDENTS Thursday, Feb. 18, 4:00–5:00 pm EST

ASSOCIATION OF BONE MINERAL DENSITY AND LOWER-BODY POWER IN DIVISION-I COLLEGIATE SOCCER PLAYERS

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BACKGROUND: Bone mineral density (BMD) is an important indicator of overall bone health and is demonstrated to be highly correlated with a lower risk of injury and osteoporosis. For athletes, undergoing chronic plyometric and power-based training has been shown to positively impact BMD. Therefore, for individuals with greater lower-body power, it may be hypothesized that BMD can be predicted from an increased vertical jump height. Repetitive impact during the counter-movement jump (CMJ) may provide a stimulus that increases BMD. The purpose of this study was to determine the relationship between lower-body power and BMD in collegiate soccer players. **METHODS:** Thirty-two (females: n=12, 18.08±0.79 years; males: n=20, 19.15±1.46 years) Division-I soccer athletes agreed to participate in this study. In order to assess lower-body power, each athlete performed three trials of a counter-movement jump on a switch mat. Participants were instructed to jump as high as possible and to reach the arms towards the ceiling on the ascent. A one-minute rest period was given between each jump and the best trial was recorded. Following this, BMD was analyzed via dual-energy x-ray absorptiometry (DEXA). In order to determine the association between BMD and lower-body power, Pearson's Product correlations were calculated for the entire group and each sex. **RESULTS:** For the entire group (n=32), results indicated a moderate-to-large, positive correlation between BMD and lower-body power (r=0.68; p<0.01). However, when factored by sex, a low-strength, positive correlation was observed in males (r=0.23; p=0.34); whereas, no relationship existed between BMD and lower-body power in females (r=0.14; p=0.66). **CONCLUSIONS:** While the results indicated a moderate-to-strong association between BMD and lower-body power for the entire group, this effect was diminished when factored by sex. While chronic impact and loading can positively effect BMD, the measurement of vertical jump height may not fully represent lower-body power for soccer players. Therefore, future research should consider the examination of a sport-specific test to explore the association between BMD and lower-body power in soccer athletes.

AGREEMENT BETWEEN ACUTE CHANGES IN CAROTID-FEMORAL AND BRACHIAL-FEMORAL PULSE WAVE VELOCITY

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BACKGROUND: Carotid-femoral (cf) pulse wave velocity (PWV) is considered the gold standard measure of arterial stiffness, and independently predicts cardiovascular disease. cfPWV can be difficult to obtain, as applanation of the carotid artery is technically challenging. Brachial-femoral (bf)PWV is a simpler alternative. However, bfPWV has not been as widely used and there is limited research comparing the two measures. In order to comprehensively study agreement between the two, it is important to know not only how well they agree at rest, but also to what extent change in cfPWV corresponds to change in bfPWV. METHODS: In 18 healthy, young subjects, PWV was measured using the Vicorder (SMT Medical) under standardized conditions. bfPWV was first recorded, followed by cfPWV, in the supine position. Additionally, to determine whether change in one measure corresponds to change in the other, measurements were also repeated in the seated posture, in the same order. Postural change was used to induce an acute and controlled change in PWV. Mixed model regression was used to calculate agreement between the two measures. The bfPWV measure was regressed against the cfPWV and nested within subject and posture (supine, seated), with subject and posture intercepts specified as random. The random variance components were used to calculate overall agreement (overall agreement between cfPWV and bfPWV) and repeated-measures agreement (change in cfPWV versus change in bfPWV) between measures. Agreement was assessed using the intraclass correlation coefficient (ICC), with ICC ≥ 0.70 representing a strong agreement, and ICC ≥ 0.90 representing a very strong agreement. RESULTS: Complete data from 18 subjects (22.6 ± 3.1 years old, 33% female) was included in the analysis. Mean supine cfPWV was 6.1 ± 0.9 m/s, and mean seated cfPWV was 7.8 ± 1.0 m/s. There was strong overall agreement (ICC: 0.74, 95%CI: 0.59-0.84) and very strong repeated measure agreement (ICC: 0.90, 95%CI: 0.84-0.94) between cfPWV and bfPWV. CONCLUSIONS: The current findings indicate a strong agreement between bfPWV

and cfPWV, and that change in bfPWV is very strongly associated with change in cfPWV. The use of bfPWV, a more user-friendly method than cfPWV, can be used interchangeably to assess arterial stiffness.

CLINICAL PREDICTORS OF VO_2MAX RESPONSE TO ENDURANCE TRAINING: HERITAGE FAMILY STUDY

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Background: There is wide variation in the response of VO_2max to exercise training. However, the influence of baseline phenotypes on VO_2max trainability (ΔVO_2max) is not well studied. Thus, the purpose of this study was to examine the contribution of modifiable, biologically, and clinically relevant baseline traits to absolute ΔVO_2max (mL/min). **Methods:** Participants were 488 sedentary, healthy adults between the ages of 17-65 (56% female, 33% Black) who completed 20 weeks of standardized aerobic exercise training as part of the HERITAGE Family Study. Phenotypes were measured at baseline and post-training. Baseline resting and submaximal exercise (i.e., 50 Watts) measures of cardiopulmonary (e.g., cardiac output, ventilation, blood pressure) and metabolic traits (e.g., lactate, free fatty acids), as well as body composition traits (e.g., percent body fat, fat free mass) were entered into a forward selection regression model predicting ΔVO_2max with age, sex, and race forced into the model. **Results:** A total of 34 traits were entered into the forward selection model, with 10 traits associated with ΔVO_2max at $p<0.05$: fat free mass (partial r^2 = 2.9%); percent body fat (partial r^2 = 1.7%); arteriovenous oxygen difference at 50W (partial r^2 = 1.6%); stroke index at 50W (partial r^2 = 1.5%); visceral fat (partial r^2 = 1.5%); ventilation at 50W (partial r^2 = 1.0%); concentration of hemoglobin (partial r^2 = 1.6%), hematocrit (partial r^2 = 1.4%), and resting lactate (partial r^2 = 0.6%); and tidal volume at 50W (partial r^2 = 0.7%). This panel of 10 traits explained approximately 14.5% of the variance in ΔVO_2max. **Conclusion:** The contribution of baseline measures of modifiable cardiopulmonary, metabolic, and body composition traits to absolute ΔVO_2max was minimal. The variance in ΔVO_2max explained in this study may be higher than normal due to the use of predictor variables derived and tested in a single study cohort. There remains a large portion of the variance in ΔVO_2max that is not yet explained. Further research is needed to identify other modifiable factors that may influence VO_2max trainability.

EFFECTS OF CLEAR, TINTED, AND MIRROR TINTED FOOTBALL HELMET VISORS ON REACTION TIME AND TARGET-DETECTION

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BACKGROUND: We have previously shown that clear football helmet visors do not impair peripheral vision reactive time (PRT). Currently, almost all organizations and levels of competitive football allow clear visor use but ban the wearing of dark tinted visors during gameplay. However, whether tinted visors influence visuomotor ability is currently unknown. **PURPOSE:** The purpose of this study was to examine the effects of clear, tinted, and mirror tinted helmet visors on PRT and target detection in collegiate football players. **METHODS:** Division 1 NCAA football players with normal/corrected to normal vision participated. In a randomized manner, participants completed PRT tests for the following conditions: Baseline/no helmet (BL), Helmet only (HO), Helmet + Clear Visor (HCV), Helmet + Tinted (40% Visual Light Transmittance) Visor (HTV), and Helmet + Mirror Tinted (28% Visual Light Transmittance) Visor (HMV). For each condition, a 60 s PRT test was completed on a Dynavision D2 visuomotor board. Subjective perception of how visors would affect field performance was assessed with a 7-point Likert scale questionnaire. **RESULTS:** Independent of visors, all helmet conditions resulted in significantly slower average PRT and lower target hits compared to BL ($p<0.05$). HMV resulted in slower average PRT compared to HO ($p<0.001$) and HCV ($p=0.015$). Target hits were lower with HMV versus HO ($p<0.001$) and HCV ($p=0.008$). However, no differences existed between HTV or HMV for PRT or target hits ($p>0.05$). Subjectively, participants believed that the HTV and HMV would make their performance worse on the field compare to HCV ($p<0.05$). **CONCLUSIONS:** Wearing a helmet regardless of visor type worsens PRT and target detection. However, only the mirror tinted visor exacerbated impairments in peripheral visuomotor ability. Since mirrored visors resulted in poorer visuomotor ability beyond that of solely a helmet or clear visor, caution is warranted in use of mirrored visors during competition for both performance and safety concerns.

THE EFFECTS OF PREVIOUS AMENORRHEA ON VASCULAR FUNCTION

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BACKGROUND: Young premenopausal women are susceptible to amenorrhea, which contributes to negative vascular remodeling and endothelial dysfunction. It is unknown whether these vascular changes are permanent or reversable when regaining a consistent menstrual cycle. METHODS: This study examined subclinical cardiovascular disease risk factors and the vascular function of 10 eumenorrheic women, and 6 previously amenorrhoeic women (mean age: 23 ± 2 years). The amenorrheic women ceased menses for an average of 11.5 ± 2 months and regained menus for a mean of 33 ± 30 months before testing. Anthropometric measurements, physical activity, central (aortic) and peripheral (brachial) blood pressures, carotid intima media thickness, carotid beta stiffness, and brachial flow mediated dilation were analyzed using a one-way ANOVA. When significance was detected a Bonferroni Post Hoc analysis was performed. An ANCOVA was performed to control for variance and confounding factors. RESULTS: Compared to the eumenorrheic group, the previously amenorrheic females had significantly lower brachial systolic blood pressure (116 ± 7 mmHg vs 106 ± 10 mmHg), mean arterial pressure (82 ± 5 mmHg vs 75 ± 6 mmHg), aortic systolic blood pressure (100 ± 7 mmHg vs 89 ± 6 mmHg), aortic diastolic blood pressure (67 ± 7 mmHg vs 59 ± 6 mmHg), aortic mean arterial pressure (82 ± 6 mmHg vs 73 ± 4 mmHg), and higher weekly minutes of physical activity (156 ± 71 mins vs 280 ± 30 mins). After controlling for physical activity using an ANCOVA, group differences in SBP ($p=0.03$) and aortic MAP ($p=0.05$) remained significant. There were no significant differences in carotid intima media thickness, beta stiffness, and brachial flow mediated dilation. CONCLUSION: There were no significant differences in vascular structure remodeling between groups. The amenorrhoeic group displayed higher amounts of exercise, and lower peripheral and central blood pressure. This suggests that there are no long-term detrimental cardiovascular effects from previous amenorrhea and that physical activity may play a role in lowering central and peripheral blood pressure.

MUSCLE CONTRACTION BY HIGH-FREQUENCY ELECTRICAL STIMULATION INDUCES HIPPO SIGNALING EFFECTOR YAP RESPONSE IN $APC^{MIN/+}$ MICE

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BACKGROUND: mTOR is an established anabolic signaling that controls the tissue size and responds to resistance-type exercise, even under muscle-wasting conditions. Hippo signaling effector YAP also plays a role in regulating skeletal muscle size. However, whether YAP responds to such an external stimulus is unknown. The purpose of this study was to determine whether muscle contraction would trigger YAP response in mice with tumor burden. **METHODS**: Male *$Apc^{Min/+}$* (Min, n=6) mice and age-matched Wild-type (WT, n=6) mice were used in this study. A single bout of high-frequency electric stimulations (HFES, ten sets of six repetitions, ~18 min) was applied to both groups under anesthesia. This intervention induced eccentric contraction on the left tibialis anterior (TA) muscle. Right TA served as contra-lateral control. 30 min following the HFES, both TA muscles were excised and snap-frozen in the liquid nitrogen for further analysis. Total protein was extracted from the tissues, and routine western blotting was conducted using approximately 60~100 µg of the total protein. Muscle weight datum was analyzed by a Student's t-test. Western blot data were analyzed by a two-way ANOVA with repeated measures (genotype x HFES). Post-hoc analyses were performed with the Bonferroni test when appropriate. The coefficient of determination (r^2) was used to examine whether a linear regression model fits the plots. **RESULTS**: Min mice lost approximately 18.0% of body weight (BW) compared to their peak BW at the time of HFES. Control TA muscle was smaller in Min mice than WT mice (52.6 mg±1.1 vs. 35.4 mg±1.2, respectively, $p<0.01$). These data confirmed that Min mice developed cachexia. Densitometry analysis of Western blot data showed that HFES increased the phosphorylation (p-) levels of p70S6K regardless of genotype ($p<0.01$). However, the p-p70S6K response to HFES was higher in WT mice than Min mice (2.5 folds vs. 1.5 folds, $p<0.01$). HFES upregulated pYAP levels ($p<0.01$), but we observed a significant interaction between genotype and HFES ($p<0.05$), indicative of altered responses to HFES. When the fold differences were plotted, there was a significant inversed relationship between p-p70S6K and p-YAP (r^2=0.565, $p<0.05$). **CONCLUSIONS**: These results suggest that muscle contraction by HFES evokes YAP activity, but the response is different between healthy and cachectic mice.

SLEEP DURATION AND ARTERIAL STIFFNESS, A META ANALYSIS

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BACKGROUND: Research has shown chronically short (<7 hours) and long (>9 hours) sleep duration may increase cardiovascular disease (CVD) risk relative to recommended sleep duration (7-9 hours). However, the factors contributing to CVD risk that also relate to sleep duration are less understood. One factor could be arterial stiffness (AS), an indicator of CVD risk. This study sought to consolidate the literature examining the association between sleep duration and AS. Studies using pulse wave velocity (PWV), the "gold standard" for AS measurement, were selected for analysis. **METHODS:** Electronic databases (PubMed, SPORTDiscus) from inception to July 2020 were referenced. Initially, 464 studies were identified. After evaluation of study eligibility, data from 10 cross-sectional studies involving 83,032 participants (65% male) were extracted for meta-analysis. Meta-analyses were completed on 3 sleep duration categories (short, recommended, and long), including sub-group analysis for cardiometabolic health status, sleep disorder status, PWV method, and age category (<65 or 65+ y). Effect sizes were calculated as weighted mean differences (WMD) using a random-effects model. Standardized mean differences (SMD) were also calculated to determine effect size magnitude, with a SMD of <0.2 as a small effect, 0.2-0.8 as moderate, and >0.8 as large. **RESULTS:** Short sleep duration resulted in a small but significant increase in PWV (WMD=15.25 cm/s, 95% confidence intervals (CI): 9.02-21.48 cm/s, p<0.001, SMD=0.02). Long sleep duration resulted in a large and positive increase in PWV (WMD=33.83 cm/s, 95% CI: 19.87-47.80 cm/s, p<0.001, SMD=0.82). Older age had a small moderating effect in short (WMD=16.8 cm/s, 95% CI: 10.3-23.2 cm/s, p<0.001, SMD=0.02) and a large moderating effect in long (WMD=16.7 cm/s, 95% CI: 10.3-23.2 cm/s, p<0.001, SMD= 0.95) sleep. Cardiometabolic

disease had a small moderating effect in short (WMD=16.6 cm/s, 95% CI: 10.3-23.0 cm/s, p<0.001, SMD= 0.03) and a large moderating effect in long (WMD=26.7 cm/s, 95% CI: 11.7-41.6 cm/s, p<0.001, SMD=0.90) sleep. **CONCLUSIONS:** Short and long sleep are associated with greater PWV (i.e. elevated CVD risk) relative to recommended sleep duration. The effects of short or long sleep on PWV are more pronounced in adults who are older and with a cardiometabolic disease. These findings indicate arterial stiffness is a factor influencing CVD risk in short and long sleep.

THE EFFECTS OF PRE-EXERCISE GLYCEROL HYPERHYDRATION ON SUBSEQUENT EXERCISE PERFORMANCE: A META-ANALYSIS

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BACKGROUND: Dehydration can negatively affect exercise performance by increasing cardiovascular strain and hyperthermia. Studies have explored the use of glycerol-containing beverages to maintain hydration status and attenuate decrements in performance with mixed results. Therefore, we sought to systematically review and quantitatively synthesize the available literature to estimate the effect of glycerol supplementation on exercise performance. **METHODS**: Six electronic databases were searched for studies that included the following: human subjects ≥18 y, glycerol and placebo or control conditions/groups, and a measure of performance. **RESULTS**: Twenty studies yielded 33 effects (k). Subjects (n = 166) were young adults ([M ± SD] 25.2 ± 3.8 y), highly fit (maximal oxygen uptake = 58.3 ± 4.1 $mL \cdot kg^{-1} \cdot min^{-1}$), and mostly men (98%). The majority of our sample (k = 25, 76%) had subjects exercise in hot and/or humid environmental conditions (32.6 ± 2.6°C) and more than half (k = 17, 52%) used a measure of total work (e.g, distance covered, time to exhaustion) to gauge performance. On average, studies achieved a moderate quality rating (satisfied 61.6 ± 9.2% of quality items), although the quality scores ranged widely from 38.3 to 86.4%. Overall, glycerol supplementation had a negligible effect on performance compared to a placebo or control treatment (standardized mean difference [SMD] = 0.16; 95% CI: -0.01, 0.26) and this SMD effect size lacked heterogeneity (Q_{32} = 10.25, p = 0.99; I^2 = 0%). *A priori* subgroup analyses failed to identify any significant effect modifiers related to sample characteristics (e.g., training status, baseline hydration status), performance test and environmental conditions (e.g., anaerobic vs. aerobic test, hot vs. thermoneutral environment), or glycerol supplementation (e.g., dosage, mixture vs. bolus consumption method) (p >0.05 for all). **CONCLUSIONS**: Glycerol supplementation was found to have a negligible effect on exercise performance; however, the practical significance of its use should also be considered when interpreting these results. The lack of heterogeneity observed in our sample limits the external validity of our findings (i.e., ecological fallacy). Hence, the lack of improvement in performance may be attributable to the specific characteristics of our sample and not the glycerol supplementation *per se*. Future studies should investigate the potential performance benefits of glycerol supplementation among unique populations or exercise modes, during conditions that elicit greater and prolonged heat stress.

ASSOCIATIONS BETWEEN BASIC PSYCHOLOGICAL NEEDS AND PHYSICAL ACTIVITY IN UNDERGRADUATE SENIORS DURING THE COVID-19 PANDEMIC

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BACKGROUND: According to Self-Determination Theory, individuals have three basic needs: autonomy, relatedness, and competence that when satisfied lead to optimal motivation, performance, and well-being. Physical activity (PA) is promoted as beneficial to both physical and mental health and has been increasingly promoted during the COVID-19 pandemic for its benefits during this challenging time. The purpose of this study was to assess the relationships between physical activity and autonomy, relatedness, and competency among senior exercise students at a Southeastern university during the COVID-19 pandemic. METHODS: Students (N=124, 21.5±1.6 y, 65% female, 78% white) enrolled in an upper level course completed surveys at Weeks 2 and 6 during Fall 2020. The Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS) was completed at Week 2 and the International Physical Activity Questionnaire (IPAQ) was completed at Weeks 2 and 6. The BPNSFP was used to compute the following: Autonomy Satisfaction, Autonomy Frustration, Relatedness Satisfaction, Relatedness Frustration, Competence Satisfaction, Competence Frustration. The IPAQ was used to assess time spent in vigorous, moderate, and walking activities during the previous 7 days. Pearson correlations were conducted to assess potential associations between PA and autonomy, relatedness, and competence. RESULTS: Relatedness Frustration was negatively associated with Week 2 min/wk of vigorous exercise (r = -0.28, p = 0.002), Week 2 min/wk of moderate exercise (r = -0.19, p=0.035), Week 2 min/wk of walking (r = -0.20, p = 0.023), and Week 6 min/wk of walking (r = -0.27, p = 0.003). Competence Satisfaction was correlated with Week 2 min/wk of vigorous exercise (r = 0.23, p = 0.012), Week 2 min/wk of walking (r = 0.18, p = 0.048), and Week 6 min/wk of vigorous exercise (r = 0.33, p < 0.001). Competence Frustration was negatively correlated with Week 2 min/wk of vigorous exercise (r = -0.28, p = 0.002), Week 6 min/wk of vigorous exercise (r = -0.30, p=0.001), and Week 6 min/wk of walking (r = -0.20, p = 0.033). CONCLUSIONS: Results from this study suggest a connection between vigorous exercise and walking with two of the three basic psychological needs. Further research should be conducted to assess if exercise may be helpful in enhancing satisfaction and lessening frustration in competency and relatedness among college students during challenging times.

POSTER AWARDS: UNDERGRADUATE STUDENTS Thursday, Feb. 18, 4:00–5:00 pm EST

AGEISM IN EXERCISE PRESCRIPTION IN THE SOUTHEASTERN UNITED STATES

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Introduction: This study aimed to determine to what extent ageism by exercise prescribers occurs within exercise prescription. For this study, exercise prescribers included fitness managers, fitness instructors, and physical therapists. **Methods:** An elicitation study under the Theory of Planned Behavior was used to evaluate ageism within the exercise prescriber population. Sixteen exercise prescribers consented to participate in a mixed methods survey that included a 5-point Likert scale and qualitative open-ended questions. Answers to the 5-point Likert scale adapted from the Ageism Attitude Scale, provided the scoring for ageist attitudes. A co-occurrence network of words was created to undertake a thematic analysis to identify emerging themes and significant statements. **Results:** A Mann - Whitney U Test revealed a significant difference in ageism levels of male providers (*Md* 68.5, n = 6) and female providers (*Md* = 56, n = 10), U = 6.5, z = -2.556, p = .05, r = 4. Male participants expressed higher ageism scores (*M* = 12.42) than female participants (*M* = 6.15). A Kruskal - Wallis revealed the age group (45-54 years) recorded a higher median score (*Md* = 69) than other age groups. Physical therapists recorded a higher median score (*Md* = 65.5) than other job titles. Themes agreed upon include perceived positive and negative aspects of wisdom as it relates to patient/provider relations, impacts of poor health which includes frailty/lack of strength, and admiration. **Conclusion/Policy Implications:** Division in demographic populations within the study supports the need to increase awareness of implicit ageism within exercise prescription. Recommendations include weaving ageism into the curriculum of academic programs and providing continuing education opportunities for professionals within the field.

EFFECTS OF ACUTE FEEDING ON RESTING METABOLIC RATE AND RESPIRATORY QUOTIENT

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BACKGROUND: Acute postprandial changes of substrate utilization and metabolic rate likely impact body composition. Sex differences in fat utilization may imply a difference in acute metabolic rate and substrate oxidation, which may have longer-term implications. The purpose of this study was to evaluate the acute effects of high protein (PRO) vs. high carbohydrate (CHO) meal consumption on resting metabolic rate (RMR) and respiratory quotient (RQ) in comparison to a fasted state (FAST). METHODS: In a randomized cross-over design, 38 normal weight young adults (age 21.9±3.2 years; height 174.2±8.8 cm; weight 71.7±9.9 kg) were asked to come in for three separate trials. Visits were randomly ordered and included a high PRO (63.5 grams PRO, 58% of meal), a high CHO (116.5 grams CHO, 86% of meal) meal, or a trial after an 8h fast. For women (n=17), all three visits occurred during the mid-follicular phase to account for the influence of estrogen. Food was given upon arrival and allowed to digest for 30 minutes. Height and weight were collected. RMR and RQ were collected in a supine position using the indirect calorimetry canopy method for 30 minutes, with the first five minutes removed. RESULTS: RMR after a high PRO meal (2224.68±458.54 kcals) was significantly greater (p<0.001) than a high CHO meal (2092.11±376.03 kcals); both conditions were significantly greater than FAST (1798.78±265.07 kcals). RQ was significantly greater as a result of CHO (0.87±0.06 a.u.) compared to FAST (0.75±0.06 a.u.; p<0.001); with no difference between FAST and PRO (0.75±0.06 a.u.; p=0.999). There was no significant sex interaction for RMR or RQ (p>0.05). CONCLUSIONS: A high PRO meal seems to cause a greater acute increase in RMR, compared to a high CHO feeding, which may have implications for body re-composition. High PRO does not appear to elicit an acute increase in RQ, suggesting that acute high PRO may support greater thermogenesis and fat oxidation, in both males and females.

EFFECTS OF LIMB DOMINANCE AND IMMOBILIZATION ON HEART RATE AND MUSCLE ACTIVATION USING AXILLARY CRUTCHES

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BACKGROUND: Previous evidence has shown differences in limb muscle activation during bipedal walking resulting in functional limb asymmetry. Furthermore, it has been reported that use of assistive walking devices alters muscle recruitment and may increase metabolic demand of ambulation. However, it is currently unknown whether functional asymmetry exists during ambulation with assistive walking devices with concomitant joint immobilization. **PURPOSE**: The purpose of this study is to investigate the effects of how limb dominance and joint immobilization alter heart rate, RPE, and muscle activation during walking with axillary crutches. **METHODS**: Twelve physically active, college-aged females were recruited for this study. In a crossover, counterbalanced study design, participants completed walking trials with three different conditions: 1) Bipedal walking (control), 2) Axillary crutch ambulation

with dominant limb (DOM) immobilization, 3) Axillary crutch ambulation with non-dominant limb (NDOM) immobilization. During the axillary crutch ambulation conditions, the corresponding knee joint was immobilized at a 30-degree flexion angle with a hinged post-operative knee stabilizer. For each walking trial/condition, participants ambulated at 0.6, 0.8, and 1.0 mph for five minutes at each speed. Heart rate and RPE were monitored throughout. Surface electromyography (EMG) was used to record muscle activation of the medial gastrocnemius (MG), soleus (SOL), tibialis anterior (TA), biceps brachii (BB), and triceps brachii (TB). EMG signals for each immobilization condition were normalized to corresponding values for bipedal walking. **RESULTS**: Heart rate ($p< 0.001$) and RPE ($p<0.001$) were significantly higher for both DOM and NDOM conditions compared to Bipedal. However, no differences existed between DOM and NDOM conditions ($p> 0.05$). No differences in muscle activation were noted for any muscles between DOM and NDOM conditions ($p>0.05$). Regardless of condition, BB activation was significantly higher during 0.8 mph ($p=,0.042$) and 1.0 mph ($p= 0.021$) compared to 0.6 mph. Furthermore, TB activation was significantly higher during 0.6 mph ($p< 0.001$) and 0.8 mph ($p< 0.001$) compared to 1.0 mph irrespective of condition. **CONCLUSION**: Compared to bipedal walking, heart rate and RPE are higher while using axillary crutches but are unaffected by limb dominance. While no differences in muscle activation were apparent based on limb dominance, slower speeds resulted in increased TB activation and faster speeds resulted in increased BB activation while using assistive devices. Thus, limb dominance appears to have little effects on muscle activation during ambulation with axillary crutches while varying speeds alter upper body muscle activation differentially.

PHYSICAL ACTIVITY AND DEPRESSIVE SYMPTOMS DURING THE COVID-19 STAY AT HOME ORDER IN NORTH CAROLINA

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BACKGROUND: Studies show that rates of depression have increased during the Corona Virus Disease of 2019 (COVID-19) pandemic, and that this may be due, in part, to increased levels of chronic stress and social isolation. Physical activity (PA) has been shown to help prevent the development of depression, and public health messaging during the COVID-19 pandemic has consistently highlighted the importance of staying physically active. How COVID-19 restrictions have impacted PA participation is currently unknown. This study aimed to explore PA participation, and the relationship between PA and depressive symptoms, in North Carolina (NC) residents during the April, 2020 NC stay at home order. METHODS: Participants (n=193, mean age: 35.6y +/- 14.0) were recruited from 29 counties in NC during the COVID-19 stay at home order. Participants were asked to complete an online survey about depressive symptoms (Beck Depression Inventory), access to PA activities, PA activity over the last month (5 point likert scale ranging from "much lower" to "much higher" than usual), and weekly PA participation (International Physical Activity Questionnaire). Total min/week of PA was calculated from the IPAQ, and PA activity likert scale results were dichotomized as (1) lower than usual or (2) the same/higher than usual. RESULTS: Forty -four percent of participants reported that their PA levels were lower than usual during the NC stay at home order. Individuals who reported that their PA levels were lower than usual reported significantly lower durations of weekly PA than those who reported that their PA levels were the same or higher (320.3 min/week vs. 538.7min/week; $t = -4.01$; $p < 0.001$). Regression analysis revealed that, after controlling for age, sex, BMI, education, race, marital status, and income, lower total PA duration per week significantly predicted higher depressive symptoms ($ß= -0.19$, $p< 0.008$). CONCLUSIONS: A significant proportion of individuals reported lower than usual PA during the NC stay at home order, which was associated with significantly reduced weekly PA durations. Consequently, lower weekly PA was associated with higher depressive symptoms. These findings should be considered preliminary, considering the small sample size and use of self-report measures, but they suggest that future study of the unique barriers and facilitators of PA participation during the COVID-19 pandemic is warranted, particularly with regards to mental health outcomes.

EFFECTS OF THE COVID-19 PANDEMIC ON THE FITNESS ROUTINES OF COLLEGE STUDENTS AND FACULTY

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BACKGROUND: The rapid transition to emergency remote teaching and the temporary closure of fitness facilities as a result of the COVID-19 pandemic had profound impacts on the daily fitness routines of both college students and faculty. The purpose of this study was to examine the initial effects of the temporary fitness facility closures from March - July 2020 due to the COVID-19 pandemic, on the fitness routines of college students and faculty at a regional University. **METHODS:** A sample of 250 students and faculty (age=18-60yrs; n = 45 males n= 200 females) participated in an online, mixed methods survey of reported exercise frequency (0, 1-2, 3-4, 5-6, 7 days/wk), type, and motivation (Likert scale) before (PRE), during (DUR), and after (POST) initial COVID-19 gym closures and physical distancing protocols. Paired Samples t-tests and Pearson product-moment correlation coefficients were used to determine the differences and relationships between the variables over time. **RESULTS:** The majority of the participants (75/ 32.33%) reported a PRE exercise frequency of 3-4days/wk. However, during COVID-19 (DUR), most participants reported an exercise frequency of 1-2 days/wk (35.78%) which was significantly lower than exercise frequency PRE COVID-19 ($p=0.00$). The majority of participants (67/ 29%) reported a POST exercise frequency of 1-2 days/week, which was significantly lower than PRE ($p=0.00$). On a Likert-scale of 0-5, there was a significant difference in exercise motivation between PRE (3.8±1.14), DUR (2.8±1.30, $p=0.00$), POST (3.5±1.21, $p=0.00$) conditions. A strong positive correlation was found between PRE frequency and PRE motivation ($r=0.704$, $p=0.00$). **CONCLUSIONS:** The COVID-19 pandemic significantly negatively impacted the exercise frequency and exercise motivation of university students and faculty. Frequency and exercise motivation levels did not return to PRE- levels, even after distancing protocols were relaxed and fitness facilities reopened. This study highlights the importance of strategies to influence exercise habits, and these results are important for researchers and practitioners to further investigate emerging technologies and platforms that improve exercise frequency and motivation in this population.

CARDIAC ABNORMALITIES AMONG YOUNG ADULTS WITH SARS-COV-2

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Background: The novel virus SARS-CoV-2 inflicts far-reaching health decrements, both directly and through secondary inflammatory stimulation. To date, there is little information regarding the effects of COVID-19 on the heart after infection, especially among young healthy adults. **Purpose:** We sought to determine whether contracting SARS-CoV-2 affects cardiac function in young, otherwise healthy adults, weeks after testing positive for SARS-CoV-2. **Methods:** Echocardiography was performed on 12 subjects (7F/5M, 20±1y, 24±3 $kg \cdot m^{-1}$) who tested positive for SARS-CoV-2 approximately 3-4 weeks prior to study test date. A parasternal long-axis view of the heart was utilized to measure septal and left ventricular posterior wall thickness, left ventricular volume, and left ventricular outflow tract. A four-chamber view of the heart was utilized to measure mitral valve function, diastolic function, end diastolic and systolic volume, and ejection fraction. Z-tests were performed to determine if these values are significantly different from the sex- and age-matched normative values with significance set at $P<0.01$ (mean±SD). **Results:** Interventricular septal wall was enlarged in male subjects with SARS-Cov-2 (1.13±0.19cm) ($P<0.01$) compared with normative values (0.92±0.16cm). Left ventricular mass index was enlarged in both female (92.2±19.9g/m^2) and male (107.1±22.8g/m^2) subjects with SARS-Cov-2 compared with normative values (61.5±14.5g/m^2, 72.4±18.0g/m^2, respectively). Mitral valve deceleration time was prolonged in the female subjects with SARS-Cov-2 (231±44ms) compared with normative values (176.7±40.1ms) ($P<0.01$). Septal wall e' (0.16±0.02m/s) and lateral wall s' (0.14±0.03m/s) were elevated in the male subjects with SARS-Cov-2 compared with normative values (0.12±0.03m/s, 0.10±0.03m/s, respectively) ($P<0.01$). **Conclusions:** These results suggest evidence of myocardial inflammation as well as systolic and diastolic abnormalities, which may persist in young adults for weeks after contracting SARS-CoV-2.

A COMPARISON OF INTERNAL AND EXTERNAL TRAINING LOADS BETWEEN OBJECTIVELY- VERSUS SUBJECTIVELY-PRESCRIBED HIGH-INTENSITY INTERVAL TRAINING

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BACKGROUND: High Intensity Interval Training (HIIT) is a method of aerobic exercise that is both effective and time-efficient. The traditional HIIT prescription uses objectively measured work rate, velocity, or heart rate targets. However, there is little evidence comparing HIIT that is prescribed using objective measures (i.e., heart rate (HR)) versus HIIT prescribed using subjective measures (i.e., ratings of perceived exertion (RPE)), even though subjectively-prescribed HIIT may be more practically applicable. The purpose of the present study was to evaluate the internal training load, VO2, HR, speed, and incline generated by single treadmill sessions of objectively- (OBJ) and subjectively-prescribed (SUB) HIIT exercise. **METHODS:** Thirteen participants (mean age =36±13yrs) completed a baseline testing session to determine peak volume of oxygen consumption (VO2) and HR, followed by a familiarization session and two randomly-assigned HIIT sessions on a treadmill. Both HIIT sessions consisted of a 5-minute warm up, 20 minutes of alternating high and low intervals for 60s each, and a 5-minute cool down. The OBJ session work intervals prescribed the high- and low-intensity intervals based on 80-90% and 30-40% of HRmax, respectively. The SUB session work intervals prescribed the high- and low-intensity intervals based on RPE vales of 8-9 and 3-4, respectively, on the Borg CR-10 scale. Participants were asked to select their treadmill speed and incline based on the prescriptions given. Training Impulse (TRIMP) was used to calculate internal load. VO2, HR, speed, and incline were measured every minute. **RESULTS:** There were no significant differences in internal load between OBJ and SUB as determined via TRIMP (OBJ = 59.2±6.0 a.u., SUB = 63.9±7.4 a.u., $p=0.09$) and average percentage of HR Reserve (OBJ = 83.6±3.7 % bpm, SUB = 86.7±4.5 % bpm, $p=0.07$), nor external load via treadmill incline (OBJ = 2.3±3.7 % grade, SUB = 2.3±2.3 % grade, $p=0.62$). However, there were significant differences between OBJ and SUB HIIT sessions for VO2 (OBJ = 29.7±6.8 ml/kg/min, SUB = 32.5±6.3 ml/kg/min, $p=0.03$) and treadmill speed (OBJ = 4.4±1.0 mph, SUB = 4.7±0.9 mph, $p<0.01$). Participants ran faster and consumed more oxygen during the SUB session versus the OBJ session. **CONCLUSION:** Participants generate similar or larger internal and external loads using real-time RPE measures of intensity (i.e., subjectively prescribed sessions) as compared to HR measures of intensity (i.e., objectively prescribed sessions) during treadmill-based HIIT exercise. These data indicate that this simpler, more practically relevant method of prescribing HIIT may be capable of generating the desired training load for a client or athlete without strict work rate or HR targets.

EFFECTS OF VERBAL FEEDBACK ON ANAEROBIC EXERCISE PERFORMANCE AND MOTIVATION

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BACKGROUND: This study investigated the effects of positive- and negative-verbal feedback on anaerobic rowing performance and motivation. METHODS: Fifteen participants were recruited (21.0 ± 0.8) and completed the study. They were randomly assigned whether they received the positive or negative feedback on their first visit and received the opposite feedback on their second visit. Participants were evaluated for their initial motivation score prior to beginning the exercise protocol. Next, the participants completed 3 maximal effort rowing sprints while the researchers played either pre-recorded positive or negative comments for 30s with a 30s-rest period. Afterwards, participants again reported their levels of motivation during the activity. Negative feedback consisted of the following phrases: "You're falling behind the average for your age group"; "Come on, row harder"; "Row faster"; "You can do better"; "Why are you going so slowly"; "Where is your power". Positive feedback consisted of the following phrases: "Good job"; "Keep going"; "You're almost there"; "Keep it up"; "Nearly finished"; "You can do it". RESULTS: Paired samples t-tests analyzed the difference between positive and negative trials in mean power output, peak power, and peak force, and motivation was assessed before and after rowing performance in both conditions. Motivation was not significantly different between positive- and negative-feedbacks (p = 0.083). Additionally, mean force across the entire effort was not different between feedback types (p = 0.205). However, peak force (p = 0.030) and peak power (p = 0.029) were significantly different between feedback types, with negative feedback eliciting higher values in both peak force (156.87 N vs. 142.53 N) and peak power (265.06 W vs. 234.52 W). CONCLUSIONS: The results from this study demonstrate that participants performed more favorably to negative feedback rather than positive feedback, though they subjectively reported slightly lower levels of motivation with negative feedback. These data may help strength and conditioning coaches and personal trainers when determining the best way to motivate their athletes and clients, as more negative cues resulted in better peak values of anaerobic performance.

SESSION III: REVIEW/SYMPOSIA Friday, Feb. 19, 11:00 am–12:00 pm EST

CARDIOVASCULAR CONSEQUENCES OF SKELETAL MUSCLE IMPAIRMENTS IN BREAST CANCER

Prashil R. Thaker[1], Gabriel Zieff[1], Emily Draper[1], Craig Paterson[2], Chad Wagoner[1], Patricia P. Lassalle[1], Jordan T. Lee[1]. *[1]University of North Carolina at Chapel Hill, Chapel Hill, NC. [2]University of Gloucestershire, Gloucestershire.*

Breast cancer survivors have a higher risk of cardiovascular disease compared to healthy age-matched controls. Through treatments such as chemotherapy and radiation, direct cardiotoxic effects impair skeletal muscle mass, quality and oxidative capacity. The detrimental effects of breast cancer treatment contribute to a significant decrease (20-30%) in peak oxygen consumption levels which may promote exercise intolerance. This decrease in peak oxygen consumption levels and limited ability to perform aerobic exercise may indirectly increase cardiovascular disease risk for breast cancer survivors. Reduced skeletal muscle mass and quality has been characterized by intramuscular fat deposition and sarcopenia which affects the ratio of intramuscular fat to skeletal muscle. Importantly, this ratio explains 50% of the variability in cardiorespiratory fitness in individuals with breast cancer or breast cancer survivors. As a potential strategy to improve skeletal muscle health and aerobic capacity, resistance training could ultimately lead to an improved capacity to conduct aerobic exercise and decrease cardiovascular disease risk.

SESSION III: POSTER/FREE COMMUNICATION Friday, Feb. 19, 11:00 am–12:00 pm EST

INTER- AND INTRA-INDIVIDUAL VO_2 RESPONSES ABOVE CRITICAL POWER

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This study compared the highest VO_2 (VO_{2peak}) recorded during a graded exercise test (GXT) to exhaustion on a cycle ergometer with the highest VO_2 (VO_{2ext}) recorded during 2 trials to exhaustion within the severe domain (>critical power [CP]). Ten subjects (Mean ± SD, age = 22.8 ± 3.6 years, weight = 71.8 ± 10.1 kg, height = 178.4 ± 6.8 cm) completed a GXT to determine VO_{2peak} and power output at VO_{2peak} (PPO). The CP was determined from 4, constant power output rides to exhaustion and the VO_{2ext} was determined during the lowest (85% PPO, Time to Exhaustion (T_{Lim}) = 615.10 ± 209.04 s) and highest (100% PPO, T_{Lim} = 240.12 ± 54.95 s) power output rides. There were no significant differences (p = 0.498) between VO_{2peak} (47.62 ± 6.30 mL·kg^{-1}·min^{-1}), VO_{2ext} at 85% PPO (46.88 ± 4.81 mL·kg^{-1}·min^{-1}) or VO_{2ext} at 100% PPO (48.26 ± 4.51 mL·kg^{-1}·min^{-1}). The smallest worthwhile effect (SWE), calculated as 20% of the GXT VO_{2peak} SD, was 1.26 mL·kg^{-1}·min^{-1}. At 85% PPO, 2 of the 10 subjects had a VO_{2ext} above VO_{2peak} that exceeded the SWE, and 5 subjects had a VO_{2ext} below VO_{2peak} that exceeded the SWE. At 100% PPO, 7 subjects had a VO_{2ext} above VO_{2peak} that exceeded the SWE, and 2 subjects had a VO_{2ext} below VO_{2peak} that exceeded the SWE. Although there were no mean differences between the VO_{2peak} and VO_{2ext}, the majority of subjects (70-90%) had a VO_{2ext} at 85% and 100% PPO that was different from VO_{2peak}. A higher proportion of subjects reached a VO_{2ext} below VO_{2peak} at 85% (50% of subjects) versus 100% PPO (20% of subjects). In addition, only 20% of subjects at 85% PPO had a VO_{2ext} that exceeded the VO_{2peak}, versus 70% of subjects at 100% PPO. The inter- and intra-individual differences in VO_2 responses for the GXT, 85% PPO, and 100% PPO may be due to intensity specific variations in motor unit recruitment patterns and relative contributions of type I versus type II muscle fibers.

RELATIONSHIP BETWEEN PHYSICAL FITNESS, COGNITIVE FUNCTION, SLEEP QUALITY, AND SEDENTARY TIME IN OLDER ADULTS.

Violet Wray, Jeffrey E. Herrick, Sean Collins. *University of Lynchburg, Lynchburg, VA.*

BACKGROUND: Aging promotes declines in both health and performance-related fitness and cognitive function which in turn may reduce sleep quality in older adults, a commonly reported complaint. Therefore, the purpose of this study is to further describe the most consequential relationships between select components of health and performance-related physical fitness, physical activity status, sedentary time, and cognitive function with sleep quality in community-dwelling older adults. METHODS: Participants enrolled in the University of Lynchburg Active Aging Program, a self-managed, limited support community-based endurance, strength, and flexibility exercise program. Select components of health and performance-related fitness were assessed; 6-minute walk test pace (6MW), body fat percentage (%fat), handgrip strength (HGS), timed up & go (TUG), 30-second chair stand (30s), and the four square balance test (4SQ) along with cognitive function (Montreal Cognitive Assessment (MoCA)), sleep quality (Pittsburgh Sleep Quality Index (PSQI)), and physical activity/sedentary time status (International Physical Activity Questionnaire (IPAQ)). RESULTS: 11 older adults enrolled in the program (70.25±9.34 years old, Sex 2:9 Male:Female, BMI 28.74±5.52 kg/m2, Race n= 5:5:1 African American (AA):Caucasian (C):Asian-Indian). Baseline (6MW 99.97±21.1 m/min, %Fat 40.41±6.07%, HGS 28.62±16.55kg, TUG 7.58±1.27 sec, 30s 13.13±3.39reps, 4SQ 11.34±3.96sec, MoCA 21.0±3.0, PSQI 5.54±3.5, PA Status 1468.5±1595.55 Light/Moderate MET min/wk, Weekly sedentary time (TSED) 6.82±0.71 hr/wk) Using a stepwise linear regression to determine the strongest predictor for sleep quality, our modeling included MoCA, METmin/wk, 6MW pace, %fat, HGS, 4SQ, TUG, 30s, and TSED; we report TSED was the most consequential predictor for sleep quality in the model (p=0.02, r= 0.791, r^2 = 0.625). There was a slight improvement in our model when METmin/wk was added (p=0.01, r=0.918, r^2= 0.843). CONCLUSIONS: Our results suggest, that in a group of community-dwelling older adults, total weekly sedentary time was the most consequential predictor of sleep quality, that prediction was slightly improved with the addition of total weekly physical activity. Therefore, our results suggest that reducing sedentary time along with increasing total weekly physical activity would be beneficial to overall sleep quality in community-dwelling older adults.

EXERCISE RESPONSES DURING REPEATED SUPRAMAXIMAL EXERCISE WHILE LISTENING TO SELF-SELECTED MUSIC: THE ROLE OF GENDER

Kendall Rhoads, Sierra Sosa, Rebecca Rogers, Thomas Kopec, Christopher Ballmann. *Samford University, Birmingham, AL.*

BACKGROUND: Music has been shown to improve performance during endurance, sprint, and resistance exercise. Multitudes of studies have suggested females may recover from intense exercise differently than males. Furthermore, recent evidence has reported that females may respond more favorably to warm-up music prior to sprint exercise compared to males although reasons are not fully clear. It is unknown if males and females respond differently to repeated supramaximal exercise while listening to self-selected music during exercise. **PURPOSE:** The purpose of this study was to examine possible gender differences in supramaximal exercise performance and psychological responses to exercise while listening to music. **METHODS:** Physically active males and females (ages 18-24) were recruited to participate. Participants completed two separate supramaximal exercise trials each with a different condition: 1) No music (NM), 2) Self-selected music (SSM). During each trial, participants completed 3 × 15 second Wingate anaerobic tests (WAnT) while listening to NM or SSM separated by 2 minutes of active recovery. Following each WAnT, rate of perceived exertion (RPE) and motivation to exercise were assessed. Mean anaerobic capacity, fatigue index, RPE, and motivation to exercise were analyzed. **RESULTS:** The were no significant gender differences for anaerobic capacity between NM and SSM conditions (p>0.05). Fatigue index was significantly lower in females while listening to SSM (p= 0.032) versus NM while no differences were observed for males (p= 0.246). RPE was lower while listening to SSM versus NM in females (p= 0.020) but not for males (p= 0.277). Lastly, motivation to exercise increased in the SSM condition versus NM in females (p= 0.006) but not in males (p= 0.090). **CONCLUSIONS:** Listening to SSM music did not result in superior performance in either males or females during repeated WAnTs. However, females responded more favorably to psychological variables (i.e. RPE, motivation) which may have in turn influenced indices of fatigue during the tests. These results suggest that females may respond more positively to listening to SSM music during repeated bouts of supramaximal exercise.

