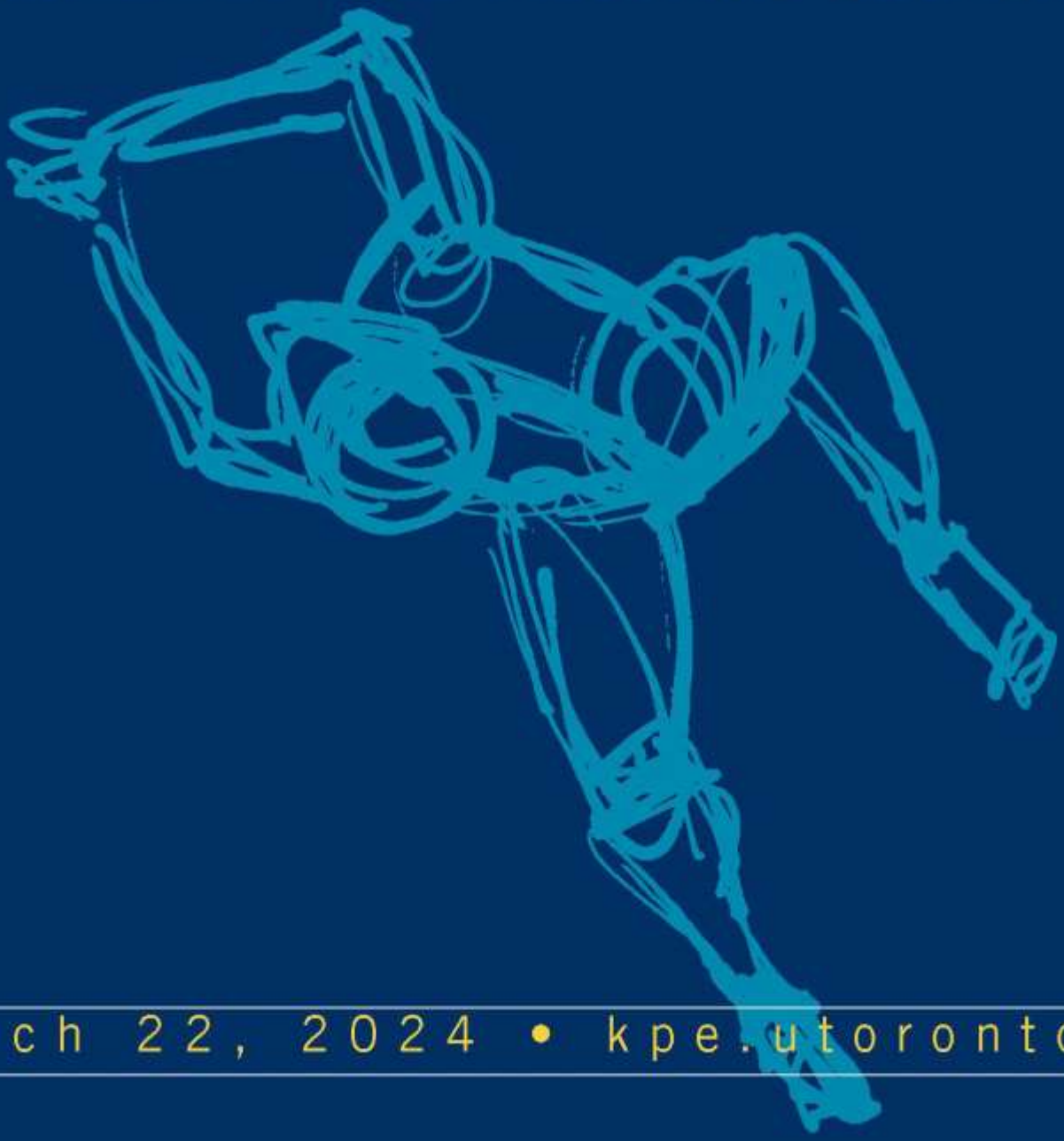
UNIVERSITY OF TORONTO
FACULTY OF KINESIOLOGY & PHYSICAL EDUCATION

THE 24th ANNUAL BERTHA ROSENSTADT

NATIONAL UNDERGRADUATE RESEARCH CONFERENCE

KINESIOLOGY AND PHYSICAL EDUCATION



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KPE @ UofT

WELCOME TO THE 24th ANNUAL BERTHA ROSENSTADT NATIONAL UNDERGRADUATE RESEARCH CONFERENCE

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CONFERENCE HISTORY

Since 1999, the Bertha Rosenstadt National Undergraduate Research Conference has been hosted by the Faculty of Kinesiology and Physical Education at the University of Toronto. This multidisciplinary conference includes topics from exercise physiology, biomechanics, sports medicine, motor learning and control, exercise and sport psychology, philosophy, history, and sociology of sport. This conference gives undergraduate students the opportunity to present literature reviews, critiques, term papers, findings from research projects or works in-progress to peers and faculty. Awards of recognition are granted to the top presenters.

GENERAL INFORMATION

Conference Site

The conference will be held in the Athletic Centre across various rooms. The Athletic Centre is located on the west side of the University of Toronto's St. George campus at 55 Harbord St. It is accessible from the Spadina subway station and by streetcar**. Upon arrival, please make your way to the 2nd floor Benson Lobby & Lounge for registration**. Signage will be posted throughout the building. ***The closest entrance to the Benson Lobby and Lounge, is 320 Huron Street – we recommend entering through the 320 Huron Street doors***.

Parking

Metered, street parking is available around the periphery of the Athletic Centre. There is also an underground parking lot across the street at Graduate House, 60 Harbord Street. This parking lot can be accessed by traveling north on Spadina Ave. or east on Glen Morris Ave.

Bike racks are available in front of the Athletic Centre on Harbord St. and behind on Classic Ave.

WIFI Access

Those from institutions connected to eduroam can access WIFI by using their post secondary sign in credentials. Individual access codes are available for pick-up at the registration desk.

PRESENTATION INSTRUCTIONS

- All sessions will be hosted and presented **in person.**
- **Arrive early so you can register and be at your presentation room a minimum of 10 minutes before your session group starts.**
- Each presenter is allocated **10 minutes** for a verbal presentation and **additional 5 minutes** for questions & answers and transition between presenters. All presenters must answer at least 1 question.
- **Presentation file**
    - **Bring your PowerPoint presentation with you** ideally on a USB memory stick (or ability to download from an email or the cloud). Presenters will not be able to use their own laptop.
    - 10 minutes before your session group starts, **pre-load your presentation on the podium computers**. Your moderators will guide you on how to load your file on the computer for your presentation.
- Each session will have between 3 and 6 presentations and will be facilitated by 2 moderators.
- The moderators will welcome all the attendees, provide session housekeeping details, introduce the speakers, and facilitate questions.
- Please **intend to stay during the full session** to limit the distractions for presenters and to support your fellow colleagues and co-presenters.
- As this is an in-person conference, live in-person presentations will not be available virtually.

Room Assignments

Sessions/Items	Location
Registration	Benson Lobby-2nd floor landing
Welcome/ Keynote / Closing Remarks	Benson 307 (BN307)
Lunch & Breaks	Benson Student Lounge
Sessions	Warren Stevens 2nd Floor (WS2007) Warren Stevens Basement (WSB67) Benson 3rd Floor (BN302, BN307, BN304)
Preparation Space	Benson 320 (BN320)
Computer Lab	Benson 330 (BN330)
Multi-faith Room	Benson 2nd floor, Dance Studio (8 a.m. - 5 p.m.)

Area of Topic	Room	Time for session	Session
Biomechanics & Injury	BN302	9:15 a.m. - 10:45 a.m.	A - I
Physical Cultural Studies	BN304	9:15 a.m. - 10:45 a.m.	B - I
Neurophysiology & Sensorimotor Learning	BN307	9:15 a.m. - 3:50 p.m.	C - I, II, III, & IV
Cardiorespiratory & Cardiovascular Physiology	WS2007	9:15 a.m. - 12:10 p.m.	D - I & II
Exercise Science & Health	WSB67	9:15 a.m. - 10:45 a.m.	E - I
Biomechanics & Exercise Interventions	BN302	10:55 a.m. - 12:10 p.m.	A - II
Skeletal Muscle Health & Physical Activity	BN304	10:55 a.m. - 3:50 p.m.	B - II, III, & IV
Nutrition & Exercise Science	WSB67	10:55 a.m. - 3:50 p.m.	E - II, III, & IV
Injury Rehabilitation & Exercise Interventions	BN302	1:10 p.m. - 3:50 p.m.	A - III & IV
Behavioural Studies & Physical Activity	WS2007	1:10 p.m. - 3:50 p.m.	D - III & IV

SCHEDULE AT A GLANCE

TIME	ITEM	TOPIC & LOCATION				
8:15 a.m. - 8:45 a.m.	**Registration & Refreshments**	**Registration & Refreshments** - 2nd Floor Benson Lobby & Lounge				
8:45 a.m. - 9 a.m.	**Welcome**	**Welcome Remarks, Dean Gretchen Kerr** - BN307				
9 a.m. - 9:15 a.m.	**BREAK**	**BREAK –** 2nd Floor Benson Lobby & Lounge				
	Room	**BN302**	**BN304**	**BN307**	**WS2007**	**WSB67**
	Session	**A**	**B**	**C**	**D**	**E**
9:15 a.m. - 10:45 a.m.	**Breakout Sessions I**	Biomechanics & Injury	Physical Cultural Studies	Neurophysiology & Sensorimotor Learning	Cardiorespiratory & Cardiovascular Physiology	Exercise Science & Health
10:45 a.m. - 10:55 a.m.	**BREAK**	**BREAK** - 2nd Floor Benson Lobby & Lounge				
10:55 a.m. - 12:10 p.m.	**Breakout Sessions II**	Biomechanics & Exercise Interventions	Skeletal Muscle Health & Physical Activity	Neurophysiology & Sensorimotor Learning	Cardiorespiratory & Cardiovascular Physiology	Nutrition & Exercise Science
12:10 p.m. - 1:10 p.m.	**LUNCH**	**LUNCH** - 2nd Floor Benson Lobby & Lounge				
1:10 p.m. - 2:25 p.m.	**Breakout Sessions III**	Injury Rehabilitation & Exercise Interventions	Skeletal Muscle Health & Physical Activity	Neurophysiology & Sensorimotor Learning	Behavioural Studies & Physical Activity	Nutrition & Exercise Science
2:25 p.m. - 2:35 p.m.	**BREAK**	**BREAK** - 2nd Floor Benson Lobby & Lounge				
2:35 p.m. - 3:50 p.m.	**Breakout Sessions IV**	Injury Rehabilitation & Exercise Interventions	Skeletal Muscle Health & Physical Activity	Neurophysiology & Sensorimotor Learning	Behavioural Studies & Physical Activity	Nutrition & Exercise Science
3:50 p.m. - 4 p.m.	**BREAK**	**BREAK** - 2nd Floor Benson Lobby & Lounge				
4 p.m. - 4:40 p.m.	**Keynote**	**Keynote, Dr. Gerome Manson** - BN307				
4:40 p.m. - 5 p.m.	**Award Presentation Closing Remarks**	**Award Presentation Closing Remarks, Professor Catherine Amara** – BN307				

2024 KEYNOTE SPEAKER

“Hold my Hand”: Exploring the planning and online control of movements to the body

Dr. Gerome Manson
4 p.m. - 4:40 p.m.
BN307

About the Keynote Speaker

We are excited to welcome our 2024 keynote speaker, Dr. Gerome Manson, who will present on: "Hold my Hand": Exploring the planning and online control of movements to the body.

Dr. Manson holds a Ph.D. in Exercise Science and Cognitive Neuroscience, earned through a collaborative program between the University of Toronto and Aix-Marseille University. He serves as the principal investigator at Queen’s University's Sensorimotor Exploration Laboratory which specializes in sensorimotor control, motor learning, and neurorehabilitation research. Dr. Manson's research approach integrates motion tracking, neural recording, neuro-stimulation, and behavioral assessments to examine the processes that underlying the learning, planning, and control of goal-directed and cyclical movements. Additionally, a significant portion of his work is dedicated to discerning the differences in these processes between neurologically healthy individuals and individuals with neurological impairments.

ORDER OF THE DAY

TIME	ITEM & LOCATION
8:15 a.m. - 8:45 a.m.	**Registration & Refreshments** - 2nd Floor Benson Lobby & Lounge
8:45 a.m. - 9:00 a.m.	**Welcome, Gretchen Kerr, Ph.D., Dean, Faculty of Kinesiology and Physical Education** - BN307
9 a.m. - 9:15 a.m.	**BREAK** - 2nd Floor Benson Lounge

Session A

- SESSION A - I: 9:15 a.m. - 10:45 a.m. - Biomechanics & Injury
- SESSION A - II: 10:55 a.m. - 12:10 p.m. - Biomechanics & Exercise Interventions
- SESSION A - III: 1:10 p.m. - 2:25 p.m. - Injury Rehabilitation & Exercise Interventions
- SESSION A - IV: 2:35 p.m. - 3:50 p.m. - Injury Rehabilitation & Exercise Interventions

Session A - I: Biomechanics & Injury (BN302)	
9:15 a.m.	**Effects of Marker-Less Motion Capture Methods on Musculoskeletal Modeling Simulation Outcomes** ***Presenter: Dorsa Eshaghi*** Faculty Advisor: Timothy Burkhart, PhD University of Toronto
9:30 a.m.	**Hip Flexion Strength After Arthroscopic Iliopsoas Tendon Release: Protocol for a Retrospective Case-Control Study** ***Presenter: Nicole Hoh*** Faculty Advisor: Dr. Timothy Burkhart University of Toronto
9:45 a.m.	**Investigating Biomechanical Differences in ACL Injury Vulnerability and Recovery Among Racial Groups in Canada** ***Presenter: Alan Joumaa*** Faculty Advisor: Dr. Timothy Burkhart University of Toronto
10 a.m.	**Comparison of Volitional and Objective Fatigue in Response to an Aerobic, Isometric, and Anaerobic-Aerobic Fatigue Protocol** ***Presenter: Dveeta Lal*** Faculty Advisor: Dr. Timothy Burkhart University of Toronto
10:15 a.m.	**An Analysis of Biomechanical Factors Contributing to Knee Injury Risk in Ballet and Bharatnatyam Dancers** ***Presenter: Nasya Zoe Sequeira*** Faculty Advisor: Dr. Timothy Burkhart University of Toronto
10:30 a.m.	**Examining of Lower Extremity Muscle Activity in Soccer-Specific Tasks to Optimize Return-To-Play Indicators Following Injury** ***Presenter: Nicolas Silon*** Faculty Advisor: Timothy Burkhart, PhD University of Toronto
10:45 a.m. - 10:55 a.m.	**BREAK** **2nd Floor Benson Lounge**

Session A - II: Biomechanics & Exercise Interventions (BN302)

10:55 a.m.	**Sex Differences in Hip and Trunk Electromyography in Response to Tasks used to Assess Function in Femoroacetabular Impingement Syndrome Patients** ***Presenter: Daniela Boada Boada Herrera*** Faculty Advisor: Timothy Burkhart, PhD University of Toronto
11:10 a.m.	**Comparison of Lower Extremity Biomechanics Between Closed and Open-Kinetic Chain Exercises** ***Presenter: Alex Isidori*** Faculty Advisor: Timothy Burkhart, PhD University of Toronto
11:25 a.m.	**Validation of an Open-Source Method to Quantify Two-Dimensional Kinematics** ***Presenter: Haoyue Liu*** Faculty Advisor: Timothy Burkhart, PhD University of Toronto
11:40 a.m.	**Lower Limb Mechanics in Athletes with Spinal Fusion for Idiopathic Scoliosis During Jumps** ***Presenter: Hassaan Mahmood*** Faculty Advisor: Dr. Timothy Burkhart University of Toronto
11:55 a.m.	**Investigating the Effects of Menstrual Cycle Phase on Countermovement Jump Performance** ***Presenter: Brandan Wilson*** Faculty Advisor: Stuart M. Phillips, PhD McMaster University
12:10 p.m. – 1:10 p.m.	**LUNCH** **2nd Floor Benson Lounge**

Session A - III: Injury Rehabilitation & Exercise Interventions (BN302)

1:10 p.m.	**Balancing Act: Investigating the Effects of Trikafta on Bone Health in Pediatric Cystic Fibrosis** ***Presenter: Sarah Allam*** Faculty Advisor: Dr. Joyce Obeid McMaster University
1:25 p.m.	**Investigating the Impact of a Resistance Band Training Intervention on Frailty in Community-Dwelling Older Adults** ***Presenter: Noor Boutanos*** Faculty Advisor: Dr. Stuart Phillips McMaster University
1:40 p.m.	**Exploring Ontario Professional Dancers' Rehabilitation Experiences and Attitudes Toward Seeking Treatment for Dance-Related Musculoskeletal Injuries** ***Presenter: Macey Culhane*** Faculty Advisor: Erin Pearson, PhD Lakehead University
1:55 p.m.	**The Short-Term Effects of Percussive Massage on Cervical Spine Range of Motion and Strength** ***Presenter: Emma Lindsey*** Faculty Advisor: Paolo Sanzo, PhD Lakehead University

Session A – III continues on the next page

2:10 p.m.	**Autonomic Nervous System Interventions for Persistent Post-Concussion Symptoms: A Scoping Review** ***Presenter: Nicolas Martinez*** Faculty Advisor: Dr. Lynda Mainwaring University of Toronto

2:25 p.m. – 2:35 p.m.	**BREAK**	**2nd Floor Benson Lounge**

Session A - IV: Injury Rehabilitation & Exercise Interventions (BN302)

2:35 p.m.	**Moving With Pain: A Short-Term Self-Directed Movement-Break Program Increases Physical Activity and Function in Chronic Pain Patients** ***Presenter: Clara Rivaya Salvadores*** Faculty Advisor: Drs. Jenna Gillen and Daniel West University of Toronto
2:50 p.m.	**The Effectiveness of the "Keep Moving" Rehabilitation Program on Balance, Strength, Range of Motion, and Psychological Well-Being for Older Adults with Brain Injuries.** ***Presenter: Cassie Roy*** Faculty Advisor: Taryn Klarne, PhD and Eryk Przysucha, PhD Lakehead University
3:05 p.m.	**Empowering Growth: Understanding the Impact of Stress Factors on Post-Traumatic Growth among Breast Cancer Survivors** ***Presenter: Hamza Salah*** Faculty Advisor: Catherine Sabiston, PhD University of Toronto
3:20 p.m.	**Evaluating Single- and Dual-Task Tandem Gait in Healthy Interuniversity Athletes** ***Presenter: Lauren Wilcox*** Faculty Advisor: Michael Hutchison, PhD University of Toronto
3:35 p.m.	**The Effects of 5-Days of Strict Bed Rest on Changes in Body Composition, Strength, and Physical Performance in Healthy Older Adults** ***Presenter: Arianne Zabbal*** Faculty Advisor: Dr. Tyler Churchward-Venne McGill University

Session B

- SESSION B - I: 9:15 a.m. - 10:45 a.m. - Physical Cultural Studies
- SESSION B - II: 10:55 a.m. - 12:10 p.m. - Skeletal Muscle Health & Physical Activity
- SESSION B - III: 1:10 p.m. - 2:25 p.m. - Skeletal Muscle Health & Physical Activity
- SESSION B - IV: 2:35 p.m. - 3:50 p.m. - Skeletal Muscle Health & Physical Activity

Session B - I: Physical Cultural Studies (BN304)	
9:15 a.m.	**Where's the "Queer" in "Kin"? A Textual Mapping of Queer History and Futurity at the University of Toronto and Faculty of Kinesiology and Physical Education** ***Presenter: Emma Karamanlian*** Faculty Advisor: Dr. Caroline Fusco University of Toronto
9:30 a.m.	**How Far Does Canadian Safe Sport Policy Go? Examining Safe Sport Policy with the Multiple Streams Framework** ***Presenter: Piper LaFayette*** Faculty Advisor: Alanna Harman, PhD Wilfrid Laurier University
9:45 a.m.	**The Conflicting Agenda's of the Olympic Charter and Trans* Athlete Policy: The Unique Intersection of Trans* Women's In/Exclusion in the Olympics** ***Presenter: Mia Macera*** Faculty Advisor: Adam Ali, PhD Western University
10 a.m.	**A Scoping Review: South Asian Females' Experiences in Sport in Canada** ***Presenter: Musabbiha Meghjee*** Faculty Advisor: Dr. Kaleigh Pennock University of Waterloo
10:15 a.m.	**Examining US Rowing's Decision to Remove Junior Lightweight Rowing Through a Risk Framework** ***Presenter: Jessie Strong*** Faculty Advisor: Dr. Adam Ali Western University
10:30 a.m.	**Are we Getting Somewhere? Promised and Delivered Active Transportation Infrastructure in Sport Mega-Event Host Cities** ***Presenter: Cody Wang*** Faculty Advisor: Dr. Madeleine Orr University of Toronto
10:45 a.m. - 10:55 a.m.	**BREAK** **2nd Floor Benson Lounge**

Session B - II: Skeletal Muscle Health & Physical Activity (BN304)

10:55 a.m.	**Investigating how Ovariectomy Influences the Repeated Bout Effect and Heat Shock Protein Expression** ***Presenter: Anchal Badwal*** Faculty Advisor: Dr. Marius Locke University of Toronto
11:10 a.m.	**Comparison of Force Loss Between Electrically Stimulated and Voluntary Contractions in Human Dorsiflexors** ***Presenter: Raaj Dudani*** Faculty Advisor: Charles L. Rice, PhD Western University
11:25 a.m.	**Does Menstrual Cycle Phase Affect Lean Mass and Skeletal Muscle Mass Measurements?** ***Presenter: Shivani Elango*** Faculty Advisor: Dr. Stuart Phillips McMaster University
11:40 a.m.	**Predicting Skeletal Muscle Adaptations Following Single-Leg Immobilization and Recovery** ***Presenter: Dominique Greyvenstein*** Faculty Advisor: Dr. Stuart Phillips McMaster University
11:55 a.m.	**The Effects of Skeletal Muscle AMPK on Exercise-Induced Skeletal Muscle and Neuromuscular Adaptations** ***Presenter: Ricky Hong*** Faculty Advisor: Vladimir Ljubicic, PhD McMaster University
12:10 p.m. – 1:10 p.m.	**LUNCH** — **2nd Floor Benson Lounge**

Session B - III: Skeletal Muscle Health & Physical Activity (BN304)

1:10 p.m.	**Investigating the Role of AMPK in Muscle Regeneration** ***Presenter: Cora Jornacion*** Faculty Advisor: Vladimir Ljubicic, PhD McMaster University
1:25 p.m.	**Does Gonadectomy in Male Rats Influence HSP Content and the Repeated Bout Effect?** ***Presenter: Noah Kazdan*** Faculty Advisor: Dr. Marius Locke University of Toronto
1:40 p.m.	**Androgenic Anabolic Steroid Use for Exercise Enhancement Purposes: Review of the Effects on Muscle Growth, Strength and Body Composition** ***Presenter: Darya Lajevardi*** Faculty Advisor: Mazen Hamadeh, PhD York University
1:55 p.m.	**Neuromuscular Compartmentalization of Anconeus: A 3D Study of Innervation Patterns of a Neglected Muscle** ***Presenter: Jocelynn McGee*** Faculty Advisor: Catherine Amara, PhD and Anne Agur, PhD University of Toronto

Session B – III continues on the next page

2:10 p.m.	**Dynamics of the Local Skeletal Muscle Oxygen Environment Pre, During and Post High-Intensity Interval Cycling in Healthy Individuals** ***Presenter: Nino Nikolovski*** Faculty Advisor: Dr. Robert Bentley University of Toronto

2:25 p.m. – 2:35 p.m.	**BREAK**	**2nd Floor Benson Lounge**

Session B - IV: Skeletal Muscle Health & Physical Activity (BN304)

2:35 p.m.	**Deletion of Skeletal Muscle AMPK Exacerbates Cancer Cachexia** ***Presenter: Saumyaa Rishi*** Faculty Advisor: Dr. Vladimir Ljubicic McMaster University
2:50 p.m.	**Investigating the Effects of Exercise on Neuromuscular Morphology in the D2.mdx Model of Duchenne Muscular Dystrophy** ***Presenter: Makayla Roberts*** Faculty Advisor: Dr. Vladimir Ljubicic McMaster University
3:05 p.m.	**Hepatic Glycogen Metabolism in Resistance Trained Female Rats with Type 1 Diabetes** ***Presenter: Theres Tijo*** Faculty Advisor: Dr. Jamie Melling Western University
3:20 p.m.	**The Effects of Electrical Pulse Stimulation and Branched Chain Amino Acids on Human Skeletal Muscle Primary Myoblasts** ***Presenter: Meenadshi Varanan*** Faculty Advisor: Dr. Stuart Phillips and Dr. James McKendry McMaster University
3:35 p.m.	**The Temporal Effects of Intramuscular Temperature and Post-Exercise Cold-Water Immersion on Human Skeletal Muscle Function** ***Presenter: Rohin Malekzadeh*** Faculty Advisor: Dr. Arthur J. Cheng York University

Session C

- SESSION C - I: 9:15 a.m.-10:45 a.m.- Neurophysiology and Sensorimotor Learning
- SESSION C - II: 10:55 a.m. -12:10 p.m. - Neurophysiology and Sensorimotor Learning
- SESSION C - III: 1:10 p.m.-2:25 p.m. - Neurophysiology and Sensorimotor Learning
- SESSION C - IV: 2:35 p.m. -3:50 p.m. - Neurophysiology and Sensorimotor Learning