SEX DIFFERENCES IN OXYGEN CONSUMPTION RELATIVE TO FAT FREE MASS IN ADOLESCENTS AND YOUNG ADULTS

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BACKGROUND: Aerobic capacity can be assessed using a cardiopulmonary exercise test by measuring VO_2 at the aerobic threshold (VO_{2AerT}) or at peak exercise (VO_{2peak}). VO_2 can be expressed in absolute terms, relative to body weight (BW) and fat free mass (FFM) to indicate different aspects of aerobic capacity and these values vary with age and between sexes. The purpose of this study is to investigate sex differences in VO_{2AerT} and VO_{2peak} expressed in absolute terms, relative to BW and FFM in adolescents and young adults of a normal weight. METHODS: 24 adolescents (12 males and 12 females, 14 to 17 years) and 24 young adults (12 males and 12 females, 18 to 30 years) participated in this study. Body composition was assessed through BodPod in adolescents and dual energy X-ray absorptiometry in adults. A cardiopulmonary exercise test on a cycle ergometer was performed using protocols of 15 watts/min in adolescents, 20 watts/min in adult females, and 25 watts/min in adult males. Metabolic data was collected through breath-by-breath analysis, using the COSMED K5 and COSMED Quark metabolic carts in adolescents and young adults, respectively. A one-way analysis of variance was applied to identify sex differences between the main outcomes. The study was approved by the Appalachian State Review Board. RESULTS: There were statistically significant correlations observed between male and female absolute VO2peak levels (0.640), and absolute VO_{2AerT} (0.468). Absolute VO_{2AerT} was higher in male adolescents compared to female adolescents (1174±249 vs. 836±137 mL/min, p = 0.035) and higher in male young adults compared to female young adults (1609±341 vs. 1188±310 mL/min, p =0.006). The absolute VO2peak was higher in male adolescents compared to female adolescents (2412±506 vs. 1699±366 mL/min, p = 0.003) and male young adults compared to female young adults young adults (3427±466 vs. 2286±368 mL/min, p = 0.000). No sex differences in VO_{2peak} and VO_{2AerT} were observed when VO_2 was expressed relative to BW and negligible differences were observed when VO_2 was expressed relative to FFM. CONCLUSION: There are no observable sex differences in cardiorespiratory fitness when VO_2 is expressed relative to FFM in both adolescents and young adults; however, males report higher cardiorespiratory capacity than females in absolute VO_2, which is higher at both submaximal and peak exercise intensities.

SEX DIFFERENCES IN OXYGEN UPTAKE EFFICIENCY SLOPE ADJUSTED FOR FAT FREE MASS IN ADOLESCENT CHILDREN

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BACKGROUND: Oxygen uptake efficiency slope is a submaximal indicator of cardiorespiratory fitness, which depends on anthropometrics and body composition. Moreover, oxygen uptake efficiency slope has been shown to be highly correlated to maximal consumption which is an indicator of aerobic power. The aim of this study is to investigate sex differences in the oxygen uptake efficiency slope expressed in absolute terms (OUES) and relative to body weight ($OUES_{BW}$), body surface area ($OUES_{BSA}$), and fat free mass ($OUES_{FFM}$), and if OUES is a better indicator of aerobic efficiency or aerobic power in healthy adolescents. METHODS: Sixty healthy adolescents (30 boys and 30 girls, aged 11-17 years) participated in this study. Body composition was assessed via Bod Pod and body surface area was calculated using the Mosteller formula. Participants performed a cardiopulmonary exercise test to volitional exhaustion on a cycle ergometer using a 15 watts/min protocol. Gas exchange parameters were measured using breath-by-breath analysis (COSMED K5). The absolute oxygen consumption at peak exercise (VO_{2peak}) and at the aerobic threshold (VO_{2AerT}) were determined. OUES was derived from the relationship between oxygen consumption (VO_2) and minute ventilation (VE) by VO_2 = a log VE + b using all points up to the AerT ($OUES_{AerT}$) and up to the VO_{2peak} ($OUES_{peak}$). RESULTS: Boys reported higher body weight (69.1±23.9 vs 56.1±9.5, p<0.01), body surface area (1.79±0.34 vs 1.58±0.15, p<0.01), fat free mass (51.7±12.8 vs 40.4±4.9, p<0.01) and VO_{2peak} relative to body weight (35.8±8.7 vs 31.0±6.5, p=0.02) compared to girls. No sex differences were observed in VO_{2AerT} relative to body weight (17.1±3.9 vs 17.1±4.9). OUES was higher in boys compared to girls (2492±729 vs 1965±540, p=0.02) while no sex differences were observed in $OUES_{BW}$ (37.5±8.8 vs 35.5±8.9), $OUES_{BSA}$ (1387±281 vs 1242±324), and $OUES_{FFM}$ (48.5±8.2 vs 48.3±10.3). A very strong correlation was obtained between $OUES_{peak}$ and VO_{2peak} in boys (r=+0.89) and girls (r=+0.86) and a moderate correlation was observed between $OUES_{peak}$ and VO_{2AerT} in boys (r=+0.79) and girls (r=+0.70). CONCLUSION: Sex differences in OUES disappear when oxygen uptake efficiency slope is expressed as $OUES_{BW}$ and $OUES_{FFM}$. Moreover, $OUES_{peak}$ has been shown to be a better indicator of aerobic power than aerobic efficiency in healthy adolescents.

EFFECTS OF A VIRTUAL REALITY PACER ON CYCLING PERFORMANCE

Lauren G. Killen, Tara Boy, James M. Green, FACSM, Lee G. Renfroe. *University of North Alabama, Florence, AL.*

BACKGROUND: Despite the popularity of virtual reality (VR) exercise, pacing effects on performance in this paradigm are not well understood. **PURPOSE:** This study examined physiological and perceptual responses of a VR pacer on cycling performance in recreationally active individuals. **METHODS:** Recreationally active individuals (n = 15) of varying aerobic fitness ($VO_{2\ peak}$ 40.6 ± 9.4 ml/kg/min) competed in two VR cycling trials to determine one's best time trial (BTT). Once the BTT was determined, in a counterbalanced order on separate days, participants completed the same course but cycled against a pacer set at one's BTT (APT) and against a 5% deceptively faster pacer (DPT). Throughout each cycling trial VO_2, HR, RPE, velocity, and time surpassed were collected at 25, 50, 75, and 100% of trial completion. **RESULTS:** Both VO_2 and HR were significantly higher ($p \leq 0.05$) for DPT at 25% and 50% of ride completion vs. BTT. Additionally, time to completion was significantly faster ($p \leq 0.05$) across all time periods for DPT vs. BTT. Despite the higher intensity selection, acute overall RPE measures were not significantly different for BTT vs. DPT. **CONCLUSION:** Findings indicate the presence of a VR pacer resulted in higher intensity selection for recreationally active individuals. Cycling with a deceptively faster pacer motivated individuals to work harder and feel more absorbed, despite a greater unpleasant perception during the trial. Even with the higher intensity, 93% of current participants beat the deceptively faster pacer suggesting pacers could be a key motivator for encouraging greater intensity selection when exercising alone.

VALIDITY OF FITBIT VERSA 2 HEART RATE

Cameron D. Addie. *Middle Tennessee State, Murfreesboro, TN.*

BACKGROUND: Millions of individuals monitor heart rate (HR), via Smartwatch technology. **PURPOSE:** The purpose of this study was to determine the validity of the Fitbit Versa 2 in measuring HR relative to the criterion measure of electrocardiogram (EKG). **METHODS:** Participants were physically active (N = 6; Males = 3; M age: 23.7 ± 2.0 years; height: 174.0 ± 6.9 cm; mass 82.9 ± 17.2 kg). The Fitbit Versa 2 was placed on the right wrist and HR was monitored using a GE CASE Stress test system (V6.7). Following a 3-minute warm up, participants walked for 3 minutes at 1% grade at a comfortable, self-selected pace (M = 2.5 ± 0.4 mph). After 3 minutes, the treadmill speed was increased to a faster walk (M = 4.0 ± 0.5 mph). In the final three minutes, the speed was increased until each participant started to jog (5.3 ± 0.6 mph). The last minute HR of each stage was compared between the FV2 and the GE CASE. **RESULTS:** The HR was underestimated using the FV2 (121 ± 11 bpm) at the faster walking stage (t = -2.84, d=.89, p < .05) compared to the GE CASE (142 ± 12 bpm)**.** There was no difference between HR measures for the slow walk or jogging stages (p > .05). **CONCLUSION:** The FV2 did not provide an accurate assessment of HR during brisk walking. Future research studies should assess the effects of varied arm or wrist movements on HR assessments during fast-paced walking.

VALIDITY OF FITBIT VERSA 2 ENERGY EXPENDITURE

Zachary R. Norred. *Middle Tennessee State University, Murfreesboro, TN.*

BACKGROUND: Wrist tracking technology has gained attention for tracking health-related metrics, however, the validity of these devices remains unknown. **PURPOSE:** To assess the criterion validity of the Fitbit Versa 2 (FV2) in estimating energy expenditure against indirect calorimetry. **METHODS:** Participants were physically active (N = 6; Males = 3; age: 23.7 ± 2.0 years; height: 174.0 ± 6.9 cm; mass 82.9 ± 17.2 kg). Oxygen consumption was measured via ParvO Medics TrueOne 2400. A Fitbit Versa 2 was placed on the right wrist of the participants. After a 3-minute warm up, participants walked for 3 minutes at 1% grade at a self-selected comfortable pace (M =2.5 ± 0.4 mph). After 3 minutes, speed increased to a brisk walk (M = 4.0 ± 0.5 mph). In the final stage, speed was increased until each participant began to jog (5.3 ± 0.6 mph). Calories expended at the last minute of each stage were compared between the FV2 and the Parvo. **RESULTS:** Caloric expenditure was overestimated using the FV2 (7.3 ± .8 kcal) for the slower walk (t = 8.0, p<.05) when compared to the ParvO (4.7 ± .8 kcal). There was no difference for the brisk walk or while jogging (p>.05). **CONCLUSION:** The FV2 did not provide an accurate estimate of caloric expenditure during the slow walking condition.

RELATIVELY-DEFINED MODERATE INTENSITY ASSOCIATED CADENCE (STEPS/MIN) THRESHOLDS ACROSS THE ADULT LIFESPAN: THE CADENCE-ADULTS STUDY

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BACKGROUND: A cadence of ≥ 100 steps/min has been consistently reported as a heuristic (rounded, evidence-based) threshold for absolutely-defined moderate walking intensity (defined as ≥ 3 metabolic equivalents [METs]) in young adults. However, less is known about cadence and relatively-defined moderate intensity indicators (i.e., ≥ 64% heart rate maximum [HRmax = 220-age], ≥ 40% HR reserve [HRR = HRmax-HRresting], and ≥ 12 Borg scale Rating of Perceived Exertion [RPE]) across the adult lifespan (ages 21-85). **PURPOSE:** To investigate heuristic cadence thresholds associated with relatively-defined moderate intensity walking across the adult lifespan. **METHODS:** 253 adults (52.8 ± 18.6 years old; BMI 25.6 ± 3.6 kg/m^2; 49% female) completed a progressive treadmill walking protocol consisting of 5-minute bouts increasing from 0.5 to a maximum of 6.0 miles/hour. The protocol concluded when participants naturally selected to jog or run, reached 75% HRmax, and/or reported RPE > 13. Cadence was hand-tallied and a chest-worn monitor continuously measured HR. Data were analyzed using both segmented mixed regression models and Receiver Operating Characteristic (ROC) curve analyses to determine analysis-specific cadence thresholds. **RESULTS:** Across all moderate intensity indicators, cadence thresholds based on segmented regression ranged

from 122.7-126.7 (ages 21-40), 115.6-119.2 (ages 41-60), and 105.9-112.8 steps/min (ages 61-85). Cadence thresholds based on ROC analyses were 113.5 steps/min (ages 21-40), 105.5-112.9 (ages 41-60), and 102.0-104.3 steps/min (ages 61-85). Overall accuracy ranged from 70.2%-96.3% across all intensity indicators and age groups. Final heuristic cadence thresholds corresponding with relatively-defined moderate intensity represented a balance between specificity and sensitivity measures. **CONCLUSION:** Regardless of the specific moderate intensity indicator (i.e., %HRmax, %HRR, or RPE), heuristic cadence thresholds were ≥ 120 (21-40 years), 110 (41-60 years), and 105 steps/min (61-85 years). These thresholds are higher than cadence thresholds traditionally associated with absolutely-defined moderate intensity, plausibly due expected age-associated differences in physiological response to, and perceived experiences of, relatively-defined physical activity. These heuristic cadence thresholds are useful for guiding and analyzing relatively-defined moderate intensity walking in adults 21-85 years old. **Funding:** NIH-NIA-5R01AG049024

THE INFLUENCE OF GRADED EXERCISE PROTOCOL ON VO_{2PEAK} ESTIMATION USING PERCEPTUAL EXERTION

Danilo V. Tolusso, Brett Gibson, Mark Schafer, Griffin Green, Scott Lyons, FACSM. *Western Kentucky University, Bowling Green, KY.*

Rating of perceived exertion (RPE) extrapolation is a method used to estimate maximal and peak oxygen consumption (VO_{2peak}) by creating individual regression equations based on the submaximal relationship between RPE (X) and VO_2 (Y). These submaximal relationships can then be extrapolated to estimate VO_{2peak} by solving for a maximal RPE value. This method allows practitioners to estimate VO_{2peak} for prescription or assessment purposes while decreasing the risks associated with maximal exercise testing. Researchers have studied the accuracy of this method using a variety of exercise modes, populations, and graded-exercise testing (GXT) protocols with varying degrees of success. However, no study has specifically investigated how the GXT itself could affect accuracy of VO_{2peak} estimations. Therefore, the purpose of this study was to examine how estimation of VO_{2peak} changes based upon the GXT employed. Ten healthy, college-aged adults performed three GXT protocols (Bruce, Astrand, and novel) with Borg RPE and VO_2 being recorded during the last 15 seconds of each stage. The three GXTs differed by how intensity was increased from stage to stage; the Bruce protocol increases both speed and grade, the Astrand increases just grade, and the novel protocol increases just speed (one mph every two minutes). Additionally, three separate regression equations were calculated for each protocol by using using submaximal VO_2 and RPE across three separate RPE ranges (6-13, 6-15, and 6-17). Outliers were specified as any estimated VO_2 value 1.5* interquartile range above or below the mean. This resulted in the removal of five data points (three from the novel protocol and two from the Bruce protocol). Agreement analyses revealed that both the novel (ICC=.62-.81) and Astrand (ICC=.29-.84) protocols resulted in better accuracy than the Bruce (ICC=.23-.44) protocol at all submaximal RPE ranges. Additionally, 95% limits of agreement were also narrower for novel (9.38-12.36 ml/kg/min) and Astrand (8.14-22.38) protocols as compared to the Bruce (14.76-30.54) protocol and narrowed as RPE range increased. Overall, results indicate that protocol selection is an important consideration when estimating VO_{2peak} via RPE extrapolation. Practitioners should select GXT protocols that increase only one component of intensity (i.e., speed or grade) between stages and use regression equations based on a larger perceptual range while also keeping in mind that the test should remain submaximal.

EFFECTS OF WATCHING TV ON EXERCISE DURATION AT 60% VO2MAX (MODERATE INTENSITY) IN COLLEGE RECREATIONAL MALE ATHLETES

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PURPOSE: The purpose of this study was to examine the effects of a self-selected TV show or movie on the duration of an aerobic exercise training session. Twenty recreational male athletes participated in three trials, 48h to 72h apart. The trials included one VO_{2max} and two aerobic exercise trials. Participant's height, weight, % body fat, and VO_{2max} were collected on the first visit. The exercise trials included a control (without TV) and an experimental trial (with TV). Exercise trials included a warm-up at a self-selected speed, then a transition into exercising at 60% of their VO_2 max. Experimental sessions involved a self-selected TV show or movie playing at a volume ≥75 decibels. Participants were instructed each trial to exercise as long as they could until they voluntarily stopped. Heart rate (HR) and ratings of perceived exertion (RPE) were taken prior, every five minutes, and at the end of the exercise trials. PRETIE-Q questionnaires were administered before and after sessions to measure the tolerance and preferences of each exercise session. RESULTS: There was a significant difference ($p > 0.05$) in increased duration of the exercise session (6.34 ±9.40 min) for running at 60% of VO_{2max} while watching television compared to running without watching television. CONCLUSIONS: Twelve out of the 16 participants (75%) ran longer with a self-selected television or movie, supporting the hypothesis. PRETIE-Q tolerance scores validate the consistency of moderate intensity in both trials, but show no significant impact on preference or tolerance to exercise sessions.

VALIDITY OF WAIST-WORN STEP-COUNTING WEARABLE TECHNOLOGIES IN ADULTS 21-40 YEARS OLD: THE CADENCE-ADULTS STUDY

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Background: The use of step-counting wearable technologies in physical activity research has surged and grown. However, only ~5% of available wearable technologies have been validated, and comparable indices for validity based on standardized protocols are lacking. The purpose of this study was to validate, in terms of mean absolute percent error (MAPE), five waist-worn step-counting wearable technologies in comparison with a criterion measurement of directly observed steps. Methods: Eighty adults (30.1 ± 5.8 years old; BMI = 24.8 ± 3.4 kg/m^2) performed 5-minute treadmill walking bouts (2-min rest between bouts), beginning at 0.5 mph and increasing by 0.5 mph until a maximum of 6.0 mph. Participants concurrently wore five step-counting wearable technologies on the waist (Actical, ActiGraph GT9X, Digiwalker SW-200, Fitbit One, NL-1000). Directly observed and tallied steps served as the criterion measure. MAPE was computed for each person-bout by subtracting the directly observed steps (criterion measurement) from the wearable technology-derived steps and dividing the differences' absolute value by the directly observed steps. MAPE was then averaged across speeds for each specific device. Results: The Fitbit One displayed the lowest (best) averaged MAPE value across treadmill speeds (13%), followed by the NL-1000 (18.5%). On the other hand, the ActiGraph GT9X reported the highest (worst) averaged MAPE value (25%), followed by the Actical (24%) and the SW-200 (21%). The lowest MAPE values across devices were observed at 3.0-4.5 mph (2%). In contrast, the largest MAPE values across devices (67%) were observed at very slow walking speeds (0.5-1.5mph). Conclusions: MAPE values for waist-worn step-counting devices are as low at 2% during normal walking speeds, but reduced performance can be expected at very slow walking speeds. The MAPE values determined herein can serve as important reference measures for researchers and manufacturers interested in comparing device performance, including devices worn at other body locations. Funding: NIH-NIA-5R01AG049024

COMPARISON OF WEARABLE TECHNOLOGY AT QUANTIFYING POWER/MUSCLE LOAD OF ENDURANCE RUNNERS AGAINST VARYING WIND RESISTANCE

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BACKGROUND: The use of wearable technology may provide useful insight to training using live feedback, and the use of multiple devices may provide a more comprehensive view of training differences. The purpose of this study was to compare the efficacy of wearable technology in determining performance variables in endurance runners while running against varying levels of wind resistance. **METHODS**: 10 trained endurance runners (4 females, 6 males) were recruited for this study and were currently running at least 120 min/wk for the past 3 months. Participants completed 2 sessions: Session 1 included a VO_{2peak} protocol to determine workload, while Session 2 involved a 20-min run at 70% VO_{2peak}. The 20-min run was divided into 10 min of no wind resistance (W_0), and 10 min with a wind resistance of 10 mph (W_{10}). Both sessions were performed at least 2 h postprandial, at the same time of day, and following the same dietary intake prior to each session. Power was calculated using a power meter, and muscle load (ML) of the quadriceps, glutes, and hamstrings were measured using EMG sensor-embedded compression shorts. HR was monitored via a chest strap HR monitor. RER and VO_2 were monitored using a metabolic cart. The middle 5 min of each segment were analyzed for session means to avoid non steady-state measures associated with beginning exercise and anticipation of completion. Paired t-tests were used to compare differences between wind resistances for all variables. Pearson correlations were conducted between power and ML for each segment. Significance was set at p<0.05. **RESULTS**: There were no significant differences between ML, RER, HR, or VO_2 (p>0.119) between segments. There was a significant difference for power, with W_{10} greater than W_0 (334.4±62.9 vs. 349.1±69.7 W; p=0.002). There were also strong correlations for power and ML for W_0 (r=0.727; p=0.017) and a trend in W_{10} (r=0.630; p=0.051). **CONCLUSIONS:** The significant differences observed in power indicates a running power meter can differentiate between wind resistance. Additionally, there is a significant correlation between power and ML, despite no significant changes in ML. These results suggest the combination of these two wearables may help determine changes in performance metrics in fluctuating conditions that can influence the physiological demand in a runner.

OXYGEN CONSUMPTION NORMALIZED BY FAT FREE MASS IN NORMAL WEIGHT AND OVERWEIGHT ADOLESCENTS

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BACKGROUND: The impact of obesity on adolescent health can be diminished by assessing and improving fitness status. Although peak oxygen consumption (VO_{2peak}) is commonly utilized to assess aerobic fitness in adolescents, oxygen consumption at the aerobic (VO_{2AerT}) and anaerobic (VO_{2AnT}) thresholds can also used as submaximal indicators of aerobic fitness. Oxygen consumption is commonly expressed in absolute terms and relative to body weight (BW); however, it is pertinent to normalize oxygen consumption values by fat free mass (FFM) to assess work done by metabolic tissue. This study aimed to investigate differences in VO_{2peak}, VO_{2AnT} and VO_{2AerT} normalized by FFM and BW between normal weight (NW) and overweight (OW) adolescents. METHODS: A sample of 38 healthy adolescents (11-17 years old) composed of 19 NW and 19 OW individuals, were recruited in this study. Body weight and body composition were assessed via BodPod. Gas exchange values were obtained from a cardiopulmonary exercise test on a cycle ergometer using a 15 watts/min protocol and breath-by-breath analysis (COSMED K5). An independent sample t-

test was used to determine significant differences in main variables between NW and OW adolescents, and a Pearson's r correlation was used to identify the association between gas exchange parameters and anthropometric characteristics. RESULTS: Compared to their NW peers, OW adolescents reported lower VO_{2peak} (29.1±7.0 vs 37.7±6.8, p<0.01),VO_{2AnT} (23.6±4.7 vs 28.8±6.3, p<0.01) and VO_{2AerT} (14.5±2.3 vs 18.7±3.6, p<0.01) when normalized by BW. However, no group differences were observed when VO_{2peak} (44.7±6.6 vs 45.1±6.4),VO_{2AnT} (36.1±4.6 vs 34.6±7.1) and VO_{2AerT} (22.6±3.2 vs 22.4±3.5) were normalized by FFM. Moderate to very strong positive correlations (r between 0.67 and 0.89) have been observed when VO_{2peak}, VO_{2AnT} and VO_{2AerT} were correlated to FFM and BW in both OW and NW groups. Significant differences were observed in the regression slopes for VO_{2peak}, VO_{2AnT} and VO_{2AerT} versus BM between OW and NW (p<0.01, p=0.01, p<0.01, respectively); however, no differences in the regression slopes were obtained for VO_{2peak}, VO_{2AnT} and VO_{2AerT} versus FFM between OW and NW adolescents. CONCLUSION: Normalizing gas exchange parameters by FFM effectively eliminated differences in submaximal gas exchange parameters between normal weight and overweight adolescents.

LOWER BODY BLOOD FLOW RESTRICTION TRAINING ON AEROBIC ADAPTATIONS IN MINIMALLY ACTIVE ADULTS

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Introduction: Blood flow restriction (BFR) training is a novel training method that has been shown to elicit positive aerobic and anaerobic physiological adaptations under low intensity. Using a pneumatic cuff placed distally on the limb to restrict blood flow and create an anaerobic environment within exercising muscle in order to elicit muscular adaptations. This has been shown to have a direct positive effect on respiratory variables as well such as VO_{2max}. Purpose: The purpose of this study is to observe the effects of peripheral BFR of bilateral lower limbs during stationary recumbent bike training on VO_{2max} and respiratory adaptations over seven weeks of biweekly training. Methods: Eight (4 males and 4 females) sedentary, recreationally active adult subjects were randomly assigned to either the BFR (n=5, BFR) group or non-BFR (n=3, CON) group. Three testing sessions were conducted throughout the study (pre-training, mid-training, post-training) which consisted of anthropometric measurements and a graded cycle ergometer VO_{2max} test using the COSMED-K5 metabolic analyzer. The test consisted of 2 min stages, starting at 100W and increasing by 25W until volitional fatigue. Each BFR training session consisted of a 5 minute warm up without BFR cuffs, application bilaterally of BFR cuffs to the proximal upper thigh region and inflation to 60% (BFR) or 5% (CON) of arterial occlusion pressure (AOP), 20 min of cycling at a heart rate reserve (HRR) of 35-45%, and a 5 minute cool down without BFR cuffs. Results: Absolute VO_{2max}, Relative VO_{2max}, Respiratory Exchange Ratio, maximum heart rate, the maximum rate of perceived exertion did not show any significant findings. There was a significant difference (p &lt 0.05) found in time to reach VO_{2max} and maximum watts reached, however these two DV declined over the course of the study. This training adaptation was likely due to a fatigue component. Overall, there was not a significant difference observed from the training protocol of this BFR study. Conclusion: This study failed to provide evidence supporting the ability of submaximal stationary recumbent bike training combined with BFR to elicit aerobic adaptations, increase in VO_{2max}.

WELLNESS OF COLLEGE STUDENTS DURING A GLOBAL PANDEMIC AND THEIR RETURN TO CAMPUS

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BACKGROUND: As defined by the National Wellness Institute (NWI), wellness is an active process through which individuals recognize and engage in conscious, self-directed steps that allow them to reach their fullest potential. The NWI recognizes six dimensions of wellness including physical, social, spiritual, emotional, occupational, and intellectual. These six dimensions are interconnected and essential for holistic health and wellness. The purpose of this study was to examine the impact of the COVID-19 lockdown upon students at Catawba College, which led to remote learning, and the subsequent return to campus on the six dimensions of wellness in college students. METHODS: The Testwell, a validated online survey, was completed by a random sample of 81 Catawba College students during the fall 2020 semester. A series of validated questions related to each of the six dimensions of wellness was examined for two different time periods; the Remote Learning (RL) period which was caused by the COVID-19 lockdown (March 11- August 14, 2020) and the Return to Campus (RC) period (August 14 - October 18, 2020). RESULTS: There was a significant increase in intellectual wellness between the RL (4.3 ± 0.9) and RC (4.5 ± 0.7) periods ($p < 0.01$). There were no significant changes in the remaining dimensions of wellness: Physical, social, spiritual, emotional, or occupational as students returned to campus ($p > 0.05$). CONCLUSIONS: Based upon the results of this study, intellectual wellness increased during the time period in which students returned to campus. No other wellness dimensions had a significant impact, positive or negative, on wellness by students returning to campus. It is important to understand the potential changes in college students' wellness, as it may warrant additional research, resources, and programs to support their evolving health and wellness needs. Future research should consider utilizing various assessments at differing time periods to further investigate the wellness of college students due to COVID-19.

ASSESSMENT OF MUSCLE MASS IN TRANSCATHETER AORTIC VALVE REPLACEMENT PATIENTS OVER ~ MONTHS POST-PROCEDURE.

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BACKGROUND: Aortic stenosis (AS) is estimated to effect 5-6% of individuals ≥75 years. Transcatheter aortic valve replacement (TAVR) is a procedure that has been developed for high risk, frail individuals to receive treatment for AS. However, <50% of patients receiving TAVR survive ≥5 years post-procedure. Lower muscle mass may be one reason for the heightened post-procedural mortality risk and reduction of quality of life (QoL). **PURPOSE:** The purpose of this study was to assess changes in muscle mass for 6 months immediately post-procedure in 20 TAVR patients. Dietary protein intake was also assessed due to its positive correlation with muscle mass. **METHODS**: Nineteen (11 women (W) and 8 men (M)) TAVR patients (73.6±8.5 years) received CT-scans assessed from a single cross-sectional image at the level of third lumbar vertebrae. The cross-sectional area of the muscle at this level was then indexed to the square of each patient's height to produce a skeletal muscle index (SMI (cm^2/m^2)). Physical activity (PA) and dietary habits were assessed using pedometers and three-day food logs, respectively. CT-scans were conducted pre and ~6 months post-procedure while PA and dietary habits were assessed at ~2 weeks and ~6 months post procedure. **RESULTS**: No significant changes were found in SMI (47.5±0.9 vs 46.5±10.1 cm^2/m^2), protein intake (0.74±0.24 vs 0.73±0.38 g/kg/day), and PA (2,594±2,357 vs 2,749±2,179 steps/d) from baseline to 6 months. However, a 45% (3 M, 6 W) occurrence of sarcopenia (SMI: M<55 cm^2/m^2; W<39 cm^2/m^2), rose to 50% after 6 months (4 M, 6 W). In addition, average protein intakes reported from the 3-day food logs were below the recommended dietary allowance (0.8 g/kg/day) while levels of PA were well below sedentary levels (<5,000 step/d) over the 6-month follow-up. **CONCLUSIONS**: Muscle mass, PA and dietary habits do not improve after TAVR procedures. Therefore, interventions are needed to address nutrition and exercise to improve muscle mass in TAVR patients.

COMPARISON OF THE 'SEATTLE' AND 'INTERNATIONAL' CRITERIA ELECTROCARDIOGRAM INTERPRETATION IN DIVISION II FEMALE COLLEGE ATHLETES

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PURPOSE: A 12-lead exercise stress test is a screening tool used to detect abnormalities that may predispose collegiate athletes to sudden cardiac death. Experts in the field have developed new standardized criteria to better interpret electrocardiogram (ECG) in athletes but most of the research has been focused on males. Therefore, it is important to continue to include females in future research to better define the unique ECG characteristics in this population. The purpose of this study was to compare the Seattle criteria to the most recently created International criteria in regards to ECG abnormalities in Division II female collegiate athletes. **METHODS:** Thirty six females (age 20.2 $\pm$1.4 yrs; height 1.70 $\pm$0.7 m; mass 69.5 $\pm$ 8.9 kg) completed cardiovascular screening with a resting 12-lead ECG analysis which was read and interpreted, according to each criteria, by an expert in the field of exercise science. ECGs were classified as 'normal' and 'abnormal' according to the parameters of each criteria and any abnormal condition was noted. Chi-square analysis was used to assess differences between the two criteria. **RESULTS:** The total number of ECGs identified as abnormal decreased from 12 (33.3%) using the Seattle Criteria to 2 (5.6%) using the International Criteria ($p < 0.05$). The most common ECG abnormality identified using the International Criteria was T wave inversion 7 (19.4%). The newer definition of pathological Q waves reduced the number of ECGs identified as abnormal from 4 (Seattle) to 1 (International), a 75% reduction ($p < 0.05$). **CONCLUSIONS**: These results demonstrated that following the International Criteria for ECG interpretation significantly reduced the total abnormal and false-positive ECG rates in female collegiate athletes compared to the Seattle Criteria without compromising sensitivity. It is important to continue to conduct ECG research on female athletes in order to further define valid and reliable criteria for this under represented population.

EFFECTS OF CHEWING GUM WITH AND WITHOUT CAFFEINE ON SLEEP QUANITITY AND QUALITY IN COLLEGE STUDENTS

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BACKGROUND: Caffeine has been well-established to decrease sleep quality and quantity in a variety of populations. The act of chewing gum increases brain activity specifically in premotor and prefrontal cortexes. We have recently shown that chewing gum improves visual and total reaction times independent of whether it contains caffeine. Thus, the act of chewing appears to mediate reaction time suggesting increased neural stimulation. However, it is currently unclear whether chewing gum alone or in combination with caffeine influences sleep differently. **PURPOSE:** The purpose of this study was to examine the effects of chewing caffeinated and non-caffeinated placebo gum on sleep quality and quantity. **METHODS:** College aged females (ages 18-24) were recruited to participate. In a crossover counterbalanced design, participants completed three sleep monitoring sessions with the following conditions: 1) Baseline (BL;no gum), 2) Non-caffeinated placebo (PL), 3) Caffeinated gum (CAFF). On each day of monitoring, an accelerometer was worn on the non-dominant wrist recording at 60 second epochs to detect sleep patterns. During the gum conditions, participants chewed either CAFF (300 mg) or PL gum 3 hours prior to bed for a

total chew time of 30 minutes. Additionally, participants were asked to refrain from viewing electronic screens or blue light 30 minutes prior to bed. All sessions were conducted on weekdays and separated by at least 48 hours. Sleep latency, awakenings, total counts, efficiency, and total sleep time were analyzed. **RESULTS:** There were no differences between any conditions for sleep latency, awakenings, or total sleep time ($p > 0.05$). Total counts were significantly higher during the PL ($p = 0.017$) and CAFF ($p = 0.020$) conditions compared to BL. Furthermore, sleep efficiency was significantly lower for both PL ($p = 0.046$) and CAFF ($p = 0.004$) compared top BL. No differences between PL and CAFF were noted for any outcomes ($p > 0.05$). **CONCLUSIONS:** These results show that chewing PL and CAFF gum prior to sleep decreases quality but not quantity of sleep. Taken together, outcomes suggest that the act of chewing prior to bedtime may negatively affect sleep quality while caffeine does not appear to potentiate negative effects further.

SURFACE EMG COMPARISON OF ISOMETRIC POSTERIOR CHAIN EXERCISE IN TORQUE-MATCHED CONDITIONS

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BACKGROUND: Low Back Pain (LBP) is the second most common cause of disability in the U. S., with approximately 80% of adults experiencing low back pain at some point in their lives. In order to best treat LBP, exercises should selectively target the impaired muscle groups. Exercises eliciting higher EMG signal strength of a muscle will ultimately lead to superior muscular adaptations over time. The Reverse Hyperextension (RH) exercise allows an individual to strengthen their posterior chain while simultaneously providing extrinsic stabilization of the abdomen and spinal column. Alternatively, the Glute-Ham Raise (GHR) allows strengthening with the extremities stationary on a supported surface, and the torso hinging in an open chain position through flexion and extension. The purpose of this study was to evaluate the influence of the RH and the GHR on EMG activity when the two exercises are matched for hip torque and hip angle. METHODS: Maximal trunk extension effort was collected performing Bering-Sorensen test on standard high plinth with counter stabilization placed mid gastrocnemius. Downward force was applied to the trunk at the level of spine of scapula for duration of 5 second for a series of 3 trials. Isometric RH and GHR were performed at hip angles of 120, 140, 160, and 180 degrees of extension with hip angles measured manually using an inclinometer. Torques about the hip for the RH and the GHR at each desired posture were matched using anthropometric tables and equations for static equilibrium. Data analysis compared surface EMG amplitude of the iliocostalis, longissimus, and multifidus at the 4 hip angles. A two-way within-subjects ANOVA was performed to compare exercise and angles. RESULTS: The RH elicited a significant increase in EMG signal for the longissimus at all angles, when compared to the GHR ($p < 0.05$) and greater activation of the illiocostalis at 120 and 180 degrees ($p < 0.05$). There was not a significant difference in multifidus activation between the two exercises. The most significant difference in muscle activation occurred at 180 degrees for all muscle groups. CONCLUSIONS: The RH can serve as an effective exercise to target the paraspinals and rehabilitate individuals suffering from low back pain. An increase in EMG activity correlates to an increase in force production and strength and, typically, a decrease in pain.

THE EFFECTS OF MANUAL THERAPY ON STROKE PATIENTS WITH UPPER EXTREMITY IMPAIRMENT

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INTRODUCTION: Stroke rehabilitation professionals often rely on evidence-based practices to improve functional outcomes for stroke patients. Manual therapy (MT) has long held a place in rehabilitation, and although growing evidence supports the use of MT in healthy individuals, MT has not been widely studied in stroke rehabilitation practices; therefore, the purpose of this study was to determine the effects of MT in stroke patients with decreased upper-body mobility and function. METHODS: Patients who experienced a stroke within the last two weeks (n=7; 57% male) were randomly assigned to: 1) traditional stroke rehabilitation (TSR); or 2) TSR with MT (TSR+MT). Participants completed 8-10 treatments over two weeks. The Fugl-Meyer Upper-Extremity Scale (FM) and QuickDASH Questionnaire (QD) were given pre- and post-treatment. Paired-samples t-tests and independent-samples t-tests were used to examine differences in FM and QD. RESULTS: There were significant differences between QDpre and QDpost ($t(6)=2.690$, $p=.036$), and FMpre and FMpost ($t(6)=-4.437$, $p=0.004$). There were no significant differences between TSR and TSR+MT for: QDpre ($t(5)=-0.945$, $p=0.388$), QDpost ($t(5)=-0.184$, $p=0.861$), FMpre ($t(5)=-0.597$, $p=0.577$), or FMpost ($t(5)=-0.733$, $p=0.497$). CONCLUSIONS: Improvements were seen between pre- and post-assessments in both groups, suggesting that emphasizing MT alone in post-stroke rehabilitation cannot be considered the primary factor for improvements in physical and motor functioning.

PHYSICAL ACTIVITY DURING PREGNANCY: GUIDELINES VERSUS ADHERENCE

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BACKGROUND: The American College of Obstetricians and Gynecologists (ACOG) recommends at least 20 minutes per day of moderate-intensity exercise. Benefits include fewer complications during delivery and faster postpartum recovery. The purpose of this study was to determine if people are receiving and utilizing this advice from their care providers.**METHODS:** Persons who had given birth within the past two years were invited via social media to answer a survey pertaining to exercise patterns and provider recommendations during pregnancy. Participants were asked whether their providers discussed exercise with them, whether they were given specific exercise information, and whether they exercised during pregnancy. In addition, participants provided information about their exercise frequency and intensity during pregnancy. Descriptive analyses and Chi-squared tests were performed.**RESULTS:** Study sample included 239 participants (aged 33±4.63 years, 74.5% white,). Just over half (n=136, 56.9%) reported receiving exercise advice during pregnancy by their providers, but only 58 (24.3%) received specific exercise information. Only 33 (13.8%) received exercise advice that was consistent with ACOG guidelines. Respondents who received exercise advice from their care providers were more likely to exercise during pregnancy than those who did not (159 (67.1%) versus 37 (15.6%); $p < 0.001$).**CONCLUSIONS:** While over 50% of participants in this study reported receiving advice to exercise during pregnancy from their care providers, most of the time this advice was not consistent with ACOG guidelines. Health care providers should share specific exercise prescriptions including dose and duration as an important part of prenatal care.

THE VALIDITY OF THE "JUMP HEIGHT" MOBILE APPLICATION WHEN MEASURING ASPECTS OF A COUNTERMOVEMENT JUMP AND A DROP JUMP

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BACKGROUND: This study investigated two smartphone apps to measure jump height, comparing one free app to one that cost $10 and evaluating their outputs to a contact jump mat as a standard. Additionally, a second purpose of this study was to evaluate how well these devices could track two different jumping techniques, countermovement jumps (CMJ) and drop jumps (DJ). We hypothesized that the free app (JH) would not be as accurate as the paid app (MJ2) when compared to the jump mat, and the MJ2 would track DJ performance better than JH when compared to with the jump mat.METHODS: Twenty participants were recruited (20.1 ± 0.8) and completed the study. In one visit participants were instructed on how to perform both CMJ and DJ and were given 1 practice attempt for each. Then, participants were measured, and their outputs averaged across 3 attempts for both CMJ and DJ. They were instructed to land on the contact jump mat with each jump. Both smartphone apps were assessed simultaneously, as the JH app required that participants hold the smartphone to their chest with both hands, and the MJ2 app required a separate clinician to sit anterior to the landing zone while keeping the participants' feet in the field of view on a separate smartphone and using the propriety software to distinguish frames of when feet pushed off the ground and then when they made contact on the landing. These outputs were compared to the jump height reported by the contact mat, where the contact mat was used as the standard.RESULTS: A repeated measures ANOVA revealed there were significant differences among the three tools when assessing CMJ ($p > 0.001$, $\eta p^2 = 0.908$), and Bonferroni post-hoc analysis revealed significance between the MJ2 app and JH app ($p > 0.001$, CI: -10.089, -7.782), MJ2 app and contact mat ($p > 0.001$, CI: -13.501, -9.897), and between the JH app and the contact mat ($p = 0.004$, CI: -4.672, -0.855). Additionally, a separate repeated measures ANOVA revealed a significant difference among the three devices when assessing DJ ($p > 0.001$, $\eta p^2 = 0.818$), and Bonferroni post-hoc analysis revealed significance between the MJ2 app and JH app ($p > 0.001$, CI: -10.173, -7.064), MJ2 app and contact mat ($p > 0.001$, CI: -13.530, -8.823), but not between the JH app and the contact mat ($p = 0.102$, CI: -0.382, 5.498). Participants' jump heights was consistently lower as assessed with MJ2 than with JH and contact mat, especially when evaluating the DJ.CONCLUSIONS: The results from this study demonstrate that a free software for assessing jump height reported outputs closer to a jump contact mat better than a paid smartphone application.

A NOVEL METHOD OF MEASURING FATIGUE OF THE STERNOCLEIDOMASTOID MUSCLE USING ELECTRICAL STIMULATION AND ACCELEROMETER

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BACKGROUND: Concussion risk in athletes has been linked to the strength of the muscles in the neck. We wish to explore if fatigue of neck muscles during exercise would lead to greater risk of concussion. To explore this, we need to develop a reliable but effective method to measure the strength of the neck muscles before and after exercise. This study will evaluate the use of accelerometry and twitch electrical stimulation to measure fatigue of the dorsal neck muscles. **METHODS**: Measurements will be made on the sternocleidomastoid muscles (SCM) of healthy control subjects. During the first testing session, an endurance test will be conducted (decline in twitch acceleration after 5 minutes of 5 Hz stimulation). Twitch contractions will be produced by placing 2 x 1 cm electrodes on the SCM and stimulating with a submaximal current that is sufficient to yield a strong contraction (constant for all test conditions). In the second session, measurements of twitch acceleration with the same stimulation current will be made before, immediately following, and 5 minutes after exercise bout. The exercise will consist of isometric holding of the head for 2.5 minutes while extended beyond the end of the bench support. Pilot studies have suggested this results in strong sensations of fatigue. Muscle acceleration will be collected with a tri-axial accelerometer taped to the subject's neck. The endurance index and twitch contraction strength will be analyzed using a MatLab routine and Excel. Declines in twitch velocity immediately after exercise will be used as evidence of fatigue. Recovery of twitch acceleration will be used as evidence of recovery from fatigue. **ANTICIPATED RESULTS:** It is hypothesized that this testing method will show evidence of neck fatigue following exercise and of recovery following a rest period and therefore evidence

that the test is feasible to effectively testing fatigue of the neck muscles. We also hypothesize that people with lower endurance index values will show greater fatigue. Future studies could use this protocol to evaluate fatigue after sporting events, as well as the effectiveness of neck specific endurance training with the goal of reducing concussion risk.

PHYSICAL ACTIVITY PATTERNS AMONG ADULTS WITH ARTHRITIS AND DIABETES WHO RECEIVE SELF-MANAGEMENT EDUCATION

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PURPOSE: To examine the physical activity (PA) patterns among adults with arthritis and diabetes who receive self-management education. **METHODS:** Sample (n=28,860) included adults (≥ 18 years of age), with arthritis and diabetes who participated in the 2019 Behavioral Risk Factor Surveillance System. Categories of PA were classified as highly active (HACT), moderately active (MACT), low activity (LACT), and inactive (INACT). Multinomial logistic regression analyses adjusted for age, gender, body mass index, race, smoking status, and socioeconomic status were fitted to determine variables that were significantly associated with the outcome ($P < 0.05$). **RESULTS:** Compared to a referent group of inactive adults, adults with arthritis and diabetes who received self-management education had significantly greater odds of being classified as HACT (odds ratio [OR] 1.7), MACT (OR 2.3), and LACT (OR 1.6) ($P < 0.05$ for all). **CONCLUSIONS**: Our findings suggest that adults with arthritis and diabetes who receive self-management education engage in greater volumes of PA. Typically, arthritis and diabetes self-management education programs promote physical activity as a mechanism to manage these diseases. More research is needed to determine if a cause-and-effect relationship exists.

BODY FAT DISTRIBUTION AND PHYSICAL FUNCTIONING IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE PATIENTS

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BACKGROUND: Chronic obstructive pulmonary disease (COPD) is a slowly progressive disease involving airway obstruction and persistent respiratory symptoms. Patients with COPD are older and often much less active than their healthy counterparts, which contributes to a vicious cycle of further sedentation and worsening health outcomes. Obesity is a common comorbidity associated with aging and COPD that may hinder regular physical activity. Current literature has yielded unequivocal results examining the effect of obesity on physical function in patients with COPD, a discrepancy that may be related to study differences in defining and measuring obesity. The purpose of this study was to examine the effect of obesity and specific body composition measures on physical function in patients with COPD. METHODS: 170 patients with COPD (age = 66 ± 10.1yrs; BMI = 27.7 ± 6.04; 80 females) were included for analyses. Physical function was assessed by six-minute walk distance (6MWD), obesity was determined based on body mass index (BMI) and body composition measures were collected using dual-energy x-ray absorptiometry. Associations between 6MWD, BMI, appendicular lean mass (ALM), and other measures of body composition were assessed using Pearson Product-Moment Correlation Coefficients. A hierarchical multiple linear regression analysis was used to determine if ALM accounted for additional variance in 6MWD after controlling for lung function (expressed as forced expiratory volume in one second (FEV1)) and BMI. RESULTS: Of the measures of body composition examined, ALM had the highest correlation ($r = 0.327$, $p < 0.001$) with 6MWD. FEV1 ($\beta = 0.220$, $p = 0.004$) and BMI ($\beta = -0.262$, $p = 0.003$) combined accounted for 4.2% of the variance in 6MWD while ALM accounted for an additional 13.3% ($\beta = 0.433$, $p < 0 .001$) of the variance in 6MWD. CONCLUSIONS: After controlling for lung function and BMI, ALM accounts for an additional 13% of the variance in 6MWD. Rehabilitation programs may improve or better preserve physical function in patients with COPD by including exercise regimens that specifically target interventions that maintain or increase limb muscle mass.

EXERCISE PRESCRIPTION FOR A MIDDLE-AGED SEDENTARY WOMAN WITH MULTIPLE COMORBIDITIES: A CASE REPORT

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This case report describes best practice recommendations and associated outcomes for a 51-year-old female with several comorbidities. There is an increased demand for exercise professionals to create evidence-based, economically feasible exercise prescriptions for complex clients with multiple comorbidities. The subject in this report presented with chronic kidney disease, prediabetes, fibromyalgia, cold-induced asthma, epilepsy, and hypothyroidism. Her past medical history included treatment and surgery for non-Hodgkin's lymphoma and several additional surgeries. Client goals include reduced pain, increased strength and balance and increased health overall. Assessments included standing and seated posture, gait, overhead squat, push up, ROM, flexibility, manual muscle, single leg stance balance, and Y-balance analyses and revealed LE strength and flexibility deficits, postural imbalances, reduced hip, knee and ankle ROM, LE hypertonicity with myofascial trigger points, decreased balance, and impaired body awareness. Based on her conditions and impairments, an evidenced-based, individualized POC was prescribed with progression instructions. The client's exercise prescription consisted of cardiovascular and strength training 3 days per week with incorporated balance training and daily flexibility training. In addition to these instructions, the subject was educated about her conditions and risk factors and was referred for interventions beyond the exercise professional's scope of practice. Telehealth was used for the client to ask questions, receive feedback, and track her progress. The subject was compliant with her 12-week independent program. Significant improvements included 1) balance time increase by 71% and 12% on the right and left sides respectively in the single limb balance assessment, 2) increased weekly physical activity from 60 to 144 minutes, a 140% increase, 3) increased flexibility, 4) increased hip, knee and ankle ROM with decreased end range discomfort, 5) increased LE strength, and 6) improved overall body awareness and motor control. This case report outlines a complex client's POC and favorable outcomes with an exercise approach. This case exemplifies the role an exercise professional can play to effectively manage the health of, and improve the quality of life for, clients with multiple medical comorbidities in a manner consistent with the "Exercise is Medicine" initiative.

TISSUE OXYGENATION, ANKLE BRACHIAL INDEX, AND SUBJECTIVE MEASURES OF PERFORMANCE IN PERIPHERAL ARTERY DISEASE PATIENTS

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BACKGROUND: Peripheral Artery Disease (PAD) is a cardiovascular disease that affects over 8 million Americans and is associated with endothelial dysfunction, lower tissue oxygenation, and reduced walking performance. The correlation between Near-infrared spectroscopy (NIRS) derived tissue oxygenation, walking performance and physical functioning is not well-established in these patients. PURPOSE: To examine the relationship between tissue oxygenation, ankle-brachial index (ABI) and subjective measures of physical function via the Walking Impairment Questionnaire (WIQ) and the 36-item Short Form Health Survey (SF-36). METHODS: Six patients with PAD (66.7 ± 8.3 years) completed a 5-minute vascular occlusion test in the most affected leg. Calf muscle oxygenation (StO_2) was monitored via NIRS, and the reperfusion slope was generated as StO_2 versus time. Each patient also completed the WIQ and SF-36, and scores were calculated for all dimensions of each survey. Variables were analyzed with Pearson Product Correlations. Significance was accepted at $p<0.05$. RESULTS: Mean reperfusion slope and ABI for patients were 0.37 ± 0.26% and 0.62 ± 0.30, respectively. Reperfusion slope was significantly correlated with ABI ($r = 0.956$), WIQ speed ($r = 0.982$), SF 36 physical function ($r = 0.962$). ABI was significantly correlated with WIQ distance ($r = 0.851$), WIQ speed ($r = 0.940$), WIQ stair climbing ($r = 0.926$). CONCLUSIONS: The NIRS reperfusion slope and ABI correlate with scores for physical function on the WIQ and SF 36. Given these relationships, future research should focus on interventions to improve reperfusion slope.

THE EFFECTS OF LONG-TERM PARTICIPATION IN FOUR DIFFERENT SPORTS ON CARDIOVASCULAR RISK FACTORS AMONG CHINESE ADULTS

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Background: Cardiovascular disease (CVD) was responsible for an estimated 17.8 million deaths in 2017. Physical activity (PA) is known to confer benefits for numerous CVD-related risk factors, including hypertension and obesity, which often cluster together. However, it remains unclear whether the potential health benefits are equivalent for adults who participate in different sports. The purpose of this study is to compare the impacts of long-term participation (i.e., ≥ 9 years) in 4 popular sports, including 2 traditional Chinese Sports (Tai-chi, Diabolo) and 2 modern sports (Aerobics, Track and Field [TF]) on CVD risk factors (i.e., hypertension, obesity, and central adiposity) among Chinese adults. **Methods:** Participants (n=252, 55.5±11.1 years of age) with complete measures were included in this cross-sectional analysis. Participants were qualified National Social Sports Instructors in China, and required to have performed their chosen sport (Aerobics, Tai-chi, Diabolo, and TF) for at least 9 years. Measures included height, weight, resting blood pressure (BP), body circumferences and body composition. Two-way ANOVA and multiple linear regression models were used to compare the effects of the different sports on CVD risk factors, including systolic BP (SBP), diastolic BP, waist circumstance, waist-hip ratio (WHR), weight, BMI and body fat percentage (Fat%), while controlling for sex effects. In addition, Tukey's pair-wise post hoc tests were used to compare effects across the different levels of sport and sex. **Results:** Holding sex effect as a constant, the mean SBP for Aerobics and TF were significantly lower compared to Tai-chi (-9.09 mmHg, p=0.025; and -13.88 mmHg, p=0.029, respectively), the mean WHR was significantly lower for Diabolo versus Aerobics (-0.034, p=0.047), the mean Fat% for Aerobics was significantly lower than Tai-chi (-2.53, p=0.018). No significant differences were observed for the other risk factors. There were no significant interaction effects for sex and type of sport. **Conclusions:** Comparison of CVD risk factors among individuals with a history of long-term participation across 4 different sports revealed several significant differences. Aerobics and TF were associated with lower BP compared to Tai-Chi; while Aerobics was also associated with lower Fat% when compared to Tai-Chi. Interestingly, Diabolo, a traditional Chinese sport, demonstrated favorable values for central adiposity when compared to Aerobics. Further research is needed exploring the health benefits of traditional and modern sports in the Chinese population. Based on results in the present study, there is potential for individually-tailored recommendations on sport participation to address specific health benefits, while also considering cultural factors, adherence and enjoyment.

EVIDENCE-BASED CLASSIFICATION TO IDENTIFY DOMAINS OF POWERCHAIR SOCCER

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BACKGROUND: The International Paralympic Committee (IPC) requires all Paralympic sports to develop an evidence-based classification system to: 1) determine eligibility for Paralympic competition, and 2) classify athletes appropriately for fairness. Powerchair football is currently a Paralympic Sport but does not have an evidence-based classification system necessary for the Paralympic Games. The purpose of this study was to complete the second step of IPC's procedure for developing an evidence-based classification system by identifying the domains essential to the sport (i.e., determining the "determinants"). METHODS: We used three methods to identify potential domains or determinants for Powerchair Football. We first analyzed factors in the current classification database to determine which factors distinguished between players with high (PF2) and low (PF1) function (n = 172). We then surveyed 100 players, coaches, and classifiers on their recommendations for essential domains to evaluate players. Finally, members of the research team (n = 3) and current international classifiers (n = 3) examined game film using an activity analysis developed by Thomas (2015). RESULTS: Five factors (head control, trunk control, visual lag, sport skills, and secondary factors such as communication) empirically distinguished between PF1 and PF2 in the current database. Survey analysis supported these domains as participants recommended drive control, finger control, hand/wrist control, vision, and attention to the game (safety) as critical domains. Game analysis confirmed some domains (e.g., motor function, vision) and yielded additional domains for consideration (cognition, perception). CONCLUSION: Domains currently included in the international Powerchair Football classification rulebook were supported by empirical evidence from survey and database analyses. The activity analysis added important domains for consideration to the process of evidence-based classification for this sport.

THE TRANSITION FROM IN-PERSON TO REMOTE JUDO DURING COVID-19 IN ADOLESCENTS WITH AUTISM SPECTRUM DISORDER

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Background: The COVID-19 pandemic has affected the daily routine of the majority of the U.S. population. For individuals with Autism Spectrum Disorder (ASD), this can be a considerable source of stress, as individuals with ASD tend to prefer structure and routine. Physical activity, especially activities with a mind-body interaction, such as martial arts, may help to manage stress in this population. Unfortunately, due to the COVID-19 pandemic, in-person activities such as physical activity are limited. The purpose of this study was to examine the feasibility of a remote-based judo program for youth with ASD during the COVID-19 pandemic. **Methods:** In March of 2020, nine high school adolescents (mean age: 16.87 years; 89% male) with ASD had been participating in a 12-week in-person judo program. The COVID-19 pandemic occurred during the 6th week of the study, and the stay-at-home order was mandated, prohibiting the continuation of the in-person sessions. After a 2-week development period, the program transitioned to a Livestream format (Zoom) for the remaining six weeks of the study. Participants completed surveys comparing their experience with the in-person and remote sessions, and their classroom teacher had administered a semi-structured interview following the end of the program. **Results:** Eight out of the nine participants attended 92% of the remote classes, while seven of the nine participants reported that the zoom sessions helped them learn. Also, the classroom teacher revealed during the interview that the remote sessions were preferred by the participants who struggled with social interactions and anxiety. The teacher also reported that the remote judo sessions helped the students cope during the pandemic by adding structure and familiarity to their schedule. **Conclusion:** The remote judo program was both feasible and acceptable for adolescents with ASD. Physical activity sessions delivered remotely should be considered as an appropriate alternative for when in-person programs are not available or as an alternative for those participants with higher levels of anxiety.

EFFECTS OF AROMATASE INHIBITORS AND ARTHRALGIA ON RANGE OF MOTION IN POSTMENOPAUSAL BREAST CANCER PATIENTS

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BACKGROUND: Breast cancer is the most common cancer diagnosed among women, with 1 in 8 being diagnosed in their lifetime. As a result of breast cancer treatment, women have been shown to develop complications that negatively impact physical activity participation, daily functioning and quality of life. Specifically, range of motion is an important variable to study as pain and restricted joint movement will interfere with daily tasks and activities. Although the standard of care for postmenopausal breast cancer patients is the medication aromatase inhibitors (AI) because of its association with improved survivorship and decreased risk of recurrence and contralateral breast cancer, one known side effect of AI use is arthralgia, characterized by joint pain and stiffness. The purpose of this research project is to examine the impact of physical activity, joint pain, joint stiffness and the use of aromatase inhibitors (AI) on range of motion in postmenopausal breast cancer patients. METHODS: The Breast Cancer Strength and Range of Motion Study at Wake Forest Cancer Survivorship Clinic is an ongoing longitudinal follow-up study of physical activity, muscular strength and range of motion in women with breast cancer. A subset of participants (n=149) who are postmenopausal and taking aromatase inhibitors (AIs) has been identified to assess the prevalence of joint pain and stiffness and the role that physical activity plays in the management of these symptoms. This sample of women (58 +/- 9.9 years) is above a healthy weight (BMI 31 +/- 15) and were diagnosed with predominantly Stage 1 (46%) or Stage 2 (31%) breast cancer. The participants self-reported their demographic information and their hospital medical records are currently being used to obtain their date of diagnosis, stage of cancer, and type of treatment. Physical activity is measured during clinic visits using the self-report Godin Physical Activity Questionnaire and the Brief Pain Inventory (BPI) questionnaire is used to assess joint pain and stiffness. Pearson correlations and independent t-tests will be used to examine the associations among physical activity, arthralgia, range of motion, and the use of aromatase inhibitors. ANTICIPATED RESULTS: If these factors are shown to significantly moderate range of motion, this information can be used to develop and implement treatment interventions to improve the patient's daily functioning and quality of life.

RELATIONSHIPS OF CHANGES IN BODY COMPOSITION WITH PHYSICAL PERFORMANCE IN OBESE OLDER ADULTS WITH KNEE OSTEOARTHRITIS

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Obesity is a leading cause of morbidity and mortality in the United States. Knee osteoarthritis (OA) is a universal cause of disability and obesity is a prominent risk factor for knee OA. The impact of long-term behavioral interventions that alter body composition through dietary weight loss on physical performance in older obese adults is not well investigated. Therefore, this study will examine the relationships of changes in body composition with physical performance in overweight and obese older adults with knee OA following an intervention of dietary induced weight loss alone (D) or in combination with exercise (D+E). The hypothesis is that individuals with less loss of fat free mass and more loss of fat mass will show greater improvements in physical performance. The analysis will use data from participants in the D and D+E intervention groups in the Intensive Diet and Exercise in Arthritis (IDEA) trial. IDEA was an 18-month randomized clinical trial that determined whether 10% weight loss in D or D+E groups would improve mechanistic and clinical outcomes in 454 older (mean age=66±6 years) overweight and obese adults (mean BMI 33.6±3.7 kg/m2) with knee OA compared to E alone. The weight loss goal for the D intervention was at least 10% from baseline weight; the E intervention consisted of 3 days/week of aerobic walking and strength training. Measures include whole body fat mass and fat free mass using dual-energy x-ray absorptiometry (DXA), gait speed, 6-minute walk distance, knee extensor and flexor strength, and self-reported function using the Western Ontario McMasters Universities Osteoarthritis Index (WOMAC). Pearson correlations will be used to examine the associations between body composition and physical performance measures at baseline and in the change of these measures from baseline to the 18-month follow-up data collection time point. Whereas cross-sectional analysis demonstrates that more body fat is correlated with poorer physical performance measures, this ongoing analysis will provide evidence for these relationships from a randomized clinical trial. The analysis targets a group of overweight and obese older adults with compromised physical performance measures. Additional strengths of this analysis include length of follow-up (18-months), the large sample size, the comprehensive measures of physical performance, and use of DXA for body composition.

OCCUPATIONAL THERAPY AS A MEANS TO COMBAT FOOD INSECURITY IN OLDER ADULTS WITH FUNCTIONAL IMPAIRMENTS

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BACKGROUND: Food insecurity is the limited or uncertain ability to access enough food. About 1 in 14 adults ages 60 years or older are food insecure in the U.S. Previous research reveals that food-insecure older adults face as high as a 66% increased risk for physical health problems and 233% higher rates of mental health issues in comparison to food-secure older adults. A significant cause of food insecurity in older adults is functional impairments, defined as the complete or partial loss of function in a body part that make activities difficult. Functional impairments can negatively influence food consumption by interfering with food-related activities of daily living (ADLs) and independent activities of daily living (IADLs), like self-feeding, grocery shopping, and preparing meals. Forty percent of older adults in the U.S. live with a functional impairment, however, this cause of food insecurity is frequently not addressed through older adult nutrition programs. Occupational therapy (OT) improves participation and performance in food-related ADLs and IADLs, yet its impact on food insecurity has not been evaluated. The purpose of this study is to examine how OT interventions that incorporate the practice of food-related activities, use of adaptive equipment, and education on public resources impact perceived levels of food insecurity and nutritional status in older adults with functional impairments. METHODS: Occupational therapists (n=3) will recruit patients ages 60 years or older as participants (n=20) and will deliver individualized OT interventions that include the practice of food-related activities, use of adaptive equipment, and education on public resources. The intervention will be a minimum of 10 hours, across the duration of multiple 1-hour sessions per week. Pre- and post-survey outcome measures include a modified version of the Hunger Vital Sign, the Seniors in the Community: Risk Evaluation for Eating and Nutrition II (SCREENII), and the Occupational Performance Measure of Food Activities (OPMF). A sub-sample of self-selecting participants will conduct an in-depth phone interview to further elucidate results. ANTICIPATED RESULTS: It is expected that participants will have improved performance and satisfaction in food-related activities and report enhanced nutritional status and a reduction of food insecurity. Funding: Maryville College Naylor Fund for Faculty and Student Research

EFFECT OF WORK-TO-REST CYCLES ON CARDIOVASCULAR DRIFT AND MAXIMAL OXYGEN UPTAKE DURING HEAT STRESS

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BACKGROUND: Cardiovascular (CV) strain, indexed as CV drift—a progressive increase in heart rate (HR) and decrease in stroke volume (SV) during prolonged exercise—is exacerbated by environmental heat stress and has been shown to be accompanied by a decrease in work capacity (VO_{2max}). In order to attenuate CV strain, work:rest ratios have been recommended by the National Institute for Occupational Safety and Health (NIOSH). Whether these guidelines sufficiently mitigate CV drift and preserve VO_{2max} is unknown. The purpose of this study was to test the hypothesis that during moderate work (201-300 kcal/h) in hot conditions [indoor wet-bulb globe temperature ($WBGT_{in}$)=29 °C] utilizing the recommended 45:15 min work:rest ratio, CV drift accumulates over time, and the magnitude of accumulated CV drift is proportional to decrements in VO_{2max}. **METHODS:** Eight subjects [5 women; (mean±SD) age=25±5 y; body mass=74.8±11.6 kg; VO_{2max}=42.9±5.6 mL/kg/min] completed 3 sessions on different days. The first visit involved measurement of VO_{2max} and familiarization with study procedures in temperate conditions ($WBGT_{in}$=18.1±1.2 °C). The following 2 counter-balanced experimental trials were conducted in hot conditions ($WBGT_{in}$=29.0±0.6 °C). Moderate work was achieved by 2.5 min of arm curls (4.5 kg at 20/min) and 20 min of walking (VO_2=1.0-1.1 L/min) on a treadmill, repeated once for a total of 45 min of work, and followed by 15 min of seated rest. HR and SV were measured at 15 and 45 min of each work bout to evaluate CV drift. The 120-min trial consisted of 2 work:rest cycles followed by measurement of VO_{2max}; the 15-min trial replicated the first 15 min of the 120-min visit, followed by measurement of VO_{2max}, and was necessary to measure VO_{2max} before CV drift occurred. **RESULTS:** CV drift accumulated between 15 and 105 min: HR increased 16.7% (18±9 bpm, *P*=0.004) and SV decreased 16.9% (−12.3±5.9 mL, *P*=0.003), but VO_{2max} was not different after 2 work:rest cycles (*P*=0.14). Core body temperature increased 0.5±0.2 °C (*P*=0.006) over 2 h. Participants drank 0.44±0.30 L of water ad libitum, which did not fully replace sweat losses (−1.2±0.1 kg, *P*=0.001). **CONCLUSION:** CV drift occurred during two 45:15 min work:rest cycles but VO_{2max} was unaffected. Although work capacity is preserved after 2 hours, CV and thermal strain persist. This study was funded by the Deep South Center for Occupational Health and Safety, a NIOSH Education and Research Center.

ASSOCIATIONS BETWEEN BUILT ENVIRONMENT AND PHYSICAL ACTIVITY LEVELS IN YOUTH WITH OBESITY IN THE MID-SOUTH

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Background: The future risks and complications of obesity pose a high burden on both the healthcare system and the patient. The recommended first line treatment for the prevention of pediatric obesity and care for overweight and obese pediatric patients is lifestyle intervention including nutrition, physical activity and sedentary behaviors to encourage energy balance. Many social and environmental factors influence these lifestyle factors; however, little is known about these factors. Purpose: To examine the effects of built environment (BE) on physical activity levels (PA) through collection of self-reported activity levels and known environmental measures in the patients of the Healthy Lifestyle Clinic (HLC) at Le Bonheur Children's Hospital. Methods: We examined the associations between BE and self-reported PA in 708 youth (BMI z-score 2.54±0.44, 12.3±3.6 years, 62% female, 69% African American, 47.5±6.5% body fat) in the HLC. Public government sources were used to evaluate BE in HLC family's communities. Results: Caregiver survey assessments of child's PA showed 26.7% complete 60 minutes of PA ≥5 days/week, 42.8% complete 60 minutes of PA ≤4 and ≥2 days/week and 30.5% complete 60 minutes of PA <2 days/week. Median household income in these communities was $43,801±21,494 (range $17,000-$129,382). Percent vacant housing was 14.2±6.8% (national=7%; Memphis metro average (MSA) =12%). Walkability (18.14±12.5; MSA=4.0), bike lanes (0.96± 0.93mi/mi2; MSA=0.14), greenways (0.2± 0.2mi/mi2; MSA=0.03), and presence of sidewalks (41.9±15.5 %; MSA=33%) were collected. PA levels were not associated with vacant housing rates (p=0.61), housing density (p=0.74), number of transit stops (p=0.31), walkability (p=0.77), bike lanes (p=0.44), greenways (p=0.91), bicycle friendliness (p=0.70), distance to community center (p=0.99), distance to park (p=0.91) and sidewalks (p=0.77) in our cohort of youth with obesity. Conclusions: Our findings suggest that in our largely urban cohort the BE (exercise space) may not be the limiting factor in PA that HLC patients complete. More work is needed to evaluate the quality and functionality of the BE.

AFFECTIVE DIMENSIONS OF DYSPNEA AT MAXIMUM EXERCISE IN COVID-POSITIVE AND HEALTHY ADULTS

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BACKGROUND: SARS-CoV-2 is a novel disease with severe physiological impairments of acute vascular, cardiac, autonomic, and respiratory function. However, one of the most common COVID-19 symptoms is shortness of breath, reinforcing the pivotal role of the respiratory system in this disease. **PURPOSE:** The purpose of this study was to examine emotional responses to exertional dyspnea (i.e., shortness of breath during exercise) in otherwise healthy, young adults who have tested positive for SARS-CoV-2. **METHODS:** Otherwise healthy, young adults (COV: 5M/7F, 20 ± 1y, 24.2 ± 3.4 kg·m-2, 35.4 ± 5.74 ml·kg-1·min-1) who tested positive for SARS-CoV-2 three weeks prior to the test date completed an incremental exercise test to voluntary exhaustion on a cycle ergometer. Subjective ratings of perceived breathlessness (RPB) and unpleasantness of breathlessness (RPU) were collected at rest and during each minute of exercise. Following exercise, subjects rated unpleasantness and accompanying negative feelings (depression, anxiety, frustration, anger, and fear) associated with their dyspnea during exercise using a visual analog scale (VAS). Results were compared to sex, age, and BMI matched controls (CON: 5M/7F, 20 ± 2y, 22.8 ± 3.1 kg·m-2, 34.9 ± 6.17 ml·kg-1·min-1). **RESULTS:** COV displayed lower RPB ratings at peak VO2 compared with CON (COV: 5.5 ± 2.5 CON: 7.5 ± 1.9, p = 0.04). VAS ratings of anger (COV: 0.05 ± 0.117; CON: 2.06 ± 1.97, p ≤ 0.001), but not depression, anxiety, unpleasantness, frustration or fear, were lower in COV compared with CON. **CONCLUSION:** Individuals who have recently contracted SARS-CoV-2 had lower perceptual ratings of breathlessness during exercise compared with healthy control subjects, indicating a reduction in the sensory dimension of dyspnea. The affective dimension appears to be maintained, with only the emotions related to anger being lower. Further examination is warranted to determine any long-term effects of SARS-CoV-2 on exertional dyspnea and other physiological consequences.

EPIDEMIOLOGY OF AXIAL SKELETON FRACTURES IN CHEERLEADING AND GYMNASTICS FROM 2010-2019

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BACKGROUND: Cheerleading and gymnastics are globally popular competitive sports. Within the United States (US), these sports often receive less on-site medical coverage, particularly at the youth level. Cheerleaders and gymnasts are at risk of fractures, and axial skeleton fractures are among the most severe injuries that participants can sustain. The purpose of this study was to describe the characteristics of axial skeleton fractures suffered during cheerleading and gymnastics participation presenting to US emergency departments (ED). **METHODS:** Researchers used the National Electronic Injury Surveillance System database to review cases of axial skeleton fractures in youth (age=5-17 years) cheerleaders and gymnasts presenting to US EDs. Independent variables included body region and mechanism of injury. Differential prevalence of axial skeleton fractures and hospital outcomes were examined using Injury Proportion Ratios (IPR) and accompanying 95% confidence intervals. **RESULTS:** A total of 208 injuries among youth cheerleaders (n=127) and gymnasts (n=81) were seen in US EDs during 2010-2019. This equated to national estimates of 4757 injuries in cheerleaders and 1692 injuries in gymnasts. The majority of these injuries were facial fractures (71.4%) and torso fractures (22.5%) and were attributed to player contact (49.8%) or surface contact (25.1%). Most injuries were treated and released from the hospital (87.1%). Neck (IPR=1.79; 95%CI=1.37-2.21) and player contact (IPR=11.66; 95%CI=8.91-14.40) injuries were more prevalent among reported cheerleading than gymnastics injuries. A comparable proportion of cheerleading and gymnastics injuries were treated and released from the ED (IPR=1.09; 95%CI=0.83-1.35). **CONCLUSIONS:** While axial skeleton fractures within cheerleading and gymnastics are rare, they can have severe outcomes. Given the higher prevalence of neck and player contact injuries within cheerleading, further attention may be directed towards better understanding and preventing such injuries in cheerleading. On-site medical providers can facilitate triaging and alleviate the physical, emotional, and financial burden posed by such injuries.

CHANGES IN FIRST-YEAR COLLEGE STUDENTS' OBJECTIVELY MEASURED DIETARY AND PHYSICAL ACTIVITY BEHAVIORS.

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BACKGROUND: Entering college is a significant phase in young adults' lives. While adapting to the changes in their lives, freshman students have shown to struggle in maintaining their health behaviors, e.g. physical activity (PA) and diet. Although "Freshman 15", i.e. excessive weight gain of 15 or more pounds, is a myth, research has shown that freshman students are vulnerable for negative health behaviors, e.g. declining levels of regular, moderate-to-vigorous PA (MVPA) and unhealthy eating habits, e.g. consuming too much sugar. Considering the negative influence of these unhealthy patterns on student and public health, the aim of this study was to examine the changes in first-year college students' dietary and PA behaviors during the first semester. METHODS: Participants were recruited using the University registrar's listserv database. A sample of 30 participants (age 18.30±1.12y) was followed during their first semester, and their dietary (ASA24-US) and PA (wrist-worn ActiGraph accelerometers) behaviors were assessed for one week at the beginning and end of the semester. RESULTS: Final sample overrepresented female (university distribution; 57%/sample distribution; 70%), and African-American (8%/17%) students, while there was an underrepresentation in Caucasian students (55%/43%) and an appropriate distribution of Asian (10%/9%) students. Twenty-six of the 30 participants (~87%) had a university provided meal plan. In total, 17 participants returned a full data set on their 7-day dietary and PA behaviors, and hence were included in the final analyses. The study findings demonstrated that participants' eating behaviors improved across the semester as they consumed less sugar (t[16] = -3.54, p = .005; M_{pre} = 95.29g/d, M_{post} =

72.12g/d) and added sugars (t[16] = -2.60, p = .026; M_{pre} = 14.12g/d, M_{post} = 9.11g/d). In addition, the study showed that participants' PA patterns changed as there was a decline in light-intensity PA (t[16] = -3.46, p = .003; M_{pre} = 1,126min/d, M_{post} = 1,005min/d) and increase in daily MVPA (t[16] = 2.52, p = .023; M_{pre} = 216min/d, M_{post} = 228min/d). CONCLUSIONS: This study showed freshman students' dietary and PA behaviors to be relatively healthy and the semester-long changes to be largely positive. Based on the findings of this study, the efforts to reduce students' consumption of sugar and sugary drinks and to increase vigorous PA are well warranted.

THE EFFECT OF WALKING A COMPANION VERSUS UNFAMILIAR DOG ON MOOD, HEART RATE, AND EXERCISE ENJOYMENT

Anna Covington, Rebecca Rogers, Thomas Kopec, Christopher Ballmann. *Samford University, Birmingham, AL.*

BACKGROUND: The human-canine interaction and relationship has been shown to have positive health benefits. Previous research has shown that spending time with therapy dogs can improve mood and increase parasympathetic nervous system activity. However, evidence has also suggested that interaction with an individual's companion dog may potentiate favorable physiological responses. It is currently unclear whether exercising with a familiar/companion or unfamiliar dog influences affective or physiological responses to exercise. The purpose of this study was to investigate whether walking with an individuals' own companion dog in comparison to an unfamiliar dog elicits a more favorable response to exercise. METHODS: Healthy males and females over the age of 18 participated in this field study. Each participant completed two trials in a crossover counterbalanced study design: 1) Walking with familiar/companion dog (FD) and 2) Walking with an unfamiliar dog (UD). Participants were instructed to walk a 1.5 mile time trial with the corresponding dog condition. The individuals own dog was used for the FD trial while a standardized unfamiliar dog was used for all the UD trials. Heart rate was monitored throughout the exercise bout. Participants completed an abbreviated POMS questionnaire pre- and post-exercise. A visual analog scale for exercise enjoyment was administered post-exercise. RESULTS: A significantly larger improvement in mood was observed during the UD versus FD trials (p= 0.028). Furthermore, mean heart rate (p=0.045) and exercise enjoyment (p= 0.025) were significantly higher during the UD versus FD trial. There were no significant differences in walking speed between trials (p=0.058). CONCLUSIONS: Findings indicate that walking a UD may improve mood and exercise enjoyment with accompanying increases in exercise intensity compared to a FD. These results may have important implications in therapy programs utilizing dogs as walking a UD may result in greater affective benefit.

INFLUENCE OF WEATHER ON DIRT AND GRAVEL TRAIL USE IN AN URBAN WILDERNESS TRAIL SYSTEM

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BACKGROUND: Utilization of public urban wilderness areas for mountain biking, trail running, and hiking may provide significant opportunities for increasing physical activity and overall wellness. Understanding how weather relates to use of different trail types (dirt trails vs. gravel trails) can provide information on how people use trails in varying weather conditions. The purpose of this study was to investigate the relationship between varying weather conditions with use of dirt and gravel trails in an urban wilderness trail system. METHODS: Data were collected using eight infrared counting stations located across mixed-use trails throughout the Knoxville Urban Wilderness in Knoxville, TN. Total daily user counts and weather measures were collected for fifty-five consecutive days in September and October. Weather variables included average temperature, humidity, and wind speed, and whether or not it rained. Correlations and multiple regression were used to examine relationships. RESULTS: There was a moderate relationship between precipitation and dirt trail use (-0.451, p<0.001), but a weak relationship between precipitation and gravel trail use (-0.338, p=0.012). When controlling for other weather variables in multiple regression, precipitation significantly decreased total user counts on all trails (p=0.043), with average humidity near significance (p=0.051). However, when examining these relationships by specific trail type, usage of dirt trails significantly decreased with precipitation and increasing humidity, p=0.015 and 0.030 respectively. Use of gravel trails only decreased with increasing average temperature (p=0.034) and not precipitation (p=0.521). CONCLUSIONS: Dirt trail use is more significantly impacted by precipitation when compared to gravel trails. This makes sense for the area studied as dirt trails, although multi-use, are more heavily used by mountain bikers than runners and hikers. Runners and hikers may avoid dirt trails due to the potential of standing water and muddy conditions. Gravel trails, which in the area studied are more utilized by runners and hikers, did not see a significant decrease in usage with precipitation events. This type of trail surface may enable runners and walkers to use them when it is or has been raining.

EVALUATING THE AWARENESS OF AND PARTICIPATION IN EXERCISE IS MEDICINE ON CAMPUS (EIM-OC)

Jeremy A. Steeves, Sarah McFann, Traci Haydu, Jennifer F. Oody. *Maryville College, Maryville, TN.*

Exercise is Medicine-On Campus (EIM-OC) involves promoting physical activity on college campuses and is ideally integrated into the student health clinic to assess student PA and provide exercise prescriptions. The campus-wide awareness of this Health Science and Outdoor Studies (HSOS) Division based campaign was unknown. Purpose: To evaluate awareness, engagement, and determinants of participation in EIM-OC at a small liberal arts college (1148 students). Methods: Maryville College students were recruited to complete an anonymous, online survey asking about their knowledge of and participation in EIM-OC and PA. Descriptive statistics were presented, and aware vs. non-aware of EIM-OC and HSOS majors vs. other majors were compared. Results: Of the 114 participants, 85.1% reported they were aware of EIM-OC, 67.5% participated in &ge1 EIM-OC event, 33.3% used the student health center on campus, and 10.5% were asked the PA vital sign questions during their health center visit. Awareness of EIM-OC significantly increased participation in EIM-OC events compared to those not-aware of EIM-OC (72.2% vs. 41.2%, p=0.01). The majority of students (62.3%) reported a major other than HSOS, and 37.7% identified as HSOS majors. More HSOS majors were aware of EIM-OC (97.7% vs. 77.5%, p&lt0.01), participated in EIM-OC events (83.7% vs. 57.5%, p&lt0.01), and valued the benefits of PA (stress management, fun, and academic productivity (all p&lt0.05)) compared to non-HSOS majors. Overall, students reported an average of 226.4 ± 270.2 minutes of PA per week, with no differences between those who were aware or non-aware of EIM-OC or in HSOS or other majors. The daily campus e-mail communication was the most common way students learned about EIM-OC events, but students said they would prefer to learn about events through flyers in dorm buildings. The main reason that students participated in EIM-OC events was class credit (43.9%), fun (36.8%), because their friends participated (28.9%), self-interest (28.1%), fitness (21.9%), and the social aspect of the events (8.8%). Conclusion: Student awareness of EIM-OC had a positive influence on EIM-OC participation; however, it was not related to increased PA. Increasing awareness of EIM-OC beyond HSOS through increased education and promotion in dorms may encourage students across campus to engage in EIM-OC events and appreciate the benefits of a physically active lifestyle. Funding: Maryville College Senior Study Grant Fund.

CHANGES IN UNIVERSITY EMPLOYEES' PHYSICAL ACTIVITY DURING THE COVID-19 PANDEMIC

M. Ryan Mason, Jake H. Hudgins, Marilyn S. Campbell, Martha J. Biddle, Melinda J. Ickes, Lance M. Bollinger. *University of Kentucky, Lexington, KY.*

BACKGROUND: COVID-19 disrupted virtually all aspects of American life during calendar year 2020. The purpose of this study was to assess the impact of the COVID-19 pandemic response on objectively measured physical activity (PA) of university employees. METHODS: Objectively measured PA data (walking distance, steps·d^{-1}, and Moderate-Vigorous PA (MVPA) time) were collected from commercial grade triaxial accelerometers from Jan-May in calendar years 2019 and 2020. Data were high pass filtered at 1000 steps·d^{-1} and 20% of their monthly average to eliminate outlier data due to improper function or insufficient wearing of PA monitoring devices. Subjects with less than three data points per week were excluded from data analysis. Data were compared by a two-way repeated ANOVA (N=625) with α = 0.05. RESULTS: Walking distance was significantly lesser in April 2020 compared to Feb 2020 (6.32 ± 0.16 vs. 6.56 ± 0.12 km·d^{-1}, p < 0.001). Walking distance was lesser during the months of April (8.9%, p < 0.001) and May 2020 (5.9%, p < 0.001) compared to similar time periods from calendar year 2019. Daily steps were significantly (4-5%, p < 0.001) lower in April 2020 compared to the months of Jan-March 2020. Daily steps during the month of May 2020 were significantly greater than April 2020 (5%, p < 0.001), but not significantly different from Jan-March 2020. Daily steps were significantly lesser in the months of April 2020 (8759 ± 158 vs. 9815 ± 133 steps·d^{-1}, p < 0.001) and May 2020 (9205 ± 159 vs. 9867 ± 132 steps·d^{-1}, p < 0.001) compared to the same time period of 2019. MVPA time was greater in the months of March-May 2020 compared to Jan and Feb of 2020 (5.0-17.0%, p < 0.001). Time spent in MVPA was similar between calendar years 2019 and 2020 for the months of March, April, and May. CONCLUSION: These data indicate a decrease in walking distance and daily steps, but not time spent in MVPA during the initial stage of the COVID-19 pandemic response. These findings suggest an increased time spent in sedentary behavior, but not reduced time spent in exercise, during the early stages of the COVID-19 pandemic compared to the previous calendar year. FUNDING: National Center for Research Resources and the National Center for Advancing Translational Sciences, National Institutes of Health UL1TR001998 (LMB).

ASSOCIATION BETWEEN COMMUNITY CRIME AND PHYSICAL ACTIVITY LEVELS IN CHILDREN WITH OBESITY IN THE MID-SOUTH

John Jackson Martin Taylor. *UTHSC - COM, Memphis, TN.*

Obesity is a serious health concern affecting nearly all communities. Studies have shown significant health disparity with lower socioeconomic areas impacted most. This study examined associations of self-reported physical activity levels (PA) with community crime and poverty levels in 708 children (BMI z-score 2.54±0.44, 12.3±3.6 years, 62% female, 69% African American, 47.5±6.5% body fat) in the Healthy Lifestyles Clinic (HLC) at Le Bonheur Children's Hospital. Caregiver survey assessments of PA showed 26.7% complete 60 minutes of PA ≥5 days/week, 42.8% complete 60 minutes of PA ≤4 and ≥2 days/week and 30.5% complete 60 minutes of PA <2 days/week. Public government and FBI sources were used to evaluate crime (total, property, and violent) and poverty levels in HLC families' communities. Median household income in these communities was $43,801±21,494 (range $17,000-$129,382). Violent crime index (0-100) was 68.9±27.2 (national average (US) =22.7; Memphis metro average (MSA) =57.6). Property crime index (0-100) was 69.8±23.4 (US=35.4; MSA=59.4). Most HLC patients live in communities with high crime (nearly double US average for property (57.9%) and violent (57.8%) while fewer patients live in areas with lower than the US average property (13.1%) and violent (23.3%) crime. Population below poverty was 24.1±13.3% (US=12.3; MSA=19.0). PA levels were not associated with total crime index (p=0.32), violent crime index (p=0.82), property crime index (p=0.92), or percent

population below poverty line (p=0.32) in our cohort of children with obesity. Our findings suggest that in our largely urban cohort, crime and poverty are significant concerns but may not be the key limiting factors in patient physical activity completion.

PHYSICAL ACTIVITY IN A UNIVERSITY COMMUNITY BEFORE AND AFTER A COVID-19 SHUT DOWN

Brynn Hudgins. *James Madison University, Harrisonburg, VA.*

BACKGROUND: Achieving recommended levels of physical activity (PA) is important for achieving and maintaining health. Recent guidelines state that any amount of PA has positive effects. With the COVID-19 pandemic resulting in the transition to remote teaching and learning, as well as changes to the daily work routine of university staff, overall PA levels were likely impacted. The purpose of this study was to assess whether a significant change in PA occurred before and after one university transitioned to remote learning. METHODS: Subjects were recruited from the James Madison University (JMU) community who owned and wore a commercial physical activity (PA) monitoring device for 30 days prior to the JMU spring break in March 2020, as well as 30 days after. During the JMU spring break, the campus went from in-person instruction to 100% online instruction. Subjects completed an anonymous online survey and input uploaded step data from their online account. Paired sample t-tests were utilized to examine differences before and after JMU spring break. RESULTS: Twenty-eight subjects (age = 42.6 ± 11.8, BMI = 28.9 ± 7.1, 20 female, 8 male) completed the survey. Sample included 4 students, 23 staff and faculty, and 1 family member of a JMU student. The 7-day step average for the week before spring break (8200.2 ± 3243.4) was higher than the 7-day step average for the week after spring break (6864.5 ± 3619.7, P = 0.006). There was a trend for a higher 30-day mean step average before spring break (8085.4 ± 2965.6) vs. after (7474.9 ± 3888.2, P = 0.08). Weekday step averages were higher before spring break (8093.5 ± 2854.5) vs. after (7195.3 ± 3695.2, P = 0.03). Weekend step average did not differ between time points (8153.3 ± 3850.4 vs. 8214.9 ± 4823.3, for before and after break, respectively, P = 0.86). CONCLUSIONS: Results found that physical activity levels were altered after stay-at-home orders took effect. Overall PA declined the week after spring break, with weekday steps being impacted most negatively for the month following. This change is likely a reflection of the significant amount of everyday transport PA that is needed to navigate daily life on a university campus (walking to class, to work, walking associated with job duties, etc.) that was removed due to stay-at-home orders. Weekend PA did not differ, as daily routines were likely more stable.

DESCRIBING MODES OF PHYSICAL ACTIVITY AMONG HIGH AND LOW SOCIOECONOMIC STATUS ADOLESCENTS

Caroline C. Sims, Jason Fanning. *Wake Forest University, Winston-Salem, NC.*

Background: Physical activity is essential in creating both positive physical and mental health with especially strong effects on stress. This is true across the lifespan, but achieving sufficient levels of physical activity is especially important in adolescence where high levels of stress can have lifelong effects. This may be compounded in low socioeconomic areas, which have unique sources of stress, and so activity promotion endeavors are especially important in these environments. Due to differences in resources (e.g., access to costly gym facilities, paved and safe roads), the amount and type of common forms of physical activity may differ in these communities. By understanding the relationship between physical activity and anxiety, and whether activity levels are drawn from different modes of activity among high and low SES individuals, health practitioners can better tailor public health messaging around physical activity.Purpose: Our primary purpose is to describe types and levels of physical activity in children of low versus high income families. This is vital in crafting relatable and meaningful public health messaging around physical activity and for planning future lifestyle interventions for stress management.Methods: This study is a secondary analysis of the NHANES 2012 data set. The NHANES survey asks an extensive array of questions related to the activity levels of individuals aged 3-15 years of age. Questions were asked in one sitting either at home or at a mobile center and children under the age of 12 had proxy respondents (usually a parent or guardian). Participants note the weekly duration in which they engaged in a variety of lifestyle and exercise behaviors (e.g., yard work, basketball).Expected results: Through this study, we expect to find that generally levels of physical activity are lower than stated recommended levels (60 minutes daily) and that the predominate mode of physical activity will differ between high and low socioeconomic status children. Thus, this would mean it would be vital that health programming adapts to serve those of all socioeconomic statuses in order to increase overall wellbeing.

CONSUMER WEARABLE DEVICE OWNERSHIP AND COMPONENTS OF THE 24-HOUR ACTIVITY CYCLE IN UNIVERSITY STUDENTS

Benjamin Donald Boudreaux, Ginny M. Frederick, Ellen M. Evans, FACSM, Patrick J. O'Connor, FACSM, Michael D. Schmidt. *University of Georgia, Athens, GA.*

BACKGROUND: Consumer wearable devices (CWD) such as activity trackers (e.g., Fitbit) or smartwatches (e.g., Apple Watch) can track different behaviors within the 24-hour activity cycle (24-HAC) which is conventionally demarcated into 1) sleep, 2) sedentary behavior (SED), 3) light (LPA) and 4) moderate-vigorous physical activity (MVPA) behaviors. College students as a cohort have altered 24-HAC patterns, though in part due to variable sleep habits, and increased SED due to academic pursuits. Moreover, this cohort is one of the first generations to mature with CWD. Although theoretically plausible, the influence of CWD ownership (CWD+; CWD-) on components of the 24-HAC in this cohort is unknown. This study examined the relationship between CWD and components of the 24-HAC, sleep, SED LPA and MVPA, in university students. **METHODS:** University students (n=647, 20.3±1.6yrs, 80% female, 49% CWD+) completed an online survey to assess demographics and CWD status, sleep duration via the Pittsburgh Sleep Quality Index, SED via the International Physical Activity Questionnaire (SED), and PA via the Godin Leisure-Time Exercise Questionnaire. Multiple linear regression examined the association of CWD with sleep, SED, and PA of the 24-HAC adjusted for sex, race, ethnicity, BMI, all known to influence outcomes of interest. **RESULTS:** CWD did not impact sleep duration (CWD+ = 488.4±65.3 vs CWD- = 480.8±79.2 min/day, p=0.26). However, students with CWD+ status had lower SED (CWD+= 390.0±156.7 vs. CWD- = 421.1±160.8 min/day, p=0.04), lower LPA (CWD+= 37.7±65.5 vs CWD- = 48.7±93.7min/day, p<0.01) and greater MVPA (CWD+ = 46.4±61.2 vs. CWD- = 42.5±59.3 min/day, p<0.01) compared to CWD-. After adjusting for other components of the 24-HAC, results remained significant for LPA (p<0.01) and MVPA (p<0.01), but SED became no longer significant (p=0.62). Total sleep duration remained non-significant (p=0.27). **CONCLUSIONS:** Owning a CWD is positively associated with MVPA, but is not associated with total sleep duration in university students. Future studies in this population should incorporate objective measures to address the limitations of self-report and explore changes in the 24-HAC components after initiating use of a CWD.