Session C - I: Neurophysiology and Sensorimotor Learning (BN307)	
9:15 a.m.	**Optimising a Machine Learning Model to Automate the Assessment of Lower Extremity Motor Function with a Circle Tracing Task** ***Presenter: Abed A. Hijleh*** Faculty Advisor: Gerome Manson, PhD Queen's University
9:30 a.m.	**Investigating the Role of Visual and Kinesthetic Information in Recognition Memory** ***Presenter: Obaida Al-Naib*** Faculty Advisor: Dr. Gerome Manson Queen's University
9:45 a.m.	**"I Can Finish That!": Perceived Ability to Hold Water in the Mouth is Influenced by Experience** ***Presenter: Cassie Chan*** Faculty Advisor: Tim Welsh, PhD University of Toronto
10 a.m.	**A Comparative Examination of the Neuromuscular Physiology behind Motor Parasomnias** ***Presenter: Maya Chawla*** Faculty Advisor: N/A (final term project) Western University
10:15 a.m.	**Does Listening to an Auditory Stimulus Help you Learn Motor Skills?** ***Presenter: Nicole Chong*** Faculty Advisor: Joyce Chen, PhD University of Toronto
10:30 a.m.	**Altered Vision: The Effects of Vergence-Accommodation on a Manual Pointing Task in Virtual Reality** ***Presenter: Colin Thomas Dolynski*** Faculty Advisor: Tim Welsh, PhD University of Toronto
10:45 a.m. - 10:55 a.m.	**BREAK** — **2nd Floor Benson Lounge**

Session C - II: Neurophysiology and Sensorimotor Learning (BN307)

10:55 a.m.	**Precision in Motion: Assessing Surgical Psychomotor Skill Acquisition through Virtual Reality Simulations** ***Presenter: Meryem Filiz*** Faculty Advisor: Recai Yilmaz, MD, PhD Candidate McMaster University
11:10 a.m.	**Perception vs. Function: Assessing Lower-Limb Dominance Using Motor Coordination, Stability, and Power Tasks** ***Presenter: Sophie Hawthorne*** Faculty Advisor: Dr. Gerome Manson Queen's University
11:25 a.m.	**Investigating the effects of handedness on ipsilateral motor cortical representations** ***Presenter: Mustaali Hussain*** Faculty Advisor: Dr. Aimee Nelson McMaster University
11:40 a.m.	**The Interplay Between Intersensory Flexibility and Specificity of Practice** ***Presenter: Kal Kiswani*** Faculty Advisor: Luc Tremblay, PhD University of Toronto
11:55 a.m.	**The Influence of Sport Type, Fitness Level, and Concussion History on Spatial Abilities and Executive Functions** ***Presenter: Adrienne Lee*** Faculty Advisor: Dr. Jennifer Heisz McMaster University
12:10 p.m. – 1:10 p.m.	**LUNCH** **2nd Floor Benson Lounge**

Session C - III: Neurophysiology and Sensorimotor Learning (BN307)

1:10 p.m.	**Transfer of Background Videogame Experience to Fine Motor Skill Performance** ***Presenter: Andrew Milner*** Faculty Advisor: Joyce Chen, PhD University of Toronto
1:25 p.m.	**The Influence of Experience on the Sensory Contributions Needed for Piano Learning** ***Presenter: Kate Olivia Moses*** Faculty Advisor: Dr. Gerome Manson Queen's University
1:40 p.m.	**The Voice you Know: Investigating the Cognitive Advantages of Familiarity** ***Presenter: Harsh Patel*** Faculty Advisor: Dr. Manda Fischer Western University
1:55 p.m.	**Does Visual Information Utilization for Limb Control Differ When we Exhale vs Inhale?** ***Presenter: Nasrin Sabet-Poor*** Faculty Advisor: Dr. Luc Tremblay University of Toronto
2:10 p.m.	**The Influence of Menstrual Phase on Synaptic Plasticity Induced via Intermittent Theta-Burst Stimulation** ***Presenter: Mary Ann Ingrid Sader*** Faculty Advisor: Dr. Aimee Nelson McMaster University

2:25 p.m. – 2:35 p.m.	BREAK	2nd Floor Benson Lounge

Session C - IV: Neurophysiology and Sensorimotor Learning (BN307)

2:35 p.m.	**What's Up?: Multisensory Contributions to the Perception of Verticality** ***Presenter: Garisan Sarvananthan*** Faculty Advisor: Luc Tremblay, PhD University of Toronto
2:50 p.m.	**The Effects of Exercise-Induced Muscle Damage on Upper-limb Online Movement Control** ***Presenter: Olivia Smith*** Faculty Advisor: Dr. Gerome Manson Queen's University
3:05 p.m.	**Augmented Reality Sensorimotor Training to Treat Chronic Neck Pain Assessed Through Corticomuscular Coherence** ***Presenter: Daniel Soppitt*** Faculty Advisor: Aimee Nelson, PhD McMaster University
3:20 p.m.	**Decoding Teamwork: Investigating Spatial Compatibility and Perceptuomotor Decision Making in Solo and Dyadic Environments** ***Presenter: Shi Lu Wang*** Faculty Advisor: Dr. Jay Pratt and Dr. Timothy Welsh University of Toronto

Session D

- SESSION D - I: 9:15 a.m.-10:45 a.m. - Cardiorespiratory & Cardiovascular Physiology
- SESSION D - II: 10:55 a.m. -12:10 p.m. - Cardiorespiratory & Cardiovascular Physiology
- SESSION D - III: 1:10 p.m.-2:25 p.m. - Behavioural Studies and Physical Activity
- SESSION D - IV: 2:35 p.m. -3:50 p.m. - Behavioural Studies and Physical Activity

Session D - I: Cardiorespiratory & Cardiovascular Physiology (WS2007)

9:15 a.m.	**Impact of Personality, Body-surveillance, and Biological Sex on Perceived Exertion** ***Presenter: Yasmeen Al-Kas*** Faculty Advisor: Dr. Ira Jacobs University of Toronto
9:30 a.m.	**Cerebral Blood Flow Responses Following High-intensity Dynamic Resistance Exercise Across Menstrual Cycle Phases** ***Presenter: Matin Borhani*** Faculty Advisor: Dr. Baraa Al-Khazraji McMaster University
9:45 a.m.	**The Effect of Hormonal Contraceptives Containing Levonorgestrel on Heart Rate Variability, in Healthy, Premenopausal Women, Measured Using the OURA Ring** ***Presenter: Joëlle Chackal*** Faculty Advisor: Maureen MacDonald, PhD McMaster University
10 a.m.	**Microvascular Function and Exercise Performance Across Limbs** ***Presenter: Trishawna Fongwoo*** Faculty Advisor: Robert Bentley, PhD University of Toronto
10:45 a.m. - 10:55 a.m.	**BREAK** — **2nd Floor Benson Lounge**

Session D - II: Cardiorespiratory & Cardiovascular Physiology (WS2007)

10:55 a.m.	**The Oxygen Uptake Efficiency Slope in Children with Inflammatory Bowel Disease and Juvenile Idiopathic Arthritis** ***Presenter: Arta Yamini*** Faculty Advisor: Dr. Joyce Obeid McMaster University
11:10 a.m.	**The Influence of Physical Activity Guidelines on Flow-Mediated Dilation and Pulse Wave Velocity in Women with Cardiometabolic Risk Factors** ***Presenter: Chung Yan (Grace) Yiu*** Faculty Advisor: Dr. Amy Kirkham University of Toronto
11:25 a.m.	**Comparing Cardiorespiratory Fitness and Insulin Resistance Between Inactive Pre-and Post-Menopausal Women at Risk of Type 2 Diabetes** ***Presenter: Joaquina Yuen*** Faculty Advisor: Amy Kirkham, PhD University of Toronto
12:10 p.m. – 1:10 p.m.	**LUNCH** — **2nd Floor Benson Lounge**

Session D - III: Behavioural Studies and Physical Activity (WS2007)

1:10 p.m.	**Physical Activity Reporting and Surveillance (PARS) Study for Children and Adolescents with Disabilities** ***Presenter: Lauren De Luca*** Faculty Advisor: Dr. Kelly Arbour-Nicitopoulos University of Toronto
1:25 p.m.	**Day-to-Day Variability in Well-Being and Physical Activity in Children with Inflammatory Bowel Disease** ***Presenter: Ben Domerchie*** Faculty Advisor: Joyce Obeid, PhD McMaster University
1:40 p.m.	**Exploring Youth Rugby Athletes' Involvement in Advancing Safeguarding in Sport at the Grassroot Level** ***Presenter: Gianpaolo Fortino*** Faculty Advisor: Dr. Ashley Stirling University of Toronto
1:55 p.m.	**A Comprehensive Investigation of the Impact of Sports Participation on Career Development, Professional Success, and Employability** ***Presenter: Amirparsa Ghaemi*** Faculty Advisor: Ashley Stirling, PhD University of Toronto
2:10 p.m.	**Quality of Life and Physical Activity in Children with Chronic Conditions or Disabilities** ***Presenter: Sarah Gillies*** Faculty Advisor: Dr. Brian Timmons McMaster University
2:25 p.m. – 2:35 p.m.	**BREAK** — **2nd Floor Benson Lounge**

Session D - IV: Behavioural Studies and Physical Activity (WS2007)

2:35 p.m.	**The Experiences of People who are Blind or Partially Sighted When Participating in the CBHA's Summer Development Camp** ***Presenter: Kapur Josh*** Faculty Advisor: Kelly Arbour-Nicitopoulos, PhD University of Toronto
2:50 p.m.	**A Systematic Review of the Effects of Acute and Chronic Exercise on the Pediatric Immune System** ***Presenter: Deema Khalaf*** Faculty Advisor: Dr. Joyce Obeid McMaster University
3:05 p.m.	**Safe Sport in Canadian Universities** ***Presenter: Lindsay Maier*** Faculty Advisor: Gretchen Kerr, PhD University of Toronto
3:20 p.m.	**School-Based Opportunities for Movement, Sport, and Physical Activity** ***Presenter: Alishba Mansoor*** Faculty Advisor: Catherine Sabiston, PhD University of Toronto

Session E

- SESSION E - I: 9:15 a.m. - 10:45 a.m. - Exercise Science & Health
- SESSION E - II: 10:55 a.m. - 12:10 p.m. - Nutrition and Exercise Science
- SESSION E - III: 1:10 p.m. - 2:25 p.m. - Nutrition and Exercise Science
- SESSION E - IV: 2:35 p.m. - 3:50 p.m. - Nutrition and Exercise Science

Session E - I: Exercise Science & Health (WSB67)	
9:15 a.m.	**Investigating the Causal Effect of Physical Activity and Sedentary Behaviours on Plasma Protein Biomarkers: A Mendelian Randomization Study** ***Presenter: Abigail Berube*** Faculty Advisor: Dr. Matthew Lanktree and Dr. Baraa Al-Khazraji McMaster University
9:30 a.m.	**Patterns of Sedentary Time in Prostate Cancer Survivors** ***Presenter: Ina Koperwas*** Faculty Advisor: Dr. Linda Trinh University of Toronto
9:45 a.m.	**Efficacy of the Dive Response as an Ergogenic Aid** ***Presenter: Derek Lemke*** Faculty Advisor: Dr. Ian Newhouse Lakehead University
10 a.m.	**Defining Initial Stay-Times for Heavy-Intensity Work in Young and Older Adults** ***Presenter: Farah Mourad*** Faculty Advisor: Glen P. Kenny, PhD University of Ottawa
10:15 a.m.	**Investigating Thermoregulation and Heat Tolerance in Prepubescent Girls as Compared to Boys** ***Presenter: Sofia Panziera*** Faculty Advisor: Dr. Brian W. Timmons McMaster University
10:30 a.m.	**Exploring the IL-6-Mediated Anti-Inflammatory Effect of Exercise in Children with Chronic Inflammatory Disorders** ***Presenter: Sabrina Sefton*** Faculty Advisor: Dr. Brian W. Timmons McMaster University
10:45 a.m. - 10:55 a.m.	**BREAK** — **2nd Floor Benson Lounge**

Session E continues on the next page

Session E - II: Nutrition and Exercise Science (WSB67)

10:55 a.m.	**Subcellular Localization of mTORC1-Mediated Phosphorylation Events in Human Skeletal Muscle After a Range of Physiological Anabolic Stimuli** ***Presenter: Paia Chen*** Faculty Advisor: Dr. Daniel Moore University of Toronto
11:10 a.m.	**Inflammatory and Autophagic Responses to a High-Fat Meal during Normoxia and Intermittent Hypoxemia in Peripheral Blood Mononuclear Cells from Healthy Young Adults** ***Presenter: Serena George*** Faculty Advisor: Pascal Imbeault, PhD University of Ottawa
11:25 a.m.	**The Effect of Intermittent Fasting on Mood: Implications of Eating Disorder Symptomatology** ***Presenter: Laura Harris*** Faculty Advisor: Dr. Jennifer J. Heisz McMaster University
~~11:40 a.m.~~ ***(CANCELLED)***	~~**Does Biological Sex Influence Blood Glucose and Lactate Concentrations in Response to High-Intensity Interval Exercise?**~~ ~~***Presenter: McKinley Kennedy***~~ ~~Faculty Advisor: Jenna Gillen, PhD~~ ~~University of Toronto~~
11:40 a.m.	**Creatine Supplementation on Athletic Performance in Resistance, Endurance, and Sport-Specific Exercises** ***Presenter: Micah MacMullen*** Faculty Advisor: Dr. Mazen J Hamadeh York University
12:10 p.m. – 1:10 p.m.	**LUNCH** — **2nd Floor Benson Lounge**

Session E - III: Nutrition and Exercise Science (WSB67)

1:10 p.m.	**The Effect of Isocaloric Dairy and Dairy-free Alternative Beverages on Post-exercise Anabolism in Active Adolescents.** ***Presenter: Alessia Magno*** Faculty Advisor: Daniel Moore, PhD University of Toronto
1:25 p.m.	**Modified Breath Test to Determine Anabolic Sensitivity Across Physical Activity States Within Remote and Controlled Settings** ***Presenter: David Nachman*** Faculty Advisor: Daniel Moore, PhD University of Toronto
1:40 p.m.	**Practical Strength Training Combined with Protein Supplementation to Improve Muscle Mass, Strength, and Physical Function in Overweight/Obese Older Individuals** ***Presenter: Arraksana Nanthakumar*** Faculty Advisor: Dr. Stuart Phillips McMaster University

Session E – III continues on the next page

1:55 p.m.	**The Impact of an Oral Ketone Monoester Supplement on Cerebral Blood Flow and Cognitive Function in Older Individuals with Subjective Memory Complaints** ***Presenter: Michaela Nikpal*** Faculty Advisor: Jeremy Walsh, PhD McMaster University
2:10 p.m.	**Rate of Fat Oxidation in Recovery From High-Intensity Interval Exercise is Influenced by the Nutritional Composition of Post-Exercise Snacks** ***Presenter: Erica Petrucci*** Faculty Advisor: Dr. Jenna Gillen University of Toronto
2:25 p.m. – 2:35 p.m.	**BREAK** — **2nd Floor Benson Lounge**

Session E - IV: Nutrition and Exercise Science (WSB67)

2:35 p.m.	**The Effect of High versus Low Dose Ketone Monoester Ingestion on Heart Rate Variability and Perceived Stress** ***Presenter: Aidan Underwood*** Faculty Advisor: Dr. Jeremy Walsh McMaster University
2:50 p.m.	**Does Biological Sex Influence the Glycemic Benefits of High-Intensity Interval Exercise?** ***Presenter: Taylor Wilcox*** Faculty Advisor: Dr. Jenna Gillen University of Toronto
3:05 p.m.	**Time Restricted Eating Interventions: A Network Meta-Analysis of Early, Late, and Self-Selected Time Restricted Eating Windows in Men and Women** ***Presenter: Luceta WUT*** Faculty Advisor: Amy Kirkham, PhD University of Toronto
3:20 p.m.	**The Effects of Caffeine in Endurance & Resistance Exercise** ***Presenter: Parsa Divanbeigi*** Faculty Advisor: Dr. Mazen J Hamadeh York University
3:35 p.m.	**The Effects of Acute Intermittent and Continuous Hypoxemia on Ketone Bodies in Healthy Young Women during the Postprandial State** ***Presenter: Nihal Yapici*** Faculty Advisor: Pascal Imbeault, PhD University of Ottawa

TIME	ITEM & LOCATION
3:50 p.m.-4 p.m.	**BREAK –** 2nd Floor Benson Lobby & Lounge
4 p.m.-4:40 p.m.	**Keynote, Dr. Gerome Manson** - BN307
4:40 p.m.-5 p.m.	**Award Presentation & Closing Remarks, Prof. Catherine Amara** – BN307

ABSTRACTS

(By session)

SESSION A - I: Biomechanics & Injury
Time: 9:15 a.m.
Location: BN302

Effects of Marker-less Motion Capture Methods on Musculoskeletal Modeling Simulation Outcomes

Presenter: Dorsa Eshaghi

Co-author(s): Margaret Harrington
Faculty Advisor: Timothy Burkhart, PhD
University of Toronto

BACKGROUND: Musculoskeletal modeling enables the non-invasive quantification of internal muscle and hip contact forces (HCFs), offering valuable insights into the causes and consequences of hip disorders in young adults, such as femoroacetabular impingement syndrome. Advancements in marker-less motion capture technology presents an opportunity to streamline data collection for model input. However, discrepancies exist between the kinematics and kinetics of conventional marker-based systems and marker-less technology, introducing a small margin of error. OBJECTIVE: To determine the effect of using marker-less in comparison to marker-based motion capture on the estimation of HCFs through musculoskeletal modeling. METHODS: Eight hybrid cameras will synchronously collect two-dimensional video data and retro-reflective marker trajectories, while force plates measure ground reaction forces during the performance of gait, a forward lunge, and a deep squat by 10 participants (five females, five males). The markerless video data will be processed with Theia3D and the marker data will be processed using QTM. Anatomic positions from each motion capture method will be extracted to scale a generic OpenSim model and the kinematics will be used to calculate joint angles. Subsequently, the forces will be input to quantify joint moments, muscle forces, and 3D and resultant HCFs on the acetabulum. To compare the HCFs between the marker-based and marker-less motion capture systems across the time signals, we will use a normalized cross-correlation function and calculate the root-mean-squared error. Also, the agreement between the peak marker-less and marker-based HCFs will be determined using Bland-Atman plot analyses. EXPECTED RESULTS: There will be strong correlations in the resultant HCFs between the two motion capture methods, showing the validity of the marker-less system. However, it is expected that there will be minor differences in the direction of forces due to the variances in hip kinematics that may alter the muscle moment arms.

SESSION A-I: Biomechanics & Injury
Time: 9:30 a.m.
Location: BN302

Hip flexion strength after arthroscopic Iliopsoas tendon Release: Protocol for a retrospective case-control study

Presenter: Nicole Hoh
Faculty Advisor: Dr. Timothy Burkhart
University of Toronto

BACKGROUND: Hip arthroscopy is a surgical treatment for femoroacetabular impingement syndrome (FAIS) and other hip pathologies. Often, the primary hip arthroscopy treating FAIS is performed with a secondary iliopsoas tendon release (ITR) surgery to treat concomitant painful psoas tendon snapping or impingement. There are mixed reports and limited empirical measures of post-ITR outcomes on hip flexion strength and weakness. Thus, this study will compare hip flexion strength between cases and controls and between operative and non-operative hips. METHODS: Participants (n=64) were recruited from Women's College and St. Michaels hospitals (16-50 years), all of whom were one to two years post arthroscopic treatment for FAIS at the time of recruitment. Cases (n=32) had an arthroscopic ITR surgery, and controls (n=32) did not. Participants will visit the biomechanics research laboratory where they will perform a maximum isometric hip flexion strength test in 90° of hip flexion, measured using a six-axis force transducer mounted to a custom test frame. EXPECTED RESULTS: It is expected that patients who underwent ITR hip arthroscopy will have less isometric hip flexion strength, power, and range of motion. Furthermore, poorer PROMs and compensatory muscle activations are expected in conjunction with these hip flexion decrements. IMPACT: The objective information indicating hip flexion function can be influential to prospective recipients of ITR regarding informed surgical decision-making. Furthermore, it can bridge the gaps in limited objective ITR outcome measures.

SESSION A-I: Biomechanics & Injury
Time: 9:45 a.m.
Location: BN302

Investigating Biomechanical Differences in ACL Injury Vulnerability and Recovery Among Racial Groups in Canada

Presenter: Alan Joumaa
Co-author(s): Anita Borhani
Faculty Advisor: Dr. Timothy Burkhart
University of Toronto

There are observed racial disparities in musculoskeletal injury rates and the quality of orthopedic care. Recent evidence identified that there are racial differences in gait parameters between Black Americans and White Americans. However, no research has investigated if these racial differences persist in tasks used to assess injury risk or readiness to return to sport. Therefore, the purpose of this study is to compare lower extremity biomechanics between White Canadians and Black Canadians in response to dynamic and multi-planar tasks. Methods: This is a cross-sectional study of 20 healthy participants (10 white Canadians [WC] and 10 black Canadians [BC]). Biomechanical testing will include the collection of markerless motion capture and ground reaction forces. Participants will perform three trials each, which consist of level ground walking, drop vertical jump, step-up, and cutting. Data analysis will compare knee joint kinematics and kinetics between racial groups using an independent samples t-test. Expected Results: We hypothesize that biomechanical differences will occur between the racial groups. This will ultimately affect the identification of lower extremity injury risk. As a result, this research may help provide potential insights into tailored intervention strategies for different racial groups, ultimately informing ACL injury prevention and rehabilitation efforts within diverse communities.

SESSION A-I: Biomechanics & Injury
Time: 10:00 a.m.
Location: BN302

Comparison of Volitional and Objective Fatigue in Response to an Aerobic, Isometric, and Anaerobic-Aerobic Fatigue Protocol

Presenter: Dveeta Lal
Faculty Advisor: Dr. Timothy Burkhart
University of Toronto

One potential risk factor of ACL injuries is neuromuscular fatigue that results in abnormal lower extremity kinematics that subsequently leads to increased strain on the ACL. Despite extensive research, there seems to be inconsistencies with the way fatigue is induced and measured. Consequently, this has made it difficult to conduct meaningful analyses and draw consistent conclusions. Therefore, the purpose of this research is to assess the differences in fatigue protocols and the different measures of fatigue. Twenty healthy participants (10 males, 10 females) will be recruited and exposed to three fatigue protocols spread over two days: i) aerobic - a stationary bike task where participants increase resistance every minute until fatigue; ii) isometric - a sustained contraction of the hamstrings and quadriceps at a 90º angle until fatigue; and iii) aerobic-anaerobic - sets of five squat jumps and 20 seconds high-knees until fatigue. Bilateral surface electromyography data will be collected from eight lower extremity muscles and the mean power frequency (MnPF) of the EMG signal will be monitored in real-time. Two force plates will measure ground reaction forces. A 3 by 2 repeated measures ANOVA will be conducted to determine if there are any differences between time to volitional fatigue compared to objective fatigue. Based on current research, it's hypothesized that in the aerobic protocol, time to volitional fatigue will precede objective fatigue due to the onset of mental fatigue. In both the isometric and anaerobic-aerobic protocols, it's hypothesized that neuromuscular fatigue will occur. However, the anaerobic-aerobic protocol will be more ecologically valid as it most mimics game-like activity. By assessing the differences these protocols have on the development of neuromuscular fatigue, this research can provide insight into the creation of a verified fatigue protocol that can allow researchers to understand the influence of neuromuscular fatigue on the occurrence of ACL injuries.

SESSION A-I: Biomechanics & Injury
Time: 10:15 a.m.
Location: BN302

An Analysis of Biomechanical Factors Contributing to Knee Injury Risk in Ballet and Bharatnatyam Dancers

Presenter: Nasya Zoe Sequeira
Faculty Advisor: Dr. Timothy Burkhart
University of Toronto

Ballet and Bharatnatyam are classical dance forms originating in Renaissance Italy and Southern India respectively. Both disciplines involve extensive use of the lower extremities, particularly in the maintenance of a half-squat position known as demi plié in ballet and araimandi in Bharatnatyam. The execution of an aesthetically and technically accurate demi plié or araimandi requires 180º of "turnout" (i.e., external rotation of the lower extremity), which is often anatomically unattainable for many dancers. Dancers may attempt to achieve non-physiological ranges of motion to perform these positions, which can reproduce lower extremity joint injury mechanisms. Although the knee is one of the most commonly reported injury sites among both ballet and Bharatnatyam dancers, biomechanical risk factors associated with knee injuries in ballet dancers have been widely studied, while Bharatnatyam has received little consideration in terms of biomechanical research. However, due to the correspondence between the demi plié and araimandi positions, it can be assumed that both dance forms place similar biomechanical stresses on the knees. This literature review identifies forced turnout, improper jumping technique and muscular imbalance as primary contributors to knee injuries in ballet dancers and cautiously extends the findings to Bharatnatyam dancers, taking into account stylistic differences. By analyzing the similarities and differences in movements and injury risks between the two dance forms, this review synthesizes a comprehensive understanding of biomechanical risk factors for knee injuries in ballet and Bharatnatyam dancers, focusing particularly on overuse injuries in Bharatnatyam dancers due to the prolonged maintenance of the araimandi position. The research underscores the necessity of cross-disciplinary knowledge, suggesting that well-established ballet injury prevention strategies could be adapted to mitigate Bharatnatyam knee injury risks. This adaptation should focus on proper technique, strength balancing, and fostering injury awareness among dancers and instructors to enhance the overall well-being of ballet and Bharatnatyam dancers.

SESSION A-I: Biomechanics & Injury
Time: 10:30 a.m.
Location: BN302

Examining of Lower Extremity Muscle Activity in Soccer-Specific Tasks to Optimize Return-To-Play Indicators following Injury.

Presenter: Nicolas Silon
Co-author(s): Pratham Singh
Faculty Advisor: Timothy Burkhart, PhD
University of Toronto

Injuries to the lower extremity are prevalent in soccer due to the sport's reliance on high-velocity movements like cutting, sprinting, tackling, shooting, and jumping. Moreover, research presents a high re-injury rate amongst these athletes, highlighting the need for improved standardized return-to-play guidelines. Numerous potential criteria and indicators have been utilized to assess return-to-play however evidence for these remain conflicting. Therefore, the purpose of the study is to quantify biomechanical measures including surface electromyography, kinematic joint motion analysis and ground reaction force data of the lower extremity during various soccer-specific tasks. Pilot data was collected using bilateral surface electromyography from wearable sensors over the rectus abdominis, adductor longus and specified quadricep and hamstring muscles. Ground reaction force data was collected using two force plates and an eight-camera Qualisys system was employed to synchronously record participant's motion. This data was collected at the Biomechanics of Orthopaedic Sports Medicine Lab during a single session. The pilot data assessed six soccer-specific tasks that were performed three times each. It is expected that the greatest activation of the quadricep muscle group will occur during the acceleration phase of the kick. The adductor longus is expected to maximally activate prior contact with the ball preceding the follow-through phase. Lastly, the hamstring muscle group is projected to maximally fire during the leg cocking phase. The expected research findings will suggest significant differences in the muscle-activation onset of the lower extremity muscle groups and imply the potential of certain muscle groups being exposed to greater demands during the kicking movement. Furthermore, examining the muscle activity data during these movements may allow for the quantification of thresholds that could standardize return-to-play decisions.