RELATIONSHIPS BETWEEN SEX, RACE, ETHNICITY, AND COMPONENTS OF THE 24-HOUR ACTIVITY CYCLE IN COLLEGE STUDENTS

Laura Faye Hildreth, Benjamin D. Boudreaux, Ginny M. Frederick, Ellen M. Evans, FACSM, Michael D. Schmidt, FACSM. *University of Georgia, Athens, GA.*

BACKGROUND: Components of the 24-hour activity cycle (24-HAC) consisting of sleep, sedentary behavior (SED), light physical activity (LPA), and moderate-to-vigorous physical activity (MVPA) are all important for health and these behaviors may be established during the transition from adolescence to adulthood. Because college students have dynamic 24-HAC patterns due to academic pursuits, the relationship between sex, race, ethnicity, and components of the 24-HAC in college students is unclear; thus, this study aimed to examine these relationships. **METHODS:** College students (n=647, 20.3±1.6yrs, 80% female) completed an online survey to assess demographics, sleep duration via the Pittsburgh Sleep Quality Index, SED via the International Physical Activity Questionnaire (SED), and physical activity (PA) via the Godin Leisure-Time Exercise Questionnaire. Multiple linear regression was used to examine the association of sex, race, and ethnicity with each component of the 24-HAC in a mutually adjusted model. **RESULTS:** Females (F) reported similar sleep duration [F= 484±73 vs M= 484±70min/day, (p=0.99)] and SED time [F=402±156 vs M 409±163min/day, (p=0.25)] as males (M). Females reported lower PA (leisure-time activity score) compared to males (M) [F= 42±26 vs M: 49±27, (p<0.01)]. Non-Hispanic White (NH-W; n=441) students reported a longer sleep duration compared to Non-Hispanic Black (NH-B; n=43) and Asian (AS; n=83) students [NH-W= 492±67, NH-B= 455±95 (p<0.01), AS= 463±73 (p<0.01)]. SED time (min/day) did not differ between NH-W and NH-B and HS students but did differ in AS students [NH-W= 388±151, NH-B: 424±124, AS= 448±165 (p=0.04), HS= 432±199]. NH-W students reported higher PA compared to NH-B and AS students [NH-W= 48±25, NH-B= 26±23 (p<0.01), AS= 34±23 (p<0.01). Total sleep duration, SED time, and PA did not differ between NH-W and Hispanic (HS; n=45) students [sleep: NH-W= 492±67 vs HS= 484±76; SED: NH-W= 388±151 vs HS= 432±199; PA: NH-W= 48±25 vs HS= 42±34]. **Conclusions:** Our data suggest that sex, race, and ethnicity are related to sleep, sedentary behavior, and physical activity behaviors in college students. Future studies should incorporate objective measures of the 24-HAC behaviors. Intervention strategies may need to vary with respect to 24-HAC behaviors and key demographic variables to be effective.

SESSION IV: REVIEW/SYMPOSIA Friday, Feb. 19, 1:00–2:00 pm EST

TARGETING SEDENTARY BEHAVIOR AS A FEASIBLE HEALTH STRATEGY DURING COVID-19

Josh P. Causey[1], Emily Draper[1], Gabriel Zieff[1], Lauren Bates[1], Zachary Y. Kerr[1], Justin B. Moore[2], Erik D. Hanson[1], Claudio Battaglini[1], Lee Stoner, FACSM[1].
[1]University of North Carolina at Chapel Hill, Chapel Hill, NC. [2]Wake Forest University, Winston-Salem, NC.

Due to social restrictions caused by the COVID-19 pandemic, increased barriers to physical activity have led to a rise in sedentary behavior, which is associated with negative physical and mental health. While traditional strategies to increase exercise and physical activity are still recommended, these may be less feasible in the wake of the pandemic. For example, the already difficult task of promoting traditional exercise and physical activity habits at multiple levels (e.g. individual, environment, and policy) has been further exacerbated during the pandemic. Strategies to reduce sedentary behavior, however, provide a low risk, practical target through which the adverse health effects associated with COVID-19 social restrictions can be minimized. Further, while conventional exercise and physical activity interventions may be limited by the necessary acquisition of certain resources, targeting sedentary behavior provides a mechanism to reduce health risks that is less hindered by factors related to health disparities such as socioeconomic status and race. Thus, strategies to reduce sedentary behavior are a feasible target that provide an equitable mechanism to mitigate negative health outcomes during COVID-19.

SESSION IV: POSTER/FREE COMMUNICATION Friday, Feb. 19, 1:00–2:00 pm EST

MENTAL HEALTH SELF-EFFICACY IN COLLEGE ATHLETIC TRAINERS: AN EXPLORATORY STUDY

Martha Dettl-Rivera. *Winthrop University, Rock Hill, SC.*

BACKGROUND: National Collegiate Athletic Association (NCAA) certified athletic trainers play a crucial role in recognizing and referring college student-athletes in the event of a mental health issue or crisis but lack formal training. The purpose of this study was to explore the influence of the USA Mental Health First Aid (MHFA-USA) course of NCAA certified athletic trainers' self-efficacy in student-athlete mental health referrals. **METHODS:** NCAA certified athletic trainers enrolled in MFA-USA courses were recruited via electronic mail to participate in the study. Participants (n=8) completed pre-course, post-course, and one month follow-up surveys measuring confidence levels with mental health referrals. One survey, Mental Health Efficacy Questionnaire (MHEQ), was adopted from an eight question validated online mental health tool to specifically measure self-efficacy scores and scored on a Likert scale of 10. The MHFA-USA Course Effectiveness (MCE) form evaluated different aspects of the course related to the Theory of Planned Behavior but only four self-efficacy questions were evaluated and scored on a Likert scale of 5. To determine changes in self-efficacy scores, repeated measures ANOVA was used to compare pre-, post- and follow-up scores from the MHEQ and the questions evaluating self-efficacy within the MCE form. **RESULTS:** The MHEQ displayed improvement of self-efficacy from pre-course to post-course. The scores increased from 7.28 ± 1.02 (M ± SD) (moderately confident) to 8.98 ± 1.06 (very confident). Additionally, confidence levels remained higher at one month follow-up, 8.94 ± .99, compared to pre-course. The MCE form also revealed improvements to confidence levels from pre-course, 3.13 ± .79 to post-course, 4.38 ± .35, as well as one month follow-up, 4.44 ± .42. **CONCLUSIONS:** There has not been current research on formal mental health training programs of NCAA certified athletic trainers. This exploratory study demonstrated there were significant improvements of self-efficacy scores in mental health referrals in NCAA college athletic trainers. These improved confidence levels established the potential for applicability and practicality of the MHFA-USA course in a college athletics setting. **Grant:** UNC-Greensboro Dissertation Grant Award - $250

EXAMINATION OF FEELING STATES AFTER AN ACUTE BOUT OF FOAM ROLLING AND HIGH INTENSITY EXERCISE

Lauren M. Biscardi, Debra A. Stroiney. *George Mason University, Manassas, VA.*

BACKGROUND: Psychological benefits of massage include acute improvement in positive affect, relaxation, perceived soreness, fatigue, and reductions in anxiety. Foam rolling also acutely reduces perceptions of soreness and fatigue. Physical activity increases positive and decreases negative affect. It is unknown whether foam rolling may have the same effects on mood as massage and/or exercise. The purpose of this study was to examine changes in affect following an acute bout of foam rolling and subsequent high intensity exercise. We hypothesize that positive affect and tranquility will increase, fatigue and negative affect will decrease. METHODS: 14 trained runners (32.9±12.4 yr; 171.1±7.0 cm; 67.8±6.7 kg; 17.8±8.1 %BF; 51.5±9.8 mL/kg/min VO_{2peak}) were recruited. Baseline testing included measures of body fat percentage, VO_{2peak} and a familiarization run. In the experimental session, participants completed foam rolling prior to a 4-minute high-intensity treadmill run. Foam rolling was applied bilaterally to the quadriceps, hamstrings, calves and gluteal muscles for 90 seconds per muscle group. The Physical Activity Affect Scale (PAAS) measured affect before foam rolling, after foam rolling and after exercise. The PAAS has 4 subscales: positive affect, negative affect, fatigue and tranquility. A repeated measures ANOVA was used to assess PAAS changes over time. A Pearson's correlation was run to determine a relationship between baseline scores and the amount of affective change. Alpha was set at .05. RESULTS: Post hoc power analysis was .84. Tranquility significantly decreased from baseline (7.71±1.5) to post-running (5.64±2.6) and from post-foam rolling (7.57±2.4) to post-running ($p<.05$). No other statistically significant differences were found. Significant negative correlations were found between baseline value and affective change for both positive affect and fatigue after foam rolling ($r=-.70$, $r=-.62$) and after exercise ($r=-.79$, $r=-.72$). Subjects worked at an intensity of 83.5±.09 $\%VO_{2peak}$. CONCLUSIONS: Decreases in tranquility and no changes in positive affect after high-intensity exercise are consistent with literature assessing mood post-exercise. Foam rolling does not seem to elicit the same responses on affect as massage and physical activity. Affective changes in response to physical activity have been tied to baseline values, our results support these findings for positive affect and fatigue.

PHYSICAL ACTIVITY, SEDENTARY BEHAVIOR, SMARTPHONE USE, AND SLEEP PATTERNS OF YOUNG ADULTS DURING COVID-19 QUARANTINE

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Background: The effect of home quarantine on health-related variables has not been assessed during the COVID-19 pandemic. This study assessed the effects of COVID-19 home quarantine on physical activity, sedentary behavior, smartphone use, and sleep patterns in college-aged adults. Methods: Data was collected in a sample of 20 young adults (mean age ± SD: 22.6 ± 3.4 years; 55% males) over seven days pre-COVID-19 quarantine and seven days during COVID-19 quarantine. Objective and subjective physical activity (accelerometer and the International Physical Activity Questionnaire (IPAQ), respectively), the number of hours sitting (IPAQ), objectively-measured smartphone use (smartphone screen time applications), and objective and subjective sleep (accelerometer and the Pittsburgh Sleep Quality Index, respectively) were assessed. Results: Results revealed significantly greater walking time and mean steps ($p < 0.001$, $d = 1.223$ to 1.605), and moderate and vigorous physical activity ($p < 0.05$, $d = 0.568$ to 0.616), in the pre- compared with the during COVID-19 quarantine phase. Additionally, smartphone use ($p = 0.009$, $d = 0.654$), sitting time ($p = 0.002$, $d = 1.120$), and total sleep ($p < 0.004$, $d = 0.666$) were significantly greater in the during compared with the pre-COVID-19 quarantine phase. Conclusion: This is the first study to use objective measures of physical activity and smartphone behavior to assess health-related activities performed during COVID-19 quarantine. In conclusion, this study revealed that during the COVID-19 quarantine time, health-related behaviors changed, as participants spent less time engaging in physical activity and more time sitting, using the smartphone, and sleeping. Increased time spent inside led individuals to make unhealthy decisions in regards to health-related variables. These findings are of importance to governing bodies to make informed decisions, including lifestyle modifications and to encourage health-promoting activities during times of quarantine.

COPING METHODS UTILIZED BY COLLEGIATE ATHLETES SUFFERING FROM SEASON-ENDING INJURY

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BACKGROUND: There is a vast amount of research on the varied physiological responses of athletes to injuries, but few studies have looked at the diverse psychological responses athletes face following season ending injuries. Many theoretical models attempt to explain how a person may cope following trauma, however currently it is unclear which of the varied coping mechanisms are utilized most frequently by athletes following season ending injury. This study examined how Division II athletes cope with season ending injuries. We anticipate athletes will utilize a variety of methods to cope with season ending injury. METHODS: This study measured 14 different coping mechanisms an athlete may use by implementing the Brief COPE Inventory to eligible athletes. The Brief Cope Inventory has been determined to be a reliable and valid method to quantify individuals' coping methods following traumatic events. The Brief Cope Inventory asks individuals to respond to prompts such as "I take additional action to try to get rid of the problem." Participant's then rate how they respond to each prompt on a 4-point Likert scale as follows: "I usually don't do this at all," "I usually do this a little bit," " I usually do this a medium amount," and "I usually do this a lot". Athletic trainers of the NCAA Division II, Gulf South Conference were emailed to explain the purpose of the study and asked to provide the inventory link to any athlete suffering a season ending injury in the past five years. 34 participants (m=15, f=19) completed the study. The results were analyzed by first raking the category mean scores from highest to lowest and then each category was compared for significant differences using a Repeated Measures ANOVA ($p < 0.5$). RESULTS: Results indicated athletes suffering from season-ending injuries choose primarily positive methods of coping significantly more than negative coping methods with the top three coping mechanisms being acceptance, planning, and active coping. CONCLUSIONS: The results yielded from this study may to be used by many medical professionals to better understand athletes' choices of coping mechanisms and direct those coping negatively to more positive ways of coping for an enhanced psychological recovery from an injury. GRANT FUNDING: McNair Scholar

EXPLORING FACTORS UNDERLYING PERFORMANCE SATISFACTION OF AN ACUTE RECREATIONAL EXERCISE SESSION

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BACKGROUND: Emotional responses to exercise can be predictive of future exercise behavior and, in studies with athlete populations, is associated with performance satisfaction (PS). However, PS pertaining to recreational exercise in non-athlete populations is understudied. PURPOSE: Explore determinants of PS of acute recreational exercise. METHODS: Upon leaving the designated exercise area of a university recreation center, respondents were asked to complete a survey regarding the bout of exercise just completed. PS was rated via 100mm Visual Analog Scale (0=completely dissatisfied, 100=completely satisfied). Respondents were asked to provide a written explanation for the basis of PS scores. Common themes and subthemes were constructed using content analysis of written responses. RESULTS: PS scores from respondents (23y±10, BMI=24.8kg/m^2, 31.8% female) were non-normally distributed (Median=82; Interquartile Range=21) and are provided after a representative quote for each subtheme. 'Performance,' the most prominent theme observed (52.5% of responses), was comprised of *intention congruence* ("I did what I came to do," PS 84), *prior performance comparison* ("pushed myself and upped my weight," PS 84), and *execution* ("able to do all of my lifts as quickly as possible," PS 69). The 'Process' theme (28.8% of responses) was comprised of *equipment availability* ("lots of free benches to use for free weights," PS 83), *time* ("workout was rushed in order to make it to class on time," PS 60), and *plan* ("I did not have an adequate workout plan," PS 50). Finally, the 'Readiness' theme (19.9% of responses) consisted of *health status* ("I'm not feeling well today," PS 28), *conditioning* ("Have not worked out in two weeks," PS 33) and *energy* ("lack of energy in the mornings," PS 72). CONCLUSION: Developing further understanding of PS and its determinants in recreational exercise may provide insight to the overall stress experience, including emotional responses. Future research may benefit from quantitatively investigating the relationship between the factors identified and performance satisfaction.

THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY, WEIGHT STATUS STRESS, AND DEPRESSION IN HBCU STUDENTS

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Background: Black college students report higher levels of stress and depression than students of other races. This disparity can be due to several factors including systematic racism, imposter syndrome, financial stress, or disproportionate effects of cardiovascular-related disease. Poor mental health can increase the risk of negative health outcomes like obesity and high blood pressure. Physical activity (PA) can reduce negative feelings and improve mental health. The American College of Health Association conducts a bi-yearly health behavior survey. From 2015-2029 only 9 historically black colleges or universities (HBCU) were included, and no more than 10% of any sample were Black. Therefore, it is important to assess the relationships health behaviors have with stress and depression. **PURPOSE:** This study examined the relationships between PA, weight status, stress, and depression. **METHODS:** Participants (N=110) were students at an HBCU who completed a Polar TriFit assessment at the university's wellness center. Body mass index (BMI) was calculated from height and weight obtained in the assessment, and participants self-reported PA. Participants completed inventories to assess stress and depression symptoms. **RESULTS:** Participants (mean age 20.9±3.9 yrs) were mostly women (66%) and predominantly Black (77.5%). Average BMI was 26.9±6.6 $kg \cdot m^{-2}$, and 47.8 % were classified as overweight or obese. Most participants reported regular PA (26.2%) or regular heavy PA (35.5%), and 38.3% reported no regular PA. There was a small, significant correlation between BMI and depression scores (r=.23, p=.02), and there were no group differences for BMI classification (p=.09). BMI was not associated with stress. Those reporting regular heavy PA had the lowest depression scores. Depression scores were lower for regular heavy PA (p=.006) and for regular PA (p=.039) compared to no PA. Regular heavy PA (p=.03) and regular PA (p=.039) participants had significantly lower stress scores than those reporting no PA. **Conclusion:** Physical activity was associated with lower depression and stress scores regardless of intensity. Therefore, it is important to promote PA to improve mental health in Black college students through intervention. PA will not eliminate chronic stress, but it might help students cope with stress and improve mental health. Research should continue to assess PA and mental health in students enrolled at HBCUs.

PERCEIVED STRESS, RESILIENCY, AND PHYSICAL ACTIVITY IN COLLEGE STUDENTS DURING COVID-19 REMOTE LEARNING

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BACKGROUND: In early 2020, the SARS-CoV-2 pandemic prompted a quick pivot to online learning for most university students in the United States. Along with social distancing and lockdown measures, these changes likely negatively impacted mental health of students. Given the relationship between stress, resiliency and physical activity (PA), the goals of this study were to evaluate the relationship among these variables and any differences between males and females. METHODS: Students (n = 360) at a southeastern U.S. university completed an online survey in Summer 2020. Perceived Stress (PSS), Resiliency (BRS), Life Events (LEI), and an adapted International Physical Activity Questionnaire (IPAQ) that added questions about resistance training were recorded. Independent T-tests analyzed differences in PSS, BRS, LEI, and PA between males and females and Pearson Correlations assessed relationships among these variables. Two-way ANOVAs examined the effect of gender and PA frequency on PSS and BRS, including separate models for each activity type (vigorous, moderate, walking, and resistance training) using High and Low frequency groups created with median splits in the sample. RESULTS: Females had lower BRS (3.2 ± 0.8 vs 3.6 ± 0.8), higher PSS (22.6 ± 6.7 vs. 17.1 ± 8.4) and higher LEI scores (248.2 ± 112.2 vs 186.5 ± 120.1) than males (all $p < 0.001$). Males generally reported higher levels of PA. PSS/BRS scores were more strongly correlated with PA in males than in females. Significant gender x PA frequency interactions were found for PSS with vigorous activity ($p = 0.03$) and for BRS with moderate activity ($p = 0.04$). There was a significant main effect of frequency for PSS with resistance training ($p < 0.001$) and for BRS with walking ($p = 0.02$) and resistance training ($p < 0.01$). CONCLUSIONS: Gender differences and associations with PA suggest that interventions may be particularly needed for females and those with low PA levels. These programs should create small and accessible PA opportunities focused on support and motivation.

SUCCESSFUL PHYSICAL ACTIVITY MAINTAINERS: STRATEGIES AND CHARACTERISTICS OF YOUNG, PROFESSIONAL AFRICAN AMERICAN WOMEN

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BACKGROUND: African American (AA) women have a higher prevalence of obesity and physical inactivity compared to their gender/racial counterparts. Young AA women gain the most weight between ages 20-30 years, yet are underrepresented in current literature surrounding leisure-time physical activity (LTPA) promotion. The purpose of this study was to explore the characteristics of young, professional, and active AA women and identify their strategies to LTPA maintenance. METHODS: AA women ages 20-34 years who met national guidelines for aerobic or muscle-strengthening LTPA for at least six months were recruited. A multimethod approach was used primarily focusing on qualitative methods with the addition of supplemental quantitative methods. Participants completed the following surveys: Processes of Change Questionnaire, Self-efficacy to Regulate Exercise, an adapted Commitment to Physical Activity Scale, and an adapted International Physical Activity Questionnaire. Next, participants engaged in a semi-structured interview about their experience with LTPA and their challenges and strategies to maintain LTPA. RESULTS: Ten women (26.1 ± 1.7 years of age; 2578.0±1228.5 MET-minutes/week of aerobic LTPA; 4.0±1.9 days/week of muscle-strengthening LTPA) completed the study. Four themes emerged from the interviews: *Early Life Contributors to LTPA Participation*, *Characteristics of Current LTPA*, *Initiating LTPA Participation*, and *Maintaining LTPA Participation*. Participants reported weight-lifting as their preferred type of LTPA, disclosed multiple planning and preparation methods to overcome challenges to LTPA, and utilized social media for social support and guidance to successfully initiate and maintain LTPA. Participants used several strategies to assist their LTPA maintenance: committing oneself (4.7±0.4 of 5), substituting alternatives (4.7±0.4 of 5), increasing knowledge (4.5±0.4 of 5), and comprehending benefits (4.5±0.7 of 5). Also, participants had high self-efficacy for LTPA (1414.5±64.4 of 1800) and high levels of commitment to LTPA (49.6±2.9 of 55). CONCLUSIONS: This study enhances the limited research in active, young AA women and identifies coping strategies that could potentially help inactive, young AA women overcome challenges to LTPA participation. This may improve long-term LTPA adherence, which could ultimately contribute to reduced obesity and obesity-related health disparities in this population.

ASSOCIATIONS BETWEEN OBJECTIVELY-MEASURED SMARTPHONES, PHYSICAL ACTIVITY, SEDENTARY BEHAVIOR, MOOD, AND SLEEP IN YOUNG ADULTS

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ASSOCIATIONS BETWEEN OBJECTIVELY-MEASURED SMARTPHONES PHYSICAL ACTIVITY, SEDENTARY BEHAVIOR, MOOD, AND SLEEP QUALITY IN YOUNG ADULTS Background: Previous studies have examined the relationships between subjective smartphone use (i.e., surveys), physical activity, and sedentary behavior. This study assessed the associations of objectively-measured smartphone use with physical activity, sedentary behavior, mood, and sleep patterns among young adults by collecting real-time data of the smartphone screen-state. Methods: This sample consisted of 306 college-aged students (mean age ± SD: 20.7 ± 1.4 years; 60% males). Over seven days of time, the following variables were measured in the participants: objectively-measured smartphone use (Your Hour and Screen Time applications), objective and subjective physical activity (GoogleFit and Apple Health applications, and the International Physical Activity Questionnaire (IPAQ), respectively), the number of hours sitting (IPAQ), mood (The Profile of Mood State (POMS)), and sleep (The Pittsburgh Sleep Quality Index (PSQI)). Results: Multiple regressions analyses demonstrated that the number of hours sitting per day, physical activity, and the POMS Global Score significantly predicted objectively- measured smartphone use (adj.R2 = 0.15). Further, participants with low levels of physical activity were more likely to increase the use of smartphones (OR = 2.981). Moreover, mood state (β = 0.185; 95% CI = 0.05, 0.32) and sleep quality (β = 0.076; 95% CI = −0.06, 0.21) predicted smartphone use, with those reporting poor quality of sleep (PSQI index &gt 5) being more likely to use the smartphone (OR = 2.679). Conclusion: In conclusion, there is an association between objectively-measured smartphone use and physical activity, sedentary behavior, mood, and sleep patterns. Those participants with low levels of physical activity, high levels of sedentary behavior, poor mood state, and poor sleep quality were more likely to spend more time using their smartphones. The results of this study should be taken into consideration by governing bodies in order to reduce smartphone usage, as it may contribute to a decrease in healthy lifestyles in young adults.

ACUTE EFFECTS OF SUBJECTIVELY- VS OBJECTIVELY-REGULATED HIGH-INTENSITY INTERVAL EXERCISE ON COGNITION

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BACKGROUND: High-intensity interval training (HIIT) may be an effective therapy for slowing the rate of cognitive decline over time. Subjectively-regulated (SUB) HIIT, which uses ratings of perceived exertion (RPE) on a 10-point scale to determine exercise intensity, may be a more practical method for prescribing HIIT to an aging population. However, there is very little evidence comparing the acute effects of objectively-regulated (OBJ) HIIT, which is programmed using heart rate, versus SUB HIIT on cognition.
METHODS: Thirteen participants (mean age = 36 ± 13 yrs) underwent baseline testing followed by randomly-assigned, single sessions of OBJ or SUB HIIT exercise sessions. All HIIT sessions included a 5-minute warm up, 20 minutes of alternating high and low intervals, and a 5-minute cool down. The OBJ session included 10 cycles of 1-minute intervals at the speed and/or incline associated with 80-90% heart rate max followed by 1-minute recovery intervals at the speed and/or incline associated with 30-40% heart rate max. The SUB session included 10 cycles of 1-minute intervals at the speed and/or incline chosen by the participant corresponding to a RPE of 8 or 9 on the Borg CR-10 scale followed by a 1-minute recovery at an RPE value of 3 or 4. Cognitive outcomes were collected before (PRE), immediately following (PT0), and after a 30-minute rest period (P30). Executive functioning was measured by the NIH Toolbox Flanker Inhibitory Control and Attention Test. Processing speed was measured by the Oral Symbol Digit Test (OSDT). Auditory immediate recall was measured using the Auditory Verbal Learning Test (AVLT). Data analysis was completed via SPSS using a repeated-measures, 2-Factor ANOVA with Time (PRE, PT0, P30) and Condition (OBJ, SUB) as factors. **RESULTS:** There were no significant interaction

or main effects of condition for any of the cognitive outcomes (p>0.05). For executive functioning, there was a significant main effect of time (F (1,2) = 3.595, p=0.042, ES=0.217), wherein scores at P30 were significantly higher than PRE values (57.75±2.792). A significant main effect of time was also evident for processing speed (F (1,2) = 40.499, p<.001, ES=0.757), where OSDT scores significantly increased at each timepoint (PRE = 123.036±3.917, PT0 = 133.071±3.823, P30 = 135.893±3.558). The main effect of time was significant for auditory immediate recall (F (1,2) = 16.752, p<.001, ES=0.563). AVLT scores significantly increased at each time point (PRE = 38.393±1.411, PT0 = 41.036±1.168, P30 = 42.643±1.180). **CONCLUSIONS:** High-intensity interval exercise, regardless of regulatory condition, significantly increases acute executive functioning, immediate recall, and processing speed in adults. Future research should focus on identifying the additive effects of HIIT exercise over time on cognition and aging-related cognitive-decline.

EFFECTS OF INTERRUPTED ROUTINE DUE TO COVID-19 ON CIRCADIAN CHRONOTYPE AND LEISURE TIME PHYSICAL ACTIVITY

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BACKGROUND: Circadian rhythm has been shown to be individualized, where some prefer to perform tasks earlier in the day, while others prefer to complete them later. Factors potentially influencing these circadian chronotypes, include sleep, routine, and physical activity. Recently, safety precautions were implemented due to COVID-19, causing changes to daily routines, which likely impacted some of these factors. Therefore, the purpose of this study was to examine the relationship between participation in physical activity, level of exercise engagement, and chronotype scores prior to and following COVID-19 related restrictions. **METHODS:** 128 active males (n=62) and females (n=66) between the ages of 18-55 years old (24.7±7.1 years) completed an online survey consisting of a demographics questionnaire, the Morningness-Eveningness Questionnaire (MEQ), and the Godin Leisure Time Physical Activity Scale (LTPA). Participants were asked to consider questions before and after COVID-19. The MEQ scores were totaled and individuals were categorized into morning (MT), intermediate (IT) and evening (ET) chronotypes. Three-way [pre-COVID chronotype (MT, IT, ET) x pre-COVID exercise engagement (recreational, organized) x time (pre-COVID, post-COVID)] repeated measures ANOVAs were conducted to evaluate MEQ scores and LTPA. **RESULTS:** A significant main effect of time was found for both MEQ (p=0.018) and LTPA (p=0.002) indicating changes in response to COVID-19 of -2.053 units (95% confidence interval= -0.361 to -3.744 units; d = -0.212) and -8.533 units (95% confidence interval= -3.328 to -13.378 units; d = -0.287), respectively. A significant time x chronotype interaction was shown for MEQ (p<0.001) with MT individuals indicating changes in response to COVID-19 of -8.557 units (95% confidence interval= -4.392 to -12.722 units; p<0.001), IT individuals indicating changes of -2.315 units (95% confidence interval= -.675 to -5.306 units; p=.044) and ET individuals indicating changes of +4.714 units (95% confidence interval= 10.423 to -0.995 units; p=0.044;), respectively. **CONCLUSION:** MEQ scores changed in response to COVID-19, with MT experiencing the greatest change, followed by ET, with an overall shift toward IT scores for both groups. LTPA was also decreased in response to COVID-19. Specific routine changes influencing the change in MEQ and LTPA scores should be identified in subsequent investigations.

THE EFFECT OF EXERCISE INTENSITY LEVEL AND SEX ON SUBJECTIVE TIMING DURING CYCLING

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BACKGROUND: The passage of time is often measured subjectively and can seem to pass slower or faster in certain situations. Tasks that are engaging or physiologically arousing alter subjective time. These characteristics are typical of aerobic exercise and can vary substantially with work rate (intensity). The impact of different intensity levels on subjective time during aerobic exercise remains largely unexplored. The primary purpose of this study was to determine the effect of intensity level on subjective time during aerobic exercise. METHODS: Apparently healthy volunteers (12 men, 8 women; age = 26.15 ± 3.84 years) completed a VO_{2peak} test on a Velotron Racermate cycle ergometer while heart rate was measured continuously. Maximal heart rate (HR_{max}) was estimated for each subject using the equation HR_{max} = 200-age, and was used to categorize moderate and vigorous exercise intensity levels. During each 3-min stage from baseline until exhaustion, subjects completed a time production task in which they produced a series of time intervals (2, 3, 5, 7, and 10 s) in a randomized order using a timing mechanism to which they were blinded. The ratio of produced (or subjective) time to actual time was calculated for four different intensity levels: 0 W (baseline), 40 W (light intensity), moderate intensity (64-76% HR_{max}), and vigorous intensity (77-95% HR_{max}). A 4 x 2 mixed ANOVA was used to evaluate the effects of exercise intensity (within-subjects factor; four levels) and sex (between-subjects factor; two levels) on time production ratio. RESULTS: There was no significant interaction effect between intensity and sex (p = 0.466, η^2 = .039) or main effect of sex (p = .777, η^2 = .005) on time production ratio. There was a significant main effect of intensity (p = .031, η^2 = .188), with an increase in time production ratio as intensity level increased from light (1.031 ± 0.178) to moderate (1.105 ± 0.215) to vigorous (1.156 ± 0.247). CONCLUSIONS: As exercise intensity level increased from light to vigorous, the time production ratio also increased, independent of sex. Time appeared to pass at a slower rate during exercise as intensity increased. This effect on subjective time was possibly caused by the attentional interference (distraction effect) of exercise at higher intensities.

ACUTE AFFECTIVE AND LYMPHEDEMA RESPONSES TO RESISTANCE EXERCISE AT VARIOUS INTENSITIES IN BREAST CANCER SURVIVORS

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BACKGROUND: Exercise intensity is a determining factor for providing a stimulus sufficient enough to illicit positive physiological outcomes in healthy adults and perhaps breast cancer survivors (BCS). Until recently higher intensities have not been prescribed to BCS because in the past clinical practice has advised BCS to avoid lifting heavy objects with the arm on the same side of the body affected by breast cancer. PURPOSE: The purpose of this study was to examine the effects of an acute bout of resistance exercise (RE) at a moderate (MOD), high (HI) or self-selected (SS) intensity on affect (feelings of pleasure and displeasure) and arm volumes (an indicator of lymphedema) BCS. METHODS: Following familiarization sessions, 8 female BCS (age: 56±5 years) were randomly assigned to exercise at 1) MOD - 60% of 1-RM for 3 sets of 12 repetitions, 2) HI - 85% of 1-RM for 5 sets of 5 repetitions, or 3) a SS weight for 3 sets of 12 repetitions in a counterbalanced fashion. Affect was measured using the feeling scale (FS; -5 to +5) and felt arousal scale (FAS; 1-6). Arm circumferences were measured to calculate the percent difference in arms between the surgically involved and uninvolved arms that had lymph nodes removed. All variables were measured at baseline, immediately after RE, 30-minutes post, and 60-minutes post RE. ANOVAs were used for analyses. Significance was set at p<0.05. RESULTS: There were no condition x time interactions for any of the variables. Across intensities, feelings of pleasure were significantly lower between shoulder press and all other exercises in the session (p=0.013). Although not statistically significant, feelings of pleasure were higher 30 minutes after MOD (4.00±0.26) and HI (4.00± 0.26) when compared to SS (3.00±0.86) and remained elevated at 60 minutes. The percent difference in arm volumes was similar between MOD (7.34±1.09%), HI (7.69±1.56%) and SS (7.81±1.44; p>0.05). CONCLUSIONS: Our preliminary findings suggest that an acute bout of RE at 60-85% of 1-RM elicits similar affective responses in BCS and does not exacerbate indicators of lymphedema. Interestingly, more negative affect was experienced during the last exercise (shoulder press) of each condition indicating that regardless of RE intensity, BCS experienced muscular fatigue, which necessary for eliciting muscular adaptations.

THE EFFECT OF EXERCISE-RELATED FATIGUE ON SUBJECTIVE TIMING

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Background In the absence of timing devices, time must be judged subjectively. Subjective time can be modified by arousal level and attentional focus, among other factors. The effect of fatiguing exercise on subjective time remains unexplored. Therefore, the purpose of this study was to determine if subjective time at a given workload was different as a result of completing fatiguing exercise. **Methods** Apparently healthy volunteers (13 men, 8 women; age= 26.48±4.03 years) completed a VO_{2peak} test to volitional exhaustion on a Velotron Racermate cycle ergometer. The exercise test was preceded by a baseline data collection period at 0 W (no cycling) and a 3-min warm-up stage of 70 W. Following termination of the exhausting exercise, subjects completed a 3-min cool-down stage of 70 W and a 0 W data collection period, in that order. During these four stages, subjects completed a time production task in which they produced a series of time intervals (2, 3, 5, 7, and 10 s) in a randomized order using a timing mechanism to which they were blinded. The ratio of produced (or subjective) time to actual time was calculated for the 0 W and 70 W stages before and after the exercise test. Paired-samples t-tests were used to compare the pre- and post-workout exercise values for the 0 W stages and the pre- and post-exercise values for the 70 W stages. Cohen's d was computed for each comparison as a measure of effect size. **Results** The time production ratio was significantly higher after fatiguing exercise (1.15±0.25) than before (1.05±0.17) for the 0 W condition (p=.02; d=.35). There was no significant difference in the time production ratios before (1.06±0.20) or after (1.11±0.23) fatiguing exercise for the 70 W condition (p=.16; d=.15). **Conclusion** Subjective time at rest seemed to pass more slowly following exhausting exercise when compared to before exercise (baseline). The finding that subjective time is elongated as a result of completing exhausting physical activity may have implications for people seeking to decrease anxiety through aerobic exercise.

THE RELATIONSHIP BETWEEN BODY IMAGE AND MENTAL HEALTH IN UNDERGRADUATE STUDENTS

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BACKGROUND: Body image is not a new issue, but it has become increasingly prevalent over the past decade due to the rise of social media, especially in college students. The purpose of this study was to examine the relationship between physical activity, body image, and mental health in undergraduate students, with the goal of determining the relationship between body image and mental health. METHODS: The participants in this study included 111 undergraduate students ranging from first-year to fourth-year students. Each participant was asked to complete an online survey to measure their body images and mental health. The Multidimensional Body-Self Relations Questionnaire (MBSRQ), a 69-item scale consisting of 10 subscales, was used to measure body image. Mental health was measured in terms of depression, anxiety, and wellbeing using the Patient Health Questionnaire-9 (PHQ-9), the General Anxiety Disorder-7 (GAD-7), and the Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS), respectively. RESULTS: Based on the current data, there was a moderately strong positive correlation between the Body Areas Satisfaction Scale (BASS) and wellbeing (r = 0.609, p < 0.001), and a moderately strong negative correlation between the BASS and depression (r = -0.602, p < 0.001). A negative correlation was also seen between the BASS and

anxiety (r = -0.481, p < 0.001). This study also found a moderate positive correlation between the Appearance Evaluation Scale and wellbeing (r = 0.532, p < 0.001). There was a negative correlation between the Appearance Evaluation Scale and both depression and anxiety (r = -0.462, p < 0.001; r = -0.345, p < 0.001; respectively). Lastly, similar results were seen for the Health Evaluation Scale. There was a positive correlation between the Health Evaluation Scale and wellbeing (r = 0.427, p < 0.001) and a negative correlation between the Health Evaluation Scale and both depression and anxiety (r = -0.463, p < 0.001; r = -0.497, p < 0.001; respectively). CONCLUSIONS: The results of this study suggested that, in undergraduate students, there is a positive relationship between body image and mental health. Further data analysis must be completed to determine whether physical activity is related to body image and mental health.

AFFECTIVE RESPONSES BEFORE AND AFTER TWO COMPETITIVE MATCHES IN NCAA DIVISION I MEN'S SOCCER ATHLETES

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BACKGROUND: Most modalities (e.g., aerobic and resistance) of exercise have found affective responses (pleasure-displeasure) to become more positive following activity. However, few studies have examined responses following a competitive match. Additionally, little is known about how physiological markers, such as testosterone and cortisol, might be correlated to these affective responses surrounding back to back competitive events. **PURPOSE**: To evaluate changes in measures of affect before (PreGame) and after (PostGame) two back to back competitive games separated by 72 hours, and the relationship between affect, testosterone and cortisol in Division 1 men's soccer athletes. **METHODS**: 19 soccer athletes (age: 18±1years; body fat: 11.0±3.1%). PreGame and PostGame affect measures and salivary samples were collected an hour before the start of the fourth and fifth game of the season and within 15 minutes after the game's completion. The feeling scale (FS; -5 to +5) was used to assess affective valence, and felt arousal scale (FAS; 1-6) to measure perceived activation. Salivary samples were analyzed via enzyme-linked immunosorbent assay (ELISA) to measure testosterone and cortisol. Analysis of variances (ANOVAs) and pearson's correlations were used with significance accepted at $p<0.05$. **RESULTS**: A significant effect for time ($p < .001$) and game ($p = .017$) was observed for FS and FAS. Univariate analyses found that the effect for time was due to FS becoming more negative (-6.84 ± .449; $p < .001$) and an increase in FAS (1.00 ± .270; $p = .002$) from PreGame to PostGame. The game effect was due to FS being more negative for the second game (-.816 ± .287; $p = .005$). Testosterone and cortisol did not seem to be related to the affective measures in this study. **CONCLUSIONS**: The findings that affect was more negative following competition is unusual considering affect usually improves following exercise. This decrease in affect is likely due to the outcome of the competition - losing the game and could also explain affect being more negative for the second game which was an additional loss. Previous research has found testosterone to influence mood when subjects win competition, which could explain why the relationships did not hold up in this study. Future research should continue to examine how physiological markers and winning influence subsequent affective responses.

DIVISION III ATHLETES' ACADEMIC PERFORMANCE, TIME COMMITMENT, AND STRESS IN-SEASON VERSUS OUT OF SEASON

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BACKGROUND: Collegiate student-athletes have significant time demands and stressors to manage. The time demands and stress on a student-athlete can change depending on whether they are in season or not. While some data support student-athletes having higher GPA's out of season than in season, other studies have shown no differences in GPA based on the sporting season. This study examined the impact being in-season vs. out of season on Division III Maryville College student-athletes GPA, credit hours per semester, time per week devoted to academics and athletics, and perceived stress, energy, and academic pressure. **METHODS:** Maryville College Student-athletes from a variety of sports (n=84) responded to an online survey where they self-reported semester grade point average, semester class credits attempted, perceived stress levels, and time devoted to sport and school, as well as which semester, fall or spring, was considered "in-season". Paired samples t-test, and Wilcoxon Sign Rank test were used to assess differences between in-season and out of season GPAs, credits earned, and time spent in both athletics and on academics outside of the classroom within each participant. **RESULTS:** Participants (42 male and 42 female) GPA was not significantly different between in season and out of season (3.25 ± 0.59 vs. 3.23 ± 0.60, p=0.79), however, participants took fewer credit hours (14.97 ± 1.24 vs. 15.60 ± 1.31, p&lt0.01), spent more time on athletics (23.40 ± 9.54 vs. 13.50 ± 8.59, p&lt 0.01), and less time on academics (13.10 ± 8.63 vs. 14.90 ± 9.53, p&lt 0.01) when in season compared to the offseason. Athletes were more stressed (p&lt 0.01), had lower energy levels (p&lt0.01), and higher academic pressure (p&lt 0.01) in season compared to out of season. **CONCLUSIONS:** Despite the rise in time commitment, stress, academic pressure, and lower energy in season; it appears that many Maryville College athletes reduce their academic schedule and are able to maintain an equivalent level of academic achievement in season compared to out of season.

THE NOCEBO EFFECT ON REACTION TIME PERFORMANCE

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BACKGROUND: The nocebo effect is a psychological phenomenon where people react negatively to a neutral stimulus based on expectations they formed from prior experiences. Previous literature has determined that people who are conditioned to a certain stimulus will physically react the same way regardless if the stimulus is present or not. The effect a nocebo can have on reaction times has yet to be established, however. Therefore, the purpose of this study was to examine the effects of a nocebo on reaction time performance in conditioned and unconditioned groups. METHODS: Sixteen participants (20.9 ± 1.1 years) completed the study. Participants were classified as "Conditioned" (n = 14) if they reported previously using lavender and believed it has a sedative effect, or "Unconditioned" (n = 2) if they were familiar with lavender oil but did not believe it has any physiological effects. In a single visit, participants completed a familiarization trial, then a baseline, were then exposed to a nocebo, and finally were reassessed after "treatment". Participants interacted with a Dynavision board, which is a large computer-controlled board with multiple circles of lights. Participants were tasked with looking straight ahead and using either hand to touch the light switch as they lit up. Faster reaction times related to touching the lights quickly, and more appropriate touches also increased their scores. Participants had one unscored familiarization trial, and 3-minutes later were then assessed for their baseline performance. Next, participants were given a capsule manufactured by the PIs (MM and KM) with 300 microliters of olive oil but were told it was lavender oil, and after 15-minutes of rest were assessed a final time on the Dynavision board. Scores and reaction times were recorded and analyzed for statistical significance. RESULTS: Paired sample t-tests did not reveal any statistically significant differences between UC and C groups for scores (p = 0.068) or reaction times (p = 0.085), though the Cohen's D effect sizes were large (scores: d = 0.964, reaction times: d = -0.872); indicating there was some psychological effect from ingesting the nocebo pill despite being non-significant. CONCLUSIONS: The study was novel for evaluating the nocebo effect for cognitive reaction time and peripheral vision performance. Although the differences between UC and C groups was not statistically significant, the large effect size indicates that there was a notable change in the values. This study serves as novel application of the nocebo effect on peripheral vision performance and reaction time. Those who have used lavender oil as a relaxant may create a physiological sedative effect even if one does not otherwise exist.

VIRTUALLY ENGAGING SOCIALLY WITH PHYSICAL ACTIVITY: THE VESPA REMOTE GROUP-MEDIATED ACTIVITY INTERVENTION

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Background: Physical inactivity and loneliness have been identified as major risk factors for poor health outcomes. Many older adults have limited access, low levels of motivation, or insufficient resources to utilize commercial gymnasiums to maintain both their physical and mental health, especially during the COVID-19 pandemic. Recently, virtual reality (VR) has significantly improved in overall quality and increased in popularity. VR headsets now offer 3-dimensional, 360-degree capabilities as well as the ability for the use of the body as a controller. Because the user must physically interact with their environment, VR offers great potential for group-mediated moderate-to-vigorous physical activity (PA) promotion. Virtual environments include options for both active games and group meeting rooms. The purpose of this study is to determine the feasibility and acceptability of the VR system for older adults in the context of an activity promotion intervention, and to explore the effect of a VR-delivered remote activity intervention on overall PA and social connection compared to a video conference cohort. **Methods:** We will recruit 30 low-active middle-aged to older adults ≥ 45 years of age for a 4-week home-based, group-mediated PA intervention delivered via either VR or video conference (VC). Participants will use their meeting modality for both group and 1-on-1 coaching instruction designed to enhance activity uptake through group dynamics and social cognitive principles. Those who are randomized to the VR group will be recommended to engage in real-world PA as well as use the available active games within the VR system. Each participant will receive a Garmin activity monitor and an activity diary for self-monitoring and goal setting purposes. Following the intervention, feasibility will be assessed via descriptive statistics on the number of participants reporting high levels of nausea, total sessions attended, adherence to behavioral prescription, and number of VR accesses outside of scheduled meeting times. Acceptability will be assessed by Likert and open response feedback pertaining to aspects of the technology used and program design. Differences in physical activity and social connection between the VR and VC groups will be evaluated by ANCOVA. **Anticipated Results:** It is hypothesized that the VR group will have greater amounts of physical activity and social connection than the VC group.

COMPARISON OF ONLINE VERSUS FACE-TO-FACE PHYSICAL ACTIVITY INTERVENTIONS ON UNDERGRADUATES' AUTONOMY AND PHYSICAL ACTIVITY LEVELS

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BACKGROUND: Approximately 33% of undergraduate students do not adhere to the physical activity (PA) guidelines put forth by US Department of Health and Human Services and do not experience the benefits associated with regular PA. Because the college years are some of the most influential years of ones' life, promoting PA and its benefits during this period is a promising strategy to reduce the risk of the future development of chronic diseases in this population. PA interventions grounded in Self-Determination Theory (SDT) effectively improve levels of PA by increasing autonomously motivated behaviors. Yet, it is unknown how SDT may impact students' PA autonomy via an online versus a face-to-face (F2F) PA intervention. METHODS: The purpose of this study is to compare the effectiveness of a F2F course-based PA intervention and its ability to increase undergraduate students' PA and autonomy levels to that of online course-based PA intervention. It is hypothesized that a F2F course-based intervention will be

more effective in increasing autonomy levels and PA in undergraduate students compared to the online intervention. The intervention will occur over a 15 week semester. Participants will complete demographics, IPAQ 7-day recall, Exercise Self-Regulation Questionnaire, and the Relative Autonomy Index. The F2F intervention will include an in-class lecture and activity. The online intervention will include the same educational material as the F2F intervention but will not incorporate any in-class lectures or activities. Statistical analyses will include frequencies and ANOVA. ANTICIPATED RESULTS: It is expected that both the online course-based PA intervention and the F2F course-based PA intervention will be effective in the promotion of autonomy and PA. However, it is expected that the F2F course based PA intervention will be more effective in increasing autonomy and PA levels of undergraduates. The results of this study could further the understanding of how online course-based PA interventions may promote autonomously motivated behavior and regular PA.

THE EFFECTS OF A BUDDY WALKING PROGRAM ON PHYSICAL ACTIVITY IN ADULTS WITH LOWER-BODY DISABILITIES

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BACKGROUND: Lower body disabilities, such as in the hip or knee, have been shown to impede individuals from participating in the minimum recommended amounts of physical activity (PA). This may be due to decreased gait speed, pain associated with exercise, lack of motivation, or decreased social interactions. Additionally, individuals with physical disabilities may experience decreased levels of PA due to the stigmatization of these individuals. To decrease this stigmatization, a buddy-walking program between physically disabled and physically abled individuals may improve the social interactions for both of these populations. This socialization may also increase levels of self-confidence, happiness, and self-worth in these individuals with physical disabilities. Finally, the incorporation of a buddy-walking program may also increase levels of PA in individuals with disabilities, as research has shown that utilizing group activities for individuals with physical disabilities may improve overall PA. Much of the research regarding this population, however, has been conducted in the youth population; therefore, the purpose of this study is to examine the effects of a buddy-walking program on PA and mental wellness in adults with lower body disabilities. METHODS: Twenty-five adults with lower body (hip or knee) disabilities will be recruited for this study. Participants must be able to walk (not wheelchair bound) to participate in this study. Pre- and post-measurements will be taken, including: 1) step counts using ankle accelerometers, 2) a 3-minute step test, 3) a timed up-and-go test, and 4) the Depression Anxiety Stress Scales (DASS) questionnaire. The buddy-walking intervention will include two buddy-walking sessions per week, for a total of one hour per session, for a total of 10 weeks. Participants will wear ankle accelerometers during buddy-walking sessions, and any improvements or changes in step count will be examined between the first and last buddy-walking sessions. Data will be analyzed using dependent samples t-tests to determine differences between pre- and post-buddy walking program for PA, aerobic fitness, mobility, and depression, anxiety, and stress. ANTICIPATED RESULTS: It is hypothesized that implementing a buddy-walking program will increase PA, aerobic fitness, and mobility and decrease levels of depression, anxiety, and stress in adults with lower body disabilities.

AGE-RELATED REDUCTION IN POWER AND MYOFIBER MORPHOLOGY AND COMPOSITION

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BACKGROUND: Power is diminished more dramatically at higher contraction velocities in older adults. It has been suggested that this may reflect age-related changes in single myofiber morphology and/or composition. The purpose of this study was to examine power, muscle activation, and single myofiber morphology and composition between young (YM) and older (OM) males. METHODS: Power, or torque multiplied by velocity, was recorded during isokinetic knee extensions at 60 deg/sec and 180 deg/sec in healthy, untrained YM (n=15; 20.7±2.2 yrs) and OM (n=15; 71.6±3.9 yrs). The relative increase in power from 60 deg/sec to 180 deg/sec was recorded for each participant. Electromyography amplitude of the vastus lateralis was normalized to its peak from a maximal isometric contraction to calculate muscle activation. Vastus lateralis tissue samples were obtained from a sub-sample (YM=13; OM=11) via microbiopsy and immunofluorescence was used to identify type I and IIa myofibers for subsequent analysis of cross-sectional area (CSA). Independent samples t-tests were used to compare groups and select correlations were assessed. RESULTS: Relative increase in power was greater in YM (159% vs. 115%; p=0.005). Muscle activation was similar between groups (p>0.05). The average number of myofibers analyzed per participant was similar between groups (YM=562.3±280.3, OM=576.6±201.4; p>0.05). Individual fiber type compositions and CSA were similar between groups (p>0.05), but type IIa:type I myofiber size ratio was lower in OM (-31.15%; p=0.002). Neither myofiber size nor composition data correlated with the relative power increase (p>0.05). CONCLUSIONS: OM had smaller type IIa myofibers relative to type I myofiber size, which may reflect age-related motor unit remodeling. Nevertheless, neither myofiber size nor composition were associated with the age-related diminishment in relative power increase. These data indicate that factors other than myofiber size or composition may be responsible for the impaired ability to increase power at a higher velocity in OM, but the smaller sample is an important consideration.

HYDROTHERAPY VS. LAND BASED EXERCISES ON DUAL TASK STATIC & DYNAMIC BALANCE IN A GERIATRIC POPULATION

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BACKGROUND: According to the Centers for Disease Control and Prevention (2016) fall death rates increased by 30% from 2007 to 2016 for the geriatric population. Disruption of balance is one factor that can lead to falls for the geriatric population especially while performing two activities simultaneously; in other words, dual tasking, which involves the performance of one task (postural control task) that demands the majority of the individual's concentration while also completing a second task (cognitive task). Finding effective therapies, like hydrotherapy, to decrease the occurrence of falls and improve balance in the geriatric population may increase quality of life. The purpose of this study was to determine the effectiveness of a six-week hydrotherapy dual task program and its effects on dual-tasking and balance in a geriatric population. **METHODS:** Eleven elderly adults (8 females; 3 males; age: 77.36 ± 6.83 years old; height: 160.79 ± cm; mass: 69.90 ± 8.34kg) completed a Timed-Up & Go test and static balance assessments on an AMTI force plate under the following conditions during a single and dual task: Eyes Open (EO), Eyes Closed (EC), Eyes Open Foam (EOF), Eyes Closed Foam (ECF), Eyes Open Dual Task (EODT), and Eyes Open Foam Dual Task (EOFDT) with a Stroop Color and Word Test (SCWT) before (pre) and after (post), six weeks of dual-tasking balance training either in a land-based (LB) or hydrotherapy (HYDRO) group. Average sway velocity, SCWT response correctness, and TUG times were analyzed using a between subject 2 x 2 [2 (Hydrotherapy x Land-Based Exercises) x 2 (Pre-test x Post-test)] repeated measures ANOVA at $p \leq 0.05$. **RESULTS:** Significant group and time main effect differences were found for dynamic balance. The HYDRO group demonstrated decreases in TUG times under the single task condition. Both groups reported decreases in TUG times while under a dual task with increases in SCWT response correctness after 6 weeks of training. Significant time main effect differences were discovered for both the HYDRO and LB groups. Both groups reported increases in average sway velocity in the EODT condition with increases of SCWT response correctness, resulting in decreases in balance performance. **CONCLUSIONS:** Both HYDRO and LB exercises may show improvements in dynamic balance while under a dual tasking condition. However, dual tasking did hinder static balance performance when difficulty increased with a cognitive task.

AGE RELATED DIFFERENCES IN ABSOLUTE AND RELATIVE MAXIMAL STRENGTH AT DIFFERENT VELOCITIES

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BACKGROUND: Examining peak torque (PT) relative to muscle size provides insight on qualitative factors (e.g., fiber type composition, muscle activation) that are influential for maximal strength, yet data is scarcer for higher velocity contractions. Contractile acceleration (ACC) has been proposed to be influenced by similar physiological factors. The purpose of this study was to examine absolute and relative PT, as well as ACC at different velocities in young and older males. METHODS: Healthy, young (n=15, age=20.7±2.2 yrs) and older (n=15, age=71.6±3.9 yrs) males performed maximal voluntary contractions at 0 deg/sec (isometric), 60 deg/sec, and 180 deg/sec using a dynamometer. Ultrasonography was used to obtain cross-sectional area (CSA) of the vastus lateralis and rectus femoris. Peak torque (PT) was obtained at all velocities, and acceleration (ACC) was recorded at 60 deg/sec and 180 deg/sec prior to the load range phase. Relative PT for each velocity was calculated by dividing PT by CSA. Independent samples t-tests were used for group comparisons, while Pearson correlation coefficients were calculated for select variables. RESULTS: CSA was lower in older males (19%, p=0.001). Absolute PT was decreased at all velocities (27-38%, p<0.001), while relative PT (22%, p=0.003) and ACC (11%, p=0.004) were decreased only at 180 deg/sec in older males. ACC was only correlated with CSA in older males (r=0.59, p=0.02). CONCLUSIONS: The smaller CSA in older males was less influential for PT at 180 deg/sec, thus indicating the importance of other physiological factors for high-velocity strength. A higher contraction velocity was needed to reveal age-related differences for ACC, which is likely due to the greater duration of velocity development. Interestingly, ACC was moderately associated with CSA, but not relative PT, which suggests ACC and relative PT may not reflect similar physiological properties in older males.

BIRTH WEIGHT, EARLY GROWTH, AND GLUCOSE REGULATION IN YOUNG ADULTS BORN PRETERM

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BACKGROUND: In the US, approximately 10% of infants are born preterm (< 37 weeks gestation) and 1.5% are born with very low birth weight (VLBW; <1500 g). Both are associated with short-term as well as long-term consequences including impaired blood glucose regulation that may persist into adulthood. Additionally, evidence suggests that accelerated growth in infancy may increase cardiometabolic risk. The purpose of this study is to examine the association between birth weight and early growth with glucose regulation, insulin resistance (IR), and risk for type 2 diabetes in young adults born prematurely with VLBW. METHODS: In a cohort of young adults, ages 18-23 years, born with VLBW at a single perinatal center, fasting blood glucose, insulin levels, and blood glucose 2 hours post-oral glucose load will be used to identify normal, prediabetes, and diabetes (based on ADA criteria). Insulin resistance (IR), insulin sensitivity (%S), and β-cell function (%β) will be calculated using the HOMA (2) model. Weight at

birth and 1-year corrected age will be obtained from a research database. Growth will be determined from the change in weight and weight z-scores from birth to 1-year corrected age. Body mass index will be determined from weight/height^2. Pearson correlations and multiple regression analysis will be used to examine univariate correlations and the independent associations between birth weight and infant growth with markers of glucose regulation and insulin resistance. ANTICIPATED RESULTS: It is anticipated that lower birth weight and accelerated growth will be associated with more impaired glucose tolerance, reduced insulin sensitivity, and a greater incidence of prediabetes and diabetes.

COMPLETING TWENTY-EIGHT UNDERGRADUATE-LED STUDIES WITH ZERO REPORTED COVID-19 EVENTS: THRIVING DURING TIMES OF SCIENTIFIC SURVIVAL

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Completing research in exercise and sport science has proved difficult during the COVID-19 pandemic. Given that SARS-CoV-2 is a respiratory virus that spreads through droplets and aerosolized particles, special caution is warranted to mitigate increased risk of spread during exercise, especially at high intensities. In this regard, having prior research experience is undoubtably advantageous as knowledge of study design, equipment, and proper data collection are essential even outside of research during a global pandemic. Completing research as an undergraduate (UG) is important for development of critical thinking ability, working independently, and hands-on clinical skills. However, most UGs have little to no research experience which presents a difficult question: is it possible to conduct UG-led exercise research, where students have almost no previous experience, safely during a pandemic involving a highly contagious respiratory virus? In the Department of Kinesiology at Samford University, we have shown that the answer is a resounding 'yes'. A cornerstone of our curriculum is a multi-semester research experience where all senior undergraduates develop their own novel study and collect data ultimately culminating into an oral defense/scientific manuscript. Thus, developing safe and scientifically sound approaches for UG research were of the utmost priority. In Fall of 2020, we successfully completed 28 individual undergraduate-led exercise studies without a single report of COVID-19 related events from laboratory testing. To achieve this, we split our approach into three phases: 1) evidence-based planning, 2) safety and equipment training, 3) implementation and data collection. The following tutorial will discuss our phases and strategies by which we provided UGs with the best research experience possible while also not compromising safety. Specifically, issues of cleaning, personal protection equipment (PPE), equipment training, safe and efficient workflow, faculty supervision, participant recruitment, and data collection burnout will be discussed. The take home message: undergraduate-led exercise and sport research can thrive during a time when other science is merely trying to survive.

EMPOWERING FUTURE PROFESSIONALS WITH DESIGN THINKING IN A CLINICAL EXERCISE PHYSIOLOGY COURSE

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BACKGROUND: Exercise prescription in clinical settings requires extensive knowledge of the physiological basis of disease, evidence-based best practices, and the ability to personalize recommendations. Clinical exercise physiology courses provide requisite knowledge of commonly encountered chronic disease conditions and exercise recommendations; however, they often inadvertently exclude the instructional development of problem solving skills necessary to formulate a personalized plan while working alongside a team. For example, exercise prescription for each individual with type 2 diabetes presents a complex and unique case that requires consideration of the type and timing of exercise and diet, medications on-board, safety measures to reduce risk of hyper- or hypoglycemia, exercise preference, among other considerations. Design Thinking (DT) allows innovators to creatively solve problems while working as a team in a step-by-step manner to fully appreciate the problem and ultimately test solutions. The steps of DT include: 1) Empathize (observe, engage, and immerse); 2) Define the problem (unpack and synthesize empathy findings into compelling needs and insights); 3) Ideate (explore a wide variety of solutions); 4) Prototype (explore ideas); and 5) Test (refine solutions). METHODS: In our clinical exercise physiology course at the University of Alabama at Birmingham, students received instruction on DT and worked in teams to design an exercise prescription for actual patients diagnosed with various disease conditions. Surveys were conducted prior to and following the course to examine perceptions about innovation, approaches to problem-solving and the value of group work. Due to COVID-19, we transitioned from face-to-face to a combination of synchronous and asynchronous virtual instruction using VoiceThread® and Google Docs to engage students and to provide a medium for collaboration and communication among groups. RESULTS: Qualitative feedback collected before instruction on DT revealed that 97% of students stated that it was important to avoid failure. At completion of the course, all students reported that DT helped them develop skills that enhanced creativity, innovation, and problem solving. CONCLUSIONS: Our experience suggests that DT is an effective strategy to teach students how to think critically, collaborate with others, and provide personalized solutions for exercise prescription.

DETERMINATION OF PREDICTIVE FACTORS OF BONE MINERAL DENSITY IN FEMALE COLLEGIATE ATHLETES

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BACKGROUND: Within athletes, increased bone mineral density (BMD) values are observed in response to greater levels of mechanical forces encountered via sport participation. However, the type of forces involved vary due to the physical demands of the sport itself. For instance, activities requiring a larger ground-impact component (i.e., gravitational loading [GL]), provide a different stimulus to osteogenesis than activities that stimulate bone growth through repeated muscle action (ML). The purpose was to determine the influencing factors of BMD in female athletes when accounting for the primary mechanism of loading (i.e., GL versus ML) within a sport. METHODS: Eighty-one female Division-I NCAA collegiate athletes from various sports completed a series of anthropometric and performance-based assessments, including height, weight, dual-energy x-ray absorptiometry (DEXA), bioelectrical impedance spectroscopy (BIS), countermovement jump (CMJ), and hand-grip dynamometry (HG). Athletes were categorized by GL sports (GL= 46) (softball (n=16), basketball [n=15],volleyball [n=9], soccer [n=13]) or as ML sports (ML=35) (cheerleading [n=28], swimming [n=7]). DEXA was utilized to determine BMD, lean body mass (LBM) and fat mass (FM); while BIS was performed to obtain intracellular fluid (ICF), and extracellular fluid (ECF). Multiple regression modeling was used to calculate standardized beta coefficients for each independent variable to determine the predictive influence on BMD. RESULTS: Results indicated a small practical effect between GL (1.23±0.07g/cm3) and ML (1.21±0.08g/cm3) BMD values (d=0.22). For GL, weight (β=1.046) was the most influential factor on BMD, followed by ECF (β=-0.512), FM (β=-0.503), HG (β=0.307), ICF (β=0.250), age(β=0.071), LBM (β=0.070), CMJ (β=-0.066), and then height (β=0.063). Regarding ML, the most influential factors were ICF (β=0.881), ECF (β=0.624), LBM (β=-0.509), age (β=.362), weight (β=-0.244), height (β=-0.184), FM (β=-0.158), HG (β=0.068), and CMJ (β=0.049). CONCLUSIONS: The small practical effect between GL and ML indicates that both types of mechanical forces influenced BMD to a similar extent. However, GL was influenced the greatest by weight which could be attributed to increased forces exerted on the body from ground reaction forces. ML sports lack a large impact component; therefore, weight was considered less influential.

BIOLOGICAL SEX MEDIATES CANCER CACHEXIA ASSOCIATED MUSCLE WEAKNESS

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BACKGROUND: Cancer cachexia is a complex metabolic and wasting disease that results in death in up to one-third of cancer patients and affects up to 80%. Currently, there are no clear diagnostic criteria, its effects are irreversible, and it cannot be treated. Therefore, a great need exists to better understand this disease. Furthermore, recent evidence states that cancer cachexia presents in a sexually dimorphic manner. Therefore, the purpose of this study was to determine whether cancer cachexia alters skeletal muscle function in a sexually dimorphic manner and to determine underlying mechanisms responsible for muscle wasting. **METHODS**: Male and female LC3 Tg+ mice underwent a 3-week period of tumor bearing ($1x10^6$ LLC cells in flank). Grip strength was measured and autophagic and inflammatory pathways were interrogated for their possible role in cancer cachexia skeletal muscle wasting. **RESULTS**: Both male and female tumor bearing mice exhibited a loss in grip strength compared to baseline values. Interestingly, males exhibited a significantly greater loss in grip strength compared females (-17% vs -13%, $P < 0.05$). Male mice also exhibited significantly larger tumors compared to female mice ($P < 0.01$). Male and female skeletal muscle exhibited a significant increase in both early phase autophagosomes and late phase autolysosomes compared to non-tumor bearing controls ($P < 0.01$). Interestingly, males showed significantly more late phase autolysosomes compared to all other groups, indicating a clear role for autophagy in cancer-mediated muscle wasting in male skeletal muscle. Since inflammation is thought to exacerbate pathological muscle wasting, IL-1beta and NF-kB (P-p65) were investigated. Both male and female gastrocnemius exhibited increased IL-1beta and NF-kB compared to non-tumor bearing controls, though only male gastrocnemius exhibited a significant increase in both IL-1beta and NF-kB protein levels ($P < 0.05$). **CONCLUSION**: These data indicate that cancer cachexia does result in skeletal muscle weakness in a sexually dimprophic manner and that possible underlying mechanisms may differ by biological sex. Such data are critical in elucidating how cancer cachexia variably presents and progresses by biological sex, and in the identification of therapeutic targets aimed at muscle wasting in a sex specific manner.

MECHANISMS MEDIATING INCREASED ENDURANCE FOLLOWING HIGH- AND LOW-LOAD TRAINING WITH AND WITHOUT BLOOD FLOW RESTRICTION

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Background: Resistance training with 70% one-repetition maximum (1RM), 15% 1RM alone, and 15% 1RM combined with blood flow restriction (BFR) using 40% arterial occlusion pressure (AOP) or 80% AOP all increase muscular endurance post-training. Given the differences in relative loads and restriction pressures, different mechanisms may be responsible for these increases. **Purpose:** To determine if changes in maximal strength (Δ1RM) and vascular conductance (ΔVC) mediate changes in muscle endurance (ΔEND) following different resistance training modalities. **Methods:** This secondary analysis comes from a study where 39 participants trained for 8 weeks with 2 of 4 conditions (randomized, 1 per leg): 70% 1RM without BFR (70/0), 15% 1RM without BFR (15/0), 15% 1RM with BFR at 40% AOP (15/40) and 80% AOP

(15/80). Participants performed 4 sets [separated by 90 s (70/0) and 30 s (15/0, 15/40, 15/80)] of knee extension exercise to momentary failure 2x/week. VC (strain gauge plethysmography), 1RM, and END (repetitions to fatigue) were tested pre- and post- training. A two-wave multiple-mediation model (adjusted for baseline values of 1RM, VC, and END), was constructed to compare the direct and indirect effects of Δ1RM and ΔVC on ΔEND. Effects were evaluated relative to other conditions. Data presented as coefficient (95% CI). Results: The model accounted for 35.2% ($p<.001$) of the variance in ΔEND. Direct effects on ΔEND did not differ between conditions [15/0=13 (9,17); 15/40=15 (11,19); 15/80=15 (11,19); 70/0=13 (9,17) repetitions; all $p \geq .231$]. Only 70/0 increased Δ1RM [3.1 (1.6,4.6) kg]. The effect of Δ1RM on ΔEND was significant [0.5 (0.0,0.9) repetitions]. Additionally, there was evidence that Δ1RM mediated ΔEND, for 70/0 compared to other conditions [vs. 15/0=1.4 (0.1,2.9); 15/40=1.4 (0.1,2.7); 15/80=1.1 (0.1,2.3) repetitions]. While 15/80 [8.30 (2.48,14.13) mL/min] and 70/0 [7.57 (1.74,13.40) mL/min] both increased ΔVC, there was no effect of ΔVC on ΔEND [0.02 (-0.10,0.13) mL/min] nor was there evidence of a mediating effect of ΔVC on ΔEND in any condition. Conclusions: Differences in 1RM changes led to increased endurance in the 70/0 condition, when compared to other conditions. However, differences in VC changes did not mediate increased endurance in any condition, suggesting other mechanisms may be responsible for increased endurance following low load training.

EFFECT OF MILD MUSCLE SORENESS ON RESTING MUSCLE METABOLISM
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BACKGROUND: Near Infrared Spectroscopy (NIRS) has been used to noninvasively measure resting muscle metabolism as a measure of muscle specific metabolic rate. NIRS monitors tissue oxygen consumption and supply by measuring optical absorption changes in oxygenated and deoxygenated hemoglobin/myoglobin. Eccentric exercise results in muscle soreness and an inflammatory response due to microscopic tears in myofilaments. Previous studies have reported elevated inorganic phosphate to phosphocreatine ratios 3 to 7 days after exercise using ^{31}P-magnetic resonance spectroscopy. Therefore, eccentric exercise may result in sustained increases in muscle metabolism. The purpose of this study is to determine if mild muscle soreness induced by eccentric exercise maintains an increase in resting muscle metabolism as measured by NIRS. METHODS: We plan to recruit 8 healthy participants for this study. We will measure baseline resting metabolism in the gastrocnemius muscles of each participant using NIRS. Resting metabolism will be measured as the relative slope of the change in oxygenated hemoglobin/myoglobin during short bouts of ischemia. Each participant will conduct one short bout of eccentric contraction exercise consisting of 100 repeated calf raises with one leg. We will measure resting metabolism before, immediately after the exercise, 1 day later, and 2 days later in both the exercised and control legs. Data will be analyzed using MatLab to determine resting metabolic rate. Analysis of variance will be performed using Excel to test the significance of the differences in the data before and after eccentric exercise. ANTICIPATED RESULTS: It is hypothesized that 1 and 2 days after the eccentric exercise, there will be an increase in resting muscle metabolism in the exercised leg. This would be significant as the inclusion of mild muscle soreness in exercise routines leading to sustained elevation in muscle metabolism may assist with weight loss programs and contribute to the benefits of exercise.

SLOW MOTION VIDEO PHONE ANALYSIS OF MUSCLE TWITCH CONTRACTION VELOCITY: THE EFFECT OF PIXEL QUANTITY
Nicholas M. Yanek, Chuan Zhang, Kevin K. McCully, FACSM. *University of Georgia, Athens, GA.*

BACKGROUND: Previous studies have used twitch acceleration measured with an accelerometer to measure muscle endurance. This method has been adapted such that slow-motion video can be used to measure muscle acceleration. The aim of this study is to determine the minimum number of video pixels to accurately measure twitch acceleration. METHODS: Measurement will be made on the rectus femoris muscle of healthy control subjects. Twitch contractions will be produced by placing 2x4cm electrodes on the muscle and stimulating with a submaximal current sufficient to produce strong, visible contractions. Video will be collected with iPhone (Apple, Inc., Cupertino, CA) using slow motion video at 240 frames per second. ANALYSIS: The videos will be analyzed ranging from their entirety, ~300,000 pixels, down to approximately 25 pixels. The videos will be analyzed using a MATLAB routine. The routine will use consecutive image correlations for the selected number of pixels, and plotting the rate of change of the correlation as an indication of contraction speed. Faster contraction acceleration will produce lower correlations. ANTICIPATED RESULTS: Pixels numbers as low as 200 will produce the same result as larger pixel sizes (200,000). Determining the number of pixels necessary to obtain adequate results will also us to determine the feasibility of measuring muscle endurance in small muscles. This includes muscles of the forehead and those associated with eye-blinking, as they will require a small number of pixels with slow motion video phone analysis.

VALIDITY OF ULTRASOUND MEASUREMENTS USING HUMAN CADAVERS
Erin Major, Alexa Reilly, Ted Eaves, Michael Berry, FACSM. *Wake Forest University, Winston-Salem, NC.*

BACKGROUND: Body Imaging is a frequently used non-invasive technique in modern medicine and the health sciences with the purpose of obtaining information on internal body structures. Magnetic Resonance Imaging, Computerized Tomography and Dual-Energy X-Ray Absorptiometry are the most commonly used body imaging techniques. While these techniques have unique advantages, their shared disadvantages include cost, lack of portability and/or radiation exposure. Ultrasonography is an imaging technique that is less expensive, portable and does not involve the use of ionizing radiation. There are conflicting reports on the validity of ultrasound for determining body composition measures, specifically muscle thickness. Therefore, the aim of this study is to determine the validity of ultrasound to measure skeletal muscle thickness as compared to direct measurements from human cadavers. METHODS: Three human cadavers will serve as specimens. Ultrasound measurements will be obtained by a single examiner at two sites using a SonoSite M Turbo ultrasound prior to dissection. Imaging will be performed in B-mode with a 6-13 MHz linear-array transducer. Skeletal muscle thickness of the rectus femoris and biceps brachii muscles will be obtained bilaterally on all three cadavers. Rectus femoris measurements will be made at two-thirds the length between the anterior superior iliac spine and the base of the patella. Biceps brachii thickness will be made at one-half the length between the anterolateral border of the acromion and the antecubital fossa. Muscle thickness will be made using the device's internal measurement program. Thickness will be determined as the linear distance between the superficial and internal layers of connective tissue at the thickest part of the image. Following removal of the skin and subcutaneous fat, a direct measurement of muscle thickness will be made by the same assessor at the same anatomical locations using an Accusize digital thin gauge needle caliper inserted through the muscle. Differences in muscle thickness between the two techniques will be determined using repeated measures t-tests. Intraclass correlation coefficients will be computed and Bland-Altman plots will be constructed to visualize differences between the two techniques. ANTICIPATED RESULTS: Based on previous studies, it is hypothesized that ultrasound will be found to be a valid measure of skeletal muscle thickness.

RELIABILITY OF ULTRASOUND MEASUREMENTS OF SKELETAL MUSCLE THICKNESS IN CADAVERS
Alexandra K. Reilly, Erin Major, Michael Berry, FACSM, Ted Eaves. *Wake Forest University, Winston Salem, NC.*

BACKGROUND: Muscle mass is an important measure of body composition and can be measured through various techniques such as ultrasonography, computerized tomography scans, and magnetic resonance imaging. Each of these techniques has strengths and limitations, especially concerning invasiveness, exposure to radiation, and cost for the patient. While studies have been conducted examining the reliability of these imaging techniques, those examining the reliability of ultrasound imaging for determining muscle thickness have not been conclusive. Differences may be related to the hydration status of the subjects and/or the amount of adipose tissue of the subject. To overcome these limitations, this study will evaluate the intra- and inter-rater reliability of ultrasound imaging measurements by measuring the muscle thickness of the biceps brachii and rectus femoris muscles collected via ultrasound in human cadavers both prior to and after removal of the skin and subcutaneous adipose tissue. METHODS: Three cadavers, male and female, donated to the Wake Forest Baptist Medical Center Anatomical Gifts program will serve as the subjects of this study. The thickness of the biceps brachii and rectus femoris will be measured bilaterally using the SonoSite M Turbo ultrasound. Imaging will be performed in B-mode using a 6-13 MHz linear-array transducer. Skeletal muscle thickness of the rectus femoris and biceps brachii muscles will be obtained before and after removal of skin and subcutaneous adipose tissue. Rectus femoris measurements will be made at two-thirds the length between the anterior superior iliac spine and the base of the patella. Biceps brachii thickness will be measured at one-half the length between the anterolateral border of the acromion and the antecubital fossa. Muscle thicknesses will be determined independently by two different assessors on three separate occasions. Differences in the mean of the muscle thicknesses will be statistically analyzed using dependent and independent t-tests. Intraclass correlation coefficients (ICC) will be used to assess intra- and inter-rater reliability, and Bland Altman plots will be used to visually inspect the level of agreement. ANTICIPATED RESULTS: Based on previous studies that have evaluated ultrasound as a measurement technique, we anticipate that ultrasounds will be a reliable measure for assessing muscle thickness.

EFFECT OF RISEDRONATE ON BONE TURNOVER IN POST-SLEEVE GASTRECTOMY PATIENTS
Rui Lyu, Kristen M. Beavers. *Wake Forest University, Winston-Salem, NC.*

BACKGROUND: The prevalence of severe obesity (body mass index≥40 kg/m^2) in the United States has increased by 3.5% over the past decade, which is accompanied by increasingly performed bariatric surgeries. Sleeve gastrectomy (SG) is the most popular type of bariatric surgery, representing over 60% of all surgical types performed in 2018. SG is highly effective at promoting excess weight loss; however, current data suggest that SG is also associated with significant bone loss and increased risk of fracture in middle-aged and older adults. Bone turnover rate, which is the ratio of bone resorption to bone formation rate, is commonly used to estimate bone loss. Clinically, the bone resorption rate is determined by serum C-telopeptide of type I collagen (CTX) biomarker level while the bone formation rate is determined by serum intact pro-collagen I N-propeptide (P1NP) level. High CTX/P1NP ratio indicates increased bone loss. Risedronate is a commonly prescribed medication to prevent bone loss through lowering bone resorption rates in osteoporosis patients, however, its efficacy in bone loss prevention in post-SG patients has not yet been tested. The purpose of this analysis is to determine the effect of risedronate on bone turnover in patients who had undergone SG.METHODS: 24 participants between ages of 40-69 scheduled for SG were recruited for a 6-month RCT (NCT03411902; with an optional 12-month follow up assessment visit) examining the efficacy of once monthly 150 mg oral risedronate (n=11) versus

placebo (n=13) on a variety of bone outcome measures. Fasted blood samples were collected at baseline, 6, and 12 months (via venipuncture), and bone-turnover biomarkers (CTX and P1NP) are slated to be analyzed via enzyme-linked immunosorbent assays on all stored plasma samples during the fall of 2020. Absolute and percentage changes in biomarkers from baseline and bone turnover rate (CTX/P1NP ratio) will be reported by group. Linear regression models (adjusted for baseline values) will be used to determine statistical significance ($p<0.05$). ANTICIPATED RESULTS: It is hypothesized that oral risedronate will reduce bone turnover in post-SG patients compared to placebo. FUNDING INFORMATION: National Center for Advancing Translational Sciences. Grant Number: UL1TR001420; National Institute on Aging. Grant Numbers: K01 AG047921, K25 AG058804

EFFECTS OF VARYING FACEMASK REINFORCEMENT ON REACTION TIME AND TARGET DETECTION IN NCAA FOOTBALL PLAYERS

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BACKGROUND: Football helmet facemasks have been shown to differentially alter visual field. We have previously shown that peripheral vision reaction time (PRT) and target detection are hindered while wearing football headgear. However, whether different levels of facemask reinforcement alter ability to respond to peripheral visual stimuli is unknown. **PURPOSE:** The purpose of this study was to examine the effects of varying facemask reinforcement on PRT and target detection in collegiate football players. **METHODS:** Division 1 NCAA football players with normal/corrected to normal vision participated. In a randomized manner, participants completed peripheral reaction time tests for the following conditions: Baseline/no helmet (BL), Light reinforced (L), Medium reinforced (M), Heavy reinforced (H), and Extra-heavy reinforced (XH) face masks. For each condition, a 60 s PRT test was completed on a Dynavision D2 visuomotor board. Subjective perception of how levels of reinforcement would affect field performance was assessed with a 7-point Likert scale questionnaire. **RESULTS:** Regardless of reinforcement, all facemask conditions resulted in significantly slower average PRT and lower target hits compared to BL ($p<0.05$). No differences for PRT or target hits were observed between L, M, or H conditions. PRT was significantly slower for the XH condition versus L ($p=0.003$), M ($p=0.001$), H ($p=0.004$). Additionally, target hits were significantly lower for the XH condition versus L ($p=0.010$), M ($p=0.009$), H ($p=0.016$). Subjectively, participants believed that the H and XH facemasks would make their performance worse on the field compare to L or M ($p<0.05$). **CONCLUSIONS:** Wearing a helmet irrespective of facemask reinforcement worsens PRT and target detection. However, only extra-heavy facemask reinforcement potentiates impairments in the ability to detect and respond to peripheral stimuli. Since unobstructed vision on the field is important for safety and performance, these findings may have important implications on equipment regulations for safety in collegiate football.

EFFECTS OF PEPPERMINT OIL ON COGNITIVE AND PHYSICAL ABILITY DURING DUAL-TASKING CONDITIONS

Kathryn Kizziah, Alysson Smith, Rebecca Rogers, Thomas Kopec, Christopher Ballmann. *Samford University, Birmingham, AL.*

BACKGROUND: Completing cognitive and physical tasks simultaneously, or dual tasking (DT), requires division of resources primarily between the brain and peripheral skeletal muscle. Previous evidence has largely shown that DT results in diminished physical performance with preservation of cognitive ability. Peppermint oil has been shown to stimulate brain activity specifically in areas important for motor output and control. Whether peppermint oil can attenuate physical performance loss during DT while still preserving cognitive ability has yet to be elucidated. **PURPOSE:** The purpose of this study was to examine the effect of peppermint oil on physical and cognitive ability during DT rowing. **METHODS:** College aged females (ages 18-24) were recruited to participate. In a crossover counterbalanced design, participants were subjected to four conditions: 1) Single task cognitive test (STC), 2) Single task rowing (STR) 3) DT placebo (DT-PL), 4) DT peppermint oil (DT-PO). For single task rowing and DT conditions, participants were asked to row as hard as possible on a rowing ergometer for 3 minutes. For STC and DT conditions, participants completed a Paced Auditory Serial Addition Test (PASAT) and a word-list memory test for 3 minutes. During DT conditions, 50 uL of peppermint oil or placebo (olive oil) were placed on an adhesive strip and placed under the nose for the entire duration of testing. Absolute differences (single task - dual task) in power output, stroke rate, heart rate, and cognitive test scores were compared between DT-PL and DT-PO. **RESULTS:** The were no significant differences between DT-PL and DT-PO for word recall ($p= 0.138$) or PASAT ($p= 0.181$) scores. While there were no differences for power output between conditions ($p= 0.131$), stroke rate ($p=0.015$) and heart rate ($p= 0.034$) were significantly higher during DT-PO versus DT-PL. **CONCLUSIONS:** These results show that peppermint oil does not confer any cognitive benefit during DT. However, physical performance may be preserved during DT with peppermint oil treatment which may have important implications in DT activities necessitating peak physical performance.

PHYSICAL ACTIVITY, FUNDAMENTAL MOTOR SKILL DEVELOPMENT, AND SELF-REGULATION IN PRESCHOOL-AGED CHILDREN

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BACKGROUND: Physical activity (PA) and motor skill development (MSD) have been shown to impact cognitive aspects of self-regulation (attention, working memory, and inhibition) in youth. However, there is little evidence supporting these relationships in preschool-aged children (3-5 years old). **PURPOSE:** To determine if PA and MSD are associated with the cognitive aspects of self-regulation in preschool-aged children. **METHODS:** Participants were 24 preschool-aged children (4.6±0.7y, 16 females) attending a university preschool. On Day 1, an ActiGraph GT3X+ was placed on the hip of each participant and worn for 7 consecutive days during waking hours to assess PA. Minutes per hour spent in light, moderate, and vigorous PA were calculated using the Pate cutpoints. Additionally, on Day 1, the Test of Gross Motor Development-2nd Edition was used to measure MSD. On subsequent days, cognitive aspects of self-regulation (one assessment per day) were measured via the Head Knees Toes Shoulders (all aspects) and the Early Years Toolbox [Card Sorting (attention shifting), Mr. Ant (visual/spatial working memory), Not This (phonological working memory), and Go-NoGo (inhibition)]. Tertile groups created from self-regulation scores were analyzed using one-way ANOVAs to determine differences in PA and MSD scores among groups for each test of self-regulation. **RESULTS:** Average ActiGraph GT3X+ wear time was 9.9±2.7 hours/day for 6.4±1.5 days/week. Average time spent in light, moderate, and vigorous intensity PA averaged 14.6 min/hour. MSD scores averaged at the 58th percentile. Performance on the "Not This" task was significantly associated with locomotor, object control, and total motor skill development scores ($F(2,21)=4.203$, $F(2,21)=4.558$, $F(2,21)=4.777$, $p<0.05$, respectively). Performance on the "Mr. Ant" task approached significance with both locomotor and total motor skill development scores ($F(2,21)=2.714$, $p=0.089$, $F(2,21)=2.806$, $p=0.083$, respectively). There were no differences in PA or MSD scores for any other self-regulation assessment. **CONCLUSION:** It appears higher levels of MSD are associated with higher working memory scores. This association may be due to the fact that many gross motor skills require sequencing of activity (e.g. galloping, throwing, etc.) which may tap into the child's working memory to execute those skills, thus relating the two variables.

A PRELIMINARY REPORT OF THE NONLOCAL REPEATED BOUT EFFECT OF THE ELBOW FLEXOR MUSCLES

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BACKGROUND: Unaccustomed eccentric (ECC) exercise can induce muscle damage. The magnitude of muscle damage can be attenuated if a previous similar bout of ECC exercise is performed (i.e., repeated bout effect [RBE]). The RBE has also been shown in the contralateral muscles after an ECC bout in the ipsilateral muscles. Interestingly, the potential nonlocal RBE (e.g., upper- to lower-limb muscles, or vice versa) has never been examined. **PURPOSE:** This preliminary study examined whether performing an initial bout of ECC exercise on the elbow flexor (EF) muscles could induce any RBE against muscle damage from the 2nd bout of knee flexion (KF) ECC exercise. **METHODS:** Twenty-seven participants were randomly assigned into an experimental (n = 15; [EXP]) or control group (n = 12; [CON]). At the start of Week 1, all participants performed a baseline bout of KF ECC exercise on the dominant or non-dominant leg. At the start of Week 5 (post-4-week rest), only the EXP group returned and performed EF ECC exercise on a random arm. At the start of Week 7, all participants performed a 2nd bout of ECC exercise with the contralateral KF muscles. All ECC exercise protocols consisted of 6 sets of 10 ECC contractions with a load equivalent to 150% of concentric 1-RM for the KF or EF exercise. Range of motion (ROM) at the knee joint, muscle soreness, and relative KF isometric strength were taken before (Pre), after (Post), 1 (1D), 2 (2D), and 7 (7D) days after each ECC exercise bout. Separate 3-way (bout [baseline, 2nd bout] × group [EXP, CON] × time [Pre, Post, 1D, 2D, 7D]) mixed factorial analyses of variance (ANOVA) tests were used to examine changes in the dependent variables. **RESULTS:** The ROM showed a main effect for time ($p < .001$). A significant 3-way interaction ($p = .013$) for muscle soreness values was shown. Pairwise comparisons trended toward significance for the 2nd compared to baseline bouts (2nd vs. baseline = 32.7 ± 17.9 vs. 25.6 ± 12.0, $p = .058$, Cohen's $d = .47$) in the EXP group only. A significant 3-way interaction ($p = .033$) was also shown for KF relative isometric strength, but follow-up tests showed no significant interactions or main effects. **CONCLUSIONS:** The current data does not suggest a nonlocal RBE in EF muscles.

GENDER DIFFERENCES IN FIFTH GRADERS' SELF-CONFIDENCE IN PHYSICAL ACTIVITY AND FITNESS ABILITIES

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Data shows that boys, aged 12-17 years, spend more time in physical activity (PA) than girls of the same age and that college women, aged 18-24 years, have less self-confidence than men in their abilities to increase PA and improve physical fitness. However, we previously reported that fourth grade girls had more self-confidence than boys that they could increase weekly time spent in PA and improve their physical fitness. Therefore, the purpose of our research was to determine when these reductions in women's self-confidence occur. In this longitudinal study, subjects were 33 fifth grade students (16 boys and 17 girls), of the same cohort as reported on previously, that attended a public elementary school in northwestern Virginia. Students participated in the FitnessGram, a nationwide assessment that tests flexibility, aerobic capacity, and muscular strength and endurance of elementary school students. After participating in the FitnessGram, students completed a 14-question proctored survey. The survey asked about the students' beliefs about PA, knowledge of PA, self-confidence, and PA participation. FitnessGram data showed fifth grade girls were more

flexible than boys, but there were no differences in aerobic capacity or muscular strength and endurance between genders. Survey results showed girls rated the benefits of PA on their health significantly higher than boys (p = 0.0457). Despite this, fifth grade girls rated the effects of low PA as less harmful than they had the previous year (p = 0.0459). Additionally, girls' self-confidence significantly decreased from fourth to fifth grade. Compared to their beliefs from one year earlier, fifth grade girls were no longer as confident that they could improve their weekly PA (p = 0.0062), physical fitness (p = 0.0083), or overall health (p = 0.0070). Our data suggests that girls' self-confidence in their abilities to increase PA and improve fitness decreased during fifth grade. During this same time period, girls rated the effects of low PA as less severe than they did the previous year. It is unclear if these beliefs are related. More research is needed to determine how these belief changes contribute to gender discrepancies in time spent in PA. We propose physical education programs throughout all grades teach the importance of healthy behaviors, including time spent in PA, and work to build and maintain self-confidence in all students, especially girls.

DOES AN EMPLOYEE MOVEMENT CHALLENGE ENHANCING PHYSICAL ACTIVITY LEVELS AND ATTITUDES IN A COLLEGE WORKFORCE
Madison Faulkner, Robyn M. York. *Montreat College, Montreat, NC.*

BACKGROUND: The Exercise is Medicine on Campus team has created a series of challenges for the employees of Montreat College to aid in boosting mental and physical health. The first challenge will be a movement challenge, lasting 5 weeks, encompassing a 10-15 minute walk on at least 5 days per week and 5 minutes of stretching on at least 2-3 days per week throughout the challenge. The purpose is to begin to build healthy habits for the employees and educate them about the amount of physical activity they should be engaging in to maintain physical health. **METHODS:** During the sign up period, a short survey was administered to gauge physical activity levels and attitudes, and mental health perceptions of the employees. The same short survey was given at the end of the challenge to see if attitudes or habits had changed. During the challenge, weekly check-ins were administered to determine levels of physical activity and stretching habits. We will also follow up one month after the challenge ends to see if the habits are still in place. In all cases, the surveys were sent via Google Forms, and data will be downloaded and coded to ensure anonymity prior to data analysis. **ANTICIPATED RESULTS:** We anticipate our study to show that physical activity enhances mood levels for the employees on campus. We think that if enjoyment of exercise is increased then the employees will be more likely to continue these healthy habits in the future. One study demonstrated that moderate physical activity throughout the day enhances mood, especially while working in a sedentary office environment (Bergouignan, 2016). Further, increases in either workout duration or level of exertion has been shown to correlate with an increased mood (Rocheleau, 2004); we anticipate that the implementation of small habits will ultimately lead employees to increase the duration, and possibly intensity, of activities throughout the work day.

THE MOTIVATING FACTORS AND BARRIERS OF PHYSICAL ACTIVITY DURING PREGNANCY AND CHILDBIRTH
Cari Jayne Barrett. *University of North Georgia, Dahlonega, GA.*

BACKGROUND: Previous studies have shown that physical activity (PA) is vital in women experiencing a healthy pregnancy, however, many women still question the safety and benefits of maintaining a healthy lifestyle while pregnant. Therefore, the purpose of this study was to examine the reasoning behind a woman's PA habits during pregnancy and the relationship between activity level and childbirth outcome. METHODS: Twenty-four (n = 24) postpartum women that met all necessary criteria participated in this study. Qualitative data was collected using an online survey that gathered information on each woman's PA habits during pregnancy and their childbirth experience. The data was collected, analyzed, and coded in three different ways and finalized into major themes. RESULTS: Participants were assigned to the "sedentary" (SG) (n=11) or "active" (AG) (n=13) group, based off the data they provided. The AG reported an average of 43.8 minutes/day of PA at a moderate-high intensity during pregnancy, which met the current CDC and ACSM PA requirements during pregnancy. The AG also reported a shorter duration of labor and a higher percentage of vaginal births, compared to the SG. The overall themes developed from the data in regards to motivating factors or barriers of PA during pregnancy were found to be: improves overall well-being, physical barriers, benefits to baby, lack of knowledge, and daily life activities. Themes considered to be motivating factors were overall well-being and benefits to the baby. Coded words in these themes consisted of: happy, active, prevention, healthy, and benefits. Themes considered to be barriers were physical barriers, lack of knowledge, and daily life activities. Coded words in these themes consisted of: pain, sickness, safety, unsure, and busy. CONCLUSIONS: Participants in both groups shared common themes among their responses to the questionnaire, two were considered motivating factors and three were considered barriers in regards to participating in daily PA. Although participants from both the AG and SG shared coded words about PA barriers, the AG group focused more on motivating factors in maintaining their PA during pregnancy.

PHYSIOLOGICAL AND PERCEPTUAL RESPONSES TO VARIOUS DURATIONS OF BLOOD FLOW RESTRICTION
Nathen A. Andrews, Chase P. Harris, Jakob D. Lauver. *Coastal Carolina University, Conway, SC.*

BACKGROUND: Traditionally heavy resistance training has been utilized to increase skeletal muscle strength and size. However, several studies using low-intensity resistance training combined with blood flow restriction (BFR) have shown similar improvements in muscle size and strength. BFR may be an effective exercise modality for individuals not well suited for traditional heavy resistance training. However, various methodological approaches to BFR should be evaluated. This includes the restriction duration (time the restriction is applied), as various durations have been utilized with different outcomes. Therefore, the purpose of this study is to examine the effects of different durations of BFR on muscle activation and oxygenation, and discomfort during low-intensity resistance exercise. METHODS: Healthy males will be asked to complete five total laboratory sessions including one familiarization session and four randomized BFR protocols; control (CON (no-BFR)), continuous BFR (C-BFR), intermittent BFR during exercise (IE-BFR), and intermittent BFR during rest (IR-BFR). Each experimental trial will consist of 75 repetitions of isokinetic unilateral knee extensions (45 deg/s) at 30% maximum voluntary isometric contraction (MVIC) and at 60% of limb occlusion pressure (LOP). The repetitions will be divided between four sets as 30-15-15-15, with a one-minute rest period between sets. During C-BFR restriction will be applied throughout all sets and rest periods, IE-BFR restriction will be applied only during exercising sets, IR-BFR restriction will be applied during rest periods only. Surface Electromyography electrodes will be placed on the participant's skin of the vastus medialis to assess muscle activation. To measure muscle oxygenation, participants will be outfitted with near-infrared spectroscopy on the vastus lateralis. Participants will also be asked to rate their perceived exertion (RPE) using the Borg scale, as well as their discomfort. Following exercise, each participant will complete an MVIC to determine fatigue and a five-minute maximum desaturation. A two-way repeated measures Analysis of Variance will be used to determine differences due to the protocol and time. ANTICIPATED RESULTS: Despite the shorter duration of restriction, we anticipate IR-BFR resulting in similar muscle activation and deoxygenation as C-BFR with a lower RPE and discomfort due to the isokinetic velocity of exercise.