SESSION A-II: Biomechanics & Exercise Interventions
Time: 10:55 a.m.
Location: BN302

Sex Differences in Hip and Trunk Electromyography in Response to Tasks used to Assess Function in Femoroacetabular Impingement Syndrome Patients

Presenter: Daniela Boada Boada Herrera
Faculty Advisor: Timothy Burkhart, PhD
University of Toronto

Although females present with a higher incidence of Femoroacetabular Impingement Syndrome (FAIS) the majority of past research has been conducted in male patients. It is therefore unclear if biomechanical differences between males and females are partially associated with FAIS sex differences. In particular, it is theorized that differences in muscle activation patterns may contribute to these sex differences. Therefore, the purposes of this study are to: i) compare three EMG normalization methods; and ii) determine the effect of these normalization methods on the muscle activations between males and females in response to tasks used to assess the function of FAIS patients Methods: Three different EMG normalization methods will be tested in a pilot sample of 2 male and 2 female participants including: 1) a maximal voluntary contraction (MVIC); 2) maximum across dynamic tasks (gait, lunge, squat); and 3) task-specific max. Preliminary data has been collected for two males and two females for the glute max, during deep squat. Results: SPM repeated measures one-way ANOVA across all participants showed that the normalization methods were not significantly different for the within-subjects comparison. However, the MVIC vs. dynamic or task normalization would result in different conclusions when comparing males and females. Dynamic or task normalization would suggest females have more glute activation across task compared to males, but MVIC would suggest females have less activation.

SESSION A-II: Biomechanics & Exercise Interventions
Time: 11:10 a.m.
Location: BN302

Comparison of Lower Extremity Biomechanics Between Closed and Open-Kinetic Chain Exercises

Presenter: Alex Isidori
Co-author(s): Tiffany Tiu
Faculty Advisor: Timothy Burkhart, PhD
University of Toronto

Rehabilitation following anterior cruciate ligament reconstruction (ACLR) includes both open kinetic chain (OKC) and closed kinetic chain (CKC) exercises to facilitate important functional goals, one of which is to regain neuromuscular coordination and strength of the quadriceps. A plethora of research posits an enhanced ability of OKC exercises to recruit muscle groups in comparison to CKC. However, a common criticism of OKC exercises is that if they are implemented too early in the rehabilitation process, they may result in abnormal loading of the graft and increases the risk of graft failure. Therefore, the purpose of this investigation is to compare the differences in lower extremity biomechanics between OKC and CKC exercise to determine if there is a CKC exercise that stimulates the quadriceps in a similar way to OKC. Five healthy adults will perform a series of OKC (unilateral and bi lateral leg extension) and CKC (squat and step up (~30 cm)) exercises at progressive loads. All exercises will be loaded as follows: (i) body weight (BW) ; (ii) 10% of BW; and (iii) 25% of BW. During each task, surface electromyography (sEMG) will be taken of the vastus medialis (VM); lateralis (VL), and rectus femoris (RF), and quantified with a marked motion tracking system. Data will be reported as a percent of maximum voluntary isometric contraction (MVIC) to quantify recruitment. It is expected that OKC exercise will result in a greater %MVIC RF, but not VM or VL comparison to CKC across all exercises. Furthermore, the step up will perform superior to the squat.

SESSION A-II: Biomechanics & Exercise Interventions
Time: 11:25 a.m.
Location: BN302

Validation of an open-source method to quantify two-dimensional kinematics

Presenter: Haoyue Liu
Co-author(s): Margaret Harrington
Faculty Advisor: Timothy Burkhart, PhD
University of Toronto

Introduction: Joint motion analysis is essential for assessing musculoskeletal disorders, but traditional lab-based methods are not always feasible due to high costs, space requirements, and the need for specialized training and technical expertise, limiting their accessibility, especially in under-resourced areas. Remote analysis, using patient-recorded videos and open-source software, could potentially provide a solution to overcome these limitations. Therefore, this study aims to validate an open-source method for quantifying two-dimensional kinematics, enabling its potential use in clinical and research settings. Methods: Seven healthy adults participated in the study, recording themselves performing bodyweight squats (sagittal-plane) and lateral lunges (frontal-plane) using their smartphones. Their motion was simultaneously recorded by a system of wall-mounted Sony RX0 II cameras synchronized at 100 Hz. Joint angles were assessed by both Kinovea (V.0.9.5) and Theia3D markerless motion tracking software. The 2D data collected by Kinovea were compared to 3D pose estimation obtained using Theia3D software, serving as the comparator. Statistical analysis involved the normalized cross-correlation function to compare the joint angles over the time duration between the two systems. Expected Results: The study anticipates that the 2D motion capture system will provide accurate measurements comparable to the 3D system for joint angles. It is expected that the joint angles assessed using the 2D method will match those obtained from the gold-standard 3D system, suggesting that the 2D system can serve as a valid alternative in lower-extremity motion analysis. Impact: Validating this open-source 2D motion analysis method has the potential to significantly impact research and clinical practice by providing a cost-effective and accessible tool for assessing lower extremity kinematics. By demonstrating its accuracy compared to the gold-standard 3D system, this study will support the wider adoption of 2D motion analysis in remote data collection, rehabilitation monitoring, and other relevant applications, ultimately enhancing patient care and research outcomes.

SESSION A-II: Biomechanics & Exercise Interventions
Time: 11:40 a.m.
Location: BN302

Lower Limb Mechanics in Athletes with Spinal Fusion for Idiopathic Scoliosis During Jumps

Presenter: Hassaan Mahmood
Faculty Advisor: Dr. Timothy Burkhart
University of Toronto

BACKGROUND: Adolescents with idiopathic scoliosis (AIS) who undergo spinal fusion often return to pre-surgery levels of physical activity. While research exists describing individuals with spinal fusion for AIS (SF-AIS)'s mechanics during the flight, stance, and vertical flight phases of the stop-jump, none exists describing the landing. During the stance phase, existing research documents a tendency for SF-AIS athletes to produce moments contributing to dynamic valgus knee posture, which may predispose them to future lower extremity injuries if replicated consistently during landings. Furthermore, reactive strength, which is measured during the drop jump, is an effective indicator of performance in jumping-dominant physical activities. AIM: To compare lower limb biomechanics between SF-AIS athletes and control athletes during the landings of stop jumps and drop jumps. METHODS: Pilot data will be collected on active SF-AIS individuals (n = 2) and matched controls (n = 2). Participants will perform five trials each of the stop and drop jump. Vertical ground reaction forces (VGRF) and peak joint moments will be measured via two floor-embedded force plates. 3D lower extremity joint angles will be measured using Theia3D markerless motion capture. Jump height will be measured using a Vertec, which will be used to calculate participants' reactive strength index (RSI) during the drop jump. Independent samples T-tests will be run to determine the significance of differences in these measures between the groups. EXPECTED RESULTS: SF-AIS individuals will produce higher peak hip internal rotation, knee abduction, and lower knee extension moments during landings. They will exhibit greater knee flexion, abduction, and hip internal rotation displacement. SF-AIS individuals will show greater lower-limb asymmetry in VGRF production. There will be no difference in jump height or RSI. IMPLICATIONS: Understanding how SF-AIS individuals jump and land can guide training for a return to physical activity that promotes performance and minimizes injury risk.

SESSION A-II: Biomechanics & Exercise Interventions
Time: 11:55 a.m.
Location: BN302

Investigating the Effects of Menstrual Cycle Phase on Countermovement Jump Performance

Presenter: Brandan Wilson
Co-author(s): Alysha D'Souza, Derrick Van Every, Shivani Elango
Faculty Advisor: Stuart M. Phillips, PhD
McMaster University

BACKGROUND: Rhythmic fluctuations in estrogen and progesterone concentrations throughout the menstrual cycle (MC) have been proposed to significantly impact exercise performance. However, current data examining the relationship between MC phase and exercise performance show conflicting findings and oftentimes poor methodological rigour in terms of controlling for MC phase. Countermovement jump (CMJ) testing is a reliable metric for assessing explosive exercise performance. AIM: We aimed to assess the effect of MC phase on CMJ performance when using gold-standard methodology for detecting MC phase. METHODS: Eleven young (22 ± 3 years), healthy, naturally cycling females were recruited. All participants were tested once in their early follicular phase (EF) (days 1-4 of cycle onset; low estrogen and progesterone), and the mid-luteal phase (ML), (7 days post-positive ovulation test; high estrogen and progesterone). Mid-stream urinary luteinizing hormone tests were used to accurately capture the onset of ovulation and the luteal phase. For each visit, participants arrived at the laboratory after a 48h absence from moderate-vigorous physical activity and a 12h fast from caffeine. Following a brief warm-up on a stationary bike, three CMJ attempts were performed using a VALD ForceDeck system. Average CMJ height was calculated, and a two-tailed paired samples t-test was used to assess differences in average CMJ height between the two MC phases. Data are presented as mean (SD). RESULTS: Average CMJ height did not differ significantly between the two phases (EF: 21.1 (5.9) cm, ML: 21.2 (6.1) cm, $p > 0.05$).CONCLUSION: Our data shows that when gold standard methodology is employed, CMJ performance does not differ between MC phases. Research investigating the influence of MC phase on various performance parameters should ensure gold standard phase-detection methods are employed to reduce conflicts in the literature.

SESSION A-III: Injury Rehabilitation and Exercise Interventions
Time: 1:10 p.m.
Location: BN302

Balancing Act: Investigating the Effects of Trikafta on Bone Health in Pediatric Cystic Fibrosis

Presenter: Sarah Allam

Co-author(s): Sarah da Silva, Dr. Linda Pedder, Dr. Brian W. Timmons and Dr. Joyce Obeid

Faculty Advisor: Dr. Joyce Obeid

McMaster University

Background: Cystic fibrosis bone disease (CFBD) is characterized by bone loss and fragility fractures, and can often progress to osteopenia and osteoporosis. Over the last 40 years, there has been an increase in the prevalence of CFBD in patients with cystic fibrosis (CF), largely attributed to advancements in disease management and increased life expectancy. Trikafta therapy, a novel combination therapy designed to correct and potentiate the trafficking defect caused by delF508 CFTR mutation, is expected to further enhance health outcomes and may further extend life expectancy. However, there is limited understanding of its impact on bone mineral density, particularly in children. Methods: CF patients, under the age of 18, who are initiating Trikafta therapy will be invited to participate in 3 study visits. Each study visit will be identical, and will take place 1 month before beginning Trikafta, and again at 1-month 6-months of therapy. We will measure standing height and weight. We will use bioelectrical impedance analysis and whole-body dual x-ray absorptiometry to assess body composition. Bioelectrical impedance analysis results will be entered into a predictive model to determine bone mineral content (BMC), while BMC and bone mineral density (BMD) will be calculated from DXA. Implications: This study will offer longitudinal insights into the relationship between Trikafta and bone density. By measuring BMC and BMD over time, we can determine if Trikafta has therapeutic extrapulmonary effects and if bone health will continue to be an area of concern in this new age of CF management.

SESSION A-III: Injury Rehabilitation and Exercise Interventions
Time: 1:25 p.m.
Location: BN302

Investigating the Impact of a Resistance Band Training Intervention on Frailty in Community-Dwelling Older Adults

Presenter: Noor Boutanos
Co-author(s): Giulia Coletta
Faculty Advisor: Dr. Stuart Phillips
McMaster University

Background: Frailty is the age-related decline in physiological systems and physiological reserve that results in a heightened vulnerability, leading to an increased risk of adverse health outcomes. With a rapidly aging population, it is necessary to develop interventions to mitigate the onset or progression of frailty in older adults. Aim: The objective of this study was to investigate the impact of an 18-week resistance band training intervention on frailty scores and related outcomes in community-dwelling older adults compared to a flexibility control group. Methods: In this two-arm RCT, older adults (≥70 years of age), generally healthy, community-dwelling, and pre-clinically mobility-limited, were included. Eligible participants were randomly allocated into a resistance band training intervention (RT) or a flexibility control group (CON). The intervention consisted of group-based, twice-weekly strength training classes using resistance bands and was divided into three six-week phases: in-person, hybrid, and online. The primary outcome was frailty measured using the Fit-Frailty App. The secondary measures were fall risk assessed using Timed-Up and Go (TUG), fracture risk assessed with bone mineral density (BMD) obtained through a dual x-ray absorptiometry (DXA) scan, and health-related quality of life evaluated using the 36-item Short Form Survey (SF-36). The outcome measures were assessed pre-and post-intervention. Results: A total of 8 participants (mean age 78 ± 5; 75% female; mean BMI 25.5 ± 3.0 kg/m2) were randomized (RT n=3; CON n=5). The intervention had no effect ($p>0.05$) on frailty, TUG, BDM, or SF-36 compared to CON. Conclusion: We have provided insight into the preliminary efficacy of a resistance band training intervention on frailty scores and related outcomes in older adults. These results are from a subset of participants involved in a larger RCT, which needs to be completed to extend these findings.

SESSION A-III: Injury Rehabilitation and Exercise Interventions
Time: 1:40 p.m.
Location: BN302

Exploring Ontario Professional Dancers' Rehabilitation Experiences and Attitudes Toward Seeking Treatment for Dance-Related Musculoskeletal Injuries

Presenter: Macey Culhane
Faculty Advisor: Erin Pearson, PhD
Lakehead University

Background: Self-employed professional dancers experience a high prevalence of musculoskeletal injuries. However, negative perceptions about healthcare and seeking treatment can adversely affect how dancers take care of themselves when injured (e.g., working through the pain). To date, no studies have sought to understand the perspectives of these dancers regarding injury attitudes and treatment experiences. Objective: The purpose of this descriptive qualitative study is to explore healthcare-seeking attitudes, decision-making, and rehabilitation experiences among self-employed professional dancers who have sustained a dance-related musculoskeletal injury. Method: One-on-one semi-structured interviews are being used. To be eligible, participants must be self-employed professional dancers living in Ontario, aged 18 or older, and currently working. Participants must have experienced a dance-related injury within the past year, one consecutive week of injury symptoms, and sought at least one rehabilitative treatment session. Interviews occur via telephone or Zoom. Data are being analyzed inductively and data collection is ongoing. Results: To date, 5 interviews have taken place with females between the ages of 22 and 32 who perform commercial and contemporary dance styles. Emerging themes primarily involve treatment barriers and facilitators. Participants shared feelings of external pressure to return to dance to avoid missed opportunities or financial repercussions. A large cost was associated with treatments that participants paid for directly. Participants generally shared that they stopped treatment when it became repetitive with little improvement observed, choosing instead to self-monitor. Facilitators included all participants experiencing a solid rapport with treatment providers who "understand the dancer lifestyle." All participants valued a program involving strengthening exercises which contributed to recovery and return to dance. Conclusion: Barriers and facilitators to seeking injury treatment need to be considered to improve dancer well-being while recovering from injury. Understanding dancers' experiences is important to improving the quality of care for musculoskeletal injuries and dancer-treatment provider relationships.

SESSION A-III: Injury Rehabilitation and Exercise Interventions
Time: 1:55 p.m.
Location: BN302

The Short-Term Effects of Percussive Massage on Cervical Spine Range of Motion and Strength

Presenter: Emma Lindsey
Faculty Advisor: Paolo Sanzo, PhD
Lakehead University

Background: Many technology users are susceptible to adopting a forward head posture, which can lead to overuse of various neck muscles. Prolonged cervical spine flexion increases the load and the stretch on the upper trapezius muscle resulting in tightness, decreased cervical spine range of motion (ROM), and muscle fatigue. Percussive massage involves moving the device over the surface of the skin to apply vibrations and rapid pulses in short bursts of pressure to a muscle belly or tendon. This technique is said to increase joint ROM and improve blood flow to the targeted muscle. To date, no research has examined the effects of percussive massage on cervical spine flexion ROM and strength.
Objective: To examine the short-term effects of percussive massage of the upper trapezius muscle on cervical spine flexion ROM and strength.
Method: Using a crossover study design with a 24-hour washout period, 19 healthy male and female students aged 18-30 years completed this study. A 5-minute percussive massage was performed bilaterally on the upper trapezius muscle. Cervical spine flexion ROM (CROM© device) and cervical spine flexion strength (Lafayette Manual Muscle Tester©) were measured pre-and post-intervention. Descriptive statistics and repeated measures mixed ANOVA were used to analyze the data with a $p < .05$.
Results: There was a statistically significant interaction with a medium effect size for treatment condition and time on cervical spine flexion ROM ($F(1,36)=5.381$, $p=.026$, partial 2.130). There was no statistically significant interaction for treatment condition and time on cervical spine flexion strength ($F=(1,36).558$, $p=.460$).
Conclusion: Percussive massage increased cervical spine flexion ROM but did not affect cervical spine flexion strength. Future research should continue to explore the effects of percussive massage to determine its clinical utility in clinical trials involving a symptomatic or pathological population.

SESSION A-III: Injury Rehabilitation and Exercise Interventions
Time: 2:10 p.m.
Location: BN302

Autonomic nervous system interventions for persistent post-concussion symptoms: a scoping review

Presenter: Nicolas Martinez
Co-author(s): Micheal Jorgensen, Lynda Mainwaring
Faculty Advisor: Dr. Lynda Mainwaring
University of Toronto

Background Concussions are experienced as symptoms (e.g., headaches, dizziness, sleep disturbances), which can persist beyond typical recovery timelines. How to manage persistent symptoms effectively remains unclear. Purpose The purpose of this presentation is to analyze, synthesize and summarize the results of studies on current interventions and present the findings in form of a scoping review. Method The criteria was developed by setting exclusion criteria and filtering studies by keywords such as "persistent", "Dizzyness", "Headache" and "sleep disturbances".Studies including injuries classified as mild traumatic brain injury (mTBI)/concussion, regardless of the mechanism of injury, were included. The search of literature was done by narrowing down the search to randomized control studies and clinical trials done after 2010. Studies were required to include both sympathetic and parasympathetic nervous system symptoms. The exclusion criteria included confounding autonomic concussion symptoms beyond the ones mentioned above. Results A total of 35 publications were screened; 12 were included in the final review by excluding publications that had a smaller participant pool than 50 individuals and were not randomized control or clinical trials. There was insufficient convincing evidence that any of the mentioned interventions successfully treated the specified symptoms long-term. There was a high amount of variability in the recommendations after a concussion had occurred in terms of rest and symptom management which limited comparisons across studies. The studies included showed uncertainty in the effectiveness of intervention methods for persistent symptoms however additional investigation would be required for symptoms not included in the review. Implications The findings lead to a greater understanding of the use of several ANS interventions and their effectiveness however a future study would be the potential for vagus nerve stimulation in addressing other ANS symptoms such as exercise intolerance and heart rate variability due to their strong correlation to the vagus nerve..

SESSION A-IV: Injury Rehabilitation and Exercise Interventions
Time: 2:35 p.m.
Location: BN302

Moving with pain: A short-term self-directed movement-break program increases physical activity and function in chronic pain patients

Presenter: Clara Rivaya Salvadores
Co-author(s): Cooper Sharpe, Dinesh Kumbhare, Jenna Gillen, Daniel West
Faculty Advisor: Drs. Jenna Gillen and Daniel West
University of Toronto

1 in 5 Canadians suffer from chronic pain (CP) and meeting Canadian Physical Activity Guideline recommendations for ≥150 min/wk of moderate-to-vigorous activity is often impractical. We evaluated the impact of a short-term personalized movement break-based activity program on physical activity, physical function, sleep, and fear-avoidance behaviours in CP patients. Data was retrospectively abstracted from medical charts of 36 patients (14 males, 22 females; 57±18y; 28±5kg/m2) who completed the movement-break program at a chronic pain outpatient clinic. The program involved a baseline assessment, a habitual activity phase, a 2-3 wk movement-break phase whereby patients were encouraged to perform hourly 2-3 min bodyweight movement breaks (e.g., bodyweight squats, stair-climbs, walking) daily, and a follow-up assessment. Physical activity was measured using wearable activity monitors. Compared to habitual activity days, patients on movement-break days accumulated more daily steps (8033±4969 vs 9511±4690 steps/d, p=0.004), light physical activity (235.3±118.5 vs 269.5±112.3 min/d, p<0.001), and moderate-to-vigorous physical activity (39.9±45.3 vs 47.3±49.7 min/d, p=0.03), which coincided with less sedentary time (11.7±3.0 vs 10.6±1.9 h/d, p=0.007). Physical function improved based on Timed-Up-and-Go (ΔTUG = -1.4±2.5s; p=0.0002; ≥minimal important difference (MID) =13/34) and 5-Times-Sit-to-Stand (5TSTS) scores (Δ5TSTS = -5.2±5.1s; p<0.0001; ≥MID =15/19); there was no significant mean change in a subset of patients that performed 30-second STS tests (Δ30STS=2.5±2.4 reps; p=0.275; ≥MID=7/15). Fear-avoidance behaviours improved based on the Pain Catastrophizing Scale (ΔPCS = -4.6±8.0; p=0.001; ≥MID=9/36) and Tampa Scale of Kinesiophobia (ΔTSK = -1.8±4.2; p=0.015; ≥MID=7/36), whereas mean Pittsburgh Sleep Quality Index did not significantly change (ΔPSQI = 11.8± 4.5 vs 11.1±4.7, p=0.113; ≥MID=9/36). Our findings suggest that short movement breaks can be effective to decrease fear-avoidance behaviours in CP patients, and increase physical activity and function, by a magnitude that is likely clinically meaningful in 20-80% of patients.

SESSION A-IV: Injury Rehabilitation and Exercise Interventions
Time: 2:50 p.m.
Location: BN302

The effectiveness of the "Keep Moving" rehabilitation program on balance, strength, range of motion, and psychological well-being for older adults with brain injuries.

Presenter: Cassie Roy
Faculty Advisor: Taryn Klarner, PhD and Eryk Przysucha, PhD
Lakehead University

Background: The "Keep Moving" is a locally implemented rehabilitation program aimed to enhance physical capabilities among older adults with brain injuries. These types of programs are essential for the maintenance or re-acquisition of their independence when engaged in physical activities. Aside from the physical changes, the importance of psychological well-being, such as perception of competence, sense of belonging, and overall confidence, cannot be underscored. Community-based exercise programs are recommended as part of the chronic care plan for those with brain injuries and are scare in our area of Northern Ontario. Objective: To evaluate the effect of the "Keep Moving" rehabilitation program on balance, strength, range of motion, and psychological well-being in older adults with brain injuries. Method: Fifteen participants with various brain injuries took part in a 10-week program at Canada Game Complex, in Thunder Bay, Ontario. Their physical capabilities were inferred from their performance on the Senior Fitness Test which assesses strength, range of motion, and agility. In addition, upon the completion of the program their perception as to how, if at all, the program changed their motivation and confidence were derived via the Neuro Quality of Life questionnaires. Results: The program has had a positive impact on different domains of participant's physical abilities and their overall psychological well-being with the majority of participants scoring higher on the Senior Fitness Test after the program ended. Conclusion: Re-acquiring and maintaining the ability to take part in physical activities, whether organized or during their daily routines, is critical for older individuals with brain injuries in Northern Ontario. The results of this project will be used to scale and spread the Keep Moving programs throughout Northern Ontario.

SESSION A-IV: Injury Rehabilitation and Exercise Interventions
Time: 3:05 p.m.
Location: BN302

Empowering Growth: Understanding the Impact of Stress Factors on Post-Traumatic Growth among Breast Cancer Survivors

Presenter: Hamza Salah
Faculty Advisor: Catherine Sabiston, PhD
University of Toronto

This study investigates the relationship between different stressors and the potential of post-traumatic growth (PTG) among 201 women diagnosed with breast cancer to whom have completed their treatment within three months prior to the study. Participants shared their experiences of social physique anxiety (SPA), body image stress, general stress, physical health symptoms, and cancer-related worries. Additionally, they reported their levels of PTG and activity with health engagement control strategies or HECS. The results indicate that while all stress factors were correlated, SPA and cancer worries were significantly associated with higher levels of PTG. On the contrary, general and physical stress were not significantly correlated with PTG. Furthermore, higher levels of HECS were found to be positively related to PTG experiences as these women had lower correlations between cancer fears and PTG as well as larger relationships between SPA and PTG. These women generally reported higher PTG levels and decreased stress levels across all areas. This study emphasizes the importance of addressing body-focused and cancer-related stress in promoting PTG among breast cancer survivors, suggesting that interventions emphasizing active engagement in health management may be beneficial for this population.

SESSION A-IV: Injury Rehabilitation and Exercise Interventions
Time: 3:20 p.m.
Location: BN302

Evaluating Single- and Dual-Task Tandem Gait in Healthy Interuniversity Athletes

Presenter: Lauren Wilcox
Co-author(s): Kyla Pyndiura, Michael Hutchison
Faculty Advisor: Michael Hutchison, PhD
University of Toronto

Background: Single- and dual-task tandem gait have recently been added to the Sport Concussion Office Assessment Tool - 6th Edition (SCOAT-6), assessing dynamic balance, coordination, and multitasking. However, no clear normative performance data of healthy interuniversity athletes exists to interpret impairment post-concussion. Objective: This study aimed to establish normative values for single- and dual-task tandem gait in healthy interuniversity athletes. Methods: At pre-season baseline testing, 105 healthy interuniversity athletes (males=62, females=43) completed three single- and dual-task tandem gait trials each. Descriptive statistics were stratified by sex, and Wilcoxon rank-sum tests were used to compare values between sexes. Failure rate classification based on SCOAT-6 reference values was reported. Results: On average, males completed the single-task tandem gait in 15.4s ± 5.1s, while females took 15.9s ± 3.0s (p=0.042). Both sexes exhibited a median total motor error of 2 (female IQR: 0-7, male IQR: 0-6). The single-task best time for males and females was 14.5s ± 5.0s and 15.0s ± 3.0s, respectively (p>0.05). The average time for dual-task tandem gait was 21.4s ± 7.7s for males and 25.5s ± 10.9s for females (p=0.018). The dual-task best time for males was 19.8s ± 7.0s and 23.0s ± 9.5s for females (p=0.049), and both sexes had a median total motor error of 0 (female IQR: 0-3, male IQR: 0-5). Cognitive accuracy, the number of correct cognitive words/months/numbers divided by the total cognitive completed, was 91.53% for males and 93.17% for females. Using SCOAT-6 criteria, 93% of athletes failed the single-task tandem gait (≥11.7 seconds), and 88% failed the dual-task (≥14.4 seconds). Conclusion: Compared to previous research, the times identified in this study were higher. These findings highlight that previously established normative SCOAT-6 criteria warrant revisiting for accurate clinical interpretation and management of sport-related concussions. Differentiating sex in tandem gait performance is essential moving forward.

SESSION A-IV: Injury Rehabilitation and Exercise Interventions
Time: 3:35 p.m.
Location: BN302

The Effects of 5-Days of Strict Bed Rest on Changes in Body Composition, Strength, and Physical Performance in Healthy Older Adults

Presenter: Arianne Zabbal
Co-author(s): SJ Hannaian, G Hajj-Boutros, JA Morais, TA Churchward-Venne,
Faculty Advisor: Dr. Tyler Churchward-Venne
McGill University

INTRODUCTION: Aging is associated with more frequent periods of physical inactivity and muscle disuse (e.g. bedrest due to illness, disease, or surgery) due to a higher degree of comorbidity and hospitalization. Muscle disuse results in accelerated rates of skeletal muscle loss and functional decline, which can be debilitating for older adults due to their pre-existing risk for sarcopenia. Here we present data on changes in body composition, muscle strength, and physical performance in a group of older adults who participated in a larger parallel group study exploring the effects of exogenous ketone supplementation as a novel strategy to protect muscle metabolic health during bed rest. METHODS: Thirty healthy older adults (age: 73.5±5.5 y, BMI: 25.5±2.7 kg/m2; mean±SD) underwent 5-days of strict bed rest. Changes in body composition (i.e., whole-body lean mass and fat mass) before and after bed rest were assessed via dual-energy x-ray absorptiometry. Changes in muscle strength and physical performance were assessed via maximal isometric voluntary contraction torque of the quadriceps (Biodex dynamometry) and both the 5-minute walk test and a 5 repetition sit-to-stand test. RESULTS: Whole-body lean mass decreased from 45.5±9.7 kg to 44.6±9.7 kg (absolute change: -0.9±0.8 kg) (Time: $P<0.0001$), while whole-body fat mass decreased from 24.2±6.6 kg to 23.9±6.5 kg (absolute change: -0.3±0.4 kg) (Time: $P<0.0007$). Maximal isometric voluntary contraction torque (60°) of the leg-extensors decreased from 140.5±51.2 Nm to 131.2±49.8 Nm (absolute change; -9.3±16.3 Nm) (Time: $P<0.0038$). Distance covered in the 5-minute walk test decreased from 465.8±61.2 m to 439.4±71.8 m (absolute change: -26.4±26.4 m) (Time: $P<0.0169$), while time to complete sit-to-stand test increased from 8.6±2.0 s to 9.7±2.2 s (absolute change: +1.1±1.3 s) (Time: $P<0.0001$). CONCLUSION: Five days of strict bed rest in healthy older adults results in a deleterious loss of whole-body lean mass, muscle strength, and physical performance.

SESSION B-I: Physical Cultural Studies
Time: 9:15 a.m.
Location: BN304

Where's the "Queer" in "Kin"? A Textual Mapping of Queer History and Futurity at the University of Toronto and Faculty of Kinesiology and Physical Education

Presenter: Emma Karamanlian
Faculty Advisor: Dr. Caroline Fusco
University of Toronto

The purpose of this study was to explore the history of queerness and the creation of queer space at the University of Toronto St. George (UTSG) campus, specifically in the Faculty of Kinesiology and Physical Education's (FKPE) curricula, co-curricular programs, and in EDI policies. Research on queer spaces explores how institutions and sport are deeply imbued with cisheteronormative ideologies and representations, which (re)produce sexism, homophobia, transphobia, racism, and the marginalization of queer people (Linghede & Larsson, 2017; Eng, 2006; Lisahunter, 2019). Muñoz (2011) argues that 'queerness is not yet here' and that 'queer' is an action and a promise to escape the cisheteronormativity of the here and now, to achieve the queer utopia/s of the future. The temporal theme (i.e., 'here', 'now' and 'not here yet') undergirding Muñoz's (2011) work guided this study of the 'then, here and now' of queerness at UTSG and FKPE. I explored the histories, present and future promises outlined in UTSG and the FKPE documents to determine what work is required to create more queer inclusivity and futurity at UTSG and FKPE. I textually mapped the 2SLGBTQI+ history at the UTSG campus and FKPE by analyzing publicly available documents related to the development of the Sexual Diversity Studies program, EDI policies, spaces, curricula, and co-curricular programs. The data was analyzed qualitatively within queer theoretical spatial studies paradigms. My textual document analysis allowed me to interpret if normative structures were (and are still) embedded in UTSG and FKPE's history and EDI policies. I asked: In what ways did/do these policies position heterosexuality and cisgenderism as the norm, thus preventing 'queer from really being here' (McKee, 2011). While there have been moments and spaces of queer disruptions to cishetero norms, we are 'not quite here yet' in terms of Muñoz's queer utopia/s and futurity.

SESSION B-I: Physical Cultural Studies
Time: 9:30 a.m.
Location: BN304

How Far Does Canadian Safe Sport Policy Go? Examining Safe Sport Policy with the Multiple Streams Framework

Presenter: Piper LaFayette
Faculty Advisor: Alanna Harman, PhD
Wilfrid Laurier University

Calls for reform within Canadian sport have hit the media and have garnered attention from academics, practitioners, and politicians as the current Canadian sport system reflects a human rights crisis (Barnes, 2022; Ibrahim, 2022). High-performance athletes across the Canadian sport system have publicly called for change amongst allegations of maltreatment. In response to the public outcry the Government of Canada required that national sport organizations become signatories of the Office of the Sport Integrity Commissioner who is responsible for administering the Universal Code of Conduct to Prevent and Address Maltreatment in Sport (Spencer, 2023) to remain eligible for Sport Canada funding. Considering these recent developments there is a need to critically review these recent policy developments and if they adequately address athlete maltreatment. This two-phase study aims to address the lack of accountability that perpetuates athlete maltreatment within Canadian sport. Phase one is currently in-progress and examines the testimony and evidentiary briefs provided to the Standing Committee on the Status of Women from various sport stakeholders. This Committee undertook "a comprehensive study into physical and emotional abuse in sport" (Ibrahim, 2022). Data are being analyzed utilizing the multiple streams framework (MSF) (Kingdon, 2010). The MSF is a theoretical policy analysis framework used across various policies and in various contexts (Hoefer, 2022). Analysis of testimony and evidentiary briefs will provide deep insight into the 'problem stream' which often lacks development (Knaggård, 2015). Analysis will also consider the politics and policy streams and how they have converged to lead to the development of the new 'Safe Sport' policy. Phase two of this study will compare how the problem was defined with the actual policy development to determine if the recent policy development adequately addresses the problem as defined by the various stakeholders.

SESSION B-I: Physical Cultural Studies
Time: 9:45 a.m.
Location: BN304

The Conflicting Agenda's of the Olympic Charter and Trans* Athlete Policy: The Unique Intersection of Trans* Women's In/Exclusion in the Olympics

Presenter: Mia Macera
Faculty Advisor: Adam Ali, Ali
Western University

The objective of this study is to examine discursive shifts in the key Fundamental Principles within the Olympic Charters, and whether they reproduce or challenge attitudes and values within the International Olympic Committee's (IOC) policies on trans* athlete inclusion from 2003-2023. The Charter's specific values of non-discrimination, fairness, and accessibility are meant to guide policy creation to ensure that the IOC remains in accordance with these values. The IOC has been considered a leader in athlete-inclusion policy and thus have the power to shape attitudes concerning trans* women athletes and their perceived threat to the goodness of sport. Despite being at the forefront of policy creation in this area, the IOC has failed other athletes that do not easily categorize themselves within the sporting binary, including Caster Semenya, Quinn, and Laurel Hubbard. As such, my study asks the following questions: Do trans* policies created by the IOC reflect the Fundamental Principles of the Olympic Movement? And what are the implications of these policies and principles for trans* women Olympians? To answer these questions, I conducted a critical discourse analysis of Olympic Charters, trans* athlete-specific policies, and position statements created by the IOC from 2003-2023. The results demonstrate that Olympic Charters and policies affecting trans* athletes stand in opposition to the Fundamental Principles of the Olympic Movement. Furthermore, Charters and policies depend on overlapping discourses of fairness, fear, biology, competitive advantage, and medicalization to both appear progressive and eschew the IOC's responsibility for supporting trans* athletes. The results demonstrate how the IOC remains an important political actor in broader social perspectives on trans* women, even as it continues describing itself as an apolitical entity.

SESSION B-I: Physical Cultural Studies
Time: 10:00 a.m.
Location: BN304

A Scoping Review: South Asian Females' Experiences in Sport in Canada

Presenter: Musabbiha Meghjee
Co-author(s): Dr. Kaleigh Pennock
Faculty Advisor: Dr. Kaleigh Pennock
University of Waterloo

South Asian women are a growing population in Canada, but their experiences in sport and recreation are not well understood. Findings suggest that South Asian women have low participation in organized sport and recreation (Vahabi & Damba, 2015), compared to other populations. This may be due in part to barriers to participation, including program accessibility, lack of female spaces, and domestic responsibilities (Joseph et al., 2022; Mahmood et al., 2022). As sport and recreation can offer tremendous physical, social, and mental health benefits (Wiium and Säfvenbom, 2019; Pullia et al., 2022), there is a need to explore the experiences of South Asian women in Canada to better understand how these spaces can be made more inclusive, accessible, and enjoyable. Thus, the purpose of this presentation is investigate South Asian females' experiences in organized sport and recreation to determine barriers and facilitators to participation. We examined South Asian females' experiences in structured sport/recreation programs in Canada by completing a rapid, small-scale scoping review. We searched peer reviewed articles and grey literature on three databases: Scopus, SPORTDiscus, and Web of Science. To meet inclusion, studies needed to be focused on South Asian females between the ages of 18 to 25 and their experiences in participating in structured recreation and sport programming either in the community or at post-secondary institutions in Canada. This project is currently ongoing, and the presentation will focus on preliminary data findings that address barriers and facilitators to organized sport and exercise for this population. We will also discuss the implications of these findings and provide recommendations for more inclusive programming within the Canadian sport and recreation programming sector.

SESSION B-I: Physical Cultural Studies
Time: 10:15 a.m.
Location: BN304

Examining USRowing's Decision to Remove Junior Lightweight Rowing Through a Risk Framework

Presenter: Jessie Strong
Faculty Advisor: Dr. Adam Ali
Western University

In September 2021, USRowing made the decision to no longer offer junior lightweight rowing events at regattas to protect the health of athletes. Instead, they have switched to age group racing categories, such as U17 and U19 classifications. There have been mixed public reactions to this announcement with those in favour of the decision charging that lightweight categories are unhealthy and dangerous, while those against the decision believe it reduces participation opportunities for smaller athletes. The purpose of this study was to examine the public reaction to USRowing's announcement removing youth lightweight rowing events. To do so, I used a summative qualitative content analysis to analyze USRowing press releases, meeting minutes, and news media articles from 2017 to 2021, which I interpreted through a risk framework. "The culture of risk" is the widespread acceptance of risk, pain, and injury by athletes for them to succeed, even though it can cause serious damage in the future. Five themes emerged from the analysis: health and safety, weight management, science and medicalization, implementation and enforcement, and participation. These themes emphasized that a "culture of risk" was present within youth lightweight rowing, which led USRowing to evaluate and restructure their existing protocols. The public reaction via the news articles revealed similar themes and demonstrated that ambivalent reactions of the community to this announcement. Many think that high school athletes should not be cutting weight to row and that limiting their caloric intake is harmful to their overall health. Others recognize the health issues associated with lightweight rowing but think that removing the junior lightweight category prevents individuals of a smaller stature from being competitive. These findings can be used to further examine the global landscape for lightweight rowing and weight-sensitive sports for young athletes.

SESSION B-I: Physical Cultural Studies
Time: 10:30 a.m.
Location: BN304

Are we getting somewhere? Promised and delivered Active Transportation infrastructure in sport mega-event host cities

Presenter: Cody Wang
Faculty Advisor: Dr. Madeleine Orr
University of Toronto

Sport mega-events such as the Olympic Games have long promised sustainable transportation infrastructure as legacies. This is one way that mega-event boosters secure buy-in from governments and local residents. This project specifically examines legacies of Active Transportation (AT) infrastructure (i.e., bike lanes, multi-use paths), given that AT has recently experienced a surge in popularity in cities around the world. Despite being a common promise in bid documents, it is unclear whether AT infrastructure projects are realized, whether the AT infrastructure delivered matches the promises made, and whether the infrastructure is used and maintained in the long-term. Using qualitative methods, this project aims to address this gap. Initially, a literature review was compiled to provide theoretical and contextual grounding for the study. Then, bid documents for each mega-event since 2000 (including Men's FIFA World Cups and Olympic Games) were collected and reviewed for bid promises related to AT infrastructure (n = 19). A second data collection included documents, artifacts (e.g. city maps), and local news articles on each set of promised infrastructure projects. These were thematically analyzed to address the research question of this project: "Are sport mega-events successful in delivering sustainable AT infrastructure projects for host regions?" The systematic literature review revealed that there is very little literature concerning AT infrastructure legacy from sport mega-events. The findings of the thematic analysis show that among the last 19 mega-events, six included promises for new or upgraded AT infrastructure. Among the cities which promised AT infrastructure, only two delivered the project fully, while two delivered projects partially, leaving two with none at all. Implications for city planners, event hosts, and sport properties are discussed.

SESSION B-II: Skeletal Muscle Health & Physical Activity
Time: 10:55 a.m.
Location: BN304

Investigating how ovariectomy influences the repeated bout effect and heat shock protein expression

Presenter: Anchal Badwal
Faculty Advisor: Dr. Marius Locke
University of Toronto

Lengthening (eccentric) muscle contractions (LCs) occur when the load applied to a muscle exceeds the force produced by the muscle. In view of this, LCs often result in skeletal muscle damage and loss of force. However, when a few preconditioning LCs are provided prior to, a more damaging bout of LCs, a phenomenon known as the repeated bout effect (RBE) occurs resulting in less skeletal muscle damage and less loss of force. In females, ovarian hormones, particularly estrogen, have been shown to protect skeletal muscle and possibly regulate the expression of alpha-beta crystallin. The purpose of this study was to assess how ovariectomy and the subsequent loss of estrogen affected the RBE and alpha-beta crystallin content. Tibialis anterior (TA) muscles from ovariectomized (OVX) and ovary-intact (OVI/control) animals were subjected to preconditioning of either 0 or 15LCs followed by 60 contractions (24 hours later). TA muscles from OVX animals demonstrated lower active, passive and peak torque production over the subsequent 60 LCs. Levels of alpha-beta crystallin in the TA muscles from OVX and OVI animals were quantified using western blots, and showed lower alpha-beta crystalline content in the TAs of OVX animals when compared to OVI TAs. In conclusion, ovariectomy and the subsequent loss of estrogen may play a role in muscle protection.

SESSION B-II: Skeletal Muscle Health & Physical Activity
Time: 11:10 a.m.
Location: BN304

Comparison of force loss between electrically stimulated and voluntary contractions in human dorsiflexors

Presenter: Raaj Dudani
Co-author(s): Alexander Zero
Faculty Advisor: Charles L. Rice, PhD
Western University

Introduction: During a sustained maximal voluntary contraction (MVC), a decline in motor unit firing rates (MUFRs) have been shown to accompany muscle fatigue; the loss in the ability to produce force. It has been suggested that this decline in MUFRs (~50% over 60s) serves to maintain force as muscle contractile properties are slowed with fatigue (i.e. 'muscle wisdom hypothesis'), whereas other studies suggest that reduced MUFRs are a cause of force loss. Purpose: This study aims to address the limitations of previous studies by assessing force loss under constant and declining rates of electrical stimulation mimicking those that occur during voluntary effort. Methods: The dorsiflexors of 20 young (ages 20-35y) males (n=10) and females (n=10) will undergo three contractile fatiguing conditions each separated by at least 72 hours; i) sustained MVC, ii) constant high-frequency electrical stimulation (40Hz) and iii) exponential decaying stimulation rate from 40 Hz to 20 Hz. Dorsiflexor torque responses will be recorded using a custom dynamometer and surface electromyography (sEMG) of the tibialis anterior will be used to evaluate muscle activity. Results: It is hypothesized that the condition in which MUFRs exponentially decrease, as found during voluntary high-intensity fatiguing contractions will result in less force loss than when the muscles are stimulated by constant frequencies of stimulation. Conclusion: This project will provide unique insights into how neural control adapts to changes in acute muscle contractile function in both male and female humans. Furthermore, these data will provide unique insights into whether reduced firing rates are causative or prevent force loss. Supported by NSERC.

SESSION B-II: Skeletal Muscle Health & Physical Activity
Time: 11:25 a.m.
Location: BN304

Does menstrual cycle phase affect lean mass and skeletal muscle mass measurements?

Presenter: Shivani Elango
Co-author(s): Alysha D'Souza, Derrick Van Every, Brandan Wilson
Faculty Advisor: Dr. Stuart Phillips
McMaster University

Dual x-ray absorptiometry (DXA) and bioelectrical impedance analysis (BIA) are widely used for assessing body composition in research. However, lean mass (LM) by DXA and skeletal muscle mass (SMM) by BIA can be influenced by body water levels, which have been thought to fluctuate throughout the menstrual cycle (MC). DXA indirectly measures LM, a sum of various soft-tissue organs and body water, while BIA estimates SMM based on body water values and uses an algorithm to estimate SMM. If body water varies between MC phases, controlling for MC phase may be necessary when assessing changes in DXA LM and BIA SMM in eumenorrheic individuals. PURPOSE: This study aimed to assess the effect of MC phase on DXA-measured LM and BIA-measured body water and SMM. METHODS: Eleven eumenorrheic females (mean age: 22±2.7 years) participated in this study. DXA and BIA scans were taken once during their early follicular phase (days 1-4 of their period) and again during their mid-luteal phase (7 days post positive ovulation test). Participants refrained from moderate to vigorous physical activity for 48 hours before their scheduled visit and arrived at the lab after a 12h fast from food and water. Upon arrival participants were asked to void their bladder and were given 500ml of water to ingest. A two-tailed paired t-test assessed differences in LM, SMM and body water between MC phases. RESULTS: No significant differences between the two phases were found for DXA LM or BIA measures of body water or SMM ($p>0.05$). CONCLUSION: MC phase does not affect DXA or BIA measures of LM and SMM, nor does it influence water retention. Our data show that controlling for MC phase is not necessary when assessing LM and/or SMM changes in eumenorrheic individuals.

SESSION B-II: Skeletal Muscle Health & Physical Activity
Time: 11:40 a.m.
Location: BN304

Predicting skeletal muscle adaptations following single-leg immobilization and recovery

Presenter: Dominique Greyvenstein
Co-author(s): Brad S. Currier, James McKendry, Changhyun Lim, Caroline V. Lowisz, Stuart M. Phillips
Faculty Advisor: Dr. Stuart Phillips
McMaster University

Introduction: Skeletal muscle is essential for human movement and overall health. Skeletal muscle atrophies rapidly during disuse and unloading, leading to numerous adverse health consequences. Evidence shows baseline muscle size is unrelated to the atrophy observed during muscle disuse. However, other factors that might impact adaptations to disuse and recovery remain unknown. We sought to determine phenotypic factors that predict changes in muscle mass, strength, and quality following single-leg immobilization and recovery. Methods: Healthy young men (n = 8) underwent two weeks of single-leg immobilization during which one leg (random balanced assignment based on leg dominance) was fitted with a knee brace to maintain 60 degrees of knee flexion and toe clearance in the swing phase while ambulating with crutches. The immobilization phase was followed by one week of passive recovery, which included the removal of the brace but no structured rehabilitation. All participants were provided with a standardized diet to maintain energy balance and adequate dietary protein for the entire study. Body composition was assessed at baseline via dual-energy x-ray absorptiometry. At baseline, post-immobilization, and post-recovery, quadriceps cross-sectional area and volume were measured with magnetic resonance imaging, and muscle strength was measured with maximal voluntary contractions on an isometric dynamometer. Physical activity was measured before, during, and during recovery from immobilization via a wrist-worn accelerometer. One-way repeated measures analysis of variance was used to determine differences between timepoints, and linear regression was performed to determine factors predicting muscle mass, strength, and quality with immobilization and recovery. Statistical analyses were performed with R (V.4.3.2). Results/Conclusion: Data analysis is ongoing, and the results will be presented at the conference.

SESSION B-II: Skeletal Muscle Health & Physical Activity
Time: 11:55 a.m.
Location: BN304

The effects of skeletal muscle AMPK on exercise-induced skeletal muscle and neuromuscular adaptations

Presenter: Ricky Hong
Co-author(s): Andrew I Mikhail, Sean Y Ng, Stephanie R Mattina, Vladimir Ljubicic
Faculty Advisor: Vladimir Ljubicic, PhD
McMaster University

Introduction: AMP-activated protein kinase (AMPK) is a key exercise molecule involved in the detection and subsequent response to energy demanding stimuli such as physical activity. However, its importance in skeletal muscle phenotype and adaptation following exercise training remains to be fully elucidated. Previous literature employs the use of transgenic gestational AMPK knockouts resulting in severe exercise intolerance. As such the purpose is to investigate changes in exercise-induced adaptations in an inducible model of skeletal muscle specific AMPK deletion. Methods: At 16 weeks of age, wild-type (WT) and inducible skeletal muscle specific B1B2 AMPK knockout (imKO) mice were orally gavaged with Tamoxifen for 5 consecutive days. Twelve weeks post tamoxifen, WT and imKO mice (n = 12) were randomly allocated into an exercise or sedentary group. The training intervention consisted of 5 days per week of progressive treadmill training for a total of 6-weeks. Following the intervention, functional testing was performed and skeletal muscles were collected for downstream processing. Results: WT mice outperformed ($p<0.05$) imKO mice in exercise capacity and skeletal muscle endurance as indicated by cage hang test. Exercise augmented ($p<0.05$) overall muscular function regardless of genotype. Our preliminary data demonstrated no significant differences in fiber type composition of the tibialis anterior between all groups. In the soleus muscle, we observed a significant reduction in the abundance of glycolytic myosin heavy chain IIX and IIB fibers in exercised WT animals only. Conclusion: This study provides evidence for AMPK's role in the improvements observed for some functional parameters, and compositional change to a further oxidative phenotype in the soleus muscle. However, also indicating the occurrence of exercise adaptations independent of AMPK activity.

SESSION B-III: Skeletal Muscle Health & Physical Activity
Time: 1:10 p.m.
Location: BN304

Investigating the role of AMPK in Muscle Regeneration

Presenter: Cora Jornacion
Co-author(s): Stephanie Mattina and Andrew Mikhail
Faculty Advisor: Vladimir Ljubicic, PhD
McMaster University

Background: Muscle regeneration is a coordinated and intricate process that is essential for restoring tissue homeostasis following injury or disease. Skeletal muscle has the remarkable capacity to regenerate and adapt to support critical functions of the human body. Adenosine monophosphate-activated protein kinase (AMPK) is an important energy sensing-molecule that plays a key role in regulating skeletal muscle quality. Furthermore, AMPK is a valuable therapeutic target for many neuromuscular disorders such as Duchenne muscular dystrophy. The presence of AMPK in supporting non-muscle cells serve the function of inducing satellite cell proliferation and facilitating macrophage skewing in response to muscle injury. However, the role of skeletal muscle-specific AMPK during muscle regeneration requires further investigation. The purpose of this study is to assess the role of AMPK in the muscle's regenerative response following acute injury. Methods: Using wild-type (WT) and AMPK skeletal muscle-specific knockout (mKO) mice, cardiotoxin was injected in the tibialis anterior muscle, and tissues were collected at 7- and 28-days post-injury (DPI), as well as in the uninjured contralateral leg. A Picrosirius Red stain was used to investigate fibrosis. Results: A main effect of injury was identified between uninjured, 7-, and 28-DPI ($p < 0.05$), however no significant differences in fibrosis were observed between groups ($n = 3$). The results also showed that fibrotic infiltration was similar - between WT and mKO animals. Summary: Although analysis is ongoing, these preliminary findings suggest that skeletal muscle AMPK may not be required for successful muscle regeneration. Future directions for this study include increasing the sample size, measuring cross-sectional area, centrally located nuclei, and gene expression of fibrotic markers. In conclusion, this study strives to expand our understanding of the role of AMPK during muscle repair research in anticipation of further enhancing muscle regeneration therapeutics.

SESSION B-III: Skeletal Muscle Health & Physical Activity
Time: 1:25 p.m.
Location: BN304

Does gonadectomy in male rats influence HSP content and the repeated bout effect?

Presenter: Noah Kazdan
Faculty Advisor: Dr. Marius Locke
University of Toronto

The repeated bout effect (RBE) is a phenomenon whereby reduced skeletal muscle damage and less torque decline are observed in muscles that are preconditioned (PC) with a few lengthening contractions (LCs), prior to a subsequent more damaging bout of LC. When subjected to a few LCs such as those used during PC, the purportedly protective HSP content is upregulated. Since testosterone influences skeletal muscle mass and possibly HSP content, it may be mechanistically involved with the RBE. To assess the relationship between low testosterone, the RBE and HSPs, male Sprague-Dawley rats underwent surgical gonadectomy (n=15). In both testosterone-reduced (T-) and control groups (n=15), tibialis anterior (TA) muscles were preconditioned with either 0 or 15 LCs (n=5 per group) by electrical stimulation, and subjected to 60LC 48 hours later. All T- TA muscles showed a greater protection of total torque throughout the subsequent 60 LC ($p<0.0001$) compared to controls; however, T- TA muscles showed no protection of active torque throughout the subsequent 60 LC. HSP25 and HSP72 content were significantly increased in all TA muscles subjected to LC when compared to unstimulated contralateral TA muscles, but there were no significant differences between T- and controls, or between TA muscles with or without PC. Morphologically, muscle damage was visually similar between T- TA muscles and controls, as well as between preconditioned and non-preconditioned TA muscles following 60 LC. In conclusion, gonadectomy and the reduction in testosterone may influence total skeletal muscle torque and possibly the RBE.