THE IMPACT OF A DUAL GENERATION SWIM INTERVENTION TO REDUCE UNINTENTIONAL DROWNINGS IN AFRICAN AMERICANS
Aniya .L Bettis, Nadarria Inge, Jermaine B. Mitchell. *University of Montevallo, Montevallo, AL.*

Background: Rates of unintentional drownings in African Americans (AA) are higher compared to their Caucasian counterparts. Despite the need to support African American families as a whole, most swim programs typically focus either on the parent or child separately. The purpose of this study was to investigate impact of a community-based dual-generation swim program to improve water safety and swimming ability of AA families. **Methods:** Seven single mothers (36 ± 4 years), seven girls (9 ± 6 years) and four boys (12 ± 6 years) participated in three out the eight scheduled swim sessions (sessions 4-8 were cancelled due to COVID-19). Session one consisted of completion of assent and consent forms, distribution of swim items and baseline swim assessments via the American Red Cross Swim Assessment. Sessions two and three consisted of 30-40-minute swim instruction. Baseline swim assessments and instruction were administered by the University of Montevallo's swim team. Additionally, post-intervention interviews were conducted. **Results:** Baseline swim assessments revealed participants were at the lowest levels for Preschool Aquatics (mothers and girls: 72%; boys: 75%) and Learn-to-Swim (mothers and girls: 29%; boys: 25%) categories. Post-intervention interviews stated that parents and youth believed the dual-generation format was beneficial and may have improved their swimming ability with more sessions. **Conclusion:** Dual-generation swimming programs may offer AA parents and youth a safe, cost-effective way to reduce unintentional drownings.

ATHLETIC TRAINING EDUCATION MOVING FORWARD. WHERE DOES THE PROFESSION GO FROM HERE?
Dennis Cobler, Beth Funkhouser. *Emory & Henry College, Emory, VA.*

Like many clinical health professions, Athletic Training Education will soon only be offered at the graduate level. While the decision to move in this direction was made several years ago, the time is quickly approaching Colleges and Universities must make a decision regarding the future status of their perspective programs. These institutions are now re-evaluating the health of their Athletic Training programs and investigating how they will move forward. While many have already decided to make the transition to the graduate level, many others have made the painful decision to withdrawal accreditation and eliminate programs altogether. At the same time institutions have been struggling with these decisions, prospective students have also had to do their own research. Is Athletic Training still a viable option for those hoping to enter the healthcare field? Does the return on investment justify the time and cost of these new programs? How does Athletic Training plan or hope to compete with other graduate options such as Physical Therapy, Occupational Therapy, or Physicians' Assistant? This presentation will examine what current data suggests the outlook of Athletic training is in the immediate future, as well as, in the years to come. The presentations will also discuss how the transition has already effected program numbers across the nation. Purpose: To discuss how the transition of Athletic Training to the Graduate level has impacted the number of programs and number of students entering the professional field. While the final impact of the move has yet to be determined, it is already clear that many programs have not, or will not, survive the transition, which may signal trouble for the overall survival of the profession itself. Major Points of Discussion will be: 1. How has the number of accredited programs changed since the decision to transition to a graduate level was announced? 2. For existing programs, what percentage of available cohort spots have remained unfilled? 3. How does Athletic Training

survive when it now must compete with programs it has historically funneled students into? 4. What is the return on investment for current Athletic Training Programs when compared to other healthcare professions? Primarily Learning Objective: 1. Participants should be able to describe how Athletic Training Education has changed over the past 5 years and how the transition to a Graduate Level has affected existing (or former) programs. This information would be beneficial for those advising current students who are interested in a career in healthcare, more specifically Athletic Training. Students should have a clear understanding of what direction the profession is moving and what challenges the profession must address in the very near future.

SESSION V: REVIEW/SYMPOSIA Friday, Feb. 19, 3:00–4:00 pm EST

MEASURING DIAPHRAGMATIC ENDURANCE AND ASSESSING RESPIRATORY DYSFUNCTION

Kristin M. Mendez, Alexander W. Parsons, Kevin McCully, FACSM. *University of Georgia, Athens, GA.*

Respiratory dysfunction affects numerous individuals across a wide range of diseases. Assessment and treatment of respiratory dysfunction, while always important, has gained additional attention with the recent COVID-19 pandemic. This symposium aims to evaluate current diagnostic techniques and introduce a novel method for measuring diaphragmatic endurance in relation to assessing respiratory dysfunction. **PORTION 1:** *To evaluate existing clinical techniques, emphasizing the advantages and disadvantages of each.* Existing clinical assessments include radiography, fluoroscopy, ultrasound, and phrenic nerve stimulation via electromyography or magnetic stimulation. Many listed involve voluntary pulmonary function tests, use of invasive pressure probes and/or balloons, or some combination of both. These tools provide respiratory dysfunction diagnoses but either require uncomfortable, invasive methods or strenuous, volitional efforts from patients, resulting in potentially inaccurate results. **PORTION 2:** *To describe and understand the new test.* Our lab has developed a novel diaphragmatic endurance test for respiratory dysfunction measure. It is the first both non-invasive as well as non-volitionally based technique. A tri-axial accelerometer is placed on the upper abdomen to record diaphragmatic movement while the participant undergoes non-invasive, phrenic nerve stimulation via pencil electrodes. An endurance index is calculated via Microsoft Excel and MatLab once data is exported directly from the accelerometer to a blue-toothed, cell phone application. This technology is inexpensive but effective and the overall test takes minimal time to complete. With a total set-up and testing time of 10-15 minutes, the actual endurance protocol finishes in five minutes and 40 seconds. As piloted previously, this new technique proves reliable and produces rapidly analyzable data all while causing little discomfort to the participant. **PORTION 3:** *A video demonstration of the technique.* The demonstration will include set up, test performance, and data analysis. Questions about the presentation are welcome and will be answered in the format of the meeting.

SESSION V: POSTER/FREE COMMUNICATION Friday, Feb. 19, 1:00–2:00 pm EST

BODY COMPOSITION OF NCAA DIVISION I FOOTBALL PLAYERS PRE AND POST COVID-19 QUARANTINE

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BACKGROUND: Strength and conditioning is an essential aspect of athlete development. The COVID-19 pandemic forced collegiate athletes to train at home, without access to strength and conditioning facilities. PURPOSE: To examine body composition of National Collegiate Athletic Association (NCAA) Division I (DI) football players pre- and post-COVID-19 quarantine. METHODS: Body composition of 29 NCAA DI football players (Age=21.0±10 yrs, Ht=186.7±5.6 cm, Wt=110.5 ±22.8 kg) were measured around the start of Spring season (March) and prior to pre-season training (June) following a minimum 2h fast and having refrained from recent exercise. Whole body dual-energy x-ray absorptiometry (DXA) was used to determine regional (arms, legs, trunk) and total body fat mass (FM), lean mass (LM), and fat free mass (FFM). Fat-Free Mass Index (FFMI) was calculated (FFMI= [LM+Bone Mineral Content (BMC)]/Height^2); participants were stratified by FFMI (Upper: >25 lbs/m^2; n=16, Lower: <25 lbs/m^2, n=13). Paired samples t-tests were used to evaluate the effect of pre vs. post-COVID on body composition. RESULTS: For the total sample, trunk LM (Mean Difference ± Standard Error: -0.96± 0.21 kg, p<0.001), and trunk FFM (-0.98± 0.21 kg, p<0.001) measures significantly increased from pre- to post-COVID-19. Legs FM was significantly decreased (0.46±0.19 kg, p=0.023) post-COVID-19. Players with a lower FFMI showed a significant decrease in legs FM (0.47 ± 0.17 kg, p=0.016), trunk percent fat (1.15±0.42%, p=0.017), and trunk FM (0.55± 0.19 kg, p=0.016). Players in the upper FFMI showed a significant increase in total LM (-0.96±0.42 kg, p=0.038), total FFM (-0.99± 0.43 kg, p=0.036), and a decrease in arm FFM (0.49 ± 0.22 kg, p=0.045). CONCLUSIONS: The collective improvement in trunk LM and FFM, as well as decreases in leg FM, suggest the limited access to weight room equipment did not have a detrimental effect on body composition. Upper body FFM was lost, only in the more muscular cohort (upper limit FFMI). Virtual programming and nutritional support likely played an important role in body composition during quarantine.

PREDICTING DIVISION I LACROSSE GAME PERFORMANCE THROUGH MICROTECHNOLOGY

Libby L. Bynum[1], Jenna Carter[1], Charli Rosenberg[1], Bradley J. Myers[1], Jennifer A. Bunn, FACSM[2]. *[1]Campbell University, Buies Creek, NC. [2]Sam Houston State University, Huntsville, TX.*

BACKGROUND: Sport science has focused on managing training load in order to influence game success, but little work has been done to evaluate the direct influence of these load metrics on game performance. The purpose of this study was to analyze relationships between external and internal load metrics with game performances for Division I collegiate women's lacrosse athletes. METHODS: Data were collected using microtechnology during 26 games over a two-year period with 18 athletes (attackers n = 5, midfielders n = 7, defenders n =6). External load variables included: total distance, distance rate, high-intensity distance (HID), speed, sprints, accelerations, decelerations, metabolic equivalent distance (MED), and sprint speed zones. The internal load metric was training impulse (TRIMP). Individual game stats were taken from publicly available data, normalized into z-scores, and used to determine game success. Regression analyses with load metrics for game success in each position were conducted. RESULTS: For midfielders, distance rate, HID, TRIMP, MED, and sprints were the most important load variables for ground balls (r^2 = .214), draw controls (r^2 = .265), and total game success (r^2 = .300). For attackers, MED, HID, and TRIMP were the most important load variables for shots (r^2=.217), shots on goal (r^2=.187), and draw controls (r^2=.203). For defenders, deceleration and HID were the most important load variables for draw controls (r^2=.247). CONCLUSIONS: These data provide specific indications of impactful load metrics for each lacrosse position. Coaches may use this information to implement specific training and drills to augment these loads for better positional preparation for athletes in each lacrosse position. Coaches may also use these data to train athletes and improve their level of fitness in a more specific manner than ever before. Increased game preparation and training from knowledge gained throughout this study will subsequently improve game performance for women's lacrosse athletes.

THE ACUTE EFFECT OF HEAVY SQUATS AND FOAM ROLLING ON VERTICAL JUMP PERFORMANCE

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BACKGROUND: Previous research has reported mixed results regarding the acute effects of foam rolling on mitigating fatigue-induced performance impairments. Therefore, the purpose of this study was to determine the ability of foam rolling to affect transient recovery from high intensity back squat exercise as measured by repeated vertical jump (VJ) performance. METHODS: Following an initial session to determine 1-RM in the back squat exercise, seventeen (mean ± SD: age; 21 ± 1.7 yrs, height; 174.7 ± 6.2 cm, body mass; 79.5 ± 15.5 kg, 1-RM: 130.1 ± 39.2 kg) university students completed four sessions (Control, Squats, FR, and combo) in a randomized order. For each session, two VJs (baseline) were performed after a standardized warm-up followed by either 13 mins rest (Control and FR) or two sets of warm-up squats (1 x 6 at 60% 1-RM, 1 x 3 at 75% 1-RM) followed by heavy squats (3 x 3 at 85% 1-RM) (Squats and Combo). Next, each session performed two more VJs (J1) followed by either 4.5 mins rest (Control and Squats) or 3 x 30 s of foam rolling for gluteals, hamstrings, and quadriceps (FR and Combo). This was followed by 2 VJs (J2) performed immediately afterwards, followed by 2 mins rest, 2 VJs (J3), 2 mins rest, and 2 VJs (J4) to conclude each session. The VJ that produced the greatest height was used for statistical analysis at each time point. Results were expressed as percent change from baseline. One-way repeated-measures ANOVAs were conducted on each measure (VJ height, impulse, reactive strength index (RSI), and eccentric rate of force development (eRFD)) for J1, J2, J3, and J4. RESULTS: There was no significant difference in the percent change in VJ height, RSI, or eRFD across all sessions at any time point. Impulse at J2 for the combo session had a significantly larger percent decrease (-5.4 ± 3.0%) compared to Control (-3.1 ± 2.9%) (p = 0.004). CONCLUSIONS: All sessions had a similar percent decrease in VJ height suggesting that the jump protocol and/or squat protocol may have impaired VJ performance. FR does not appear to acutely affect recovery from heavy squat exercise as measured by VJ height, RSI, or eRFD. However, FR performed immediately after heavy squats appear to induce a small transient decrease in impulse produced during VJ.

RELATIONSHIP BETWEEN WELLNESS SCORES AND INTERNAL AND EXTERNAL TRAINING LOADS IN A DIVISION I WOMEN'S LACROSSE TEAM

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Background: The study of athlete wellness encompasses not only training loads, but may include subjective indicators of an individual's readiness for training. Most research regarding wellness and training loads have focused primarily on professional male athletes, leaving female athletes largely under-represented. The purpose of this study was to examine the relationship between pre-training wellness scores and internal and external training load outputs during the preparation phase of a Division-I women's collegiate lacrosse team. **Methods:** Athletes (n = 27) logged their daily wellness (i.e., ratings of sleep, energy, stress, and muscle soreness), session ratings of perceived exertion (sRPE), and training metrics during a 16-week preparation phase. Training metrics were collected during each practice with global positioning system (GPS) units and heart rate monitors. Metrics included total distance, high speed distance, sprints, accelerations, decelerations, and Athlete Load (a proprietary metric with VX

Sport). Repeated measures mixed linear models were constructed to evaluate the relationships between wellness and training load measured objectively and subjectively. **Results:** The largest effects observed indicated: improved sleep was predictive of increased total distance (up to 310.5 m, 95% CI 36.7-584.3), high-intensity distance (up to 72.7 m, 95% CI 17.2-128.3), and Athlete Load (up to 6.8 AU, 95% CI 1.8-11.8). Less fatigue was predictive of increased total distance (up to 323.6 m, 95% CI 52.2-594.9) and Athlete Load (up to 5.6 AU. 95% CI 0.6-10.5). For each one-unit increase in overall wellness score, total distance (3.5 m, 95% CI 1.2-15.1) and Athlete Load (0.2 AU, 95% CI 0.0-0.3) increased. Changes in fatigue scores elicited an average increase in Athlete Load of 5.6 AU and TRIMP by ~41 AU, while an increase in muscle soreness resulted in an average decrease in sRPE by ~52.3 AU. **Conclusion:** This is the first study to indicate the utility of wellness scores and their impact on performance in collegiate female athletes. Results indicated that pre-training wellness scores are predictive of training output. Specifically, improvements in sleep and energy had the greatest impact on distance, high speed distance, and overall athlete load. Systematically monitoring athlete wellness may help coaches with decision-making relevant to training and game play.

THE ASSOCIATION BETWEEN BIOMARKERS OF RESILIENCE AND READINESS WITH FITNESS CHANGES IN COLLEGE SOCCER PLAYERS

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BACKGROUND: The free testosterone to cortisol ratio (fTC) and heart rate variability (HRV) indices have been independently proposed as objective biomarkers of physiological resilience and readiness, respectively. It is hypothesized that individuals that enter a training period with high resilience and readiness would have a greater positive response to the training. Therefore, the purpose of this study was to investigate the association between fTC and HRV with fitness changes in division I male college soccer players. **METHODS:** Two division I teams were recruited to participate in this study. Participants completed an orthostatic HRV challenge (supine, sitting, standing) and provided blood samples prior to the 6-week Spring training period. The HRV indices of root mean square of successive differences (RMSSD) and high frequency power (autoregressive, normalized; HF) were calculated in all postural conditions. Blood samples were assayed for free testosterone and cortisol using competitive binding ELISAs. Participants completed the yo-yo intermittent recovery test (YYIR) before and after the 6-week training period and the absolute increase in distance (m) achieved during the YYIR represented the change in fitness (YYIRΔ). Separate linear regression models tested the association of fTC and all HRV indices and their interactions with YYIRΔ. All predictors were first centered and scaled and alpha level was set at p<0.05 for all models. **RESULTS:** Participants (n = 21, age = 19.5±1.0 years, height = 179.0±6.4 cm, weight = 76.9±9.4 kg, body fat = 12.6±4.3 %) from the two teams did not differ in YYIRΔ (mean±SD = 438±212, p = 0.64). A significant association with YYIRΔ was observed for the interaction between fTC and $HF_{sitting}$ ($F(3,17) = 4.31$, $\beta = 4.92$,$p = 0.02$, $R^2 = 0.33$). No other indices or interactions were significantly associated with YYIRΔ. **CONCLUSIONS:** These results suggest that HRV and fTC represent potential objective pre-training biomarkers capable of identifying athletes that will be most responsive to individualized fitness and conditioning programs. Further research is necessary to confirm the utility of these specific objective biomarkers in larger cohorts and across multiple training situations.

SALIVARY CORTISOL ANALYSIS IN COLLEGIATE FEMALE LACROSSE ATHLETES

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BACKGROUND: Cortisol is a glucocorticoid hormone that fluctuates with sympathetic response to stress and is associated with neuromuscular performance. Cortisol levels have been shown to correlate with several markers of athlete readiness and recovery (e.g., countermovement jump and ratings of perceived exertion), as well as fluctuate throughout a competitive season with performance. Self-reported wellness scores and ratings of perceived exertion (RPE) are subjective measurements that evaluate athlete stress levels in various aspects of training. The purpose of this study was to 1) evaluate changes in salivary cortisol in Division I female collegiate lacrosse athletes (n=26) and 2) assess the relationship between cortisol and athlete wellness and training load. METHODS: Saliva samples were collected biweekly on Monday mornings during the first six weeks of the competitive season. Subjective athlete total wellness scores and subscores (muscle soreness, sleep quality, fatigue, and stress) were taken on the same days. Objective total weekly training load for distance, high-intensity distance (HID), sprints, accelerations, and decelerations were tabulated from the previous training week. RESULTS: There was an upward trend in cortisol (wk 1: 0.637 ± 0.296µg/dL, wk 2: 0.611 ± 0.450 µg/dL, wk 3: 0.767 ± 0.495 µg/dL), but no difference in time points. Week two (2660.4 ± 770.3 m) had lower HID than weeks 1 (3593 ± 917.4 M) and 3 (3238.7±1560.3 m) (p < .001) and week three (29.54 ± 18.3) had the most sprints (p < .001). Cortisol showed no relationship with muscle soreness or sleep (r = .080-.153) and low correlations with total wellness, stress, and fatigue (r = .062-.159). There was also no relationship between cortisol and total distance, HID, accelerations, and decelerations (r = .017-.083) and a low relationship with sprints (r = .206). CONCLUSIONS: Although cortisol did not correlate with wellness scores or objective data, the upward trend over collection points suggested that as the season progressed, the athletes had increasing levels of stress within the body. This stress could be a result of stress induced from performance or game settings. In order to combat higher stress levels, the coaches could implement off the field practices to reduce stress including counseling services, rest and recovery practices, or consistent stress management tracking. The 2020 season in which this study was conducted was halted due to the COVID-19 pandemic. If carried out to completeness, this trend could be analyzed more thoroughly across the competitive season.

SPRINT ZONE ANALYSIS BY POSITION OF DIVISION I WOMEN'S LACROSSE

Charli Rosenberg, Libby Bynum, Jenna Carter, Bradley Myers, Jennifer Bunn, FACSM. *Campbell University, Buies Creek, NC.*

BACKGROUND: Two evaluations of game play for women's lacrosse have been published, one from collegiate play and one from international play. Neither study evaluated the differences in sprint zones among the three field positions. The purpose of this study was to compare sprint zones by position in Division I women's lacrosse during practice and games. METHODS: Players (n = 13) wore a vest with microtechnology (global positioning unit and heart rate monitor) to track movement and speed during games (n = 9) and practices (n = 41). Players included 4 attackers, 4 midfielders, and 5 defenders. Sprint zones were measured by the number of sprints conducted in zones 1 through 5 (Sprint1-Sprint5) and the distance traveled in each zone (Dist1-Dist5). Zones were determined by percentage of maximum sprint speed (1 < 60%, 2 = 60-69%, 3 = 70-79%, 4 = 80-89%, 5 ≥ 90%). A repeated measures ANOVA was conducted to determine differences between positions for average speed, max speed, sprint zones, and distance zones, and training and games were used as a covariate. RESULTS: Analyses showed differences between training and games for average speed (2.08-3.01 km/hr, p < 0.001), max speed (25.3-26.4km/hr, p=0.021), Sprint1 (58-142 reps, p<0.001), Sprint2 (8-33 reps, p<0.001), Sprint3 (5-15 reps, p<0.001), Sprint4 (3-5 reps, p<0.001), Sprint5 (.7-1.7 reps, p=0.031), Dist1 (662-2091 m, p<0.001), Dist2 (195-755 m, p<0.001), Dist3 (217-473m, p=0.001), and Dist5 (27-101, p=0.003). All variables were higher in games than training except Sprint5 and Dist5 where training was higher. For the interaction between activity type and position there was a difference in Sprint4 (p = 0.032) and Sprint2 (p = 0.046), with attackers logging higher values than the defenders and attackers in both zones during games. CONCLUSIONS: There is a mismatch in sprint demands between training and games, with a greater game demand for efforts in zones 1-4 in games for all positions. These data indicate no need to train differently by position, but coaches and support staff can utilize this information to alter the structure of training to meet the demands of the game.

EFFECTS OF TRAINING CESSATION ON ISOMETRIC MAXIMAL STRENGTH

S. Kyle Travis[1], Iñigo Mujika[2,3], Kevin A. Zwetsloot[4], Jeremy A. Gentles[1], Michael H. Stone[1], Caleb D. Bazyler[1]. *[1]East Tennessee State University, Johnson City, TN. [2]University of the Basque Country, Leioa, Basque Country. [3]Universidad Finis Terrae, Santiago, Chile. [4]Appalachian State University, Boone, NC.*

BACKGROUND: The purpose of this study was to compare the effects of 3 days (3D) versus 5 days (5D) of training cessation on isometric maximal strength in strength athletes. **METHODS** Nineteen strength-trained athletes (23.8±4.1y; 90.8±20.7kg; 174.2±7.3cm) completed a powerlifting specific 4-week training block followed by random assignment to 3D or 5D of training cessation. Isometric squat and bench press peak force (IPF) and allometrically scaled peak force (IPFa) were assessed on force platforms before (T1) and after 4-weeks of training (T2), and at 3D or 5D of training cessation (T3). A 2x3 mixed ANOVA with post-hoc comparisons and Hedge's g effect sizes were used to assess changes in isometric maximal strength. Alpha criterion was set to $p<0.05$. **RESULTS:** The 2x3 mixed ANOVA revealed significant interactions for bench press IPF ($p=0.03$) and IPFa ($p=0.04$). Post-hoc comparisons revealed a significant increase in bench press IPF ($p=0.01$,g=0.45) and IPFa ($p=0.017$,g=0.90) in 3D only following training (T1 to T2), whereas bench press IPF ($p<0.001$,g=0.08) and IPFa ($p<0.001$,g=0.16) decreased in 5D only following training cessation (T2 to T3). There were no significant changes in isometric squat measures. **CONCLUSIONS:** Upper body isometric maximal strength is better preserved with 3D of training cessation whereas lower body isometric maximal strength is preserved similarly with 3D or 5D of training cessation in strength athletes.

CHANGES IN PERFORMANCE AND SUBJECTIVE MEASURES ACROSS A COLLEGIATE FIELD HOCKEY SEASON

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BACKGROUND: Athlete monitoring is a common method to manage athlete workloads and overall stress in attempt to optimize performance. These assessments include both objective and subjective measures indicative of athlete readiness The purpose of this study was to assess changes in performance alongside subjective measures throughout a collegiate field hockey season. METHODS: Female athletes (n=20; BMI=23.9 ±3.3 kg/m^2; %BF=24.7±5.3%) completed countermovement vertical jump (CMJ) testing via digital contact mat, the Pittsburgh Sleep Quality Index (PSQI) to assess sleep quality, and the Multicomponent Training Distress Scale (MTDS) to evaluate training distress every 7±1 d throughout the preseason (T1-T2) and season (T3-T13). MTDS was analyzed as a total composite score and by each subscale: depressed moods (DM), vigor, physical signs/symptoms (PSS), sleep disturbances (SDis), perceived stress (PSt), and general fatigue (GF). Linear mixed effects models were conducted with an α-level of 0.05 using R. RESULTS: There were significant time main effects for CMJ, global PSQI, and total MTDS (P<0.001). Time main

effects were seen for all MTDS subscales except for GF and SDis. CMJ increased from baseline at T7 (P<0.001) but returned to baseline by T13 (P>0.05). PSQI scores decreased from T1 to T2 (P=0.04) but returned to baseline by T8 and was elevated for the remainder of the season (P<0.05). MTDS was significantly higher than baseline at T11 (P=0.005) but returned to baseline by T12 (P>0.05). DM increased above baseline at T11 (P=0.02) than and returned to baseline at T12. Vigor was lower than baseline at T8 (P<0.001) and remained suppressed through T12 (P=0.01) but returned to baseline by T13 (P>0.05). PSS increased from T1 to T2 following preseason (P<0.001), remained above baseline through T9 (P<0.05), and returned to baseline at T10 (P>0.05). There were no changes in PSt from baseline at any timepoint (P>0.05). CONCLUSIONS: Following preseason, PSS increased immediately which coincided with improved PSQI scores as well as CMJ performance over the first half of the season. However, as the season progressed, increases were seen in total training distress which was largely driven by negative changes in subscales including DM and vigor. This culminated in subsequent downturns in CMJ by T13. These findings suggest that multiple metrics should be used by coaches to monitor athlete fatigue, readiness, and training distress as the MTDS changes appear to precede differential changes in performance.

BRIDGING THE GAP BETWEEN ACADEMICS AND ATHLETICS: DEVELOPING A MUTUALLY BEFENICIAL RESEARCH AND SERVICE RELATIONSHIP

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For many Exercise/Sport Science university researchers working with athletic departments can be an incredibly beneficial, but equally difficult, opportunity. Working with athletes provides researchers with access to student athletes for applied sport performance and recovery research. However, oftentimes these research ideas are met with skepticism from coaches or players. It is important for researchers and athletic departments to work to establish a solid working relationship that is mutually beneficial with the goal of conducting research and helping the athlete/team be successful in their sport. The purpose of this presentation is to discuss the beneficial nature of an academic and athletic department partnership on the university campus and to provide insight on potential areas of expertise that Exercise/Sport Science faculty and students can provide athletic departments. The presenters will also discuss how data from their established relationship has been processed, analyzed, and used to inform decision making within various programs. Concepts will include: a) the developmental process of establishing a relationship; b) the role that Sports Science plays in overall player development and team success, and c) the benefits and limitations of a partnership between academic and athletic departments. The learning objectives are to: a) provide instruction to individuals on how to establish a plan a partnership; and b) improve understanding of the role that each side of the partnership plays in ensuring a healthy relationship. The target audience for this tutorial will be Exercise/Sport Science faculty and Strength and Conditioning professionals who may want to establish a mutually beneficial partnership between academic and athletic departments at the university level.

EFFECT OF WARM-UP ON THE PREVALENCE OF MEDIAL TIBIAL STRESS SYNDROME IN HIGHSCHOOL CROSS-COUNTRY ATHLETES

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BACKGROUND: Medial Tibial Stress Syndrome (MTSS) is among one of the most frequently reported running-related musculoskeletal injuries. Individuals at higher risk for MTSS include those with increased body weight, a history of running injuries, higher navicular drop, and greater hip external rotation with the hip in flexion. Minimal research has investigated the prevention of MTSS with limited evidence supporting few preventative measures. Additionally, there is currently no common standard for warm-up protocols in high school cross-country programs; therefore, these protocols need to be identified and evaluated to determine associations between warm-up and the prevalence of MTSS. The purpose of this study is to gain a better understanding of which method of warming up could yield the most promising results for the prevention of MTSS in high school cross country athletes and to use this information to further educate coaches and athletes on the most efficacious protocols to implement in the future. METHODS: Due to COVID-19, the approach to this study has been modified to meet CDC guidelines. Participants will be recruited via communication with high school cross country coaches and will include male and female high school cross-country runners (14-18 years). Data will be collected through an electronic Qualtrics Survey which will include 12 questions with an estimated 3-minute response time. The questions will address potential risk factors for MTSS, any warm-up protocols they currently engage in before running, and any measures they may or may not take to prevent and/or treat MTSS. Data will be analyzed using Pearson product-moment correlations to investigate potential relationships between warmup and prevalence of MTSS. ANTICIPATED RESULTS: It is hypothesized that strengthening-based exercises for the muscles surrounding the shins will be the most efficacious preventative measure based on the physiological origins of the syndrome described in the introduction.

CHRONICITY OF SYMPTOMS IN TREATMENT OF LATERAL EPICONDYLITIS WITH BLOOD FLOW RESTRICTION

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BACKGROUND: Lateral Elbow Tendinopathy (LET) is commonly known as Tennis Elbow, and is typically diagnosed by the presence of pain over the lateral epicondyle of the humerus during loading of the wrist extensor muscles[1]. Treatment goals for Lateral Epicondylitis characteristically include: 1) pain control and/or elimination; 2) movement preservation; 3) improvement of grip strength and grip endurance; 4) control or elimination of further histological or clinical deterioration; and 5) return to normal function[2]. Blood Flow Restriction (BFR) therapy, is an innovative, safe, and effective method of training for the development of muscle strength and hypertrophy that utilizes a combination of venous occlusion and maintenance of arterial flow to the working muscles while applying low-load resistance[3,4] BFR therapy has been shown to improve mechanical and morphological properties to a similar extent as conventional high-load resistance training.[5] This is important for individuals with myotendinous conditions, such as LET, who may not tolerate high-load resistance training. The purpose of this study was to assess the efficacy of BFR in the rehabilitation of LET. METHODS: Four subjects (3 male, 1 female) between 18 and 65 years of age, diagnosed with LET by standard diagnosis methods participated in the protocol. Subjects were assessed for Pain utilizing the Visual Analog Scale (VAS), Grip Strength utilizing a handheld grip dynamometer, and manual muscle tests of the Extensor Carpi Radialis Brevis and Longus. The intervention protocol included a therapeutic exercise plan utilizing 10%-30% of 1 rep max with BFR set at 40% of Arterial Occlusion Pressure, Passive Stretching, and Mobilization With Movement (MWM). Participants completed the protocol two times per week for 8 weeks. RESULTS: The subject with the most recent onset of pain ~6 weeks, saw significant improvement in pain, grip strength and manual muscle testing results at completion of the protocol ($p<0.05$). Subjects experiencing pain for greater than 12 months showed no significant improvement in pain, no increase or significant *decrease* in grip strength, and varied results with manual muscle testing following the protocol. CONCLUSIONS: Results indicated that chronicity of pain may be a factor in the rehabilitation of LET utilizing BFR. A time interaction was noted in the participant with the most acute LET, while those with chronic LET were not improved.

NCAA PERSONNEL'S PERCEPTIONS OF FORMER ATHLETES' PHYSICAL ACTIVITY AND KNOWLEDGE OF THE PHYSICAL ACTIVITY GUIDELINES

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BACKGROUND: Researchers are calling for physical activity (PA) promotion in former college varsity athletes (FCVAs) due to unfavorable, post-sport health and PA changes. National Collegiate Athletic Association (NCAA) athletics personnel provide support and direct training, thus may be influential in developing current college athletes' perceptions of healthy PA behavior and useful in promoting PA in this population post-sport. PURPOSE: Determine NCAA personnel's perceptions of FCVA PA behavior, promotion of PA in current athletes, and knowledge of the Physical Activity Guidelines for Adults (PAGA). METHODS: NCAA head coaches, athletic trainers, and strength and conditioning coaches from Divisions (D) I-III completed an online survey. Survey items assessed level of agreement (1-7 Likert scales) with statements concerning FCVA's PA behavior, if personnel discussed post-sport PA with athletes (yes/no), and allowed respondents to enter values (frequency, duration) corresponding with their knowledge of health-promoting levels of PA. A MANOVA compared Likert scale responses and chi-square and descriptive statistics assessed one-word responses across division, position, and sex. RESULTS: Respondents (N=154, 69% men, 43±11years , 86% Caucasian, 82% coaches) in 30 NCAA sports (DI 38%, DII 25%, DIII 37%) agreed FCVAs maintain healthy moderate-to-vigorous PA (MVPA) levels (89%), remain more active than non-athlete alumni (86%), but may experience transitional difficulties that negatively affect PA behavior (73%); no differences were found in responses across division, position, or sex. A higher proportion of female (70%) over male (53%) personnel discuss post-sport PA maintenance with athletes ($X^2(1, N=141)=3.8$, $p=.06$) prior to retirement. Similarly, DII (67%) and DIII (63%) personnel also indicated discussing PA maintenance more so than DI counterparts (46%; $X^2(2, N=146)=5.6$, $p=.06$) prior to athletes retiring. The majority of respondents were unaware of the aerobic (15% correct; 166±118 min/week; range 15-750 min of MVPA/week) and muscle strengthening (10% correct; 3±1 bouts/week; range 0-6) PAGA. CONCLUSIONS: Personnel showed a degree of variability in PAGA knowledge, and their similar perceptions of FCVA's PA behavior indicates misconceptions that contrast with current research. Implementing education on the PAGA and buy in by this population regarding FCVA inactivity should be considered in future directions.

ASSOCIATION OF UPPER EXTREMITY PAIN AND PREPARATORY SOFTBALL PITCH KINEMATICS

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BACKGROUND: Analysis of the windmill softball pitch typically begins at the top of the backswing, neglecting movement before this phase. However, early phase movement prior to the top of back swing may affect pain or injury and is often easier seen and more easily coached. Therefore, the purpose of this study was to determine the association of upper extremity (UE) pain with softball pitching kinematics at the beginning of a pitch. METHODS: Thirty-nine NCAA Division I female softball pitchers were recruited to participate. Participants were divided into 2 groups: UE pain (n= 14, 19.5 ± 1.29 yrs, 172.80 ± 11.07 cm, 86.14 ± 12.72 kg) and pain-free (n = 25, 19.92 ± 1.32 yrs, 174.63 ± 5.21 cm, 75.75 ± 10.91 kg). An electromagnetic motion capture system tracked kinematic data

during the riseball softball pitch. Data were cleaned and processed in MATLAB, then analyzed using SPSS. Independent samples t-tests were used to determine differences in trunk axial rotation, pelvic axial rotation, shoulder extension, and push hip flexion between UE pain and pain-free groups at maximum shoulder extension during the preparatory phase of the pitch. RESULTS: Levene's test indicated the assumption of equal variance was met for all independent variables. Independent samples t-test revealed no significant differences in trunk axial rotation (p = 0.691), pelvic axial rotation (p = 0.445), shoulder extension (p = 0.575), and right hip flexion (p = 0.879). CONCLUSIONS: The results of this study indicate no significant differences in preparatory phase pitch kinematics during the softball windmill pitch between UE pain and pain-free groups. While no mechanical differences were found between groups, it is still unknown whether mechanics at the beginning of the softball pitch impact performance. Further studies are needed to find a potential association between preparatory phase mechanics and performance and whether associations exist in pitchers of varied age and skill levels.

EXPLORING HOW NCAA PERSONNEL DISCUSS POST-SPORT PHYSICAL ACTIVITY MAINTENANCE WITH COLLEGIATE ATHLETES: A QUALITATIVE ANALYSIS

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BACKGROUND: Research suggests that collegiate athletes exhibit unhealthy levels of physical activity (PA) post-retirement. Due to their influence on athletes' training in college, collegiate athletics personnel are in a unique position to influence athlete's perceptions of healthy PA levels post-sport. However, at present is unclear if and how personnel address PA maintenance with athletes prior to their retirement. PURPOSE: Explore if and how National Collegiate Athletic Association (NCAA) personnel discuss PA behavior maintenance with current college athletes. METHODS: Head coaches, athletic trainers, and strength and conditioning coaches from Divisions (D) I-III completed online surveys where they indicated if they discuss PA maintenance with their athletes (yes/no), elaborated on how and why they do/do not discuss post-sport PA maintenance (open-ended), and provided basic demographic information. Frequency analyses were used to describe yes/no responses and demographics. Content analyses were used to construct common themes and subthemes across responses. RESULTS: 129 respondents (66.7% men, 43±11 years, 84% Caucasian, 83% coaches) from 30 NCAA-sanctioned sports (DI 36%, DII 26%, and DIII 38%) completed the survey, including the open-ended question. 54.5% responded "yes" to discussing PA maintenance with athletes, 40.3% responded "no", and 5.2% were "unsure". Three themes emerged: *Perceptions for Maintaining Former Athletes' Health,* where respondents acknowledged transitional challenges facing athletes and gave opinions on how athletes should maintain a healthy lifestyle in light of these challenges ("How important it is to be healthy for their lifetime" R35); *Perceptions of, and Practices for, Maintaining PA,* where respondents described their perceptions of former athletes' PA behaviors and reasons for promoting or not promoting PA maintenance ("Teaching/giving them tools about why and how to train" R09); and *Recognizing Transitional Difficulties*, where respondents discussed specific internal and external challenges athletes face in transition ("Loss of the sport and the mental aspects of this transition" R47). CONCLUSION: NCAA personnel recognized the importance of maintaining health and PA in former athletes in light of transitional difficulties. Understanding their diverse practices and non-practices for promoting PA will define if/how personnel are utilized in future PA-promotional efforts for this population.

MASSAGE IT OUT. PHYSIOLOGICAL RESPONSES TO MYOFASCIAL RELEASE INTRA-EXERCISE

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There has been a growing trend to use percussive therapy massage devices to aid in muscle recovery. Specifically, these devices aim to reduce muscle inflammation, soreness, tension, and help flush extracellular fluids similar to that of a therapeutic massage. While emerging evidence highlights the benefits of percussive therapy post exercise, there is a notable lack of research on percussive therapy intra-exercise. **PURPOSE**. Examine the physiological responses (i.e., sets/reps till functional failure) to myofascial release during single arm bicep curls and single leg quadriceps extensions. **METHODS:** Participants [N= 10, 3 females; age (M ± SD); 22.9 ± 3.3 yrs; BMI (M ± SD); 23.8 ± 10.3] completed an initial 10 repetition maximum (10-RM) test for biceps curls and leg extension. Following, participants completed two testing sessions in which single arm biceps curls and single leg, leg extensions were completed at their individual 10-RM until functional-failure (i.e., < 7 reps completed). Percussive therapy was randomly assigned and all participants received myofascial release on all 4 body parts tested (i.e., right & left biceps/quads), and completed a control (i.e., no myofascial release) on all 4 body parts tested. **RESULTS:** Participants reported a significant condition effect, but no significant effect for body part (i.e., biceps vs. quads) was found. Participants completed significantly more sets [M_{diff} ± SE = 0.60 ± 0.15; P = .003; Cohen's d = .59] and repetitions [M_{diff} ± SE = 5.98 ± 1.34; P = .002; Cohen's d = .65] during the control condition relative to the active (i.e., myofascial release) condition. **CONCLUSION:** It appears that percussive therapy may be best post workout and not offer any significant benefits during exercise. Further, there is preliminary evidence that percussive therapy during exercise may hinder physical performance. The mechanisms for this phenomenon have not been explored above but warrant further investigation especially with the growing trend of utilizing personal massage devices during exercise and athletic events.

COMPARING SELF-REPORTED AND FUNCTIONAL OUTCOMES BETWEEN OSSEOINTEGRATED AND SOCKET PROSTHESES

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Abstract
Background: Osseointegrated (OI) prostheses are becoming a more attractive option for amputees, especially in matters of chronic skin issues, pain, and discomfort with socket prosthetic use. Despite the mounting number of publications that support OI prostheses, a meta-analysis has not yet been conducted. Thus, this study aims to provide a meta-analysis of self-reported and functional outcome comparisons between OI prostheses and traditional socket prostheses in lower extremity amputees. We hypothesize that OI prosthesis will result in improvements in self-reported and functional outcomes when compared to socket prostheses. Methods: Six databases were used; Cochrane, Pubmed, Medline, EMBASE, CINAHL, and Web of Science. Search terms used; Amput* OR Amputation AND Osseointegration AND Human. Initial search terms used; Questionnaire for Persons with a Transfemoral Amputation (QTFA), Endo exo prosthesis, Bone anchored, Osseointegration, the Osseointegrated Prostheses for the Rehabilitation of Amputees (OPRA), and Press fit. The search was conducted by two independent reviewers. A total of 1434 studies met the initial search criteria, 277 studies remained after the removal of duplicates, 23 full text articles were reviewed, and 12 studies were eligible for final inclusion. Two independent reviewers assessed study quality and extracted data before combining the data into one dataset. Analysis was performed using Comprehensive Meta-Analysis. Self-reported outcomes, QTFA & Short Form 36 (SF-36), are both measures of a spectrum of mental and physical qualities. The selected functional outcomes for comparison were the 6 Minute Walk Test (6MWT) and Timed Up and Go (TUG). Results: Twelve studies compared outcomes of QTFA: Global Score, SF-36: Physical Component Summary, 6MWT, & TUG between OI and socket prostheses. Eleven studies evaluated the subjective outcomes and 9 studies evaluated the functional outcomes. Overall, the analysis showed OI prostheses had significantly higher self reported scores, QTFA (ES=2.981, P<0.001), and SF-36 (ES=2.068, P<0.001), as well as significantly lower recorded times, TUG (ES=2.156, P<0.001), and significantly higher walk distances, 6MWT (ES=2.576, P<0.001). Conclusion: OI prostheses were found to produce significantly higher self-reported metrics in both the QTFA and SF-36 as well as significant reductions in TUG time and significant increases in 6MWT walk distances.

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 the majority of these injuries occurring in adolescents. Following SRC, glucose disposal and utilization is decreased in affected areas of the brain. The disruption in metabolism may impose a toll on the molecular machinery that supports cognitive and functional activities, leading to significant declines in neurocognition, balance, and stability. Current treatment strategies (rest, hydration, and over-the-counter medications) neglect to address metabolic changes which could have long-term consequences. In contrast, 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 is to determine if ketone supplementation within 7-14 days of SRC will attenuate associated perturbations in energy metabolism. METHODS: Thirty high-school aged athletes (15 male and 15 female) aged 12-19 y who have suffered a SRC within 7-14 days will be enrolled in a 4-week intervention, with measures occurring at enrollment (baseline), 7, 14, and 30 days. As part of standard of care, the Sports Concussion Assessment Tool (SCAT5), Return-to-Sport, and Return-to-School assessments will be conducted by a licensed healthcare professional. The C3Logix Concussion Management System will be will also be utilized by trained research personnel to evaluate cognitive function, balance, reaction time, and stability. The double-blind procedure will involve participants being randomly assigned to one of two groups, to either receive the ketone supplement or a placebo control. A 2x4 (group x time) repeated-measures ANOVA will be used to evaluate differences in the proposed outcomes. ANTICIPATED RESULTS: Our central hypothesis is that ketone supplementation within 7-14 days of SRC will attenuate the associated perturbations in energy metabolism leading to improved cognitive, biochemical, and functional outcomes compared to placebo. **Sponsor:** Faculty Development Grant Program funded by the Faculty Senate of the University of Alabama at Birmingham.

RELATIONSHIP BETWEEN CONCUSSION HISTORY AND REACTION TIME IN COLLEGIATE ATHLETES

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Background: Concussions, a common injury in collegiate contact sports, are a subset of mild Traumatic Brain Injuries that affect the neurological, physiological, and psychological functioning of athletes. Concussions often have effects lasting beyond the cessation of noticeable symptoms, with reaction time (RT) being one of them. RT has been reported as one of the most sensitive measures of a concussion and compared to other computerized diagnostic tests, it can be retested periodically at a low cost and little time commitment. For these reasons, establishing simple and complex RT scores may be an indispensable tool for clinical management of concussions. The purpose of this study is to evaluate the

effect of concussion history on both simple and complex RT in collegiate athletes. Methods: Forty Maryville College student-athletes (20 with and 20 without concussion histories) will be recruited to complete a survey consisting of demographic information, an evaluation of concussion education, and concussion history. Following the completion of the survey, an onsite socially distanced data collection will occur. The computerized Stroop test, which has participants respond as quickly as they can to a set of color words, will provide measures of simple and complex RT. Simple RT is established by responding to the words every time they are presented. Complex RT is averaged between two sets of trials where participants respond when the word and text color are congruent and then when the word and text color are incongruent. Analysis will include descriptive statistics and after checking assumptions for normality, independent t-tests to compare simple and complex RT between athletes with and without concussion histories. Multiple regression analysis will evaluate the relationship between number of concussions, and time since most recent concussion and the outcome of reaction time. Anticipated Results: It is hypothesized that athletes with a concussion history will have slower simple and complex RT and will be less accurate in the complex RT trials than athletes with no concussion history. It is also hypothesized that athletes with more total, and recent concussions will demonstrate slower RTs and less accuracy than athletes who have fewer, and longer timeframe since their last concussion. Funding: Maryville College Senior Study Grant Fund

RELATIONSHIP BETWEEN MAXIMAL FAT OXIDATION AND VENTILATORY THRESHOLD IN ENDURANCE TRAINED MALES

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BACKGROUND: Training above ventilatory threshold (VT), and corresponding heart rate, have resulted in improvements in aerobic capacity; the ability to oxidize fatty acids is a limiting factor in endurance performance. Additionally, little is known about the contribution of body composition on maximal fat oxidation (Fat_{max}). The purpose of this study was to characterize Fat_{max} and its relationship to VT in endurance trained young adult males. A secondary purpose was to understand the impact of body composition on Fat_{max}. METHODS: 25 trained males (Age: 22.2±2.4 yrs; Height:177.0±4.8 cm; Weight: 75.3±6.9 kg; VO_{2max}: 50.5±14.6 mL/kg/min) were assessed for body composition using dual-energy X-ray absorptiometry to estimate lean mass (LM), fat mass (FM), and percent body fat (%BF). All subjects performed an incremental graded exercise test to volitional exhaustion. Fat_{max} was determined as the exercise intensity ($\%VO_{2max}$) at which the highest rate of fat oxidation was observed. VT was determined automatically from the software as the point by which respiration increased to compensate for CO_2 and lactate accumulation. Paired t-tests were used to determine the differences between Fat_{max} and $VT_{\%VO2max}$, Fat_{maxVO2} and VT_{VO2}, and HR at Fat_{max} and VT. Multiple linear regression was used to analyze the influence of body composition on Fat_{max}. RESULTS: There were no significant differences between Fat_{max} and $VT_{\%VO2}$ (Mean Difference ± Standard Error: -0.2±0.1%; p=0.107) or Fat_{maxVO2} and VT_{VO2} (-3.4±3.1 L/min; p=0.288). Fat_{maxHR} was significantly lower than VT_{HR} (-11.7±3.1 bpm; p=0.001). LM, FM, %BF did not significantly influence Fat_{max} ($F=0.888$, $R^2=0.13$, p=0.464). CONCLUSIONS: The similar intensity observed between VT and Fat_{max} suggests training above VT could be a useful strategy for maximizing fat oxidation during exercise, thereby supporting glycogen sparing in addition to enhanced training volume and exercise adaptations. Body composition does not appear to be an important factor for Fat_{max} in young males.