SESSION B-III: Skeletal Muscle Health & Physical Activity
Time: 1:40 p.m.
Location: BN304

Androgenic Anabolic Steroid Use for Exercise Enhancement Purposes: Review of the Effects on Muscle Growth, Strength and Body Composition

Presenter: Darya Lajevardi
Co-author(s): Amirhossein Mohseni
Faculty Advisor: Mazen Hamadeh, PhD
York University

The utilization of anabolic-androgenic steroids (AAS) by athletes for physical and performance enhancement has been widely documented. Yet, the full scope of these effects and their associated risks remains underexplored. Recent decades have witnessed AAS usage expanding from competitive athlete populations to casual exercisers, driven by the desire to augment muscle size and body composition. Our research created an updated literature review on the impact of testosterone AAS supplementation on athletic performance parameters. These efforts aimed to expand upon earlier studies' findings and highlight current literature gaps. Relevant studies were identified through comprehensive searches in databases including PubMed, CINAHL, SPORTDiscus, and PsycINFO, focusing on outcomes such as muscular strength, body composition, and cardiovascular endurance. AAS elicits a wide range of physiological effects, with beneficial and adverse implications via the activation of non-genomic and genomic pathways. This activation triggers a cascade of biochemical events characterized by variable onset times, ranging from minutes to days and durations extending from days to months. Thus delineating the multifaceted and diverse influence of AAS on physiological systems. Among healthy, physically active adults, the use of AAS is linked to slight absolute improvements in muscle strength and moderate enhancements in lean body mass. However, the clarity and thoroughness in reporting adverse effects were inconsistent. Most studies conducted were short-term, with dosages examined not being reliable indicators of AAS use by athletes. Future research should focus on determining which AAS derivate has the best rewards-to-risk ratio. Given the ethical and legal implications of uncovering these derivatives, we suggest future research to investigate the effects of selective androgen receptor modulators (SARMs) on the same athletic performance outcomes. Understanding the fundamental processes by which SARMs influence athletic performance could offer an alternative supplement to AAS, mitigating adverse side effects while facilitating muscle improvement.

SESSION B-III: Skeletal Muscle Health & Physical Activity
Time: 1:55 p.m.
Location: BN304

Neuromuscular Compartmentalization of Anconeus: A 3D Study of Innervation Patterns of a Neglected Muscle

Presenter: Jocelynn McGee
Co-author(s): Catherine E. Amara & Anne M. R. Agur
Faculty Advisor: Catherine Amara, PhD and Anne Agur, PhD
University of Toronto

INTRODUCTION: Studies of innervation of anconeus (AN) have been based on 2D analyses using photographs/manual measurements. Previous studies consist of serial dissection which only enables viewing in one plane at a time. There are currently no 3D studies of AN innervation that take into consideration the entire muscle volume. The purpose was to dissect, digitize and model in 3D the intramuscular innervation of AN to assess neuromuscular compartmentalization and propose functional implications of the findings. METHODS: The nerves innervating AN were traced, digitized, and modelled in 3D in 8 specimens (mean age 81+-12 years) to determine the innervation patterns of the 3 parts of AN, proximal (P), distal (Di), and deep (Dp). The course of the nerves and innervation patterns were determined, and a frequency map was constructed. Based on the 3D models, dissection photographs, and frequency map, functional implications were proposed. RESULTS: The 3D models, of the intramuscular innervation provided more comprehensive knowledge than previously possible. The nerve to anconeus (NtoA) entered and coursed between P and Dp parts providing muscular branches. The Di part had 2 patterns of innervation: 1) NtoA bifurcated into medial and lateral branches that coursed in the same plane, supplying the respective halves, or 2) NtoA bifurcated into superficial and deep branches that coursed anteriorly and posteriorly in the muscle belly. These branches gave off small muscular branches throughout their course. CONCLUSION: The P and Dp parts form one neuromuscular compartment innervated by the NtoA. A second neuromuscular compartment is formed by Di part, innervated by distinct branches of the NtoA. This suggests that the P and Dp parts are activated together, and the partitioned Di part could have distinct functional implications. The results of this study enable the development of specific in vivo ultrasound protocols to study the function of each neuromuscular partition.

SESSION B-III: Skeletal Muscle Health & Physical Activity
Time: 2:10 p.m.
Location: BN304

Dynamics of the local skeletal muscle oxygen environment pre, during and post high-intensity interval cycling in healthy individuals

Presenter: Nino Nikolovski

Co-author(s): Adam N. Di Salvo, Stephanie Estafanos, Celine Bailleul, Jenna B. Gillen, and Robert F. Bentley

Faculty Advisor: Dr. Robert Bentley

University of Toronto

Background: The microvasculature plays an important role in skeletal muscle oxygen saturation (SmO_2) during exercise. High-intensity interval exercise (HIIE) is a potent training stimulus; however, evidence characterizing local muscle oxygenation during HIIE in relation to basal microvascular function is limited. Purpose: This study aims to examine the local skeletal muscle oxygen environment before, during, and post-HIIE. Methods: Eight participants (24±3 years, 25% female) completed microvascular assessments at rest (MA1), immediately after (MA2), and two-hours post (MA3) cycle ergometer HIIE (12, one-minute intervals at 85% peak power interspersed with one-minute recoveries at 20% peak power). SmO_2 was assessed at the vastus lateralis using near-infrared spectroscopy (Moxy Monitor). Deoxygenation and reoxygenation during MAs and intervals 1, 6, and 11 were fit with linear and mono-exponential models respectively. Time constants (tau, τ) pertaining to 37% of total change for deoxygenation and 63% of total change for reoxygenation were identified. SmO_2 area under the curve (AUC) following microvascular assessments were computed. Results: Data are mean±SD or median, Q1-Q3. Microvascular function was impaired immediately after HIIE compared to rest (AUC; 52, 3-122 vs. 241, 145-575 %·s, p=0.025). While the SmO_2 nadir did not differ between interval 1 and 11 (-43±11 vs. -48±10 %, p=0.488), interval 11 had a greater deoxygenation τ (7±2 vs. 5±2 s, p=0.041). Peak reoxygenation was attenuated at interval 11 (-1, -23-6 vs. -16, -33to-1 %, p=0.015), yet the reoxygenation τ was not different (16, 14-24 vs. 23, 11-25 s, p=0.600). There was no correlation between MA1 resaturation rate and deoxygenation τ (p>0.05), or reoxygenation τ (p>0.05). Conclusion: Microvascular function is impaired following HIIE. Preliminary results reveal no relationship between basal microvascular function and either deoxygenation or reoxygenation during HIIE. This data elucidates the local skeletal muscle oxygen dynamics of HIIE and the effects of HIIE on acute microvascular function.

SESSION B-IV: Skeletal Muscle Health & Physical Activity
Time: 2:35 p.m.
Location: BN304

Deletion of skeletal muscle AMPK exacerbates cancer cachexia.

Presenter: Saumyaa Rishi
Co-author(s): Andrew I Mikhail, Rozhin Raziee, Magda Lesinski
Faculty Advisor: Dr. Vladimir Ljubicic
McMaster University

Background: Cancer-induced cachexia is characterized by accelerated weight loss primarily through skeletal muscle atrophy. Clinical prognosis of cancer patients is heavily influenced by the cachectic phenotype as those presenting with significant skeletal muscle loss experience greater rates of mortality. Adenosine-monophosphate activated protein kinase (AMPK) is an energy sensing kinase that modulates skeletal muscle protein synthesis and degradation. Recent work suggests that AMPK signaling is perturbed in cachectic individuals. However, the functional and mechanistic role of the kinase in preserving skeletal muscle mass during cachexia remains to be fully elucidated. Thus, the purpose of this study was to investigate the effect of AMPK on cancer-induced skeletal muscle atrophy. Methods: Eight-week-old WT and skeletal muscle-specific AMPK knockout (mKO) mice were injected with Lewis Lung Carcinoma (LLC) cells or saline (PBS) solution. Skeletal muscle samples were collected 4 weeks post-inoculation to assess changes in fiber type composition, cross-sectional area, and fibrosis using immunofluorescence and histochemical staining. Additionally, we examined mitochondrial function through high-resolution respirometry. Results: WT and mKO tumour-bearing mice had a significantly lower extensor digitorum longus (EDL) muscle weight compared to healthy controls. Moreover, the mKO-LLC group exhibited a further reduction ($p<0.05$) in EDL weight compared to WT-LLC. Additionally, there was a significant reduction in fiber cross-sectional area in the mKO-LLC group compared to the WT-LLC group. We observed no significant fiber type change in the EDL. In the quadriceps, both mKO and LLC groups displayed reduced Complex I and Complex I+II oxidative phosphorylation rates compared to WT-PBS, with further reduction in mKO-LLC versus mKO-PBS ($p<0.05$). Increased muscle collagen deposits were evident in mKO compared to WT in the EDL ($p<0.05$). Conclusion: Collectively, this data indicates reduced muscle mass preservation and poor tissue quality with AMPK loss. This opens future avenues of research into AMPK targeted therapeutics for cancer cachexia.

SESSION B-IV: Skeletal Muscle Health & Physical Activity
Time: 2:50 p.m.
Location: BN304

Investigating the effects of exercise on neuromuscular morphology in the D2.mdx model of Duchenne Muscular Dystrophy

Presenter: Makayla Roberts
Co-author(s): Stephanie Mattina, Sean Ng, Andrew Mikhail, Dr. Vladimir Ljubicic
Faculty Advisor: Dr. Vladimir Ljubicic
McMaster University

Background: Duchenne muscular dystrophy (DMD) is a life-limiting neuromuscular disease that negatively affects the structure and function of the neuromuscular junction (NMJ). Dystrophic muscle is characterized by denervation, elevated endplate diameter, and elevated post-synaptic acetylcholine receptor (AChR) clustering. Volitional exercise can attenuate the age-related decline in NMJ morphology, however, the therapeutic effect of exercise at the NMJ in the dystrophic condition remains unknown. The purpose of this study is to examine whether voluntary wheel running (VWR) alters the morphology of the NMJ in a pre-clinical model of DMD. Methods: Seven-week-old D2.mdx animals were randomized into a sedentary (D2.mdx SED) or exercise (D2.mdx VWR) condition for 10 weeks, while DBA mice served as sedentary, wild-type controls (WT SED). The D2.mdx VWR animals were further separated using the median running distance into low (D2.mdx Low VWR) and high volume (D2.mdx High VWR) groups). Following the intervention, the epitrochleoanconeus (ETA) muscle was dissected and stained for pre- and postsynaptic structures. Confocal microscopy was employed to image 20 - 40 NMJs per sample, and the number of AChR clusters were quantified. Results: Our preliminary results demonstrate that that D2.mdx animals exhibited significantly more AChR clustering compared to WT SED mice ($p < 0.05$), however, no differences were observed between D2.mdx groups ($n = 3$). Summary: 10 weeks of chronic, volitional exercise may not influence post-synaptic NMJ morphology in the D2.mdx model of DMD.

SESSION B-IV: Skeletal Muscle Health & Physical Activity
Time: 3:05 p.m.
Location: BN304

Hepatic Glycogen Metabolism in Resistance Trained Female Rats with Type 1 Diabetes

Presenter: Theres Tijo
Co-author(s): Mitchell Sammut, Alyssa Honkoop, Stephanie Rizza, Jamie Melling
Faculty Advisor: Dr. Jamie Melling
Western University

Introduction: Individuals with Type 1 Diabetes Mellitus (T1DM) have lower hepatic glycogen stores, thereby increasing their risk of hypoglycemia during exercise. Previous research has shown that resistance exercise training (RT) increases hepatic glycogen stores in rats. However, female rats have not been studied. Therefore, the purpose of this study was to determine whether RT alters hepatic glycogen stores in female rats with T1DM. Methods: Forty female Sprague-Dawley rats were randomly assigned to one of four groups: Control sedentary (CS, n=10), control resistance trained (CT, n=10), T1DM sedentary (DS, n=10), or T1DM resistance trained (DT, n=10). T1DM was induced by low-dose Streptozotocin injections (20 mg/kg each day for seven consecutive days). Blood glucose levels were maintained in the normal range (4-9 mmol/L) with intensive insulin therapy (one implanted insulin pellet; 2IU/day). CT and DT underwent progressively overloaded vertical weighted ladder climbing 5 days/week for six weeks. Following the six weeks, intravenous glucose tolerance tests (IVGTT) were conducted on all animals. Animals were sacrificed and tissues were harvested afterwards. Results: DS and DT animals stored greater glycogen in the liver and exhibited a greater hepatic p-Akt:Akt ratio following the IVGTT compared to CS and CT ($p<0.05$). RT did not appear to improve blood glucose response to exercise as post-exercise blood glucose was lower in DT compared to CT but did not reach hypoglycemic levels ($p<0.05$). Conclusion: These results indicate that female rats with T1DM can store greater hepatic glycogen after receiving a bolus of glucose potentially through increased insulin signalling. This suggests that low hepatic glycogen storage in female rats with T1DM is not due to a lack of insulin sensitivity in the liver or activation of enzymes involved in hepatic glucose uptake.

SESSION B-IV: Skeletal Muscle Health & Physical Activity
Time: 3:20 p.m.
Location: BN304

The Effects of Electrical Pulse Stimulation and Branched Chain Amino Acids on Human Skeletal Muscle Primary Myoblasts

Presenter: Meenadshi Varanan

Co-author(s): Dr. James McKendry, Linda May, and Dr. Stuart Phillips

Faculty Advisor: Stuart Phillips, PhD and James McKendry, PhD

McMaster University

Skeletal muscle plays a significant role in physical mobility and resilience. Age-related declines in muscle mass (sarcopenia) can affect the body's ability to respond to illness and stress. Anabolic resistance describes a scenario where muscle protein synthesis does not increase to the same extent in older versus younger individuals in response to normal anabolic stimuli such as exercise and feeding. While we understand age-related sarcopenia sufficiently, several underpinning mechanisms remain unknown. The benefits of exercise as a therapeutic agent are well known in humans, but the use of electrical pulse stimulation (EPS) in cell culture models allows us to examine the biochemical and molecular mechanisms that underpin adaptation more closely. The purpose of our study was to investigate the effects of EPS in younger and older muscle cells. Human skeletal muscle primary myoblasts obtained from a young (28 y) and older (56 y) donor were stimulated in Earle's Balanced Salt Solution at 25Hz, 10V, 2ms with 1s rest between each contraction for 12h with and without the presence of branched-chain amino acids (BCAA). We sought to interrogate the acute mTORC1 pathway signalling response to "exercise" and "feeding". Our results indicate that EPS and BCAAs alone are insufficient to increase the phosphorylation of rPS6; however, when combined, rPS6 phosphorylation was robustly increased. Phosphorylation status of other proteins (mTORC1, 4eBP1, AMPK) in the mTORC1 pathway remained unchanged. The results for the stimulation of old cells are pending; however, we hypothesize that the older cells will display impairments in the muscle protein synthetic signalling cascades compared to the younger cells, replicating in vivo studies. Studying the metabolic mechanisms between differently aged muscle cells and how exercise improves these consequences, can help to gain a better understanding of anabolic resistance. Our research findings will enhance our understanding of the mechanisms behind age-related anabolic resistance.

SESSION B-IV: Skeletal Muscle Health & Physical Activity
Time: 3:35 p.m.
Location: BN304

The temporal effects of intramuscular temperature and post-exercise cold-water immersion on human skeletal muscle function

Presenter: Rohin Malekzadeh
Co-author(s): Andrew J. Richards, Alireza Vaziri
Faculty Advisor: Dr. Arthur J. Cheng
York University

Cold water immersion (CWI) is a post-exercise intervention that has become widely popular due to its proposed benefits on improving the recovery of exercise performance. This modality is assumed to be effective in improving post-exercise skeletal muscle recovery with some studies alluding to benefits while others associating negative effects. One potential explanation for the discrepancies in the literature on the effectiveness of CWI as a recovery modality may be due to inconsistencies in the duration of CWI employed, which will have implications on the intramuscular temperature and its effects on muscle contractile function. The aim of this study was to identify if a given reduction in intramuscular temperature with prolonged CWI was associated with changes in sarcolemmal membrane excitability, as well as muscle strength and power generation in humans. Another aim of this study was to replicate post-exercise CWI and to determine whether increasing intramuscular heat generation with active or passive heating are sufficient to attenuate cooling-dependent impairments in skeletal muscle function with post-exercise cold-water immersion. Participants partook in a randomized cross-over design in three separate visits consisting of 1) 1h CWI at 10°C without exercise, 2) 1h CWI at 10°C following non-fatiguing dorsiflexion exercise, and 3) 1h CWI at 10°C following passive pre-heating of the dorsiflexors. It was hypothesized that acute CWI (<30 min) will not affect skeletal muscle function due to limited reductions in intramuscular temperature whereas prolonged CWI (>30min) will impair skeletal muscle function by drastically reducing intramuscular temperature and thus impairing muscle contractility. It was also hypothesized that active or passive heating the muscle will attenuate the effects of post-exercise CWI on impairing skeletal muscle function. Our preliminary results showed that compound muscle action potential as a measure of skeletal muscle function is impaired over the course of CWI and is minimized with pre intramuscular heating.

SESSION C-I: Neurophysiology and Sensorimotor Learning
Time: 9:15 a.m.
Location: BN307

Optimising a machine learning model to automate the assessment of lower extremity motor function with a circle tracing task.

Presenter: Abed A. Hijleh
Co-author(s): Igor Serafini, Sophie Hawthorne, Gerome Manson
Faculty Advisor: Gerome Manson, PhD
Queen's University

A comprehensive lower extremity motor function test is essential for quantifying performance and measuring improvements in individuals with lower limb motor dysfunction, as existing tests such as LEMOCOT often lack the resolution to assess functional deficits and track progress, prompting exploration into alternative techniques such as utilizing motion capture systems to measure performance in tracing tasks. However, these systems are expensive, cumbersome, and lack the portability to be used in a clinical setting as they're intended. The purpose of this project was to utilise machine learning to develop a model that can be used to assess lower extremity target tracing by only using a single video camera. To assess the feasibility of this model in a clinical setting, two tests were completed: an RMSE comparison test and a generalizability test. The RMSE comparison test had individuals complete a circle tracing task normally and without vision, to create variation in RMSE scores, while recording with a cellphone and a lab-based motion tracking system. A generalizability test was completed to assess the model's ability to continuously track a given point, specifically the tip of the shoe's midsole, across a variety of lighting conditions, angles, and different shoes. The RMSE comparison test showed that the machine learning model was successfully able to characterize variations in performance alongside the lab-based system. The generalizability test showed that this model was also able to continuously track the tip of the midsole in a variety of conditions without any additional training. These results provide evidence that machine learning models can be used to accurately track motion across a variety of conditions to assess lower extremity motor function, facilitating their use case in a clinical environment.

SESSION C-I: Neurophysiology and Sensorimotor Learning
Time: 9:30 a.m.
Location: BN307

Investigating the Role of Visual and Kinesthetic Information in Recognition Memory

Presenter: Obaida Al-Naib

Co-author(s): Anisa Hassan, Jeffery Wammes, Mathew Pan

Faculty Advisor: Dr. Gerome Manson

Queen's University

When trying to memorize unfamiliar text, individuals can employ a variety of strategies. Previous studies have found that strategies that have a motor component such as handwriting or drawing lead to better recall and recognition performance as compared to passive strategies. One hypothesis is that the visual information (e.g., the trajectory or trace) produced by the active movement provides additional spatial information that facilitates memorization. The goal of the present study was to examine if providing this additional visual information, without the active movement, is sufficient to improve the memorization and recognition of unfamiliar words. Participants first completed a pre-test where they memorized a list of 8 unfamiliar words (written in Kanji). After memorization, participants were presented with a quiz where they had to recognize the correct word out of 3 words. Based on their relative performance participants were assigned to one of 3 experimental groups: 1) Static group; 2) Dynamic group; 3) Active group. In all groups, participants memorized a list of 8 Arabic words. In the Static group, the words were presented as images. In the Dynamic group, the images were animated so the visual trace replicated the handwriting of the Arabic word. Finally, in the Active group, participants were shown the dynamic trace and then actively wrote the Arabic word. After memorization, participants underwent a post-test which was the same format as the pre-test but used Arabic words. Our initial results suggest that both Dynamic and Active Groups recognized more Arabic words than the Static group. These findings suggest that providing the visual trace is sufficient to improve recognition of unfamiliar words.

SESSION C-I: Neurophysiology and Sensorimotor Learning
Time: 9:45 a.m.
Location: BN307

"I can finish that!": Perceived ability to hold water in the mouth is influenced by experience

Presenter: Cassie Chan

Co-author(s): Luc Tremblay, April Karlinsky, Merryn Constable, Catherine Sabiston, Tim Welsh

Faculty Advisor: Tim Welsh, PhD

University of Toronto

People make many perceptual estimates about other objects to determine their abilities to act on those objects. For example, when looking at sets of stairs, actors examine the height and depth of the stairs to determine if they can climb them taking 1 or 2 steps at a time. The current literature indicates that, when visual information is available to individuals about their body/limb, individuals can accurately estimate their own ability to act. It is unknown if individuals can perceive the ability to act when relevant body dimensions are not visible. The present study investigated people's abilities to estimate how much water they can fit in their mouth. Participants (N=20) completed two perceptual estimation tasks and an actual assessment of the volume of their mouth. The estimation tasks involved participants: 1) pointing to 1 of 9 glasses with different amounts of water to indicate the largest volume of water they believed they could hold in their mouth, and 2) pouring the largest volume of water into a glass that they believed they could hold in their mouth. In the assessment task, a measurement was taken of the actual maximum amount of water that could be fit into the mouth. To assess the influence of experience, the estimation tasks were completed before and after the assessment task. Findings indicate that estimations from the pointing task were more consistent with actual volume than estimations from the pouring task. Further, experience enhanced estimations with estimations in the pouring task better aligning with the actual volumes after completing the assessment task. Future research will investigate the influences of factors such as hunger, thirst, and fatigue on estimations of how much water one can hold in their mouth because the physiological state of the perceiver has been shown to influence perceptual estimates.

SESSION C-I: Neurophysiology and Sensorimotor Learning
Time: 10:00 a.m.
Location: BN307

A Comparative Examination of the Neuromuscular Physiology behind Motor Parasomnias

Presenter: Maya Chawla
Faculty Advisor: N/A (final term project)
Western University

Motor parasomnias are a physiologically diverse category of sleep disturbances characterized by abnormal involuntary skeletal muscle activity. The "activation-arousal" scheme of reciprocally inhibitory cortical and subcortical networks responsible for wakefulness, NREM and REM sleep (Liu and Dan, 2019) illustrates the interdependency of sleep promotion and movement inhibition. During the transition from wakefulness to NREM stage 1 sleep (N1), misfiring of the reticular activating system causes hypnic jerks, cursory whole-body muscle contractions propagating in a pattern analogous to the infant startle reflex which result in awakenings accompanied by panic and sensations of falling. Restless leg syndrome (RLS), another N1 parasomnia caused by a cerebral iron-deficiency induced nocturnal dopamine deficit produces pain and dysesthesias in the legs which cause forceful, erratic leg contractions that significantly interrupt sleep. Periodic limb movements during sleep (PLMs) occur in later stages of NREM and are attributed to abnormal hyperexcitability of spinal flexor reflex pathways; normal transient increases in sympathetic nervous system activity during sleep elicit a stereotyped lower extremity movement sequence resemblant of a nociceptive flexor withdrawal reflex due to accessory propagation of excitatory activity between L3-S1. Abnormal disinhibition of the lower brainstem nuclei responsible for skeletal muscle atonia in REM sleep leads to REM sleep behaviour disorder (RBD), in which individuals enact their dreams. The voluntary, goal-directed movements indicate disinhibition of cortical movement planning areas, and abnormal perfusion of the supplementary motor area (SMA) is seen. Degeneration of the substantia nigra and reduced expression of striatal D2 receptors are also related to RBD prevalence, and RBD is becoming increasingly recognized as a potential prodrome of Parkinson's disease. Continuing to elucidate the neuromuscular mechanisms behind motor parasomnias holds great promise to improve the quality of sleep for those affected and at risk and inform the navigation of ethical, and legal issues related to sleep movement disorders.

SESSION C-I: Neurophysiology and Sensorimotor Learning
Time: 10:15 a.m.
Location: BN307

Does listening to an auditory stimulus help you learn motor skills?

Presenter: Nicole Chong
Co-author(s): Anthonia Aina
Faculty Advisor: Joyce Chen, PhD
University of Toronto

The ability of the human motor system to adapt motor outputs based on sensory feedback, known as sensorimotor adaptation, is crucial for effective goal-directed motor performance in daily activities. Prior work showed that listening to pleasurable music enhances sensorimotor adaptation by elevating arousal and mood, known as the arousal and mood effect. While much literature has studied the benefits of music listening on cognitive performance, its potential role in improving motor adaptation performance is underexplored. This study aimed to investigate the impact of music listening on a visuomotor adaptation and de-adaptation task. Music listening was hypothesized to lead to a faster adaptation and a slower de-adaptation rate compared to silence. Sixty participants performed a visuomotor adaptation task. They were randomized to one of five different listening conditions: silence, favourite music before task, favourite music during task, audiobook during task, or neutral music during task. Participants moved a computer cursor to a target position, with the angular displacement between the target and cursor position measured as the directional error in each trial. We performed a one-way ANOVA. Results showed a significant difference in adaptation rate across the five groups [$F(4, 3931) = 19.52$, $p < 0.001$]. Post hoc tests revealed that participants adapted their movements at a faster rate when listening to their favourite music during task performance compared to participants who listened to silence ($t= 5.42$, $p < 0.001$), or participants who listened to their favourite music before task performance ($t =12.34$, $p < 0.001$). Participants who listened to neutral music or audiobooks also had faster adaptation rates compared to participants in the silence condition ($p < 0.001$). Together, these results suggest that listening to auditory stimuli during performance, whether it is music or audiobooks, improves a person's ability to adapt their movements in response to a visual cue.