ACUTE EXERCISE LOWERS BLOOD GLUCOSE AND METABOLIC LOAD POST-HIGH-FAT MEAL INDEPENDENT OF AGE

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BACKGROUND: A single high-fat meal (HFM) that is "typical" in a Westernized diet may result in adverse post-prandial outcomes that contribute to cardiovascular and metabolic disease risk. Older adults are at an increased risk for cardiometabolic diseases compared to younger adults. While acute exercise may lower post-prandial triglycerides (TRG) and glucose (GLU) in young and middle-aged adults, the effects are unclear in healthy older adults. Therefore, we tested the effect of acute exercise on high fat meal (HFM) induced TRG, GLU and metabolic load index (summation of TRG (mg/dL) x GLU (mg/dL)) in healthy older adults. **METHODS:** Twelve young adults (YA) (age= 23.3 ± 3.9 yrs, n = 5 M/7 F, 25.3 ± 5.0 kg/m^2) and 12 older adults (OA) (age= 67.7 ± 6.0 yrs, n = 8 M/4 F, 25.8 ± 3.1 kg/m^2) visited the laboratory in a random order to complete a HFM with no exercise (NE) or acute bout of exercise (EX) condition. EX was performed 12 hours prior to a HFM for a duration long enough to expend 75% of the calories consumed in the HFM. For the HFM ((Marie Callender's Chocolate Satin Pie at 12 kcal/kgbw; 57% fat, 37% CHO, 4% PRO), blood samples were taken at 0, 30, 60 and 90 minutes, and then every hour postprandially up to 6 hours post-meal. A repeated measures ANOVA including time and condition (NE, EX) as the within-subjects' factors and age as the between subjects' factors for TRG, GLU and MLI. Significance was set a priori at $p<0.05$. **RESULTS:** There was no difference in BMI or fasting TRG and GLU between groups, however TRG levels increased to a larger magnitude in OA compared to YA (p<0.001). There was a trend towards lower peak TRG levels following EX in the OA compared to the YA-NE (p=0.085). Interesting, there was no difference in GLU between OA and YA after the HFM. However, EX attenuated post-prandial GLU post EX compared to NE independent of age (p=0.027). There was no time by group interaction between OA and YA, however there was a significant lower MLI after EX compared to NE in OA and YA (p<0.001). **CONCLUSIONS:** TRG responses were larger in OA compared to the YA. Pre-prandial EX tended to reduce peak TRG in OA and reduced GLU post-HFM in OA and YA. Subsequently, EX lowered the MLI independent of age. Future research should investigate the mechanism(s) by which acute EX modifies post-prandial metabolism across the lifespan in order to maximize exercise intervention aimed at lowering chronic disease risk.

ENDURANCE EXERCISE PREVENTS METABOLIC DISTRESS-MEDIATED HEPATIC SENESCENCE VIA PROMOTING AUTOPHAGY

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Dysregulated caloric intake (i.e., positive caloric imbalance) contributes to metabolic diseases such as obesity and type 2 diabetes, leading to dysfunction of numerous critical organs in the body, including the heart and brain. Furthermore, such metabolic distress has been linked to non-Alcoholic Fatty Liver Disease (NAFLD), one of the most common diseases in the United States, affecting almost 25% of the U.S. population. While there is no cure for NAFLD, growing evidence has emerged that endurance exercise protects the liver against FAFLD through the restoration of liver function. However, the mechanisms of exercise-induced hepatic protection remain an unresolved topic. The present study investigated if endurance exercise-induced autophagy attributes to metabolic distress-induced premature senescence (aging), metabolic signaling, oxidative stress, and inflammation in the liver of mice fed with a diet in high fat and fructose, which replicates NAFLD. Female mice (n=33) were divided into three groups: control group (CON, n=11), high-fat + high fructose group (HFD+HF, n=11), and high-fat + high fructose + exercise group (HFD+HF+EXE, n=11). The mice assigned to HFD+HF and HFD+HF+EXE groups were fed with HFD and HF for 12 weeks, after which the mice assigned to the exercise group began habituation to treadmill running for five days. After the habituation, the mice started treadmill running exercise for 13 weeks (60 min a day, five days a week), with a diet in HFD/HF continued. Our study showed that that endurance exercise promoted autophagy evidenced by an increase in LC3-II and reduction in p60 proteins) and prevented hepatic senescence (a reduction in p53, p22, p16, and beta-galactosidase). Also, exercise contributed to preventing hepatic inflammation and oxidative stress caused by the high caloric diet, evidenced by suppressed levels of proinflammatory cytokines such as TNF-alpha and IL-1 beta and NADPH oxidase 2 (NOX2). Importantly, exercise also improved glucose regulation by upregulation GLUT2 expression and fatty acid transportation (e.g., an increase in fatty acid-binding proteins). This study suggests that exercise-induced autophagy may play a crucial role in the prevention of NAFLD-induced hepatic senescence and inflammation.

ASSOCIATIONS BETWEEN PHYSICAL ACTIVITY LEVEL AND METABOLIC DYSFUNCTION IN YOUTH WITH SEVERE OBESITY

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BACKGROUND: Obesity is a serious epidemic caused by a host of factors; one of which being physical inactivity. Physical inactivity is associated with a variety of adverse health outcomes, including obesity complications like cardiovascular disease and hypertension. METHODS: The purpose of this project is to evaluate self-reported physical activity levels and the associations with obesity co-morbidities. 706 youth (69% African American, 62% female, 12.3±3.6 yrs, BMI z-score 2.54±0.44, 147.1±28.0% of 95$^{th\%ile}$, and 47.5±6.5% body fat) were evaluated from the Healthy Lifestyle Clinic (HLC) at Le Bonheur Children's Hospital. Physical activity (PA) was assessed by survey of the caregivers and categorized by activity level (26.7% complete 60 mins PA >5 day/wk, 42.8% complete 60 mins PA ≤4 and ≥2 day/wk, and 30.5% complete 60 mins PA <2 day/wk). Medical provider's evaluations were abstracted from medical records and obesity-related diagnoses were recorded. RESULTS: In chi-square analyses, PA levels were not significantly associated with severity obesity (p=0.84), hypertension (p=0.7), low HDL levels (p=0.6), insulin resistance (p=0.3), abnormal liver function (p=0.5), impaired glucose tolerance (p=0.5), or elevated triglycerides (p=0.07). However, low PA levels were significantly associated with diagnosis of elevated LDL levels (p=0.02). In our cohort of youth with severe obesity, self-reported physical activity levels were not significantly associated with obesity-related metabolic complications except for elevated LDL levels. Further predictive modeling suggests that the strength of the association between physical activity and LDL levels are significantly impacted by age (p=0.026), sex (p=0.011), race (African American vs White p=0.000) and income (<$20k vs >$50K p=0.0080). CONCLUSIONS: Our results are counter to previous published relationships between PA and chronic health conditions. The severe levels of obesity in our cohort likely overwhelms the contribution of PA alone and further investigation has yielded strong associations with observed covariates.

METABOLIC AND VENTILATORY RESPONSES TO EXERCISE IN YOUNG ADULTS FOLLOWING SARS-COV-2 INFECTION

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Background: The novel SARS-CoV-2 virus has inflicted irreparable damage to human health. Given the virus primarily infects cells within the pulmonary system, as well as systemically in cells with angiotensin converting enzyme 2 receptors, it stands to reason that physical exertion based activities may be affected. **Purpose:** To assess whether or not metabolic and ventilatory variables

during exercise are affected following acute SARS-CoV-2 infection. **Methods:** A cross-sectional analysis (n=24) was accomplished using age, sex, and BMI matched young adults that tested positive for SARS-CoV-2 three weeks prior to data collection (CoV+, n=12; 20.3±1.2 yr, 7F, 24.2±3.4 kg•m^{-2}) or negative controls (CTRL, n=12; 20.8±1.9, 7F, 22.8±3.1 kg•m^{-2}). Subjects were compared during rest, 60W, 120W, and peak exercise on a cycle ergometer. Metabolic and ventilatory measurements were collected on a metabolic cart. Values are expressed as mean±SD. **Results:** No significant differences were observed in relative or absolute peak oxygen uptake (VO_{2peak}) (CoV+: 35.4±5.7 mL•kg^{-1}•min^{-1}, 2.5±0.7 L•min^{-1}; CTRL: 34.7±6.6 mL•kg^{-1}•min^{-1}, 2.4±0.8 L•min^{-1}, respectively; p>0.05) between groups. Additionally, ratings of perceived exertion on the Borg scale were similar at VO_{2peak} (CoV+: 14.8±3.0; CTRL:17.2±1.7, p>0.05). Minute ventilation (V_E), tidal volume, and breathing frequency were similar between groups at each exercise intensity (p>0.05). Minute ventilation to minute volume of carbon dioxide (V_E•VCO_2^{-1}) was not significantly different at any stage of exercise between groups (p>0.05). **Conclusion:** Metabolic and ventilatory variables during an incremental exercise test do not appear to be significantly different between CoV+ and CTRL groups. These data suggest that exercise following SARS-CoV-2 infection may not incur physiological determinants or perceptual changes.

INTENSITY OF ACTIVITY AND METABOLIC HEALTH

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Background: Physical activity is associated with metabolic health. However, the relationship between intensity of free-living activity and metabolic health is not well-established. The purpose of this study was to examine the relationship between metabolic health markers and activity intensity throughout the day. We hypothesized that vigorous activity would correlate with insulin sensitivity (SI), β-cell function, and central adiposity. **Methods**: 37 females (21.1±2.8 years, 27.7±3.3 BMI) participated in this study. Each participant underwent an overnight fast prior to arriving to the lab. Upon arrival, participants received a 2-hour frequently-sampled oral glucose tolerance test (OGTT) after consuming a 75g glucose beverage, as well as intra-abdominal adipose tissue (IAAT) and subcutaneous abdominal adipose tissue ultrasounds. Free-living activity was obtained by 7-day accelerometry. Non-compliant, as well as the most- and least-active step count days were excluded. The remaining 3-4 days were assessed via Freedson-cut points for time spent in each intensity level of activity (sedentary, light, moderate, vigorous). Plasma insulin, glucose, and c-peptide measures from the OGTT were used to determine SI and β-cell function by minimal modeling. SI and β-cell function were log transformed to adjust for non-normality of data. Correlations were controlled for both age and race. **Results**: SI was correlated with minutes in vigorous activity (Vig) (r=0.436, p=0.023). IAAT was correlated to SI (r=-.373, p=.047). IAAT and β-cell function were not correlated to any level of physical activity (all p-values>0.05). Insulin sensitivity was not correlated with any other level of physical activity (all p-values>0.05). **Conclusion**: Insulin sensitivity was associated only with vigorous activity, while β-cell function did not correlate any volume of activity intensity. This data suggests that vigorous activity may be necessary to elicit improvements in insulin sensitivity. Vigorous activity should be considered in lifestyle prescriptions designed to improve metabolic health.

ELEVATED MATERNAL LIPID METABOLISM IS ASSOCIATED WITH EXCEEDING GESTATIONAL WEIGHT GAIN GUIDELINES

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Background: Only 30% of women achieve gestational weight gain (GWG) within recommended ranges set forth by National Academy of Medicine (NAM). Because extreme deviations from these recommendations for GWG have been associated with unfavorable maternal outcomes, a greater understanding of maternal metabolic factors that influence GWG is warranted. The purpose of this study was to explore the potential link between maternal lipid metabolism and GWG. Methods: Thirty-two women with a lean pre-pregnancy BMI were recruited during late pregnancy and fasting metabolic measurements using indirect calorimetry were assessed after an overnight fast. Fasting lipid oxidation rates were calculated using standardized equations. Pre-pregnancy weight and final delivery weight were self-reported and used to calculate total GWG, which was then categorized as follows: inadequate (below the NAM guidelines), adequate (adhered to the NAM guidelines), or excess (exceeded the NAM guidelines). One-way ANOVA with post-hoc Tukey tests were used to compare lipid oxidation rates across GWG categories and correlation coefficients were used to assess the relationship between GWG and maternal lipid oxidation. Results: Fasting lipid oxidation was significantly higher (p<0.05) among women with excess GWG compared to women with adequate GWG. Absolute GWG was positively correlated to lipid oxidation (r= 0.507, p= 0.003). Conclusions: The results from this study indicate that fasting lipid oxidation may play an important role in GWG. A better understanding of the metabolic profile of women during pregnancy may be critical in truly understanding a woman's risk of GWG outside the recommendations. Mounting evidence suggests that GWG counseling during prenatal care may need to be tailored to women based not just on their weight status, but other metabolic characteristic, in order to achieve GWG for optimal maternal health. Funding was provided by NIH NIGMS IDeA Grant 5P20GM103436 and WKU RCAP Grant 17-8011.

THE EFFECT OF A SPINACH DERIVATIVE SUPPLEMENT, SOLARPLAST, ON INFLAMMATION BLOOD BIOMARKERS

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BACKGROUND: Smoking has been associated with a rise in inflammation levels. These persistent levels of inflammation throughout the body are highly correlated with an increased risk of multiple chronic diseases such as cardiovascular disease, type II diabetes mellitus, as well as certain types of cancer. Spinach is an antioxidant rich food that may assist in decreasing inflammation. Solarplast (Deerland Enzymes, Inc) is a supplement derived from spinach, containing both antioxidant enzymes and molecules, that may assist in reducing inflammation; however, this supplement has not been examined to date. The purpose of this study was to investigate the effects of Solarplast on inflammatory blood biomarkers in smokers. METHODS: Sixteen participants, who had been smoking for a minimum of one year, completed this study (Solarplast: 31.6 yrs, 76.4 kg; Placebo: 28.1 yrs, 73.4 kg). All participants were asked to arrive at the laboratory in a fasted state, underwent a blood draw from a vein in the antecubital space and were randomized to either the supplement (Solarplast: 100 mg/d) or placebo (maltodextrin: 100 mg/d) group. Participants were asked to consume their supplement once daily for 45 days and then return to the lab to undergo another blood draw. Serum was stored immediately following blood draws at -80 degrees Celsius. Serum markers of IL-6, TNF-alpha, and IL-4 were tested via enzyme linked immunosorbent assays. Data were analyzed via a 2 (Solarplast vs Placebo) x 2 (Pre and Post) repeated measures analysis of variance. Post-hoc paired sample t-tests were utilized when appropriate. RESULTS: A main effect for time ($p < 0.001$) and group x time interaction ($p = 0.006$) was noted for IL-6. A significant decrease in the Solarplast group was seen for IL-6 from Pre to Post (Pre: 3.30 ± 0.51, Post: 1.76 ± 0.36; $p < 0.001$) with no significant changes in placebo (Pre: 3.16 ± 0.65; Post: 2.71 ± 0.39; $p = 0.124$). A main effect for time ($p = 0.003$), but no group by time interaction was noted for TNF-alpha. A time effect trend was noted for IL-4 ($p = 0.091$). CONCLUSIONS: Supplementing with Solarplast appears to be effective at decreasing pro-inflammatory markers, as assessed by IL-6 and TNF-alpha in smokers. This research was funded externally by Deerland Enzymes, Inc.

INFLUENCE OF PRENATAL YOGA ON MENTAL HEALTH IN PREGNANCY DURING THE COVID-19 PANDEMIC

Cathryn Duchette, Maire Blankenship, Rachel Tinius. *Western Kentucky Univeristy, Bowling Green, KY.*

BACKGROUND: During the ongoing COVID-19 pandemic, the mental health of expecting mothers has become increasingly important, as recent studies have demonstrated increased levels of stress and anxiety for new and expectant mothers. Prenatal yoga has been shown to be an effective tool for improving mental health during pregnancy, but to date no research has been done to determine the efficacy of prenatal yoga for mental health during a pandemic. Therefore, the purpose of this study is to determine the influence of a 10-week prenatal yoga program on maternal mental health, including anxiety and depression, during the COVID-19 pandemic. METHODS: 32 women will be recruited and randomly assigned to either the yoga group or the control group. After completing baseline surveys on depression, anxiety, health-related quality of life, and self-rated abilities for health practices, the yoga group will participate in 10 weeks of prenatal yoga (either in-person or virtually), while the control group will be asked not to do any prenatal yoga. At the end of 10 weeks, both groups will repeat the baseline surveys to determine the effect of yoga on anxiety and depression. Before and after the first yoga session, additional mood data will be collected to understand the impact of one yoga session on acute stress and anxiety levels. We will run independent students t-tests to examine differences in stress, anxiety, and depression between the yoga group and control, and paired t-tests to determine differences before and after the initial session. ANTICIPATED RESULTS: To date, 24 women have been recruited and 5 have begun the yoga sessions. Baseline surveys suggest high levels of stress, anxiety, and depression, as shown by an average depression score of 8.55±1.04 (with a score of 10 representing possible depression) and an average anxiety score of 39.95±2.84(with a score of 39 or higher representing clinical significance). Same day surveys suggest that immediately post-yoga session, women feel significantly less tense (p=0.023), nervous (p=0.024), and anxious (p=0.006). Data collection is ongoing, but should be completed by February 2021. CONCLUSIONS: The findings of this study may provide clinicians with valuable information regarding exercise options for patients during this challenging time. FUNDING: This research is supported by a Graduate Student Research Grant from Western Kentucky University's Graduate School.

METABOLIC FLEXIBILITY, INSULIN RESISTANCE, AND OBESITY DURING PREGNANCY ARE ASSOCIATED WITH NEONATAL ADIPOSITY

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Background. Pregnant women with obesity are less metabolically flexible, and this is linked to maternal insulin resistance during pregnancy. It is well-known that an altered intrauterine metabolic environment contributes to the programming of neonatal outcomes; however, the relationship between maternal metabolic flexibility (i.e. the ability to switch between fat and carbohydrate oxidation in response to changes in fuel availability) and neonatal outcomes has

not been studied. *Purpose.* The aim of this study was to determine the relationships between maternal metabolic flexibility and other metabolic factors during pregnancy and neonatal health outcomes. *Methods.* The interventional physiology study among a cohort of pregnant women utilized indirect calorimetry to assess lipid oxidation rate before and after consumption of a high-fat meal. The percent change in lipid oxidation was calculated as the measure of 'metabolic flexibility'. Maternal insulin resistance was measured via fasted plasma insulin and glucose values. Neonatal adiposity was assessed within 48 hours of delivery by skinfold anthropometry. Additional neonatal outcomes were also assessed including cord blood biomarkers. *Results.* A less favorable maternal metabolic profile (decreased metabolic flexibility, increased insulin resistance, increased BMI) was associated with higher neonatal adiposity. Specifically, metabolic flexibility (r=-.271, p=0.034), maternal HOMA-IR (r=0.280, p=0.030), and maternal BMI (r=0.299, p=0.018) were correlated with subscapular skinfold. Regression analysis revealed metabolic flexibility was a significant independent predictor of neonatal subscapular skinfold thickness even when controlling for neonatal gestational age at delivery, maternal HOMA-IR, and maternal BMI (p=0.046). *Conclusions.* Decreased metabolic flexibility/substrate shifting in response to a high-fat meal during pregnancy is linked to neonatal adiposity.

THE ASSOCIATION OF PHYSICAL ACTIVITY WITH LIPID LEVELS IN PREGNANT WOMEN WITH OVERWEIGHT AND OBESITY

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Background: Atypical lipid levels during pregnancy are associated with increased risks of pre-eclampsia and other adverse outcomes. Moderate to vigorous physical activity (MVPA) has been shown to improve lipid levels outside of pregnancy. This study examined the relationship between free-living MVPA and lipid levels during pregnancy in women with overweight and obesity. **Methods:** A secondary analysis of Gestational Weight Gain and Optimal Wellness (GLOW) trial data examined MVPA in the sports/exercise domain, self-reported from the Pregnancy Physical Activity Questionnaire (PPAQ, n= 343), and MVPA from ActiGraph wGT3X-BT devices (n= 294). Total cholesterol (TC), triglycerides (TG), high-density lipoprotein (HDL), low-density lipoprotein (LDL), and very low-density lipoprotein (VLDL) were measured from fasting blood samples at ~10- and ~32-weeks' gestation. Ordinary least squares estimated associations with lipid levels, adjusting for GLOW group assignment, pre-pregnancy BMI, and gestational weeks. **Results:** Device-based MVPA was higher in early pregnancy than late (P = 0.04), but there was no difference for PPAQ-based sports/exercise MVPA. At 10-weeks' gestation, sports/exercise PPAQ-based MVPA was favorably associated with HDL and VLDL (both P_{trend}=0.04); women in the highest sports/exercise PPAQ quartile had 4.5 mmol/L (95% CI 0.5,8.5) higher HDL and 2.5 mmol/L (CI -4.6, -0.3) lower VLDL than the lowest quartile. At 32-weeks' gestation, the highest device quartile had 5.7 mmol/L (CI 0.0, 11.45) higher HDL than the lowest. **Discussion:** Sports/exercise specific MVPA may modestly improve HDL and VLDL in women with overweight and obesity, particularly in early pregnancy prior to increases in lipogenesis.

COMPARISON OF DUAL TASK COST DURING OVERGROUND WALKING IN POSTPARTUM VERSUS CONTROL WOMEN

Amy Giboney, Juli Kunzman, Rebecca R. Rogers, Mallory R. Marshall. *Samford University, Birmingham, AL.*

BACKGROUND: Anecdotally, many pregnant women report that their memory is impaired compared to non-pregnancy, but results of studies of cognitive abilities are mixed. The effect of pregnancy on ability to dual task, or perform two tasks simultaneously, has not been studied, and little is known about how and if memory changes persist into the postpartum period. Thus the purpose of this study was to examine the effect of walking over ground at a self-selected speed while also performing a thinking task on gait and cognitive performance during postpartum compared to non-pregnant controls. METHODS: A total of n=13 postpartum women (mean 14.2±1.5 weeks postpartum, age 31.9±3.9 years old) and n=20 non-pregnant controls (age 32.1±4.7 years) were recruited to participate in this study. Of the controls, 11 had been pregnant previously, though not within the past year, and nine had never been pregnant. All participants performed a baseline walking gait analysis on a GaitRite gait analysis system and then performed four cognitive tests while walking: serial 1, 3, and 7 subtraction tests and a phoneme monitoring test where participants listened to a story and answered questions related to the content and also counted the frequency that two words appeared in the story. Each assessment lasted two minutes each, and participants completed the same four assessments while seated. The order of the testing was counterbalanced. Dual task cost (DTC) was calculated using the formula (Single task score - Dual task score)/Single task score)*100. T-tests were used to compare the two groups. RESULTS: Postpartum participants walked at a faster velocity than controls during serial 1 (p=0.003), serial 3 (p=0.005), serial 7 (p=0.006) and phoneme (p=0.014) testing. Postpartum women also correctly answered more serial 1 (129.5±17.1 vs 108/7±31.4), serial 3 (45.1±25.5 vs 29.9±17.2) and serial 7 (23.0±12.2 vs 14.1±11.1) subtractions compared to controls (p<0.05 for all comparisons). However, there were no differences in the dual task cost for any gait parameters or cognitive tests (p>0.05). CONCLUSIONS: There were no differences between postpartum women and controls in the dual task cost of walking or performing cognitive tests, suggesting that a recent pregnancy does not adversely affect a woman's ability to simultaneously perform a walking and cognitive task.

CHANGES IN DUAL TASKING FROM ACROSS PREGNANCY AND POSTPARTUM

Anna Tankersley, Ashleigh Davis, Rebecca R. Rogers, Mallory R. Marshall. *Samford University, Birmingham, AL.*

BACKGROUND: Eighty-one percent of pregnant women report decrements in memory and cognitive functioning during pregnancy, but results of studies on the topic are mixed. No studies have examined the ability of pregnant and postpartum women to simultaneously perform two tasks (i.e. dual tasking) and whether this ability changes as pregnancy progresses. Thus, the purpose of this study was to examine changes in dual tasking across pregnancy and into the postpartum period. METHODS: A total of n=13 pregnant women (31.9±3.9 years old at study enrollment) visited the laboratory at three time points: 2nd trimester (22.3±3.5 weeks), 3rd trimester (33.8±2.6 weeks), and postpartum (14.2±1.5 weeks postpartum) and completed a baseline walking gait analysis on a GaitRite gait analysis system. They then performed four cognitive tests while walking: serial 1, 3, and 7 subtraction tests and a phoneme monitoring test where participants listened to a story and answered questions related to the content and also counted the frequency that two words appeared in the story. Each assessment lasted two minutes, and at each visit the participants completed the same four assessments while seated; testing order was counterbalanced. Dual task cost (DTC) was calculated using the formula (Single task score - Dual task score)/Single task score)*100. Analysis of variance (ANOVA) was used to compare means. RESULTS: There were few differences in DTC across pregnancy and postpartum time points. During the third trimester, women had significantly greater DTC for serial 3 correct responses compared to 2nd trimester and postpartum (-112.1% in 3rd trimester, 17.3% in 2nd, 4.0% at postpartum; p=0.035), which indicates that only in the 3rd trimester did the women perform better while walking than while seated. There were no other significant differences in DTC for any cognitive tests or gait parameters (p>0.05). CONCLUSIONS: These data suggest few changes in dual tasking capability across pregnancy and into the postpartum period.

MATERNAL LIPID METABOLISM IS LINKED TO NEONATAL ANTHROPOMETRIC OUTCOMES

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Background: Maternal substrate metabolism may contribute to poor infant health outcomes such as increased adiposity, which has implications for future risk of obesity and metabolic disease in the offspring. The purpose of this study was to explore the potential impact of maternal lipid oxidation on neonatal anthropometric outcomes. Methods: After an overnight fast, maternal bodyfat% (skinfolds), and resting metabolic rate (RMR) and lipid metabolism (calorimetry) were assessed during the third trimester of pregnancy (N=61, 32-39wks gestation). At delivery, neonatal weight, length, and head circumference were obtained and within 48 hours, neonatal body composition (fat and lean mass) was measured by skin fold thickness at 4 sites. Pearson product-moment correlation coefficients were used to assess the degree of the relationship between variables. Partial correlations were used to adjust for potential confounders. Results: Maternal lipid metabolism was correlated to total neonatal skinfolds (r=0.288, p=0.024), birthweight (r=0.491, p<0.001), and body fat mass (r=0.526, p<0.001). These relationships remained significant even when accounting for maternal fat free mass, pre-pregnancy BMI, and baby gestational age and gender. There was also a positive relationship between maternal RMR and birthweight (r=0.313, p=0.015) and body fat mass (r=0.393, p=0.002). Conclusions: Our findings indicate that increased lipid oxidation is associated with increased infant weight/adiposity. It is well-known that substrate metabolism can be modified through dietary intake and exercise training, therefore, future intervention strategies for pregnant women may involve tailoring diet and exercise in order to maximize the positive influence on the infant's birth weight and body fat percentage Funding was provided by NIH NIGMS IDeA Grant 5P20GM103436 and WKU RCAP Grant 17-8011.

IMPACT OF PARTIAL AND COMPLETE FLUID RESTRICTION ON INFLAMMATORY BIOMARKERS

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BACKGROUND: Limited evidence exists examining the manipulation of total body water on inflammatory biomarkers in free-living emerging adults. Therefore, the purpose of this study was to investigate the acute effects of partial and full fluid restriction on inflammatory biomarkers in male and female emerging adults.**METHODS:** Thirty-one males and females (42% female; age, 23±4 y; mass, 78.2±17.3 kg; height, 173.2±9.9 cm; body fat, 18.2±8.7%) provided a 24 h measure of urine volume (U_{VOL}) and urine osmolality (U_{OSM}), 24 h dietary and fluid intake record, and fasted blood draw for two consecutive days. Following measure of nude body mass (NBM) and blood draw on day 1, participants underwent a 2 h sauna exposure (41ºC, 50% RH) and were randomly assigned to one of three groups; control (CON) where females and males consumed 2.0 and 2.5L of water, respectively, partial fluid restriction (PART) where participants consumed water matching sweat losses following the sauna exposure, and full fluid restriction (FULL) where participants were restricted from consuming water prior to visiting the laboratory on day 2. Blood samples were analyzed for c-reactive protein (CRP), interleukin 6 (IL-6), interleukin 8 (IL-8), interleukin 10 (IL-10), interferon gamma (IFN-γ), tumor necrosis factor alpha (TNF-α) and copeptin, a surrogate for arginine vasopressin. **RESULTS:** On day 2, percent body mass loss in PART (MD [95%CI]; 1.2% [0.2,

2.1], p=0.013) and FULL (1.4% [0.45, 2.5], p=0.004) were significantly greater than CON (0.0±0.5%). Higher U_{OSM}(p=0.001) and copeptin (p<0.001), and lower U_{VOL}(p=0.008) were observed in PART and FULL compared to CON. CRP was significantly lower in CON (estimate [95%CI]; -7.35 pg/mL [-4.81, -13.13], p=0.011) than PART, however there were no differences between CON (1.82±1.55 pg/mL) and FULL (3.93±6.17 pg/mL, p>005). IL-8 was significantly greater in FULL (estimate, 3.12 pg/mL [0.49, 5.72], p=0.021) than PART. There were no differences in IL-6, IL-10, IFN-γ, or TNF-α between groups (p>0.05). **CONCLUSIONS:** Partial and full fluid restriction over 24 h produced significant changes in circulating concentrations of CRP and IL-8, however, these differences were not consistent between hydration groups. Twenty-four-hour changes in total fluid intake eliciting mild hypohydration (<1.5% body mass loss) may be insufficient to cause a sustained systemic inflammatory response in free-living emerging adults.
Grant or Funding Information: This study was funded by a University of North Carolina at Greensboro Office of Research Engagement New Faculty Grant.

THE EFFECTS OF BLOOD FLOW RESTRICTION TIMING ON MUSCLE ACTIVATION AND OXYGENATION DURING RESISTANCE TRAINING
Chase P. Harris, Nathen A. Andrews, Jakob D. Lauver. *Coastal Carolina University, Conway, SC.*

BACKGROUND: Heavy resistance training has been traditionally used to increase muscle strength and size. However, blood flow restriction (BFR) techniques with low-intensity resistance exercise have resulted in similar increases in muscle size and strength. BFR involves the restriction of arterial inflow and occlusion of venous outflow in exercising musculature. While BFR may be an effective modality when heavy resistance training is contraindicated various methodological approaches including differences in restriction pressures, timing, and durations of restriction have been used. Therefore, the purpose of this study is to determine the effects of the timing of BFR on muscle activation and oxygenation during resistance exercise. **METHODS:** Subjects will be asked to complete 5 sessions. Session 1 will be a familiarization session. Sessions 2-5, subjects will complete one of four BFR protocols; Control (CON (no-BFR)), Continuous BFR (C-BFR), pre-exercise occlusion with intermittent exercise BFR (pre-IE-BFR), and pre-exercise occlusion with intermittent rest BFR (pre-IR-BFR). Before each session, limb occlusion pressure (LOP) will be measured and 60% LOP will be utilized during exercise. Additionally, maximal voluntary isometric contractions (MVIC) will be performed and 30% MVIC will be used during exercise. For each protocol, subjects will perform 4 sets of 30-15-15-15 repetitions of knee extension at 45 degrees a second, with one minute of rest between sets. During C-BFR, restriction will be applied during all exercise, pre-IE-BFR, restriction will be applied for 180s before exercise and during each set of exercise, pre-IR-BFR, restriction will be applied for 375s before exercise and during rest periods between sets. All BFR protocols will result in the same duration of BFR (555s). Following exercise, a 5-minute max desaturation will be performed for data normalization. For all sessions, subjects will be equipped with surface electromyography on the vastus medialis to measure muscle activation and near-infrared spectroscopy on the vastus lateralis to measure muscle tissue oxygenation. A two-way repeated measures Analysis of Variance will be used to determine differences due to the protocol and time. **ANTICIPATED RESULTS:** We hypothesize that C-BFR and pre-IR-BFR will results in similar acute changes in muscle activation and tissue oxygenation during exercise despite the difference in timing of BFR application.

SESSION VI: REVIEW/SYMPOSIA Friday, Feb. 19, 4:00–5:00 pm EST

EXERCISE IS STILL MEDICINE DURING COVID-19: ADAPTATIONS TO EXERCISE IS MEDICINE ON CAMPUS AT UNC
Kathleen Stanford[1], Alexander Pomeory[1], Lauren C. Bates[1], Kyle Tamminga[2], Thevy Chai[2], Justin C. Moore[3], Lindsay Brookey[4], Lee Stoner, FACSM[1]. *[1]University of North Carolina at Chapel Hill, Chapel HIll, NC. [2]UNC Campus Health Services, Chapel HIll, NC. [3]Wake Forest School of Medicine, Winston-Salem, NC. [4]UNC Campus Recreation, Chapel HIll, NC.*

Introduction: Exercise is Medicine On Campus (EIM-OC) is a global initiative to promote physical activity among college students through collaboration between campus healthcare providers and EIM-OC professionals and has been a success at the University of North Carolina (UNC). With the advent of COVID-19 the University of North Carolina (UNC), like many other campuses, had to adapt to ensure continued success of EIM-OC. Purpose: Illustrate the three main changes EIM-OC members facilitated to the normal EIM process: ii) consultations with participants were moved from a physical location to a virtual platform and ii) alternative and accessible resources were identified, including in participants home towns; iii) novel strategies were adopted by the EIM-OC team to continue to educate health care providers about the importance of exercise. Discussion: EIM-OC experienced an increase in referrals and follow-up meetings despite challenges presented by the COVID-19 pandemic closures. In particular, the change to virtual consultations was well-received by participants, possibly due to a lack of commute time, a less intimidating format or more flexibility in scheduling. Participants in EIM-OC still received tailored resource recommendations, including at-home workouts from on-demand and apps, local trails for outdoor exercise and guides to using virtual campus recreation activities. Conclusions: Following adaptations to the traditional EIM-OC process, referral and follow-up numbers increased compared to those prior to the pandemic. Physical activity recommendations can be modified successfully despite fitness facility closures and exercise access challenges associated with students living remotely. Remaining up to date on campus fitness-opportunities, researching high-quality fitness applications with live and on-demand features, and finding local socially- distant physical activities outdoors have enabled UNC students to remain active during the pandemic. Therefore, such changes could be implemented to other institutions to maintain physical activity among the college student body.

SESSION VI: POSTER/FREE COMMUNICATION Friday, Feb. 19, 4:00–5:00 pm EST

PRIOR ATHLETIC INVOLVEMENT RESULTS IN BETTER WALKING SCORE ON THE MUSCULOSKELETAL HEALTH QUESTIONNAIRE
Jessica Downs, Abigail Cramer, Kenzie Friesen, Kevin Giordano, Nicole Bordelon, Abigail Brittain, Gretchen Oliver, FACSM. *Auburn University, Auburn, AL.*

BACKGROUND: Youth and adolescent sport participation is highly encouraged for immediate and long-term physical health benefits. We hypothesize that participation in youth and adolescent sports may positively affect musculoskeletal health and quality of life in early adulthood. The purpose of this study was to investigate musculoskeletal health in college-aged individuals between those who previously participated in athletics and those with no previous participation. METHODS: Forty-one college students participated in this study. Participants completed an online questionnaire containing information about previous athletic participation and musculoskeletal health (MSK-HQ). Thirty-seven participants indicated that they had previous athletic participation, while four had no athletic participation. The MSK-HQ had nine different sections (pain/stiffness, walking ability, physical activity level, work/daily routine, needing help, and sleep). Participants identified a score of 0-4 regarding how much over the last two weeks their symptoms interfered/effected the respective section. Symptoms were defined as joint, back, neck, bone, and muscle symptoms such as aches, pain, and/or stiffness. Due to non-normally distributed data, a Mann-Whitney U test was used to compare differences in MSK-HQ scores. RESULTS: A significant difference in walking score between groups *(Z* = -2.507, *p* = .043*)* was identified. CONCLUSIONS: Those who identified with previous athletic participation reported less interference with their ability to walk over the last two weeks due to joint, back, neck, bone, or muscle symptoms than those who had not participated in athletics. Prior sport participation may have a positive impact on musculoskeletal health and quality of life in adulthood.

HEAT-TREATED MONTMORENCY CHERRY SUPPLEMENT DOES NOT SIGNIFICANTLY AFFECT REACTIVE HYPEREMIA OR HEART RATE VARIABILITY
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Background: Preliminary data in our lab has shown that heat-treating Montmorency cherries is effective at increasing ACE inhibition, which not only affects blood pressure, but also reactive hyperemia. Previous research has also shown an effect of ACE inhibitors on heart rate variability (HRV). The purpose of the study was to determine if heat-treated cherries would elicit superior reactive hyperemia and HRV responses compared to untreated cherries. **Methods:** 22 pre-hypertensive men with a BMI > 25 were assigned to an untreated tart cherry (UTC) or heat-treated tart cherry (HTC) group using a randomized balanced design, with a placebo (PLA) serving as a control in both groups. Each trial was separated by a minimum of 48 hours. Participants consumed the supplement, rested for 1 hour, and HRV was then monitored for the next 90 minutes with a finger cuff through a non-invasive blood pressure system, after which blood flow was temporarily occluded. Reperfusion of the tissue was captured after the release of occlusion via an infrared plethysmograph to determine reactive hyperemia. All data are presented as mean ± SEM. **Results:** Data for time-domains and frequency-domains for HRV was not normally distributed and thus, a Kruskal-Wallis test was used. All data are presented as HTC, UTC, and PLA, respectively. Average RR (ms) (855.93 ± 33.47, 840.23 ± 33.46, 851.16 ± 23.66; χ^2 = 0.30, p = 0.86), SDRR (ms) (97.48 ± 10.22, 91.54 ± 10.22, 90.99 ± 7.22; χ^2 = 0.49, p = 0.97), and CVRR (ms) (0.11 ± 0.01, 0.11 ± 0.01, 0.10 ± 0.01; χ^2 = 0.14, p = 0.93) did not differ significantly. VLF (μs^2) (5551.54 ± 1206.3, 5387.44 ± 1206.3, 4663.83 ± 853.00; χ^2 = 0.40, p = 0.82), LF (μs^2) (7974.63 ± 1628.60, 5292.65 ± 1628.60, 5237.54 ± 1151.60; χ^2 = 0.19, p = 0.91), and HF (μs^2) (6735.01 ± 1993.50, 4781.78 ± 1993.50, 4965.76 ± 1409.6; χ^2 = 0.04, p = 0.98) did not differ significantly. For reactive hyperemia, width (ms) (2477.00 ± 824.13, 4040.33 ± 824.13, 2922.83 ± 582.75; F = 0.98, p = 0.41), height (V) (0.02 ± 0.02, 0.06 ± 0.02, 0.05 ± 0.02; F = 0.58, p = 0.58), time to peak (ms) (1678.00 ± 626.07, 2592.00 ± 626.07, 1933.95 ± 442.70; F = 0.58, p = 0.58), and peak area (Vs/) (0.06 ± 0.12, 0.16 ± 0.12, 0.14 ± 0.09; F = 0.20, p = 0.82) did not differ significantly. **Conclusions:** Neither heat-treated or untreated Montmorency cherries are effective in producing significant acute changes in reactive hyperemia or HRV in pre-hypertensive men.

RESIDUAL EFFECTS OF PLAYING AN OVERHEAD SPORT ON HUMERAL RETROVERSION AND RANGE OF MOTION
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BACKGROUND: Research has shown that repetitive stress from playing an overhand (OH) sport increases humeral retroversion on the dominant side. Additionally, there is a paucity of data available about these adaptations' residual effects after sports participation cessation. This study's primary purpose was to investigate the effect of prior participation in an OH sport versus not participating in an OH sport on glenohumeral range of motion (ROM) and humeral

retroversion. **METHODS:** Thirty-eight college-aged individuals participated. Participants were split into two groups: (1) individuals who previously participated in an OH sport (n = 18, 20.2±1.1yrs, 166.0±15.9cm, 73.1±13.7kg), and (2) individuals who previously did not play an OH sport or any sport (n=20, 20.6±.7, 167.8±6.2cm, 66.8±13.3kg). Inclusion criteria were pain, injury, and surgery free for at least the past six months. Following a health history questionnaire, we measured bilateral shoulder internal (IR) and external (ER) ROM via an inclinometer and humeral retroversion using an ultrasound imaging machine. Measurements were recorded for three trials and averaged for analysis. The data were non-normally distributed; thus, a Mann-Whitney U was used to determine group differences. A Wilcoxon T-test analyzed bilateral differences within each group. **RESULTS:** There were no significant differences between groups for all dependent variables. When analyzing within individuals, the Wilcoxon test revealed a significant bilateral difference for ER *(Z = -2.240, p = .025)* for the non-OH sport group. Specifically, the non-OH sport participation group had increased ER ROM on their dominant side versus non-dominant. For previous participation in an OH sport group, the Wilcoxon test revealed a significant bilateral difference in humeral retroversion (Z = -2.308, p = .021) and IR ROM (Z = -2.614, p = .009). Specifically, the OH sport group had increased humeral retroversion in their dominant than non-dominant arm but less IR ROM. **CONCLUSION**: The bilateral difference found in the OH sport group for humeral retroversion is significant as it indicates prior sport participation may have residual osseous effects that clinicians need to consider when evaluating shoulder injury or pain. Understanding if there are residual effects from playing an OH sport could help examine injury risk later in life.

INJURY HISTORY, SPORTS PARTICIPATION, AND CURRENT PHYSICAL ACTIVITY AMONG YOUNG ADULTS

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BACKGROUND: The purpose of this study is to examine the association between injury history and current physical activity (PA) among young adults. METHODS: Participants were recruited through ResearchMatch and university classes to complete online REDCap surveys. Eligible participants (N=273) were 18-25 years old, not currently injured, and reported no PA limitations. Participants (N=236) who completed the demographic, injury history, PA (Godin Leisure Time Exercise Questionnaire) surveys, and were not PA outliers were included. Participants were categorized by injury frequency (0; 1; 2+ previous injuries) and high school athlete status (competitive high school athlete; non-athlete/non-competitive athlete). Current moderate-to-vigorous physical activity (MVPA) was calculated using recommendations from Godin (2011). We conducted a two-way ANOVA (injury frequency x high school athlete status) to examine the interaction between injury history and high school athlete status on current MVPA. RESULTS: The sample was aged 22.2 ± 2.1 years, primarily female (77.5%), and white (81.8%). Among the overall sample, current MVPA was highest among individuals who reported 1 injury (52.0 ± 25.4), followed by 2+ (49.2 ± 22.7), and 0 (40.5 ± 28.6) injuries. Current MVPA for competitive high school athletes was 53.2 ± 27.7 compared to 36.0 ± 25.0 for non-high school athletes. There was a statistically significant interaction between injury history and high school athlete status on MVPA (F(2, 230)=3.01, p=0.05). Former competitive high school athletes reported less current MVPA as the frequency of previous injury increased whereas non-athletes reported greater levels of current MVPA as the frequency of previous injury increased. Among individuals who reported 0 or 1 injury, former competitive high school athletes had higher levels of current MVPA compared to non-athletes (p<0.001, p=0.01). Individuals who reported 2+ injuries had similar levels of current MVPA regardless of high school athlete status (p=0.83). CONCLUSION: At low levels of previous injury (0 or 1), former competitive high school athletes had higher current MVPA levels compared to non-athletes. However, individuals who reported 2+ injuries had similar levels of MVPA regardless of high school athlete status. Future studies should examine whether young adults who have experienced multiple injuries have unique PA barriers and facilitators.