SESSION C-I: Neurophysiology and Sensorimotor Learning
Time: 10:30 a.m.
Location: BN307

Altered Vision: The Effects of Vergence-Accommodation on a Manual Pointing Task in Virtual Reality

Presenter: Colin Thomas Dolynski
Co-author(s): Xiaoye Michael Wang
Faculty Advisor: Tim Welsh, PhD
University of Toronto

Virtual reality (VR) technology has shown extensive development in recent years due to its potential extensive capabilities. Improvements in data processing and image quality remain at the highest priority. One area for improvement, known as the Vergence-Accommodation conflict (VAC - the discrepancy between the eye's convergence angle on a target position and the accommodative distance) has yet to be resolved within VR head mounted displays (HMD). VAC leads to compression of perceived distances resulting in decreasing accuracy during movement and limiting the transfer from virtual practice to physical performance. The purpose of the present study was to understand the effect of VAC on distance perception using a manual pointing task in VR systems. A secondary purpose was to determine if a software adjustment to the presentation of the visual information can ameliorate any effects of VAC. It was hypothesized that the VAC may lead to inaccurate targeted movements, and the software adjustment would improve the accuracy. Participants completed a manual pointing task in a virtual setting with randomized target distances of 10, 20, and 30 cm. Trials were blocked into three visual modalities - without adjustment, attenuated adjustment, and full adjustment. Separate ANOVAs were conducted to determine if constant error (CE), variable error (VE), and movement time (MT) differed across conditions. Post hoc analysis revealed that CE in full adjustment were greater than that without adjustment. No significant effect was found regarding the interactions between visual conditions and target distance for VE and MT. The results of this experiment do not support the hypothesis that the software-based adjustment to the presentation of visual information could improve targeted movement accuracy in VR. These findings can be used to support further research resolving VAC in VR.

SESSION C-II: Neurophysiology and Sensorimotor Learning
Time: 10:55 a.m.
Location: BN307

Precision in Motion: Assessing Surgical Psychomotor Skill Acquisition through Virtual Reality Simulations

Presenter: meryem filiz

Co-author(s): Meryem Filiz, Mrs1,2*, Recai Yilmaz, MD1,2, Trisha Tee, BSc1, Ali M. Fazlollahi, BSc1, Puja Pachchigar, BSc1, Rolando Del Maestro, MD, PhD1,2

Faculty Advisor: Recai Yilmaz, MD, PhD

McMaster University

Introduction: The convergence of precision and skill in high-stakes environments is pivotal for both neurosurgical procedures and athletic performance. This study delves into the use of virtual reality (VR) surgical simulators to scrutinize psychomotor performance and surgical skill acquisition, reflecting on the parallels between the meticulous control required in neurosurgery and the precision in athletic training. By evaluating expert and trainee neurosurgeons' performances on simulated brain tumor resections at various depths, we aim to shed light on the nuanced nature of psychomotor learning. Methods: We analyzed the performance of 45 participants, spanning from medical students to expert neurosurgeons, during a VR-simulated subpial tumor resection task. The Intelligent Continuous Expertise Monitoring System (ICEMS) provided real-time metrics, including performance score, instrument tip separation, and risk assessments, which were then statistically analyzed using MATLAB for 3D modeling and IBM SPSS for regression analysis. Results: Our findings highlight a significant disparity in performance across different depth intervals, with expert neurosurgeons demonstrating consistent proficiency irrespective of the surgical depth-a testament to their refined psychomotor control. Contrastingly, performance variations among trainees underscore the steep learning curve associated with mastering surgical precision at increased depths, akin to the challenges athletes face when refining their skills for peak performance. Conclusion: The insights garnered from VR surgical simulators underscore the critical role of depth in psychomotor learning and surgical skill proficiency. This study not only enhances our understanding of surgical training dynamics but also invites a broader discussion on the importance of precision and control in both medical and athletic training domains. By drawing parallels between these fields, we emphasize the universal value of psychomotor performance enhancement and the potential cross-disciplinary applications of VR technology in training and skill development.

SESSION C-II: Neurophysiology and Sensorimotor Learning
Time: 11:10 a.m.
Location: BN307

Perception vs. Function: Assessing Lower-Limb Dominance Using Motor Coordination, Stability, and Power Tasks

Presenter: Sophie Hawthorne
Co-author(s): Sarvenaz Heirani Moghaddam, Sadiya Abdulrabba
Faculty Advisor: Dr. Gerome Manson
Queen's University

Handedness and eyedness are commonly used criteria in motor control to select participants. Both eye and hand dominance result in asymmetries that have been shown to affect motor behaviour and neurophysiological responses. Although similar scales exist for lower-limb dominance (e.g., footedness), it is unknown if such footedness scales relate to performance lower-limb coordination, stability, or power tasks. The primary objective of this research is to investigate the relationship between individuals' perceptions of lateralized lower-limb dominance and their performance on lower-limb motor control and power tasks. Six healthy participants (5 women) who have not experienced a lower limb injury in the past year participated in the study. Participants self-reported their footedness using the Waterloo Footedness Questionnaire - Revised. Participants' handedness was assessed using the Flinder's Handedness Survey, and eyedness was assessed using the Miles (1930) Eye Dominance Questionnaire. Participants performed three tasks with both their right and left leg: 1) circle drawing task (CDT) in seated and standing position; 2) single leg stance (SLS); and 3) a single leg jump (SLJ). Control and precision was quantified by computing the RMSE of the mobilizing leg in the CDT. Stability was assessed by measuring the COP variability in the medial-lateral and anterior-posterior direction for the stance leg in the CDT and the SLS. Vertical jump height was used to quantify performance in the SLJ. Task-specific measures were compared between limbs, and an asymmetry index was computed and used to compare to questionnaire measures. Overall, participants demonstrated no difference in performance across all lower-limb tasks. Furthermore, there were no significant relationships between task-based measures of asymmetry and footedness score. These results suggest that footedness questionnaires may exaggerate implied differences in performance between limbs. Further research on the behavioural and neurophysiological basis of footedness is needed to accurately quantify lower-limb dominance.

SESSION C-II: Neurophysiology and Sensorimotor Learning
Time: 11:25 a.m.
Location: BN307

Investigating the effects of handedness on ipsilateral motor cortical representations

Presenter: Mustaali Hussain
Co-author(s): Marc Cuizon
Faculty Advisor: Dr. Aimee Nelson
McMaster University

Descending motor control is regulated by the primary motor cortex (M1) both contralateral and ipsilateral to the moving limb. While handedness has been shown to influence contralateral M1 representation structure and activity, no study has investigated its impact on ipsilateral representations. Therefore, this study aimed to explore the influence handedness may have on the makeup and excitability of ipsilateral hand muscle M1 representations. Right- and left-handers received transcranial magnetic stimulation to the cortical area controlling the first dorsal interosseous (FDI) muscle. First, the motor threshold (%MSO) for FDI muscle activation was determined to quantify representation excitability. Next, motor-mapping was performed to image the area and center of gravity (CoG) of the FDI motor representation, with CoG representing the central point of motor representation. All measures were collected under resting and active conditions, the latter involving a submaximal FDI muscle contraction ipsilateral to the stimulated hemisphere. Differences in thresholds and motor-maps across conditions delineated ipsilateral M1 excitability and structural representation, respectively. Preliminary results show that in both right- and left-handers, the active condition induced the greatest decrease in motor threshold within the left hemisphere, with right-handers showing a greater decrease (-2.53±3.38 %MSO, p=0.01) than left-handers (-1.55±2.94 %MSO, p=0.11). In addition, during the active condition, both right- and left-handers also showed a greater increase in motor representation area within the left hemisphere, with right-handers showing a greater increase (130.41±195.42 mm2, p=0.05) than left-handers (95.34±128.17 mm2, p=0.05). Finally, CoG shifts from the active condition were most substantial within participants' dominant hemisphere (right-handers: anterior-lateral shift, left-handers: posterior-medial shift). Collectively, these findings suggest a left-hemispheric dominance in ipsilateral motor control that may be amplified by right-handedness, with handedness also potentially contributing to more distinct ipsilateral motor representations within the dominant M1. Our elucidation of ipsilateral motor pathways may further augment rehabilitative approaches for stroke recovery.

SESSION C-II: Neurophysiology and Sensorimotor Learning
Time: 11:40 a.m.
Location: BN307

The Interplay Between Intersensory Flexibility and Specificity of Practice

Presenter: Kal Kiswani
Co-author(s): Amin Mostofinejad, Fiona Magill, Sameeha Jafri
Faculty Advisor: Luc Tremblay, PhD
University of Toronto

Applying multiple senses when learning a skill can manifest across numerous in-vivo settings and may provide alternative mediums through which learning could occur. Conceptually, intersensory flexibility provides someone the ability to flexibly interchange between sensory modalities when performing a motor task, and while specificity of practice is nevertheless present, the ability to use and apply vision in proprioceptive contexts can be beneficial. The specificity of practice hypothesis suggests that if the primary source of afferent information used to optimize performance is removed then performance will decline. This study investigates the potential mitigation of the detrimental effect of practice specificity by inducing intersensory flexibility through alternating between visual and proprioceptive modalities when learning a task. The experiment is composed of four phases: calibration (for horizontal individuality), familiarization (5 trials for movement time bandwidth acquaintance), experimental (10 blocks of 10 trials), and retention (10 trials). Participants (n=18) will be equally and randomly assigned into one of three conditions and asked to perform an aiming task from a movement comparable to a bicep curl: no vision (NV), laser vision (LV), and mixed vision (MV), where MV alternates between the LV and NV conditions from block to block. The retention test will occur in NV. The goal of the task is to bring the arm to horizontal. Final arm angle and movement time augmented feedback will be provided during acquisition only. The accuracy of the aiming movement will be the main dependent measure. It is hypothesized that individuals in the NV group will have the best performance in the NV retention test, followed relatively closely by the MV group, with the LV group exhibiting the worst performance. Such results would indicate that the LV and NV conditions yield typical sensory specificity, whereas MV will help individuals avoid sensory specificity and instead develop intersensory flexibility.

SESSION C-II: Neurophysiology and Sensorimotor Learning
Time: 11:55 a.m.
Location: BN307

The Influence of Sport Type, Fitness Level, and Concussion History on Spatial Abilities and Executive Functions

Presenter: Adrienne Lee
Co-author(s): Dr. Yasaman Jabbari
Faculty Advisor: Dr. Jennifer Heisz
McMaster University

The present study examined the influence of sport type and fitness level on cognitive performance and explored how previous concussions can influence cognition. In this cross-sectional observational study, we recruited 19 strategic athletes, 8 static athletes, and 31 non-athlete controls. All participants were students at McMaster University, athletes were members of McMaster varsity sports teams, and non-athletes reported engaging in less than 150 minutes of moderate-to-vigorous aerobic activity. Anthropometric measures were taken to estimate aerobic fitness. Cognition was measured using the Mental Rotation Task with five degrees of rotation difficulty to assess spatial abilities, the Perspective-Taking and Spatial Orientation Test to assess egocentric spatial transformation, and the Flanker Test to assess executive functions. Both athlete groups were fitter than non-athletes, $F(2, 55) = 16.08$, $p < 0.05$, and strategic sport athletes (21%) had higher rates of concussion than either the static sport athletes (0%) or non-athletes (0%). We observed a significant interaction of group by 'rotation degree difficulty' for the mental rotation task such that the static athletes were more accurate than the non-athletes on the most difficult mental rotation condition, $F(2, 55) = 3.80$, $p < 0.05$. Although performance on the flanker task did not differ by group, it did differ by the participants' fitness such that higher fit participants made fewer errors than lower fit participants, $r(58) = -.30$, $p < 0.05$. Taken together, these preliminary findings suggest that athletes have better cognition than non-athletes, but certain sports may confer greater benefits.

SESSION C-III: Neurophysiology and Sensorimotor Learning
Time: 1:10 p.m.
Location: BN307

Transfer of Background Videogame Experience to Fine Motor Skill Performance

Presenter: Andrew Milner
Co-author(s): Maryam Hassanzahraee
Faculty Advisor: Joyce Chen, PhD
University of Toronto

There is much research on the topic of transfer of learning. However, one area that has been less studied is the role of expertise on transfer of learning. We investigated if experience playing video games transfers to other fine motor skills. We hypothesised that videogame experience only transfers to skills similar to the games practised, following Thorndike's Theory of Identical Elements. We recruited and tested nine right-handed, neurotypical, participants between 18 and 44 years old. Participants were either "expert" videogame players (as defined by playing ≥ an hour per day for the last 10 years) or had little to no videogame experience, "novice". Participants performed two tasks: a Point-and-Click task, similar to a videogame, and a Sequential Visuomotor Isometric Pinch Task (SVIPT). For the Point-and-Click task, participants used a computer mouse controlling a cursor in the middle of a computer screen and clicked on targets on the screen as quickly and accurately as possible. During the SVIPT, participants pinched a force transducer to control a cursor on the screen that moved between targets in a sequential order as quickly and accurately as possible. For both tasks, participants underwent acquisition testing (3 blocks of 10 trials) followed 24 hours later with a retention test (1 block of 10 trials). The dependent variables are "score" for the Point-and-Click task, and "skill" for the SVIPT task. Both variables incorporate speed and accuracy. Repeated measures ANOVA will be performed for each dependent variable with factors group (experts, novices) and blocks (4 levels). Visual examination of the data suggests that experts may have better "scores" than the novice group (Point-and-Click), but not "skill" (SVIPT). Data analyses are ongoing. These preliminary qualitative observations suggest that expertise is domain specific since experts may be better when they perform motor skills that are similar to video games.

SESSION C-III: Neurophysiology and Sensorimotor Learning
Time: 1:25 p.m.
Location: BN307

The Influence of Experience on the Sensory Contributions Needed for Piano Learning

Presenter: Kate Olivia Moses
Co-author(s): Liam Morassut, Sadiya Abdulrabba
Faculty Advisor: Dr. Gerome Manson
Queen's University

Sensory feedback - such as auditory and visual feedback - is important when learning to play a new musical instrument, such as the piano. Although the contribution of different sources of sensory information to the learning of piano sequences has been extensively studied in expert pianists, limited research has examined how sensory feedback use differs between experts and novice pianists. The purpose of our study was to investigate which sources of sensory information are important for piano sequence learning in individuals without previous piano learning experience (novice), compared to individuals with previous piano learning experience (experienced). Novice (N = 13, 8 females) and experienced (N= 6, 5 females) piano players performed piano sequences across three different sensory feedback conditions (audiovisual, auditory-only, visual-only). On day one, participants performed a pre-test, an acquisition period, and an immediate retention test. During the pre-test, participants performed three sequences at 120 BPM and received audiovisual feedback from the piano. During the acquisition trials participants practiced each sequence at both 60 BPM and 120 BPM. Each sequence was randomly assigned to a sensory feedback condition (i.e., audiovisual, visual-only, or auditory-only). Additionally, during the acquisition phase, participants were provided with feedback about their accuracy (i.e., correct, or incorrect) and sequence timing accuracy (i.e. inter-onset interval (IOI)). The immediate post-test test assessed retention by having participants perform each sequence at 120 BPM with audiovisual feedback from the piano. Participants then performed a 24-hour delayed retention test which was the same as the pre-test. Analysis of the data revealed that all participants (novice, experienced) significantly improved from the pre-test to the post- and retention tests. We found no significant differences in IOI or accuracy across the sensory conditions. These findings suggest that learning can occur even when audio or visual feedback is not available.

SESSION C-III: Neurophysiology and Sensorimotor Learning
Time: 1:40 p.m.
Location: BN307

The Voice you Know: Investigating the Cognitive Advantages of Familiarity

Presenter: Harsh Patel
Faculty Advisor: Dr. Manda Fischer
Western University

Hearing loss is accompanied by difficulty in understanding speech in noisy environments. Although a familiar voice is easier to understand than a novel voice, the mechanism underlying familiar-voice benefits is not well understood. Familiar voices may benefit speech understanding more in noisy environments because they are more efficient to process (i.e., less resource-intensive). Therefore, we will compare speech intelligibility for a familiar versus unfamiliar talker while varying cognitive load to determine if a familiar voice is more efficient to process. To measure speech intelligibility, participants (N = 40) will hear two sentences spoken concurrently by either a familiar and novel voice or by two novel voices (baseline condition) and report the content of one (the target) while ignoring the other (the masker). Simultaneously, participants will track the location of 0 (low load) or 4 (high load) moving dots. We expect word report accuracy to be higher for familiar target voices compared to when both voices are novel regardless of load (familiar voice benefit). If familiar voices are more efficient to process compared to novel voices, we expect that the negative effect of load on word report accuracy will be reduced when the target voice is familiar compared to when it is novel. In other words, a familiar voice may require fewer resources to process compared to a novel one, making it more resistant to the additional cognitive load imposed by the simultaneous tracking task. Together, these results will enhance our understanding of the mechanisms that afford familiar-voice benefits.

SESSION C-III: Neurophysiology and Sensorimotor Learning
Time: 1:55 p.m.
Location: BN307

Does visual information utilization for limb control differ when we exhale vs inhale?

Presenter: Nasrin Sabet-Poor
Faculty Advisor: Dr. Luc Tremblay
University of Toronto

In many physical activities, there is an emphasis on controlling breathing. Notably, such control of inhaling and exhaling arguably helps improve limb stability (e.g., pistol shooting) and movement fluidity (e.g., tai-chi, yoga). However, the mechanisms of how breathing can influence limb control remain relatively unknown. In this explorative study, we will explore how distinct phases of breathing might modulate the processing of visual information during goal directed reaching movements. Our focus lies in assessing the effects of breathing on upper-limb reaching movement endpoint accuracy (i.e.,ariable and constant error), and limb acceleration profiles. Twenty healthy participants between the ages of 17-47 will be recruited to take part in this study. Participants will be asked to perform reach movement to a target, as accurately as possible and within a 400-500 milliseconds bandwidth. In separate experimental conditions, a cue to start moving will be presented when the participant starts to inhale or exhale. As well, to assess visual feedback utilization, participants will perform reaches with or without vision during the movement. A motion tracking system and a triaxialaccelerometer will be used to collect movement data, while participants breaths will be promptedby auditory cues and their vision controlled with liquid-crystal goggles. It is expected that visual feedback availability will yield better endpoint accuracy and precision, as well as more evidence of online control in the accelerometer's frequency domain analysis. In contrast, it is not clear if the expected improvements trajectory smoothness in the exhale condition will be accompanied by better or worse endpoint accuracy and precision.Finally, it is also not known how visual feedback availability and the breathing phase conditions will interact.

SESSION C-III: Neurophysiology and Sensorimotor Learning
Time: 2:10 p.m.
Location: BN307

The influence of menstrual phase on synaptic plasticity induced via intermittent theta-burst stimulation

Presenter: Mary Ann Ingrid Sader
Co-author(s): K.R. Ramdeo, F.C. Adams, C.C. Drapeau, S.D. Foglia, M.C. Cuizon, R. Nucci
Faculty Advisor: Dr. Aimee Nelson
McMaster University

Background: Short-term plasticity induced by repetitive transcranial magnetic stimulation (rTMS) is influenced by ovarian hormones. Estradiol appears to increase the propensity for neural plasticity; however, it is currently unknown how progesterone affects brain plasticity. Objective: This study examined the potential impact of different phases of the menstrual cycle on short-term plasticity induced by intermittent theta burst stimulation (iTBS). The hypothesis is that iTBS increases motor evoked potentials (MEPs) during the follicular phase was investigated. Additionally, how the luteal phase effects by short-term plasticity caused by iTBS was investigated. Method: This was a placebo-controlled study, delivering either real iTBS or sham iTBS to the left primary motor cortex. Twenty-nine adult females attended a total of three sessions according to luteal phase, follicular phase and a day chosen at random. Results included short-interval intracortical inhibition (SICI) and corticospinal excitability, as reflected by the amplitude of MEPs, recorded from the right first dorsal interosseous. Results: An increase in MEP amplitude were observed during the follicular phase after real iTBS. MEP amplitude did not significantly change throughout the luteal phase, or sham iTBS. Additionally, SICI remained unchanged regardless of type of stimulation (real or sham iTBS) and menstrual cycle phase. Conclusion: Results show that iTBS induced plasticity is exclusive to the follicular phase. These findings suggest that women's propensity for plasticity varies across the menstrual cycle, however inhibitory interneural pathways remain unaffected.

SESSION C-IV: Neurophysiology and Sensorimotor Learning
Time: 2:35 p.m.
Location: BN307

What's Up?: Multisensory Contributions to the Perception of Verticality

Presenter: Garisan Sarvananthan
Co-author(s): Amin Mostofinejad, Sameeha Jafri
Faculty Advisor: Luc Tremblay, PhD
University of Toronto

Identification and accurate perception of verticality (i.e. orienting ourselves relative to the earth's gravitational forces) is essential for fundamental tasks such as standing and walking. However, it is not clear how the different sensory signals such as vision, vestibular input, and proprioception contribute to the perception of verticality (PV). Such a research question is relevant for theoretical reasons (e.g. multisensory integration) and practical reasons (e.g., falls in older populations). Previous research in our lab has shown that a head tilt-which alters neck proprioception and vestibular signals-produces shifts in PV. Interestingly, the shift in PV occurred in the presence of vision, suggesting greater contributions from neck proprioception and/or vestibular input than vision to PV. Thus, the purpose of the current study is to investigate the relative contributions of neck proprioception as compared to vestibular signals to PV by implementing a head tilt and galvanic vestibular stimulation. Participants will be seated in a lit room with their eyes open. Their task is to raise their hand as vertically as possible in four experimental conditions utilizing two head orientations (head straight or tilted left) and two galvanic vestibular stimulation conditions (none or anode left). The main dependent variable is the average angular error between the limb direction and the true vertical. It was hypothesized that the experimental conditions involving head tilt would yield greater biases in the perception of verticality than galvanic vestibular stimulation. The results will be discussed in the context of multisensory integration for the perception of the earth's gravitational vertical, advancing our understanding of how humans perceive and orient themselves in relation to gravity.

SESSION C-IV: Neurophysiology and Sensorimotor Learning
Time: 2:50 p.m.
Location: BN307

The Effects of Exercise-Induced Muscle Damage on Upper-limb Online Movement Control

Presenter: Olivia Smith
Co-author(s): Sarvenaz Heirani Moghaddam
Faculty Advisor: Dr. Gerome Manson
Queen's University

Coordination and control of multiple muscle groups are critical when adapting to movement disruptions, such as altered goals or pathways. Humans use sensory information from both internal (e.g., proprioception) and external sources (e.g., vision) to engage in online movement control. After intense or unusual exercise, exercise-induced muscle damage (EIMD) can occur within 24 to 48 hours. EIMD can also increase noise in proprioceptive signals and may influence online movement control. The objective of the study is to investigate the effects of EIMD on upper-limb movement control. Two right-handed, neurologically healthy, female participants (aged 21) took part in the pilot experiment, they had normal or corrected-to-normal vision and participated in less than 5 hours of structured strength training weekly. The study consisted of familiarization and baseline testing, an exercise protocol, and a muscle damage assessment. In each session, a maximal voluntary contraction of the biceps brachii was assessed using a dynamometer. This dynamometer is also used for the EIMD-inducing protocol. To test the effects of EIMD on online control, participants completed a series of reaching tasks using the Kinarm Exoskeleton Robot. During some reaches, participants were required to correct their movement to either a force or target perturbation. Our pilot data shows that our protocol successfully induced muscle damage and alters movement accuracy and timing. These results suggests that EIMD may alter our ability to engage in online movement control. These findings may have implications for coaching and injury prevention.

SESSION C-IV: Neurophysiology and Sensorimotor Learning
Time: 3:05 p.m.
Location: BN307

Augmented Reality Sensorimotor Training to Treat Chronic Neck Pain Assessed Through Corticomuscular Coherence

Presenter: Daniel Soppitt

Co-author(s): Stevie Foglia (PhD Candidate), Claudia Turco (PhD), Faith Adams, (PhD Candidate), Stephen Toepp (PhD Candidate), Ravjot Rehsi (Research Associate), Karishma Ramdeo (PhD Candidate), Chloe Drapeau (MSc Candidate), Sola Yatim (BSc Student), Kevin Chong (MSc)

Faculty Advisor: Aimee Nelson, PhD

McMaster University

Background: Chronic neck pain (CNP) is a debilitating condition causing motor control deficits, increased fatigue, and increased pain sensitivity in and around the cervical muscles. More than 20% of Canadians suffer from CNP and both its prevalence and severity increase with age. Traditional pain treatments such as opioids provide minimal relief and cause severe side effects. While manual therapy and exercise have been shown to improve pain and function, overcoming kinesiophobia - the fear of movement - is a barrier to these treatments. Virtual reality (VR) allows patients to engage in exercise in an immersive environment which reduces kinesiophobia. VR is more effective than manual exercise, however, limitations including cost, portability, and potential to cause simulation sickness may be addressed by using augmented reality (AR). AR is more accessible in cost and portability, and reduces simulation sickness. Non-invasive neuromodulation called repetitive transcranial magnetic stimulation (rTMS) has the potential to enhance the beneficial effects of AR sensorimotor training. rTMS has been used as an adjunct therapy in stroke rehabilitation and shown to promote neuroplastic changes following sensorimotor training. The objective of this study is to explore the effects of rTMS along with a novel AR sensorimotor training task on pain and motor function in 40 older individuals with CNP. Methods: Participants will be evenly split into control and active groups, both of which will engage in AR sensorimotor training 3-5 days per week for 2-4 weeks following either sham (control) or real (active) rTMS. Assessments will include, pain and function questionnaires. Corticomuscular coherence will be assessed using electroencephalography and electromyography. Impact: Individuals with CNP lack effective, lasting treatments for their pain. This study seeks to implement a novel treatment to address this problem and disrupt the cycle of pain to improve quality of life for CNP patients.

SESSION C-IV: Neurophysiology and Sensorimotor Learning
Time: 3:20 p.m.
Location: BN307

Decoding Teamwork: Investigating Spatial Compatibility and Perceptuomotor Decision Making in Solo and Dyadic Environments

Presenter: Shi Lu Wang
Co-author(s): Dr. Joseph Manzone
Faculty Advisor: Jay Pratt, PhD and Timothy Welsh, PhD
University of Toronto

When individuals act alone, they respond more efficiently to information presented on the same side of space as the impending response than to information presented on the opposite side of space from the response. This spatial compatibility effect provides strong evidence on the coupling of perception and motor decision-making. This effect can also bias perceptuomotor decision-making (PDM) as colours are perceived differently when presented on the same or different side of space from the response. Cooperative decision-making among individual actors is fundamental to complete tasks in many environments. This cooperation is thought to be enabled by a co-representation process in which each co-actor represents the partner's response in addition to their own. If co-representation occurs, the biases in PDM might emerge in a cooperative environment. The purpose of this study was to determine if spatial compatibility may affect decision-making in paired and alone trials. Participants were shown a pixelated square with yellow and blue pixels and asked to quickly decide which color was more prevalent using left- or right-key responses. The positions of these squares on the screen-either spatially compatible or incompatible with the correct response-were to determine if PDM was influenced by spatial compatibility. Participants (n=7 males, 20 females, Mage=22.7) first completed this task alone and then a sub-group (n=4 males, 10 females, Mage=22.7) was then rescheduled to replicate the experiment with a partner, where each partner was assigned to either left- or right-key responses. Current results show that compatible trials have shorter decision-making times and lower pixel thresholds in alone ($p<0.01$) and partnered trials ($p<0.01$). With additional data, future analyses will reveal how PDM is affected in a cooperative environment. This research and possible findings can provide novel evidence on decision-making coupling and spatial compatibility in social environments.

SESSION D-I: Cardiorespiratory & Cardiovascular Physiology
Time: 9:15 a.m.
Location: WS2007

Impact of Personality, Body-surveillance, and Biological Sex on Perceived Exertion

Presenter: Yasmeen Al-Kas
Co-author(s): Liam O'Brien, Catherine Sabiston, Ira Jacobs
Faculty Advisor: Dr. Ira Jacobs
University of Toronto

The perception of some sensory modalities, like audition and pain, have been reported to be influenced by sex and personality. This study investigated whether another sensory modality, i.e. rating of perceived exertion (RPE) expressed relative to measured physiological strain, is similarly influenced. Currently, four healthy individuals (2 males, 2 females) have completed the protocol out of a target sample size of 28 participants. One highly extraverted male and female (scoring 16-24 on Eysenck's Personality Inventory (EPI)) and one highly introverted male and female (scoring 0-10 on EPI) participated in two trials on a bicycle ergometer: an initial familiarization trial including measurement of VO2max, followed by a submaximal exercise trial. During the first trial, participants completed a stepwise incremental test starting at 50 watts, increasing by 50 watts every 2 minutes until exhaustion to determine VO2max. In the submaximal exercise trial, participants underwent a 5-minute warm-up followed by cycling sequentially at 30%, 50%, 65%, and 75% of VO2max for 4 minutes at each intensity. Throughout both trials, VO2 and heart rate (HR) were measured. During the second trial, blood lactate ([La−]b) and RPE for total body and legs were recorded in the last 30 seconds of each intensity. Of the measured variables, only RPE relative to %VO2max and to %HRmax suggested influences of personality and sex on the variables. Although the sample size was limited, the findings suggest that extraverted individuals exhibit a higher %HR max relative to the RPE total body and legs than introverted individuals. Additionally, extraverted males exhibited higher %VO2max and %HR max relative to RPE total body and legs than extraverted females. Further data collection is needed to validate the influence of extraversion, body-surveillance, and sex on variations between %VO2max, [La−]b, %HRmax, and RPE.

SESSION D-I: Cardiorespiratory & Cardiovascular Physiology
Time: 9:30 a.m.
Location: WS2007

Cerebral Blood Flow Responses Following High-intensity Dynamic Resistance Exercise Across Menstrual Cycle Phases

Presenter: Matin Borhani
Co-author(s): Elric Y. Allison, Malak Aiad, Michelle Y. Mei, Huseyn Ismayilov
Faculty Advisor: Dr. Baraa Al-Khazraji
McMaster University

Introduction: Immediately following resistance exercise (RE), the cerebrovascular system attempts to restore homeostatic perfusion levels. However, the recovery dynamics of this system after high-resistance exercise is not well established. Additionally, research in this field has predominantly recruited male participants which limits the generalizability of such studies. This is particularly relevant, as fluctuating sex hormones, such as estrogen and progesterone, affect the vascular system though their influence on cerebrovascular control and exercise response remains unclear. Objective: Combined, this study aims to investigate the influence of sex hormones on cerebral hemodynamic control immediately following high-intensity RE. Expected results: Based on previous studies that have demonstrated a positive association between estrogen and cerebral blood flow (CBF), it is hypothesized that the mean middle cerebral artery velocity (MCAv) will be higher immediately post-resistance exercise for females in the high-hormone phase (mid-luteal) as compared to females in the low-hormone phase (early follicular). Methods: 11 naturally cycling females were screened and recruited to participate in the study. The protocol involved 3 sets of 3 repetitions of bilateral leg-press at participants' estimated 90% one repetition maximum. After each set, participants were given 3 minutes to rest. Protocol was completed once during the early follicular and a second time during the mid-luteal phase on two separate days. MCAv, transcranial Doppler ultrasound (TCD) derived hemodynamic parameters (pulsatility and resistance indices), end-tidal CO2, heart rate and continuous blood pressure were monitored across the exercise protocol. Repeated measures ANOVA will be utilized to assess the interaction between recovery dynamics and the different phases of the menstrual cycle over 1 minute. Significance: To provide insight into the mechanistic control of post-exercise hemodynamics, while also aiming to elucidate whether fluctuations in sex hormones have a role in the regulation of cerebral hemodynamics following high-intensity RE.

SESSION D-I: Cardiorespiratory & Cardiovascular Physiology
Time: 9:45 a.m.
Location: WS2007

The Effect of Hormonal Contraceptives Containing Levonorgestrel on Heart Rate Variability, in Healthy, Premenopausal Women, Measured Using the OURA Ring

Presenter: Joëlle Chackal
Co-author(s): Jenna Stone, Maureen MacDonald
Faculty Advisor: Maureen MacDonald, PhD
McMaster University

INTRODUCTION: Oral contraceptive pills (OCPs) are increasing in popularity, with over 151 million users worldwide. OCPs containing a combination of ethinyl estradiol and levonorgestrel, a second-generation progestin, have been found to be associated with cardiovascular risks. Heart rate variability (HRV), the variation in time intervals between consecutive heartbeats, serves as a trusted marker of cardiovascular risk by providing insight into the autonomic nervous system, where an increase in HRV represents improved cardiovascular adaptability and resilience. Despite the well-known influence of OCPs on vascular health, their direct impact on HRV remains unknown, and provide valuable information about the interplay between hormonal contraception, autonomic nervous system (ANS) regulation and cardiovascular health. The OURA smart ring offers precise HRV monitoring, yielding high-accuracy data comparable to that obtained from a research-grade electrocardiogram (ECG). Therefore, the purpose of this study is to investigate the effect of hormonal contraceptives containing ethinyl estradiol and levonorgestrel on HRV, in healthy premenopausal women, using the OURA ring. METHODS: 4 (n=4) healthy, premenopausal, female participants, between the ages of 18-35, were recruited from McMaster University, Hamilton, ON. Participants wore an OURA ring for a period of 14 days, measuring the differences in HRV with and without the active intake of hormonal contraceptives. RESULTS: A paired t-test was used to compare HRV differences with and without treatment, and a p-value of 0.2 was obtained, indicating no effect of phase on HRV. SIGNIFICANCE: This study will provide insight on the impact of commonly used contraception methods, help shape decisions concerning women's reproductive health, and contribute to the prevention of cardiovascular disease in women using hormonal contraceptives worldwide.

SESSION D-I: Cardiorespiratory & Cardiovascular Physiology
Time: 10:00 a.m.
Location: WS2007

Microvascular Function and Exercise Performance Across Limbs

Presenter: Trishawna Fongwoo
Faculty Advisor: Robert Bentley, PhD
University of Toronto

Introduction: The completion of physical activity requires the cardiovascular system to facilitate the delivery of oxygen to active skeletal muscle. During small muscle mass exercise, in which the pumping capacity of the heart is not approached, the local vasculature controls local oxygen delivery. Due to the bipedal nature of humans, the arms and legs are chronically exposed to both differing hemodynamic stresses and habitual training tied to activities of daily living (e.g., fine motor tasks vs. locomotion). As such, it is unknown the extent to which these differences influence microvascular function and exertional capacity. Purpose: To determine the effect of basal microvascular function on arm and leg exercise performance. Methods: Healthy, recreationally active males and females (18-35 years of age) will be recruited. Participants will undergo a basal microvascular function assessment in the left arm and left leg, followed by step incremental forearm handgrip (2.5kg every 3 mins) and single-leg knee extension (2.3kg every 3 mins) exercise. Active skeletal muscle saturation of the flexor digitorum superficialis and vastus lateralis (Moxy Monitor, near-infrared spectroscopy; NIRS) respectively, central hemodynamics (Finometer MIDI, finger photoplethysmography) and pulmonary oxygen consumption (VO2master Pro) will be assessed during steady state at each intensity. Expected Results: Basal microvascular function will be enhanced in the leg compared to the arm. Exercise will result in an increase in central hemodynamics, oxygen consumption, and skeletal muscle desaturation. Basal microvascular function will predict both the ability to perform exercise as well as how quickly active muscle resaturates during recovery. Implications: Elucidating the contribution of microvascular function to exercise performance between limbs will advance the understanding of cardiovascular control and oxygen delivery. This knowledge may be applied to strategically tailor exercise programs to improve peripheral adaptations (i.e., microvascular function) in order to facilitate performance advancements.

SESSION D-II: Cardiorespiratory & Cardiovascular Physiology
Time: 10:55 a.m.
Location: WS2007

The Oxygen Uptake Efficiency Slope in Children with Inflammatory Bowel Disease and Juvenile Idiopathic Arthritis

Presenter: Arta Yamini
Faculty Advisor: Dr. Joyce Obeid
McMaster University

Cardiorespiratory fitness (CRF) assessments traditionally use maximal exercise protocols. These tests may not be practical for children with chronic diseases. The oxygen uptake efficiency slope (OUES) is measured at submaximal intensities and may yield similar prognostic outcomes to maximal testing. Few studies have examined the link between maximal (VO2peak) and submaximal (OUES) indicators of fitness in children with chronic inflammatory disease. This study aimed to (1) compare the OUES in children with Inflammatory Bowel Disease (IBD) and Juvenile Idiopathic Arthritis (JIA) to healthy peers, and (2) determine the relationship between VO2peak and OUES. Children JIA or IBD and healthy controls between 7-17 years of age completed a single study visit. Anthropometric measurements including height, weight, and body fat percentage were conducted. A maximal aerobic fitness test was conducted using a cycle ergometer and metabolic cart for gas exchange analysis. VO2peak was defined as the highest 20-sec oxygen uptake. OUES were derived from the slope of a linear regression between VO2 and logVE at 25%, 50%, 75%, 80%, 90%, and 100% of exercise. Objectives 1 and 2 were assessed by ANCOVAs and Pearson correlations, respectively. Seventy participants (JIA = 29, IBD = 22, healthy = 19) completed the study. Analyses are ongoing and will be presented at CHRD. These results could help support the use of submaximal fitness testing and OUES as an important marker of CRF, particularly for children who are not able to do maximal exercise. Submaximal testing could increase accessibility to CRF testing for monitoring health status.

SESSION D-II: Cardiorespiratory & Cardiovascular Physiology
Time: 11:10 a.m.
Location: WS2007

The influence of physical activity guidelines on flow-mediated dilation and pulse wave velocity in women with cardiometabolic risk factors.

Presenter: Chung Yan (Grace) Yiu

Co-author(s): Jennifer S. Williams, Barbara Gonze, Alfred Min, Stephanie Small, Jenna B. Gillen, Amy A. Kirkham

Faculty Advisor: Dr. Amy Kirkham

University of Toronto

Background: Following the Canadian physical activity (PA) guidelines (i.e., 150 min/wk moderate-vigorous physical activity + 2/wk resistance training) are associated with improved cardiovascular health and mitigates cardiometabolic risk. Endothelial function [assessed by flow mediated dilation (FMD)] and arterial stiffness [assessed by pulse wave velocity (PWV)] are early risk factors for atherosclerosis the development of cardiovascular diseases. However, the impact of adhering to PA guidelines on FMD and PWV remains unclear in women with cardiometabolic risk factors. Therefore, this study investigated the impact of a 6-week PA guidelines-based intervention on FMD and PWV in women with cardiometabolic risk. Methods: Twenty-two women (age=55±13, BMI=29.0±6.2) with moderate-to-high CANRISK scores (≥21 points) and low physical activity levels (<30 min/wk MVPA) were recruited for a 6-week randomized control trial pilot study. Participants were randomized into control (CON; n=10; 2x/week stretching sessions) and exercise (EX; n=12; 2x/week aerobic and resistance exercise sessions + counselling to follow PA guidelines) groups. Pre- and post-intervention assessments included a non-invasive FMD test using ultrasound and PWV test using Sphygmocor arterial tonometry. A linear mixed model ANOVA with factors group and time were used to analyze FMD and PWV. Results: There was no effect in group or time on PWV [CON (Baseline: 8.9±2.1m/s, Follow-Up: 8.7±2.0m/s), EX (Baseline: 7.9±1.8m/s, Follow-Up: 7.7±2.1m/s), p=0.53]. There was no effect of group or time on %FMD, [CON (Baseline: 7.6±2.3%, Follow-Up: 7.6±2.6%), EX (Baseline: 9.4±6.4%, Follow-Up: 8.2±3.8%), p=0.53]. Conclusion: Six weeks of adherence to PA guidelines did not yield statistically significant changes in FMD and PWV among women with cardiometabolic risk factors. Future research should investigate whether cardiovascular improvements may be observed in a larger study with women with higher CANRISK scores and a longer (e.g., 6 months) intervention duration.

SESSION D-II: Cardiorespiratory & Cardiovascular Physiology
Time: 11:25 a.m.
Location: WS2007

Comparing cardiorespiratory fitness and insulin resistance between inactive pre- and post-menopausal women at risk of type 2 diabetes

Presenter: Joaquina Yuen
Co-author(s): Barbara de Barros Gonze, Alfred Min, Stephanie Small, Jennifer Williams, Rebecca Christensen, Jenna Gillen, Amy Kirkham
Faculty Advisor: Amy Kirkham, PhD
University of Toronto

Introduction: Menopause is a pivotal stage in aging where women face various physiological changes stemming from marked reductions in sex hormone levels. Inactive women tend to experience reduced cardiorespiratory fitness (CRF) and elevated insulin resistance (IR) with increasing age, both of which are exacerbated by the onset of menopause. However, few studies have directly compared pre- and post-menopausal women for CRF and IR, which is important in understanding aging associated health risks. Therefore, the purpose of this study was to compare CRF and IR between pre- and post-menopausal women. Methods: A cross-sectional approach was employed using baseline data from a larger pilot randomized controlled trial. 16 pre-menopausal (age 42±6 years; BMI 29.0±6.0 kg/m2) and 16 post-menopausal (age 64±8 years; BMI 29.0±6.5 kg/m2) inactive women (<30 mins/week moderate-to-vigorous aerobic physical activity) with a moderate-to-high Canadian diabetes risk score (≥21 points) were recruited. CRF, measured as peak volume of oxygen consumption, was determined via cardiopulmonary exercise testing, using a modified Balke treadmill protocol. IR, measured as homeostasis model assessment-insulin resistance (HOMA-IR) and Matsuda index, was determined using glucose and insulin assays of blood samples collected following >8-hour fast and during 2-hour oral glucose tolerance test, respectively. Independent samples t-tests were conducted to compare outcomes between pre- and post-menopausal women. Results: CRF was not different between pre-menopausal (25.0±4.5 mL/kg/min) and post-menopausal women (22.5±4.3 mL/kg/min; p=0.123). HOMA-IR was not different between pre-menopausal (3.44±2.71) and post-menopausal women (3.09±2.21; p=0.703). Matsuda index was not different between pre-menopausal (3.80±2.14) and post-menopausal women (4.79±4.17; p=0.425). Conclusion: The onset of menopause may lead to unfavourable changes in women's cardiometabolic profile. This study showed no difference in CRF and IR across the menopausal transition but was likely underpowered to detect the small differences between groups. Future studies should include larger sample sizes to further our understanding of these differences.

SESSION D-III: Behavioural Studies and Physical Activity
Time: 1:10 p.m.
Location: WS2007

Physical Activity Reporting and Surveillance (PARS) Study for Children and Adolescents with Disabilities

Presenter: Lauren De Luca

Co-author(s): Thi Nancy Nuynh (Doctoral Student and PhD Candidate in the Faculty of Kinesiology and Physical Education, University of Toronto), Maeghan James (Postdoctoral fellow at Children's Hospital of Eastern Ontario Research Institute), Justin Haegele (Associate p

Faculty Advisor: Dr. Kelly Arbour-Nicitopoulos

University of Toronto

Tools of surveillance and reporting of physical activity (PA) are critical in providing data on participation rates and environmental characteristics to best support PA participation for children and adolescents. Of these tools is the Global Matrix, which has adopted a standardized grading scheme to produce country-specific PA Report Cards comprising of ten PA indicators (e.g., Overall Physical Activity, Organized Sport, Physical Fitness, Family, School). The grading scheme is based on benchmarks, which are standardized guidelines and measures that are used to produce grades under each indicator. There have been reported concerns about the ableist language used within the benchmarks that disregard the perspectives of individuals with disabilities. This evidence suggests a need to gather perceptions of children and adolescents with disabilities and their families on (inter)national reporting (i.e., the Global Matrix). The current study aims to interpret and describe what knowledge tools children and adolescents with disabilities and their parents consider useful in PA reporting and surveillance. Using a purposeful sampling technique, semi-structured virtual interviews are currently being conducted with parent-child dyads of families that include children and adolescents with disabilities aged 8-17. Interviews will be transcribed verbatim and de-identified. A reflexive thematic analysis will be used to further understand the perceptions of children and adolescents with disabilities and their families towards reporting and surveillance. The results from this study will provide a contextual understanding of the utility of reporting and the gaps that exist in understanding surveillance tools for children and adolescents with disabilities and their families.

SESSION D-III: Behavioural Studies and Physical Activity
Time: 1:25 p.m.
Location: WS2007

Day-to-Day Variability in Well-Being and Physical Activity in Children with Inflammatory Bowel Disease

Presenter: Ben Domerchie

Co-author(s): Benjamin Domerchie, Samantha Morin, Sara King-Dowling, Emily Brackenridge, Robert Issenman, Nikhil Pai, Mary Sherlock, Mary Zachos, Samira Samiee-Zafarghandy, Lee Hill, Joyce Obeid

Faculty Advisor: Joyce Obeid, PhD

McMaster University

Introduction: Child¬ren with inflammatory bowel disease (IBD) may experience day-to-day variability in well-being, defined as a state of positive feelings and the meeting of an individual's potential. This may be caused by fluctuations in disease symptoms, feelings of isolation, fear of flare-ups, and may influence physical activity (PA). No studies have assessed the day-to-day variability of well-being and PA in pediatric IBD. Objectives: We examined the (1) variability in well-being and PA; (2) relationship between daily PA intensity and well-being; and (3) relationship between the adherence to Canadian PA recommendations for youth and well-being in children with IBD. Methods: Children ages 7-17 years with IBD wore an ActiGraph accelerometer for 4-6 weeks to determine daily time spent in total, light, and moderate-to-vigorous PA. Participants self-reported their IBD-related well-being daily in a logbook. The question, adapted from the Childhood Health Assessment Questionnaire, was "Considering your IBD, how well are you doing today?" and was scored from 0 (best score) to 10 (poorest score). Variability was assessed using the coefficient of variation. Pearson's rank correlation coefficient evaluated the relationship of PA intensity and well-being, and the Mann-Whitney U test evaluated well-being and adherence to PA guidelines. Results: Nine participants (11% female, 10.3±1.8 years) have completed the study. Analyses are ongoing and will be presented at the National Undergraduate Research Conference. Conclusion: This study may provide insight into the day-to-day impact of IBD on feelings of well-being and physical activity. Understanding these associations may reveal important avenues for future interventions to improve outcomes for youth with IBD.

SESSION D-III: Behavioural Studies and Physical Activity
Time: 1:40 p.m.
Location: WS2007

Exploring Youth Rugby Athletes' Involvement in Advancing Safeguarding in Sport at the Grassroot Level

Presenter: Gianpaolo Fortino
Co-author(s): Sarah McGee
Faculty Advisor: Dr. Ashley Stirling
University of Toronto

The debate over the extent to which children should have autonomy and a voice in society poses a continuous threat to the rights and healthy development of children. Autonomy is often defined as an individual's right over themselves for the condition of self-governance such as having the capacity to make individual informed decisions that are free from coercion and pressure from others. While in recent years there has been a growing endorsement of child-centered approaches and a commitment to safeguarding children's rights in various fields such as child development, parenting, and education, the focus on child autonomy in the realm of sports has been comparatively limited. Despite notable progress in implementing measures to protect child and youth athletes from harm in the context of sports, there remains a significant lack of emphasis on supporting the rights of child and youth athletes to express themselves and participate in decision-making processes. Youth athlete participation and decision making in advancing safeguarding in sport, is particularly under researched. Therefore, the purpose of this study was to qualitatively explore high school, male, youth rugby athletes' (aged 13-17) perspectives on the role they play in advancing safeguarding practices in sport. The primary method of data collection included semi-structured interviews with high school rugby athletes, granting them the liberty to contribute their thoughts and opinions to this discussion. The interview was guided by Roger Hart's (1992) "Ladder of Participation" framework, with a specific focus on youth's "degrees of participation", rungs 4-8. The interviews were transcribed and analyzed through the six phases of thematic analysis. The findings of this study highlight the importance of effective prevention and intervention safeguarding strategies to enhance the inclusion and safety for everyone involved in sport, while empowering youth athletes and giving them a voice.

SESSION D-III: Behavioural Studies and Physical Activity
Time: 1:55 p.m.
Location: WS2007

A Comprehensive Investigation of the Impact of Sports Participation on Career Development, Professional Success, and Employability

Presenter: Amirparsa Ghaemi
Faculty Advisor: Ashley Stirling, PhD
University of Toronto

The topic of "Sport for Employability" refers to the use of sports and physical activities as a means to enhance individuals' employability skills and career prospects. It recognizes the value of sports in not only promoting physical well-being but also fostering personal development, teamwork, leadership, and various transferable skills that are highly sought after in the professional world. The research methodology involved reviewing the existing literature and analyzing various texts to gather extensive insights. This research investigated the multifaceted relationship between sports participation and employability, aiming to elucidate pathways in which engagement in various sports activities contributes to an individual's career development and overall professional success. It is noteworthy to mention that as the current job opportunities become increasingly competitive, aside from academic qualifications, possessing a diverse set of skills and attributes are favoured. Preliminary findings indicate a positive correlation between regular sports participation and the development of essential soft skills necessary for professional success. Leadership skills, developed through partaking in a sports team or leading group training sessions, emerge as a significant outcome of sports involvement. The ability to work effectively within a team honed through collaborative actions in sports settings, is identified as a pivotal factor in career advancement. Current sport for employability programs offer valuable opportunities for practical experiences and increasing qualifications. In future research, a more consolidated alignment with career market needs and investigation of employment policy issues can be completed to foster longer-term, more secure employment (Moustakas et al., 2022). Policymakers play an essential role in impacting sports organizations to deliver sport for employability programs. Fostering an environment where individuals can leverage their sports experiences to enhance their professional prospects through educational integration, public awareness, qualification and skill recognition, and financial support for sports programs.

SESSION D-III: Behavioural Studies and Physical Activity
Time: 2:10 p.m.
Location: WS2007

Quality of Life and Physical Activity in Children with Chronic Conditions or Disabilities

Presenter: Sarah Gillies
Co-author(s): Ethan Parikh, Leili Hadayeghi, and Brian W. Timmons
Faculty Advisor: Dr. Brian Timmons
McMaster University

Background Previous studies examining the relationship between physical activity and quality of life in children with chronic conditions or disabilities report positive correlations. However, most studies restricted their analysis to one chronic condition and thus were limited by small sample sizes. Purpose To combat the small sample size limitation, we will examine movement behaviours across multiple chronic conditions. Using data from MOMEMTUM, this project aims to examine the relationship between physical activity and quality of life in children ages 12 to 17. Methods Children (12- to 17-years-old) with any chronic condition, at least one year past diagnosis, and their parent/guardian will complete an online survey. Physical activity is assessed using the International Physical Activity Questionnaire short form (IPAQ-SF), and quality of life is measured using the Pediatric Quality of Life Inventory (PedsQL). Linear regressions will be used to examine the correlation between these variables. Results In the preliminary stages of this project, 15 dyads have completed the survey. Child- and parent/guardian-reported PedsQL total scores range from 49 to 96 and 27 to 92, respectively, on a scale from 0 to 100 (100 being the highest score). On average, the child-reported minutes per day spent doing vigorous, moderate, and light physical activity were 96, 67, and 52, respectively; parents/guardians reported 79, 52, and 37 minutes, respectively. Discussion Research about the relationship between physical activity and quality of life in children with chronic conditions is significant to affected children, as well as their families and health care providers.