EFFECTS OF BEETROOT JUICE SUPPLEMENTATION ON DIURNAL FLUCTUATIONS IN SUPRAMAXIMAL EXERCISE PERFORMANCE IN TRAINED SPRINTERS

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BACKGROUND: Beetroot juice (BRJ) is a rich source of dietary nitrate that has been previously shown to improve power output and movement velocity during explosive exercise. Diurnal fluctuations in power output have been well established with power output loss typically occurring during morning (AM) times. However, it is currently unknown if BRJ supplementation can mitigate anaerobic performance decrements due to time of day. **PURPOSE:** The purpose of this study was to examine the effects of acute BRJ supplementation on circadian fluctuations in anaerobic performance in Division 1 NCAA sprinters. **METHODS:** Male Division 1 NCAA Track & Field sprinters participated. In a double-blinded crossover study design, participants completed three counterbalanced exercise trials: Morning-placebo (8:00 HR, AM-PL), Morning-BRJ (8:00 HR, AM-BRJ), and Afternoon- no supplement (16:00 HR, PM). For the AM-BRJ trial, participants ingested 70 mL of BRJ concentrate (400 mg nitrate) 2 hours prior to exercise while 70 mL of black currant juice (PL) was consumed for the AM-PL trial. During each trial, participants completed 3 × 15 s Wingate anaerobic tests (WAnTs) separated by 2-mins of rest. Anaerobic performance measures, rate of perceived exertion (RPE), and heart rate (HR) were analyzed. **RESULTS:** Mean power output (p= 0.017), anaerobic capacity (p= 0.009), and total work (p= 0.026) were significantly lower during the AM-PL trial compared to PM. However, BRJ supplementation attenuated AM losses of mean power output (p= 0.919), anaerobic capacity (p= 0.744) and total work (p= 0.933) in the AM-BRJ versus PM trial. RPE was not significantly different between any trials (p>0.05). Heart rate was significantly lower during AM-BRJ compared to AM-PL (p=0.030) and PM (p<0.001). **CONCLUSIONS:** Power output and anaerobic capacity suffer during AM versus PM times in collegiate sprinters. However, BRJ supplementation abolished diurnal decrements in performance and restored AM power output to PM levels. Furthermore, BRJ resulted in lower heart rates despite improvements in performance. These data suggest that acute BRJ ingestion may be useful in attenuating declines in anaerobic performance in well-trained athletes which may be beneficial in optimizing training regimens.

MASS SPECTROPHOTOMETRY VERSUS BLOOD METERS IN THE ASSESSMENT OF BETA-HYDROXYBUTYRATE LEVELS FOLLOWING KETONE SUPPLEMENTATION

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Blood ketones are commonly tested with blood meters by researchers, clinicians, and the general population. Limited research has tested the validity of blood meters in the measurement of the ketone beta-hydroxybutyrate (BHB), especially in a human population. Therefore, this study sought to determine if a regularly used blood meter provided similar blood BHB results as mass spectrophotometry, the gold standard of measurement, after consuming a racemic ketone supplement. Sixteen young adults participated in this randomized, triple-blinded, cross-over, placebo-controlled study. Participants visited the laboratory three times; the first visit included informed consent and familiarization, and the following two visits were separated by at least one week and included data collection. During data collection, blood samples were collected before and 30-minutes after consuming either the placebo or racemic ketone salt supplement. Blood BHB was measured immediately by the blood meter at each time point while blood for the mass spectrophotometry measure was processed and frozen for subsequent analysis. A three-way repeated measures ANOVA was conducted to determine the effects of device, time, and drink on blood BHB levels. Follow-up Tukey post hoc tests were used when necessary. There was a statistically significant simple two-way interaction between device and time for racemic ketone salts, F(1, 12) = 11.232, p = .006, but not for placebo, F(1, 12) = .877, p = .368. BHB measured by mass spectrophotometry was significantly (p = .003) higher 30 minutes after ingestion (M = 2.808 ± .521 mmol) than before (M = 0.762 ± .089 mmol). The increase in BHB across the same time points when the blood meter was used was not significant following Bonferroni correction for multiple comparisons (p = .026). The difference in the increase in BHB between the two devices was substantial (d = 0.945). Thirty minutes after ingesting racemic ketones, a significant difference was only detected by mass spectrophotometry but not by the blood meter. Racemic ketone salts are made up of half D-BHB and half L-BHB isomers. We speculate that the blood meter only measured D-BHB isomer whereas mass spectrophotometer measured total BHB which includes D, L-BHB isomers. Funding: KetoMojo, Inc, Augusta University, and Medical College of Georgia

THE INFLUENCE OF MACRONUTRIENT DISTRIBUTION ON URINARY HYDRATION MARKERS, THIRST, AND FLUID INTAKE

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BACKGROUND: Animal research suggests that variations in daily dietary macronutrient distribution may impact fluid consumption. However, this has not been fully investigated in humans. Thus, the purpose of this study was to determine the impact of dietary intake on fluid intake, thirst, and urinary hydration biomarkers. **METHODS:** Thirty-four participants (44% female; age: 23±4 years; height: 172.9±10.3cm; body mass: 77.2±18.1kg; body fat: 18.4±8.4%) recorded their food and fluid intake, and provided a 24h urine sample over seven consecutive days. Urinary hydration biomarkers included urine volume (U_{VOL}), urine osmolality (U_{OSM}), urine specific gravity (U_{SG}), and urine color (U_{COL}). Each morning, participants completed two subjective ratings of perceived thirst; a 9-point Likert scale, and 100mm visual analog scales comprised of six indices (thirstiness, pleasantness, dryness, taste, fullness, sickness). **RESULTS:** Mean weekly macronutrient percentages and total calorie intake were used in multiple regression models as predictors of average total fluid intake, thirst, and urinary hydration markers. Throughout the week, participants reported consuming, on average, 1945±429 calories (36.5±4.4% fat, 44.3±6.3% carbohydrate, 18.5±4.5% protein) and 2508±1122mL fluid per day. Mean 7-day 24h urinary hydration markers were U_{VOL}:1724±850mL, U_{SG} :1.017±0.005, U_{OSM}: 565±212, U_{COL}: 3.89±0.99. Dietary intake that was higher in percentage of fat consumed was associated with higher ratings of "fullness" on morning thirst scale sub ratings (adj R^2 = 0.1181, p =0.0167). Consuming a greater proportion of calories from protein was associated with increased U_{VOL} (adj R^2 = 0.1370, p = 0.0340). However, protein intake was not significantly associated with fluid intake (adj R^2 = 0.0569, p = 0.2516), regardless of the type of fluid consumed (p > 0.05). U_{OSM}, U_{SG}, U_{COL} and the other indices of thirst were not associated with macronutrient consumption (p>0.05). **CONCLUSIONS:** These results suggest increased consumption of dietary protein intake is associated with improved hydration status based on increased 24h urine volume, with the maintenance of other urinary hydration indices. Grant or Funding Information: This study was funded by a University of North Carolina at Greensboro Office of Research Engagement New Faculty Grant.

ASSOCIATIONS BETWEEN PHYSICAL ACTIVITY, 24-HOUR URINARY HYDRATION MARKERS AND TIMING OF FLUID INTAKE

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Background: Appropriate fluid intake is important to offset water losses induced by physical activity. However, limited research has investigated the relationships between physical activity and fluid intake in free living individuals. Thus, the purpose of this study was to assess the associations between objective and subjective measures of physical activity, reported fluid intake, and urinary hydration biomarkers in free living emerging adults. **Methods:** Thirty-four participants (44% female; age, 23±4 years; height, 172.9±10.3cm; body mass, 77.2±18.1kg; body fat, 18.4± 8.4%) provided a 24h urine sample across seven consecutive days for measures of urine volume (U_{VOL}), urine osmolality (U_{OSMO}), urine specific gravity (U_{SG}) and urine color (U_{COL}). A validated fluid log was used to record fluid intake each day, where fluid intake was segmented into morning (waking - noon), afternoon (noon - 5pm) and evening (5pm - sleep). Physical activity was objectively assessed using wrist-worn actigraphy and analyzed using standard cutoffs. Subjective assessment of physical activity quantified day-level physical activity and was measured by MET-minutes. **Results:** Over 7 consecutive days, participants participated in 16.97±23.42 minutes of moderate-to-vigorous physical activity (MVPA) and 677.89±702.62 MET-minutes of activity per day. Mean 7-day fluid consumption was 2551±1056mL and corresponding mean 7-day U_{VOL}, U_{OSMO}, U_{SG}, and U_{COL} was 1699±865mL, 567±210 mOsm/kg, 1.020±0.010 AU, and 3.9±1.0 AU, respectively. Increased MVPA (adj R^2 = 0.114, p = 0.044) and increased total MET-minutes (adj R^2 = 0.192, p = 0.005) was associated with decreased 24 h U_{SG}. Greater morning and evening fluid consumption was associated with increased 24h U_{VOL} (adj R^2 = 0.589, P = 0.02; P < 0.0001). Greater evening fluid intake was associated with lower 24h U_{OSMO} (adj R^2 = 0.331, P = 0.01). **Conclusions:** Increasing day-level physical activity in addition to consuming a greater volume of fluids in the morning and evening improved hydration status as reflected by 24h urinary hydration variables. Further work is needed to explore the associations between physical activity and timing of the fluids consumed. Grant or Funding Information: This study was funded by a University of North Carolina at Greensboro Office of Research Engagement New Faculty Grant.

THE EFFECTS OF CAFFEINE ON JUMPING PERFORMANCE AND MAXIMAL STRENGTH IN FEMALE COLLEGIATE ATHLETES

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BACKGROUND: Caffeine is often used to enhance athletic performance. Research regarding caffeine's effects on strength and power performance is lacking, especially in female athletes. Therefore, the purpose of this study was to analyze the acute effects of caffeine (6 mg/kg of body mass) on jumping performance and maximal strength in female collegiate athletes. **METHODS:** Eleven female collegiate athletes performed two testing sessions separated by one week, and randomly received a caffeine (CAF) or placebo (PLA) condition using a double-blind approach. After receiving the CAF of PLA, athletes sat quietly for 60 minutes. Following a standardized warm-up, athletes were assessed on squat jump (SJ) and countermovement jump (CMJ) jump height (JH) and peak power (PP) and isometric mid-thigh pull isometric peak force (IPF) and rate of force development (RFD) on force platforms. A paired samples t-test with Hedge's g (g) effect size was used to compare performance results between conditions. Alpha level for all analyses was set at $p<0.05$. **RESULTS:** There were small to moderate differences in SJ-JH ($p=0.02$,g=0.35), SJ-PP ($p=0.005$,g=0.77), CMJ-JH ($p=0.007$,g=0.20), CMJ-PP ($p=0.08$,g=0.25), IPF ($p=0.18$,g=0.12), and RFD ($p=0.12$,g=0.32) in favor of caffeine over placebo. **CONCLUSIONS:** Caffeine ingestion produced small to moderate improvements in jumping performance; however, caffeine failed to significantly affect maximal strength when compared with the placebo. Therefore, caffeine appears to be an effective ergogenic aid when used to enhance jumping performance, but not maximal strength in female collegiate athletes.

INFLUENCE OF KETTLEBELL SWING STYLE AND LOAD ON PEAK KETTLEBELL VELOCITY AND TOTAL SYSTEM POWER

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BACKGROUND: Kettlebell swings are a common functional movement used in resistance training programs with the purpose of developing strength and power. The exercise has two main variations, overhead swing (OHS) and shoulder-height swing (SHS). The purpose of this study was to evaluate the effect of load and movement variation on peak kettlebell velocity (PKV) and total system (kettlebell-participant sum) peak power (TSPP) during the concentric phase of OHS and SHS. **METHODS:** Fifteen physically active women (29.8 ± 5.3 yrs) who had been incorporating kettlebell swings into their weekly training programs for a minimum of 6 months performed 4 sets (two sets OHS, two sets SHS) of 15 swings using 12kg and 16kg kettlebells. Variation and load were randomized between participants with two minutes between-set rest. Three-dimensional kettlebell kinematics were used to compute PKV (composite vector of vertical and anterior velocity) while TSPP was computed from the vertical ground reaction forces. PKV and TSPP were statistically compared with separate variation by load repeated measures analysis of variance were used with $\alpha \leq .05$. **RESULTS:** PKV was significantly greater during the OHS compared to the SHS ($P<.001$, $\%_{diff}=15.2\%$, d=2.4). Additionally, PKV was significantly greater with the 12kg kettlebell compared to the 16kg ($P=.002$, $\%_{diff}=2.8\%$, d=.33). During the OHS, TSPP was significantly greater with the 12kg kettlebell compared to the 16kg ($P=.032$, $\%_{diff}=29.6\%$, d=.55). None of the other post hoc comparisons were statistically significant. **CONCLUSION:** The increased displacement required by the OHS is likely the cause of the higher PKV and represents more effort by the participants to perform the movement. In contrast, a 4kg increase in kettlebell mass had a much smaller effect on PKV, and only influenced TSPP during the OHS. These data support the use of the OHS if velocity of the movement and TSPP are important programming goals. Future research should consider the effect of kettlebell load during the OHS on effort and TSPP.

THE EFFECTS OF TART CHERRY JUICE AND WHEY PROTEIN ON RECOVERY FOLLOWING EXERCISE INDUCED MUSCLE DAMAGE

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BACKGROUND: Nutritional interventions to prevent and reduce the effects of exercise-induced muscle damage (EIMD), including natural anti-inflammatories have been found to decrease inflammation and aid in the recovery of EIMD. PURPOSE: To examine the effects of tart cherry juice and whey protein on measures of recovery following fatiguing forearm exercises. METHODS: Eight recreationally active women (age: 21±1yr; BMI: 22.9±2.9 kg/m2) were randomly assigned to either one of two supplemental protocols (S1: 2x8 oz tart cherry juice + 30 g whey protein (WP)/day or S2: 30 g WP/day) for 3 days. Participants completed 3 sets of 7 hand, wrist, and forearm exercises until fatigue with 60 s rest in between. Hand-grip strength, wrist circumference (WC), perceived recovery (PRS), fatigue, and muscle soreness (MS) were measured at pre-, 0, 24, 48, and 72h post-exercise. ANOVAs were used for analyses. Significance was set at $p<0.05$. RESULTS: No significant ($p>0.05$) time or supplement effect was observed in PRS, WC, or handgrip strength (29±7, 25±4, 29±6, 29±7, 30±6 and 30±6, 23±5, 27±7, 29±6, 29±9 kg) between S1 and S2 at pre-, 0, 24, 48 or 72h post-exercise, respectively. However, significantly higher ($p=0.003$) MS between S1 (3.6±3.6, 4.9±1.5, 5.2±3.0, 7.1±2.5, 4.5±3.7) and S2 (2±2.5, 4±1.2, 4.1±3.4, 4.0±3.4, 4.0±3.5) at pre-, 0, 24, 48 or 72h post-exercise was observed. In addition, a significant interaction ($p=0.01$) in fatigue between S1 (3.3± 1.6, 4.6±1.4, 3.4±1.9, 3.9±2.2, 2.9±1.9) and S2 (3.9±2.2, 4.5±1.6, 3.3±2.3, 4.1±1.6, 4.6±1.4) at pre-, 0, 24, 48, or 72h post-exercise was observed. CONCLUSION: Supplementation of tart cherry juice and WP following fatiguing forearm exercise could be used to reduce perception of fatigue but not perceived muscle soreness or improve handgrip performance.

THE EFFECTS OF PROTEIN TIMING ON PERFORMANCE MEASURES IN ATHLETES

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PURPOSE: The purpose of this study was to provide a connection between athletes' performance and protein timing, specifically examining the number of protein servings throughout the day in a population sample of 13 NCAA Division I baseball players at a southeastern university in the United States. Current research headlines the importance of overall protein intake and its relation to physical performance measures. METHODS: Prior to having BIA measurement recorded and completing a vertical jump and maximum sprint test, athletes completed a 24-hour NutriTiming® dietary intake log. This data was inputted into the NutriTiming® software and assessed if protein consumption positively/negatively affected athletic performance. RESULTS: There was a relationship that trended towards more servings of protein equated to a higher vertical jump and lower sprint times, however, the significance level of the sprint time, 0,116, and the highest vertical jump, 0.142, showed the data was not statistically significant (desired 0.05) when using a 2-tailed significance. CONCLUSIONS: A diet which incorporates 15-30 grams of protein multiple times throughout the day rather than consuming 50-60 grams in one meal is more effective for athletic performance due to the body's optimal protein usage rate being between 20-30 grams. Future research should examine the relationship between protein timing and athletic performance using a bigger sample of athletes as well as multiple sports and genders for optimum results.

PERSPECTIVES ON THE RELATIONSHIP BETWEEN NUTRITION AND MENTAL HEALTH WITHIN NCAA DIVISION I COLLEGIATE ATHLETIC PROGRAMS

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BACKGROUND: Research has shown a strong relationship between one's nutrition and mental health. Packed schedules and little rest time may make student-athletes more susceptible to mental health issues than the general population, but few athletes are fully aware of the effects that nutrition can have on their brain, mental well-being, and athletic performance. Collegiate athletic programs are beginning to recognize the individual contributions of nutrition and mental health to performance by hiring sport nutritionists and psychologists for their athletes, but it is unclear whether these topics are ever discussed within the same context. The goal of this study was to understand the perspectives of different athletic personnel on the relationship between nutrition and mental health. METHODS: 17 athletic personnel (11 Female, 6 Male) from 6 NCAA Division I universities were recruited for a 30-45 minute semi-structured WebEx interview. Interviewees included Athletic Trainers, Coaches, Sports Dietitians, Sports Psychologists, Strength & Conditioning Coaches and Sports Physicians. Subjects were asked questions about their educational backgrounds, resources and perspectives on the integration of nutrition and mental health in their programs. RESULTS: All interviewees reported a need for greater monetary resources and staffing. Almost none of the interviewees felt they had more than general or personal interest-level knowledge on topics pertaining to nutrition or

mental health, with the exception of sports nutritionists or psychologists. Each school varied in the degree to which their departments were collaborative among staff. Athletes were reportedly more or less likely to utilize the resources provided depending on coach attitudes toward nutrition or mental health. CONCLUSIONS: Regardless of size, reputation and annual spending, each interviewed university was in the early stages of integrating nutrition and mental health programs into their existing athletic departments. Implications of this work may be to help schools imagine new ways to reallocate funding for nutrition or mental health programming.

MONITORING COMPETITION JUMP LOAD IN DIVISION I FEMALE COLLEGIATE VOLLEYBALL ATHLETES

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BACKGROUND: Tracking competition jump data using inertial measurement units (IMU) specifically designed for high-velocity jumping and change-of-direction sports provides a practical approach for assessing external load in volleyball athletes. The purpose of this study was to compare position-based jump load differences in collegiate volleyball athletes. **Methods**: Data from 12 National Collegiate Athletic Association (NCAA) Division I female volleyball players from the 2018 and 2019 competitive seasons were evaluated. Players were outfitted with an IMU prior to each match. All jumps were individually assigned, time-stamped, and recorded for jump height. Maximal height (HTmax) was determined as the median of the top 15 jumps throughout the season. Absolute jump counts and totals relative to playing time at low (<50% HTmax), moderate (≥50 to <70% HTmax), high (≥70 to <90% HTmax), and maximal (≥90% HTmax) intensities were calculated. Six athletes were represented in both 2018 and 2019, resulting in a total of 18 athlete-seasons used for positional analyses (middle blocker [n=6], outside hitter [n=6], and right-side hitter [n=6]). Two-way ANOVAs were used to analyze positional differences across absolute and relative jump intensities. **Results**: Results showed main effects for absolute jump counts by position ($p<0.001$). Middle blockers had the highest overall jump count (81.7 ± 37.8), followed by outside hitters (62.8 ± 30.9) and right-side hitters (48.0 ± 23.6). A significant intensity*position interaction for absolute jump count was found ($p<0.001$). Right-side hitters had lower moderate- ($p<0.001$), high- ($p<0.001$), and maximal ($p<0.001$) intensity jumps than middle blockers. Right-side hitters had lower high- ($p=0.003$) and maximal ($p<0.001$) intensity jumps than outside hitters, while outside hitters had lower moderate- ($p=0.003$) and high-intensity jumps ($p<0.001$) than middle blockers. No statistically significant differences were observed in relative jump counts by position ($p>0.05$). **Conclusion**: Significant differences in competition jump load and intensity exist between positions in NCAA Division I female volleyball players. Middle blockers have higher absolute jump counts as compared to outside hitters at moderate and high intensities, while both positions have higher jump counts at moderate, high, and maximal intensities compared to right-side hitters. Position-specific jump load recommendations for training sessions may be warranted to maximize athlete readiness.

THE EVALUATION OF LOWER BACK PAIN IN COLLEGE STUDENTS

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PURPOSE: The aim of the current study was to determine and evaluate any discomfort in the body as a result of lower back pain in physically active college students via survey. The hypothesis stated that lower back pain causes mostly lower body painful sensations particularly in glutes and hips. METHODS: 56 college students (47 females and 9 males) who were enrolled in physical activity courses agreed to participate in the research. All individuals completed an informed consent and a personalized Qualtrics survey that was designed to indicate physical activity levels and lower back pain in college students. RESULTS: Out of all participants, 13 individuals demonstrated a lack of any lower back perceptions. The evaluation also indicated that 43 participants had some level of lower back pain (mostly "slightly too much" type) for extended time period (between less than a month and more than a year). Individuals emphasized that they experienced lower back pain during various occupations (standing, sitting, laying etc.). Participants also demonstrated additional discomfort and painful sensations (mostly in their hips, glutes and upper back) as a result of their lower back pain. CONCLUSIONS: The findings demonstrated that there is a potential correlation between a lower back pain and physical activity levels of collegiate students. Potentially, lower back pain could affect muscular structure and composition in hips, glutes and upper back. Muscle imbalance in other body parts could also result in lower back pain sensations.*Data is still being collected and sample will increase by presentation date.

NEITHER CAFFEINE NOR CYP1A2 GENOTYPE INFLUENCE FATIGUABILITY OR FORCE STEADINESS OF THE KNEE EXTENSORS

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BACKGROUND: Although, caffeine has been reported to increase time to fatigue during exercise, it is unknown whether caffeine improves force steadiness during fatigue. Further, it remains unclear whether the variability in physiological responses to caffeine supplementation are associated with genetic markers (i.e. CYP1A2) of caffeine metabolism. Therefore, the purpose of this study was to examine the role of the CYP1A2 genotype on fatiguability and force steadiness of the knee extensors following caffeine supplementation. **METHODS:** This study utilized a randomized, double-blind, placebo controlled, crossover design. Thirty-seven recreationally active males (Age: 23 ± 3 y; Daily Caffeine Intake: 379.9 ± 296.5 mg) completed two experimental visits in which maximal voluntary isometric contraction (MVIC) strength and fatiguability of the knee extensors were assessed approximately 60 and 75 minutes, respectively, following ingestion of either caffeine (CAF; 6 mg/kg/bw) or placebo (PLA). For all testing, subjects were seated in an isokinetic dynamometer and fatiguability was assessed via repeated 50% MVIC trapezoidal ramp contractions with a 10s plateau until the subject could no longer follow the force trajectory. Total torque impulse (TQ_{IMP}) and repetitions completed were recorded and the coefficient of variation of torque (TQ_{CV}) was analyzed during the first, middle, and last repetition from each fatiguing bout. Subjects were genotyped for CYP1A2 polymorphism as either AA (n=21) or AC/CC (n=16) via saliva sample. **RESULTS:** No significant interaction effects were found for any variable ($p=0.224$-0.783). MVIC ($p=0.004$) was significantly greater following CAF when compared to PLA ($p=0.004$; 296.1 ± 87.4 vs. 273.0 ± 77.3 Nm), although this did not lead to a greater TQ_{IMP} ($p=0.079$; 15,998.0 ± 7100.9 vs. 14165.2 ± 5561.2 Nm/s) or repetitions completed ($p=0.727$; 7.8 ± 3.9 vs. 7.5 ± 3.1 reps). When collapsed across time, TQ_{CV} significantly increased from FIRST (2.34 ± 0.73 Nm) to MID ($p=0.027$; 2.57 ± 0.80) to LAST ($p=0.002$; 2.97 ± 1.19 Nm) and from MID to LAST ($p=0.045$). **CONCLUSIONS:** While MVIC strength was significantly greater post CAF, this did not result in increased TQ_{IMP}, repetitions completed, or a decrease in force fluctuations with fatigue. Further, the CYP1A2 genotype did not appear to modulate any of the responses in the present study.

EVALUATION OF AN IN-PERSON AND REMOTE-BASED LEARNING OF A NUTRITION PROGRAM FOR ADOLESCENTS WITH AUTISM SPECTRUM DISORDER (ASD):A COVID-19 PILOT STUDY

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Introduction: Adolescents with Autism Spectrum Disorder (ASD) demonstrate poor health-related behaviors, such as nutrition, compared to their typically developed counterparts. With the occurrence of the COVID-19 pandemic and mandatory stay-at-home orders, such health-related behaviors may be complicated and there is a need to focus on the feasibility and acceptability of remote-based nutrition programs. **Methods**: Eleven high school students with ASD were recruited to participate in a modified nutrition program utilizing Zoom software during COVID-19. The duration was once a week for four weeks, and concepts reviewed included shopping for healthy food on a budget, introducing non-perishable but nutritious food items, and food preparation safety measures. **Results**: Ninety-seven percent of participants attended the remote-based nutrition program, while 87% attended the in-person nutrition program. While in-person demonstrated benefits including face-to-face interaction and hands-on cooking, the remote-based component demonstrated a high degree of feasibility and acceptability. Half of the students felt their health-related behaviors were negatively impacted by COVID-19 but reported that the implementation of the remote-based nutrition program positively impacted their nutrition choices. **Conclusion**: The enforcement of health-related behaviors in adolescents with ASD is significant especially during disaster-related situations. Future research should focus on efficacy and intertwining methods of in-person and remote-based learning of nutrition or other health-related behavioral interventions in this population.

PHYSIOLOGICAL OUTCOMES OF MOTIVATIONAL INTERVIEWING FOR WEIGHT MANAGEMENT AMONG COLLEGE STUDENTS DURING COVID-19

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BACKGROUND: According to a national survey, 38.7% of undergraduates are overweight or obese based on self-reported height and weight. These statistics may be exacerbated after the Covid-19 pandemic due to quarantine restrictions. Motivational interviewing (MI) may provide an effective intervention strategy to address weight gain among college students as MI has shown effects in long-term behavior change. Therefore, the purpose of this study was to determine the effect of a MI intervention compared to online education (control) on body composition. **METHODS**: 40 college students whom were considered overweight by their BMI were randomized into either the MI group (n =18) or the control group (n=22) for six months in the beginning of 2020. The MI group received three face-to-face interviews before the pandemic and three video chat interviews after the outbreak of Covid-19 lasting about 30 minutes. The online education group received six, monthly emails that contained information on various weight management topics (exercise, nutrition, sleep, etc.). Body composition was measured utilizing dual energy X-ray absorptiometry (iDexa). **RESULTS**: Data were analyzed from 22 students who returned for post-testing (MI = 12 and control = 10). A Whitney Mann U test of change scores from pre-post revealed significant changes in fat mass ($z = -2.51$, $p = .012$) lean mass ($z = -2.04$, $p = .04$), and BMD ($z = -1.99$, $p = .048$). **CONCLUSIONS**: Participants in the control group had significant fat mass gains while losing a significant amount of lean mass and bone mineral density when compared to the MI group. With most of the study taking place during the Covid-19 outbreak, MI demonstrated strong potential in body composition maintenance when compared to online education among overweight college students during a national pandemic.

EFFECT OF ACUTE FEEDING ON BIOELECTRICAL IMPEDANCE VECTOR ANALYSIS CALCULATED PHASE ANGLE IN HEALTHY SUBJECTS

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BACKGROUND: Phase angle (PhA) calculated via bioelectrical impedance vector analysis (BIVA) is a measure of body cell mass and hydration that is commonly used to detect fluid imbalance and nutritional status. Phase angle is derived from the raw impedance values resistance (*R*) and reactance (*Xc*), obtained from multi-frequency bioelectrical analysis (MF-BIA). Currently there are no studies investigating the effect of acute feeding on measures of PhA obtained by MF-BIA. The purpose of this study was to determine the effect of acute feeding on PhA. METHODS: Thirty-eight young adults (Age: 21.9±3.1 yrs; Height: 174.1±8.7 cm; Weight: 72.1±9.9 kg; BMI: 23.5±1.9 kg/m^2) were randomized to four conditions; high carbohydrate (CHO: 116.5 g CHO; 86% of meal), high protein (PRO: 63.5 g PRO; 58% of meal), ad libitum mixed (MX: 67 g CHO, 21 g PRO; 25 g FAT) and fasted (FAST: 8 hr fast). Meals were consumed one hour prior to MF-BIA measurement. Bioelectrical impedance was measured using a tetrapolar stand-up MF-BIA device. Subjects stood for five minutes prior to measurement on the device's scale with the soles of their feet positioned on four corresponding electrodes; subjects held the handles in both hands making contact with corresponding electrodes on the thumbs and palm of each hand as impedance was measured. Separate one-way ANOVAs were used to compare PhA of the whole body (WB), trunk (TR), right arm (RA), and right leg (RL) between feeding groups. RESULTS: There was no significant difference in PhA between feeding groups for WB (p = 0.985, mean ± SD = 6.46±0.71°), TR (p = 0.918, mean ± SD = 8.95±1.64°), RA (p = 0.903, mean ± SD = 5.82±0.79°), or RL (p = 0.988, mean ± SD = 7.03±0.57°). CONCLUSIONS: The lack of difference between PhA values across feeding groups suggests that acute feeding does not alter hydration-sensitive MF-BIA measures of impedance values. This could indicate that current measuring practices, which typically require participants to be fasted, may not be necessary to obtain reliable body composition values.

RELIABILTY OF QUADRICEP AND HAMSTRING SOFT TISSUE MEASURES USING DUAL ENERGY X-RAY ABSORPTIOMETRY (DXA) SCANS.

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BACKGROUND: Advances in Dual energy x-ray absorptiometry (DXA) scanning technology and accompanying software provides total body and regional soft tissue analyses, and the ability to analyze uniquely created regions of interest (ROI). This study determined the intra- and intertester reliability of quadriceps (QUADS) and hamstring (HAMS) soft tissue measures using total body DXA scans. **METHODS:** Total body DXA scans from 41 (21 men) young adults were acquired with the subjects lying on their left sides with the right leg bent removing it from the analyses field of view. Unique regions of interest were created using the custom analyses software to trace the soft tissue of the QUADS and HAMS. ROI were manually traced with the middle of the femur and the borders of the soft tissue as the medial and lateral boundaries, while the base of the gluteal fold and the knee joint served as the proximal and distal borders. Soft tissue measures included mineral-free lean (MFL) masses of the left QUADS and HAMS and were determined twice by two investigators (Invest 1 and Invest 2). Group mean differences, explained variance, and calculation of the intraclass correlation coefficient (ICC), the standard error of the measurement (SEM), the minimal difference (MD), and the coefficient of variation (CV) were determined with significance $p < 0.05$. **RESULTS:** Intratester reliability for Invest 1 QUADS MFL (2228.5 ± 527.4 vs 2231.0 ± 529.0 g; r^2 = 0.984), and HAMS MFL (2476.3 ± 597.0 vs 2477.6 ± 602.9 g; r^2 = 0.971); and for Invest 2 QUADS MFL (2223.8 ± 556.4 vs 2231.8 ± 546.3 g; r^2 = 0.981) and HAMS MFL (2326.7 ± 566.4 vs 2333.5 ± 555.7 g; r^2 = 0.992) resulted in no significant group mean differences and significant explained variance. Subsequently, the group mean of the MFL measures were used for both Invest 1 and Invest 2 to determine the intertester reliability. Similarly, no significant group mean differences and significant explained variance was found for the QUADS MFL (2229.8 ± 527.1 vs 2227.8 ± 550.0 g; r^2 = 0.963) and HAMS MFL (2477.0 ± 597.7 vs 2330.1 ± 560.5 g; r^2 = 0.945), with ICC, SEM, MD and CV% of 0.990, 74.61 g, 206.81g and 3.35%; and 0.969, 143.26 g, 397.10 g, and 5.96% for the QUADS and HAMS, respectively. **CONCLUSION**: MFL of the QUADS and HAMS can be reliably measured using DXA scans and may be useful for determining muscular strength relationship and to evaluate the effectiveness of rehabilitative strategies.

THE IMPACT OF A FUNDAMENTAL MOTOR SKILL INTERVENTION ON BODY COMPOSITION OUTCOMES IN PRESCHOOL CHILDREN

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Background: Rates of obesity and severe obesity have increased in young children aged 3-5 in recent years. Fundamental motor skills (FMS), which are the building blocks of movement, are deficient in overweight and obese children, and FMS interventions may provide a method to curb childhood obesity. **Purpose:** This randomized control trial aimed to determine the effect of a FMS intervention on Fat Mass (FM), Fat-Free Mass (FFM), and BMI in children aged 3 to 5. **Methods:** Eleven preschool classes were randomly assigned to an intervention (6 classes) or control group (5 classes). Participants in the intervention group attended a FMS intervention twice a week, whereas the control group participated in outdoor free play. Time spent outdoors (870 minutes) and teacher to child ratio was equated between groups. FM and FFM were measured with foot-to-foot bioelectrical impedance and BMI pre and post-intervention. **Results:** The control group had significantly more fat-free mass before the study than the intervention group (t = - 2.586, p = .012). Post testing showed the intervention group had a significantly lower fat mass (t = - 2.820, p = .006), fat free mass (t = - 3.465, p = .001), and BMI (t = - 2.649, p = .010) when compared to the control group. **Discussion:** This study highlights the need to target young children for obesity prevention. FMS interventions may provide a method to help do so.

EXPLAINING DISCREPANCIES IN BODY FAT PERCENTAGE VALUES BETWEEN LABORATORY CRITERION MEASURES IN COLLEGIATE ATHLETES

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BACKGROUND: Two of the most common laboratory measures for estimating body fat percentage are air displacement plethysmography (ADP) and dual-energy x-ray absorptiometry (DXA). However, discrepancies often exist between estimated values as a result of the differences in measurement techniques. The purpose was to examine the agreement between DXA and ADP, as well as identify potential contributing factors contributing to the variability in body fat percentage values in collegiate athletes. **METHODS:** For this study, 170 Division-I male (n=76) and female (n=94) athletes from various sports volunteered to perform three body composition tests (i.e., ADP, DXA, and bioelectrical impedance spectroscopy [BIS]). DXA was used to determine body fat percentage (BF%), lean soft tissue (LST), fat mass (FM), and bone mineral density (BMD); while, ADP was used to determine BF% and BIS determined intracellular (ICF) and extracellular fluid (ECF). Agreement between ADP and DXA was based on r-values, standard error of estimate (SEE), constant error (CE), and 95% limits of agreement (LOA). Predictors of the differences between ADP and DXA (i.e., CE of ADP-DXA) were explored using multiple regression modeling with height, weight, BMD, ECF, ICF, LST, and FM as independent variables. **RESULTS:** For the entire group, a CE of -5.51±3.71%, SEE of 3.40%, and adjusted R^2 of 15.9% was observed. Weight (β=0.94) and FM (β=-1.00) were the strongest predictors of BF% followed by BMD (β=-0.44), height (β=-0.28), LST (β=0.38), ICF (β=-0.22), and ECF (β=0.21). When factored by sex, the prediction strength of BF% discrepancies increased for weight (β=2.00), FM (β=-1.87), ICF (-0.58), and ECF (β=0.26), as well as decreases in LST (β=-0.22), BMD (β=-0.31), and height (β=-0.25). For females, weight (β=1.16), BMD (-0.58), and FM (-0.91) were the strongest predictors to describe the discrepancy between ADP and DEXA. Additionally, ECF (β=-0.23), ICF (β=0.31), height (β=-0.37), and LST (β=0.21) exhibited a low prediction strength. **CONCLUSIONS:** Based on these findings, weight and FM were determined to be the strongest predictors to describe the discrepancies between ADP and DXA. Results also indicated that differences in BF% estimations are influenced by sex, proportional fluid volumes (i.e., ICF and ECF), and BMD. These findings warrant further research as to provide adjustments to BF% estimation models to account for individual differences in physiological and anthropometric factors.

IMPACT OF MENSTRUAL CYCLE ON BODY COMPOSITION MEASURES AND RESTING METABOLISM

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BACKGROUND: Hormonal fluctuations that occur throughout the menstrual cycle may have a significant impact on body composition and metabolism, which could alter measurement accuracy. The purpose of this study was to identify the effects of menstrual cycle phase on body composition; a secondary aim was to evaluate menstrual cycle phase on resting metabolic rate (RMR) and respiratory quotient (RQ). **METHODS:** Body composition was obtained from a 4-compartment (4C) model (fat mass [FM], fat-free mass [FFM], and body fat percent [%BF]) and dual-energy X-ray absorptiometry (DXA; FM, lean mass [LM], trunk FM [TFM], and trunk LM [TLM]) in 19 eumenorrheic females not using any form of birth control (Mean±Standard Deviation [SD]: Age 21.3±3.1 yrs, Height 166.9±5.7 cm, Weight 65.0±2.2 kg). RMR (kcal/day) and RQ (a.u.) were measured via indirect calorimetry for 25 minutes. Body composition, RMR, and RQ were measured during the early follicular (EF) and mid-follicular (MF) phases. Dependent samples t-tests were used to compare outcomes between EF and MF. **RESULTS:** No significant differences were found in 4C outcomes (FM, FFM, and %BF; p>0.05) between EF and MF. No significant differences were found for DXA-measured LM, TLM, or %BF (p>0.05), however, DXA FM was significantly greater during EF compared to MF (Mean Difference [MD]±Standard Error [SE]: 0.29±0.09 kg; p=0.005), and DXA TFM was greater during EF (Mean±SD; 7.9±2.9 kg) compared to MF (Mean±SD; 7.8±2.5 kg; p=0.06). While RMR was not significantly different between phases (MD±SE: 6.0±43.8 kcal/day; p>0.05), RQ was significantly higher during EF (Mean±SD; 0.76±0.05 a.u.) compared to MF (Mean±SD; 0.73±0.03 a.u; p=0.029). **CONCLUSIONS:** Often women are excluded from research due to physiological effects of hormonal fluctuations throughout the menstrual cycle; body composition from 4C or DXA do not appear to be impacted beyond measurement error as a result of compartmental changes from the menstrual cycle during the early and mid-follicular phases. Women oxidized more fat as demonstrated by a lower RQ during MF.

BODY VOLUME DERIVED FROM A 2 DIMENSIONAL DIGITAL IMAGE ACCURATELY MEASURES ADIPOSITY IN A THREE-COMPARTMENT MODEL
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BACKGROUND: Traditional laboratory-based body composition assessment techniques involve expensive equipment, are not portable, and can be burdensome for participants. Accurate, efficient, and portable methods of body composition assessment would be a valuable resource for practitioners in the sports performance and allied-health fields. The purpose of this study was to compare body fat percentage (%Fat) derived from a criterion 4-compartment (4C) model ($\%Fat_{4C\text{-}UWW}$) to a 3-compartment (3C) model, using body volume (BV) derived from a novel 2D image analysis program ($\%Fat_{3C\text{-}IMAGE}$). METHODS: A sample of 48 participants were recruited for this study (60.5% male, 80% Caucasian, 22.9±5.0 yrs., 24.2±2.6 kg/m^2). A single digital image of each participant was taken from the rear/posterior view using a 12.9 inch, 64g iPad Pro, and was used to estimate BV, via a proprietary algorithm, for the inclusion in the calculation of $\%Fat_{3C\text{-}IMAGE}$. The 4C criterion method utilized dual energy x-ray absorptiometry for the estimation of bone mineral content and underwater weighing to estimate BV for the calculation of $\%Fat_{4C\text{-}UWW}$. Additionally, both methods included total body water, estimated from bioimpedance spectroscopy, in each of their calculations of %Fat. Bivariate correlations and linear regression determined the strength of the relationship between $\%Fat_{3C\text{-}IMAGE}$ and $\%Fat_{4C\text{-}UWW}$. Statistical significance was determined using an alpha <0.05. All data are presented as M±SD. RESULTS: Small mean differences were observed between $\%Fat_{3C\text{-}IMAGE}$ (19.5±6.1) and $\%Fat_{4C\text{-}UWW}$ (18.1±6.4) (ES=0.23, p<.001), however the strong correlation (r =.939, p<.001) yielded "excellent" agreement between measures (SEE=2.2 %Fat). CONCLUSIONS: Although the novel 2D image analysis program slightly overestimated %Fat values within our sample, the magnitude of those differences were small. Additionally, the strong correlation and small SEE further indicate that the novel 2D image analysis program provides a valid estimate of %Fat when combined with a measure of total body water, without the need of DXA or UWW. The inclusion of BV derived from the novel 2D image analysis program in a 3C assessment model provides practitioners with a simple, non-invasive, and portable method for estimating body composition when traditional laboratory methods are unavailable.

PREDICTORS OF CLINICALLY MEANINGFUL GAIT SPEED RESPONSE AMONG OLDER ADULTS PARTICIPATING IN WEIGHT LOSS INTERVENTIONS
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Background: Caloric restriction can modestly improve gait speed among older adults with obesity; however, whether the likelihood of achieving a clinically meaningful response (≥0.05 m/s) differs by baseline characteristics is not well described. The purpose of this study was to explore whether select baseline characteristics increase the likelihood of achieving a +0.05 m/s change in gait speed among older adults randomized to caloric restriction (CR only, or with exercise) versus control (exercise only, or education) conditions. **Methods:** Individual level data from 1188 older adults participating in eight, 5-6-month, behavioral-based weight loss interventions were pooled, with treatment arms collapsed into caloric restriction (CR; n=667) or no caloric restriction (No CR; n=521) categories, based on original randomization assignment. Poisson risk ratios (95% CI) were used to examine whether achievement of +0.05 m/s fast gait speed interacted with age, sex, race, body mass index, diabetes, hypertension, cardiovascular disease, baseline gait speed, or inflammatory burden (CRP≥3 mg/L and IL-6≥2.5 pg/mL). Main effects were also examined, and all models were adjusted for study, age, sex, race, and baseline gait speed. **Results:** The study sample (70% female, 80% White) was 67.6±5.3 years old with a BMI of 33.8±4.4 kg/m^2. Weight loss achieved in the CR versus No CR group was -7.8±0.5% versus -0.9±0.5% (Mean±SE, p<0.01). Mean gait speed change was +0.10±0.01 m/s versus +0.07±0.01 m/s in the CR and No CR groups, respectively, with 411 (62%) CR and 287 (55%) no CR participants achieving a +0.05 m/s gait speed improvement. Interaction effects were non-significant across all subgroups. No main effect of CR was observed [RR: 1.09 (95% CI:0.93,1.27)]; however, a main effect of baseline gait speed was observed, with participants walking <1.0 m/s more likely to experience a meaningful improvement [RR:1.37 (95% CI:1.09,1.73)]. **Conclusion:** Likelihood of achieving a clinically meaningful improvement to CR does not vary by select baseline characteristics, nor was there an independent effect of CR. However, low gait speed at baseline increased likelihood of achieving +0.05 m/s, regardless of CR. Future work aims to explore clinically meaningful threshold of other physical function indices, as well as considering potential moderating effects of exercise and amount of achieved weight loss.

LIFESTYLE INTERVENTION FOR TREATMENT OF DIABETES: RANDOMIZED TRANSLATIONAL TRIAL IMPROVING CONTROL OF CVD RISK FACTORS
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Background: The Look AHEAD trial examined improvement of risk factor control in overweight and obese adults with T2D in a controlled, intensive lifestyle intervention. This program was not accessible to patients outside of the study and was therefore difficult to translate to the general public to use on their own. The purpose of Lifestyle Interventions for the Treatment of Diabetes study (LIFT-D) is to assess the translation of Look AHEAD whereby a community-based lifestyle weight loss intervention program was implemented to test the efficacy and success of patients with type 2 diabetes to treat themselves in a community-based setting. **Method:** 260 patients with type 2 diabetes were randomized to either a community health workers (CHW)-led lifestyle weight loss program (LWL) or a clinic-based diabetes self-management (DSM) group. DSM was the control for the study. The intervention was conducted for 12 months. For the CHW-led LWL program met once per week and had a maintenance check in once a month. Follow-up data on primary and secondary outcomes were collected at the end of the study (12 months) and at 24 months (12 months after the study finished). Weight, wait circumference, blood pressure were taken at each study visit. Serum glucose, total cholesterol, triglycerides, and HDL-cholesterol were analyzed as well. Self-monitoring was used to record weight control practices, physical activity, tobacco and alcohol use, and frequency of self-monitoring blood glucose. The primary goal of LWL was to facilitate more than at least 7% weight loss. **Results:** There were no statistically significant differences between groups of any demographic variables, except for education attainment. The DSM group had more participants who had achieved less than a college degree while the LWL group had more participants who had achieved an associate/bachelor degree. However, the DSM intervention had overall higher numbers for total minutes of activity per week, lower HDL, and lower A1C, for example. **Conclusions:** The LWL intervention did not support the hypothesis that it would significantly reduce CVD risk, weight loss and control of risk factors compared to the DSM intervention. However, the LWL may be more accessible to patients and have lower costs and use of health care compared to DSM. This study highlighted the importance of decreasing the cost of effective type 2 diabetes treatment in community-based settings to reduce health disparities in patients with T2D.

FRUIT AND VEGETABLE INTAKE INFLUENCED BY SELF-EFFICACY IN ULTRA-ENDURANCE ATHLETES
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BACKGROUND: As ultramarathon events grow in popularity, research is only beginning to elucidate the impact of dietary intake on these extreme endurance athletes. Previous studies have measured whether these athletes are consuming adequate daily carbohydrates, however little information is available regarding dietary intake of fruits and vegetables in this population. The purpose of this study was to describe the habitual fruit and vegetable intake of ultramarathon runners and determine whether sources of nutrition information and self-efficacy predicted intake. METHODS: Participants (N=224) accessed, responded to, and submitted the survey via a secure, study-specific web-based link. The survey battery included demographic information, a Food Frequency Questionnaire (FFQ), the General Nutrition Knowledge Questionnaire (GNKQ), the Self-Efficacy for healthy diet scale (8-SeED), and the Sources of Nutrition Information (SONI) questionnaire. Multiple regression analysis was used to predict fruit and vegetable intake (alpha = 0.05). RESULTS: Overall, the athletes consumed 5.05±3.6 servings of fruits and vegetables daily. The model significantly predicted intake (R^2= 0.118, p <0.001), however the only significant covariate was self-efficacy (t = 4.75, p<0.001). Regarding sources of nutrition information, there was a modest, but significant correlation between intake and use of peer-reviewed literature (r= 0.191, p=0.008). CONCLUSION: Overall, these athletes have relatively high fruit and vegetable intake, and this is influenced by dietary self-efficacy rather than nutrition knowledge.