SESSION D-IV: Behavioural Studies and Physical Activity
Time: 2:35 p.m.
Location: WS2007

The experiences of people who are blind or partially sighted when participating in the CBHA's Summer Development Camp

Presenter: Kapur Josh

Co-author(s): Josh Kapur, Amy Latimer-Cheung, Meredith Wing, Zac Scanlan, Julia Deuville, Kelly Arbour-Nicitopoulos

Faculty Advisor: Kelly Arbour-Nicitopoulos, PhD

University of Toronto

Persons with disabilities face numerous structural, psycho-emotional, and social barriers to full participation in sport. Though quality participation (QP) is widely discussed in the literature, little attention has been given to QP and sport programming for people who are blind or partially sighted (herein sight loss). QP is measured through six building blocks (belongingness, autonomy, meaning, engagement, challenge, and mastery) to allow proper engagement in sport in order to wholly derive the associated health benefits. The current study seeks to address the gap in research on QP in sport programming for individuals with sight loss by exploring strategies to foster the QP building blocks for athletes participating in a summer sport development camp for youth with sight loss. A qualitative study design, integrating interviews and focus groups, underpinned by integrated knowledge translation principles and constructivism, is used to explore the research question. Interview data from 13 youth and 13 parents during the summer camp in August 2023 were analyzed using thematic analysis, to identify strategies to support the QP building blocks. Focus groups with four parent-youth dyads will be conducted in March 2024 as a form of member checking for nuanced perspectives related to the researcher-generated QP strategies. Based on preliminary findings, six strategies for supporting the QP building blocks were identified through the analysis of the interviews including having the ability to choose how they play and what they play; being supported by peers, coaches, and parents; having an individual level of challenge; and improving their skills throughout the camp. Focus groups are underway to further explore the perspectives of youths and parents towards the identified strategies and other strategies to include. The results of this study will inform a QP blueprint to guide the development of accessible and inclusive sports programming for youth with sight loss.

SESSION D-IV: Behavioural Studies and Physical Activity
Time: 2:50 p.m.
Location: WS2007

A systematic review of the effects of acute and chronic exercise on the pediatric immune system

Presenter: Deema Khalaf
Co-author(s): Lo, M. M., Bjelica, M., Bjelica, A., Jakubowski, J., Letts, E., Obeid, J.
Faculty Advisor: Dr. Joyce Obeid
McMaster University

Background: Regular exercise is associated with improved immune function in humans. Most studies to date have examined this relationship in adults. More research is necessary to understand the effects of exercise on the immune system of pediatric populations. Objectives: This systematic review aims to assess existing evidence on the effects of acute or chronic exercise on the immune system of healthy children. Methods: A literature search of six databases (MEDLINE, EMBASE, Cochrane Library, Web of Science, ClinicalTrials.gov, CINAHL) was conducted. Studies were included if they: 1) recruited healthy children (<18 years of age) with no medical diagnoses or use of medications, 2) included any acute exercise bout or chronic exercise (i.e., exercise training), 3) included pre-intervention to post-intervention measurements, 4) reported at least one immune parameter (innate or adaptive component, count or function), and 5) were available in English. Article compilation, selection, and data extraction was completed using Covidence software. Findings will be compared as percent change from baseline. If possible, we will perform a meta-analysis on the findings using pooled effect sizes. Risk of bias assessments will be performed, using the Risk Of Bias In Non-Randomized Studies (ROBINS-I) tool for acute exercise studies, and the Cochrane Risk of Bias (RoB 2.0) tool for exercise training studies. Results: Following screening, 139 articles satisfied the eligibility criteria. Extraction is currently in progress. Results will be summarized for each study, grouped by immune outcome, and split by acute and chronic exercise. Conclusions: This systematic review will synthesize existing evidence on the exercise-immune interaction in healthy children. This information will be critical to identify gaps in our current understanding of the immune response to exercise in children, and will serve as the foundation for future avenues of investigation.

SESSION D-IV: Behavioural Studies and Physical Activity
Time: 3:05 p.m.
Location: WS2007

Safe Sport in Canadian Universities

Presenter: Lindsay Maier
Faculty Advisor: Gretchen Kerr, PhD
University of Toronto

Over the past decade, major cases of athlete maltreatment have claimed news headlines directing public attention toward the sport environment. This led to the development of the Universal Code of Conduct to Prevent and Address Maltreatment in Sport (UCCMS) in 2019, and the mandate for National Sport Organizations to adopt this Code by 2023. Although this mandate did not extend to university sport, this Code represents a 'gold standard' that all sport organizations should follow. Without the adoption of this Code, university athletes may be left at risk of harm. Therefore, the purpose of this study was to examine university sport policies to assess Safe Sport-related information, including adherence to the UCCMS, available to student-athletes competing in university sport in Canada. A complete list of Canadian universities participating in university sport (57) was compiled, separated into their respective regional conferences (Ontario University Athletics, OUA; Canada West, CanWest; Atlantic University Sport, AUS; Réseau du sport étudiant du Québec, RSEQ). An analysis of available documents on each university website was completed, and athletic directors were contacted to request any additional information. The UCCMS acted as the standard against which all university policies were evaluated. The findings indicate that 56% of universities had information available on their website to evaluate. Of those with available information, 35% of universities had information on Safe Sport, and 12% of universities had outlined Safe Sport reporting procedures. Additionally, 14% of universities made reference to the UCCMS, and 6% of universities integrated the information found within the UCCMS into their respective policy. These findings suggest that current athlete protection measures in university sport are insufficient or absent, which has important implications for the safety of athletes, coaches, administrators, and other stakeholders involved in university sport in Canada. Recommendations are made to advance Safe Sport in Canadian universities.

SESSION D-IV: Behavioural Studies and Physical Activity
Time: 3:20 p.m.
Location: WS2007

School-based opportunities for movement, sport, and physical activity

Presenter: Alishba Mansoor
Co-author(s): Sasha Gollish, Samira Sunderji, Sarah Ryan
Faculty Advisor: Catherine Sabiston, PhD
University of Toronto

Introduction: Physical activity and sport confer life-long benefits, including mental and physical health. School is often the gateway to sport participation. Yet, by early adolescence many choose to no longer participate and participation numbers are disparate between boys and girls. Objective: This research study identifies and describes physical activity and sport in Ontario public and Catholic schools demonstrating benefits and barriers to participation, especially for girls. Methods: This is a mixed methods study including content analysis from 72 Ontario school boards, including a representative sample of websites, policies, curriculum, and other reports. Discussions with end-users provided lived experiences specific to youth. Secondary data analyses conferred benefits and barriers of physical activity and sport for girls. Results: School participation rates are low among girls for physical activity and sport. Some evidence suggests boys have more opportunities for sport. Barriers identified at the school board and in schools include access to facilities and equipment, limited opportunities, and competing curriculum and priorities. Student-level barriers include social belonging, safety, demographics, and gender identity. Key role models like teachers, administrators, and especially female coaches actively influence girls' participation. Despite evidence linking mental health to physical activity, there was limited connection between mental health and physical activity in the representative sample. Conclusion: Schools and school boards must establish a foundation for physical activity, movement, and sport knowing the strong, positive relationship between physical activity and mental health.

SESSION E-I: Exercise Science & Health
Time: 9:15 a.m.
Location: WSB67

Investigating the causal effect of physical activity and sedentary behaviours on plasma protein biomarkers: a mendelian randomization study

Presenter: Abigail Berube
Faculty Advisor: Dr. Matthew Lanktree and Dr. Baraa Al-Khazraji
McMaster University

Introduction: The proteome-wide effect of physical activity on circulating protein biomarkers is unclear. The purposes of this study are: i) use mendelian randomization (MR) to assess how physical activity behaviours impact circulating protein biomarker concentrations and ii) use pathway enrichment analysis (PEA) to explore which biological pathways may be significantly modulated by physical activity. Methods: Two-sample MR was performed to investigate causal relationships between physical activity behaviours and the concentration of 1,161 protein biomarkers. Genetic variants strongly associated with measures of physical activity levels and sedentary behaviours including time spent watching television, using a computer, and driving, were obtained from previous genome-wide association studies (n=91,105 and n=422,218). Data for the biomarker concentrations was obtained from the Population Urban and Rural Epidemiology study (n=12,066). The inverse-variance weighted (IVW) method was used as the primary MR analysis. Further sensitivity analyses included the weighted median, MR-Egger and MR-PRESSO methods. Multiple testing correction was performed using the Bonferroni method. Significant results from the IVW analysis were used in a PEA conducted using the online g:Profiler tool. Results: After removing pleiotropic results, each physical activity phenotype was found to have a nominally significant association ($p<0.05$) with 16 to 78 biomarkers, however no biomarker associations remained statistically significant after applying the Bonferroni correction. PEA conducted using the nominally significant values, revealed 48 biological pathways enriched beyond statistical probability following Bonferroni correction (padj< 0.05). Notably pathways involving signalling receptors were upregulated in 3/5 phenotypes (p=4.696x10-7 to p=5.229x10-4). Multicellular organismal processes, i.e. biological processes related to the function of a multicellular organism, was also upregulated in 3/5 phenotypes (p=5.024x10-5 to 1.274x10-3). Impact: Although MR analysis was unable to identify individual biomarkers that are significantly associated with physical activity phenotypes, PEA suggests that physical activity behaviors may modulate various biological pathways, particularly those related to signalling and organismal function.

SESSION E-I: Exercise Science & Health
Time: 9:30 a.m.
Location: WSB67

Patterns of Sedentary Time in Prostate Cancer Survivors

Presenter: Ina Koperwas
Co-author(s): Michelle Ha, Sarah O'Rourke, Ally Tabaczynski, MSc & Linda Trinh, PhD
Faculty Advisor: Dr. Linda Trinh
University of Toronto

Background: Advances in cancer treatment and prognosis have led to a growing number of prostate cancer survivors (PCS). Although PCS are living longer, many suffer from numerous long-term treatment-related side effects. High volumes of sedentary behavior (SED) are associated with increased risk of all-cause, cardiovascular, and cancer-related mortality, and reduced quality of life (QoL). Reducing SED has been associated with improvements in several cancer-related outcomes. To optimize SED intervention efficacy, understanding how SED is accumulated throughout the day is warranted. The purpose of this study is to objectively measure and identify SED patterns using ActivPALTM inclinometers in PCS. Methods: This study is part of a larger, on-going randomized controlled trial aimed at reducing SED in inactive PCS. At baseline (N=27), thigh-worn ActivPALTM inclinometers measured sedentary time and steps continuously during a 7-day wear period. Demographic and clinical information was collected via self-report to characterize the sample. The percentage of time spent lying, sitting, standing, stepping, and the number breaks in SED were calculated using ActivPALTM algorithms (PAL Software version 8) to describe SED patterns. Results: PCS have a Mage=67.7±7.0 years, 57.1±44.5 months since diagnosis, and body mass index of 29.2±5.0 kg/m2. PCS received surgery (63.1%), hormonal therapy (41.1%), and radiation (59.2%), and 74.0% had localized prostate cancer. PCS reported a mean of 102.1± 39.7 minutes of stepping time/day, 231.3±59.6 minutes of standing time/day, 493.1±123.8 minutes of sitting time/day, 76.8±63.1 minutes of seated transportation time/day and 51.9±72.1 minutes of secondary lying time/day. Lastly, PCS reported a mean of 51.2±11.8 sit-to-stand transitions/day and mean total of 7,814±3,341 steps/day. Conclusion: PCS spend the majority of their time in sedentary time and engage in minimal stepping activities per day. Interventions are needed to reduce SED in PCS for enhancing QoL.

SESSION E-I: Exercise Science & Health
Time: 9:45 a.m.
Location: WSB67

Efficacy of the Dive Response as an Ergogenic Aid

Presenter: Derek Lemke
Faculty Advisor: Dr. Ian Newhouse
Lakehead University

Background: Athletes are constantly looking to enhance competitive efficacy. The dive response has been proven to result in increased hemoglobin concentration due to splenic contraction. There has been minimal research of the dive response in an athletic setting. Investigating the dive response in the context of high intensity exercise will expand upon current physiological knowledge of the dive response. This research will determine if the dive response enhances performance. This may lead to a novel ergogenic aid. Objective: The purpose is to verify the effectiveness of the dive response as an ergogenic aid. Method: Sixteen active individuals, aged 18-26, with a healthy spleen were recruited. Participants performed control and treatment procedures. There was a counterbalanced randomized crossover of treatments. The control procedure consisted of a Wingate Anaerobic Power Test (WAPT). The treatment procedure consisted of a method designed to elicit a splenic contraction, and an identical WAPT procedure. Peak power (PP), average power (AP), and the fatigue index (FI) were collected from the WAPT and controlled for individual body mass. Pre- and post-exercise O2 saturation were taken immediately prior and after WAPT execution to determine ΔO2 saturation. Results: With twelve participants completed thus far, none of PP (watts/kg), AP (watts/kg), FI (watts/second/kg), nor ΔO2 saturation (%) saw statistically significant changes. Conclusion: With P values too high to reject the null hypothesis, it is difficult to definitively say that this method has had an effect on athletic performance and oxygen uptake. There are other physiological effects associated with cold water submersion that may be responsible for results. Further research should incorporate a larger sample size and investigate effects on aerobic exercise performance in trained athletes.

SESSION E-I: Exercise Science & Health
Time: 10:00 a.m.
Location: WSB67

Defining initial stay-times for heavy-intensity work in young and older adults

Presenter: Farah Mourad

Co-author(s): Katie E. Wagar, Roberto C. Harris-Mostert, Fergus K O'Connor, Kristina-Marie T. Janetos, Brodie J. Richards, Emily J. Tetzlaff, James J. McCormick, Robert D. Meade, Glen P. Kenny

Faculty Advisor: Glen P. Kenny, PhD

University of Ottawa

INTRODUCTION: To mitigate increases in core temperature that are considered potentially dangerous for workers (≥1°C from baseline), workplaces often rely on guidance from government and occupational regulatory agencies to ensure worker safety in hot environments. However, there is a lack of guidance on safe work durations before heat mitigation protocols are employed. Consequently, current guidelines fail to consider age-related differences in heat dissipation that can affect heat tolerance. This is a critical knowledge gap, given initial stay times that are too long may lead to core temperatures that exceed the recommended limits, whereas too short may reduce worker productivity. PURPOSE: To evaluate initial stay-times (time for core temperature to reach 1°C above baseline) for heavy-intensity work in warm to hot ambient temperatures in young and older adults. METHODS: On three randomized days, 12 young (6 female; median [IQR] 24 [22-26] years) and 12 older (6 female; 64 [63-65] years) adults performed heavy-intensity work (260 W/m2 metabolic heat production) in wet-bulb globe temperatures (WBGT) of 26, 29 and 32°C. Work continued until core (rectal) temperature reached +1°C above baseline. RESULTS: A temperature by group interaction for stay-time was observed ($P<0.05$). Stay-time decreased with increasing temperatures in young ($P<0.05$) but not older adults ($P\geq0.05$). In 26°C WBGT, a difference in stay time was observed ($P= 0.01$), with stay-time being greater in young (83 [61-115] min) compared to older (45 [39-57] min) adults. Conversely, stay-times were not different in young versus older adults in 29°C WGBT ($P=0.059$) or 32°C ($P=0.595$). CONCLUSION: The time taken for core temperature to increase 1°C above rest during heavy-intensity work in the heat declines with increasing WGBT in young but not older adults. Thus, young adults may experience increased stay-times when performing work in lower (26°C WGBT) as compared to higher (29°C and 32°C WGBT) ambient temperatures.

SESSION E-I: Exercise Science & Health
Time: 10:15 a.m.
Location: WSB67

Investigating Thermoregulation and Heat Tolerance in Prepubescent Girls as Compared to Boys

Presenter: Sofia Panziera
Co-author(s): João Antônio Chula
Faculty Advisor: Dr. Brian W. Timmons
McMaster University

Background: With rapidly rising global temperatures, it is imperative to explore the human body's ability to adapt to varying climates and thermoregulate. Existing studies analyzing thermoregulatory processes have focused largely on adult populations and male participants, however, with a dearth of information relevant to young girls, it is integral that we understand their physiological responses to heat and how they impact performance. Objectives: This study investigates the thermoregulatory responses to exercise in heat in young girls and boys, directly compared by completing an identical exercise routine. Methods: Eight-10 year old boys and girls will be recruited to exercise for approximately 60 minutes in the heat, with assessed variables including heart rate, fluid balance, skin and core body temperature, perceived exertion, temperature sensation, comfort, and thirst, with a focus on heat tolerance. Participants will complete four 15 minute bouts of exercise in a climate chamber, set to 35℃ with a 35% rh, alternating from a treadmill and cycle ergometer. Collected variables will be compared between the girl and boy participants through statistical analysis. Results: Data collection for this study is ongoing and results will be presented at the conference. Conclusion: This study will provide new information on heat tolerance of young boys and girls. Comparing possible thermoregulatory differences in young girls and boys could be useful in revising heat-related physical activity guidelines.

SESSION E-I: Exercise Science & Health
Time: 10:30 a.m.
Location: WSB67

Exploring the IL-6-Mediated Anti-Inflammatory Effect of Exercise in Children with Chronic Inflammatory Disorders

Presenter: Sabrina Sefton
Co-author(s): Dr. Brian W. Timmons
Faculty Advisor: Dr. Brian W. Timmons
McMaster University

Initially recognized as a 'cytokine' in immune signalling, interleukin-6 (IL-6) has emerged as a significant skeletal muscle factor in mediating exercise's anti-inflammatory effects. However, elevated levels of IL-6 have also been established as a potent marker of chronic inflammation. These complex opposing effects, facilitated by differential interactions between IL-6, its soluble and membrane-bound receptors, and glycoprotein 130 (gp130), are poorly understood in children with chronic inflammatory disorders (CID) engaging in exercise interventions. Therefore, this study seeks to 1) assess how IL-6 and its pathway mediators are impacted by prolonged moderate- and high-intensity exercise in children with various CIDs, compared to healthy controls; and 2) compare these differences across sexes and different CIDs. An ELISA-based secondary analysis of serum IL-6, IL-6R, gp130 and IL-6/sIL-6R complex concentrations before and after exercise will be conducted. Changes in concentrations of these mediators will be compared for the first time between a sample of children with chronic kidney disease, cystic fibrosis, juvenile idiopathic arthritis, Crohn's disease and acute lymphoblastic leukemia, and healthy controls. While the analysis of soluble mediators cannot reveal their cellular origins, thus preventing concrete conclusions regarding their inflammatory nature, this study sets the foundation for future research on underlying inflammatory pathways involved in CIDs and exercise among children. As exercise becomes increasingly recognized as a therapeutic agent in children with varied inflammatory disorders, exploring these apparent gaps holds profound implications for the optimal provision of evidence-based exercise interventions without exacerbating baseline inflammation.

SESSION E-II: Nutrition and Exercise Science
Time: 10:55 a.m.
Location: WSB67

Subcellular localization of mTORC1-mediated phosphorylation events in human skeletal muscle after a range of physiological anabolic stimuli

Presenter: Paia Chen
Co-author(s): Cassidy T. Tinline-Goodfellow, Paul Babits, Dinesh Kumbhare, Daniel R. Moore
Faculty Advisor: Dr. Daniel Moore
University of Toronto

mRNA translation initiation is the primary rate-controlling step for protein synthesis, partly regulated by the mechanistic target of rapamycin complex 1 (mTORC1) signalling pathway. mTORC1 activity is regulated by anabolic stimuli such as resistance exercise (RE) and essential amino acids (EAAs) with leucine being a primary regulator. mTOR-lysosomal complexes, a central site of mTORC1 activation, translocate to the cell periphery following anabolic stimuli, gaining proximity to downstream substrates and ribosomal machinery. Though, there is an absence of literature locating mTORC1-mediated downstream phosphorylation events across anabolic states, assembly of translationally competent ribosomes require the phosphorylation of ribosomal protein S6 (p-RPS6S240/244), a downstream target of mTORC1. This study aimed to determine subcellular mTORC1-mediated phosphorylation events (p-RPS6S240/244) in skeletal muscle (SKM) following anabolic stimuli. Using a randomized crossover design, eight recreationally active individuals (6M/2F) ingested either a leucine enriched amino acid (LEAA; 4g, 1.6g Leucine) beverage or placebo (PLA; isocaloric maltodextrin), following a bout of unilateral leg RE. Bilateral muscle biopsies from the vastus lateralis were obtained 240 min following RE and LEAA allowing for RPS6 phosphorylation assessment during basal conditions and response to LEAA, RE, and RE+LEAA. Immunofluorescent staining of SKM cross-sections was performed targeting p-RPS6S240/244 as a marker of mTORC1 activity in the cell periphery. Immunoblots for p-RPS6S240/244 were also performed from whole muscle homogenates. Immunoblot for p-RPS6S240/244 demonstrated a significantly greater main effect of exercise ($P = .0255$), but not nutrient condition ($P = .81$). Peripheral p-RPS6S240/244 staining intensity after RE significantly increased ($P = .043$), with a trend for nutrient condition ($P = .0819$), proposing the greater anabolic effects of LEAA than PLA. Consistent with the anabolic effect of RE and trend of nutrition, p-RPS6S240/244 (proxy for mTORC1 activity) and staining intensity was increased in human SKM, especially within the periphery of muscle where ribosomal translational machinery typically resides.

SESSION E-II: Nutrition and Exercise Science
Time: 11:10 a.m.
Location: WSB67

Inflammatory and Autophagic Responses to a High-Fat Meal during Normoxia and Intermittent Hypoxemia in Peripheral Blood Mononuclear Cells from Healthy Young Adults

Presenter: Serena George
Co-author(s): Nicholas Goulet, Vincent Bourgon, Caroline Marcoux, Jean-François Mauger, Ruwan Amaratunga, Pascal Imbeault
Faculty Advisor: Pascal Imbeault, PhD
University of Ottawa

Introduction: Obstructive sleep apnea (OSA) is marked by sleep fragmentation and intermittent hypoxemia, which impairs cellular immune function. Further, high-fat diets can worsen cellular immune function by increasing inflammation, and may also modulate cellular survival mechanisms (e.g., autophagy) in immune cells such as peripheral blood mononuclear cells (PBMCs). However, how dietary factors influence immune function in relation to OSA remains unclear. Therefore, this study investigated whether postprandial inflammation coincides with changes in autophagy within PBMCs and assessed whether these responses are altered by intermittent hypoxemia. Methodology: Using a randomized crossover design, 4 young adults (2 men, 2 women; mean age [SD], 22 years [5]) were exposed to normoxia (ambient air: 20.93% O2, ~98% SpO2) and intermittent hypoxemia for 6 hours following the ingestion of a high-fat meal (33% daily energy expenditure, 59% calories from fat). Intermittent hypoxemia was administered at rest using 100% nitrogen until SpO2 dropped to 85%. Fifteen hypoxemic cycles were administered hourly, representing moderate OSA. Autophagy-related proteins (microtubule-associated protein 1 light chain 3 [LC3]-II) and inflammatory markers (interleukin-6 [IL-6]) were assessed in PBMCs at baseline, and after 3 and 6 hours of exposure via Western blot. Data were normalized to ß-actin (expressed as a relative quantity [RQ] from baseline) and were analyzed using two-way ANOVA with Tukey's post hoc test and an alpha set at 0.050 to establish statistical significance. Results: IL-6 increased during normoxia after 3 hours (1.5RQ [0.4], PTukey = 0.046), returning to baseline after 6 hours. There were no changes in IL-6 during intermittent hypoxemia. This was paralleled by a trend towards higher levels of LC3-II during normoxia compared to intermittent hypoxemia ($p = 0.063$, $\eta p2 = 0.735$). Conclusion: Inflammatory and autophagic responses to a high-fat meal during intermittent hypoxemia may be altered compared to normoxia. Larger studies are needed to confirm this hypothesis.

SESSION E-II: Nutrition and Exercise Science
Time: 11:25 a.m.
Location: WSB67

The Effect of Intermittent Fasting on Mood: Implications of Eating Disorder Symptomatology

Presenter: Laura Harris
Co-author(s): Kristan Amendola and Dr. Jennifer J. Heisz
Faculty Advisor: Dr. Jennifer J. Heisz
McMaster University

Intermittent fasting (IF), a dietary trend involving periods of abstaining from food and drink has been shown to improve mood in healthy populations (Cuccolo et al., 2022). However, concerns surrounding the safety of IF for individuals with disordered eating remain prominent (Liu et al., 2020). Disordered eating refers to eating behaviour that becomes controlled by body weight. While disordered eating is less severe than clinical eating disorders, it remains associated with poor mental health (da Luz et al., 2018). Given the positive impact of IF on mood in healthy populations, the purpose of this study was to explore whether this relationship translates to individuals with disordered eating. It was hypothesized that individuals with higher eating disorder symptomatology would display lower mood at baseline and improvements in mood following IF. Sixteen healthy, active females with an average age of 18.23 (SD = 0.44) completed a within-subject crossover study where participants completed 3 days of alternate day fasting and 3 days of time-restricted feeding in a counterbalanced order, separated by 4 days. Participants were categorized into either high disordered eating (n=9) or low disordered eating (n=7) based on their responses to the Eating Disorder Examination Questionnaire at baseline. Mood scores were assessed pre-, during, and post-fasting via the Profile of Mood States. Neither baseline mood ($t(14)=-0.39, p=0.35$) or change in mood after fasting ($t(13)=-0.92, p=0.19$) differed between individuals with high versus low disordered eating. However, there was greater variance in mood change after fasting for individuals with higher disordered eating. Although at the group level, our findings suggest that fasting does not significantly impact mood, some individuals with disordered eating may experience worse mood following IF. Ultimately, future research should be conducted with a larger sample size and individual experiences with disordered eating should be considered when determining relationships between IF and mood.

SESSION E-II: Nutrition and Exercise Science
Time: 11:40 a.m.
Location: WSB67

Creatine Supplementation on Athletic Performance in Resistance, Endurance, and Sport-Specific Exercises

Presenter: Micah MacMullen
Co-author(s): Nekaylah Prevost
Faculty Advisor: Dr. Mazen J Hamadeh
York University

Creatine supplementation is one of the most popular nutritional aids to improve sport performance. Intramyocyte creatine concentration increases after creatine loading inducing various metabolic changes within muscle cells. The most studied creatine intervention uses creatine monohydrate paired with a carbohydrate supplement to induce the insulin response causing more creatine to be transported into muscle cells. Many studies have examined the effects of creatine supplementation on exercise performance and the relative mechanisms influencing anaerobic resistance exercise. However, there is a dearth of research focusing on relating the metabolic effects of creatine on endurance and sport athletes. The effects of creatine supplementation on athletic performance can generally be explained by increased capacity of the phosphagen system and the anabolic effects of muscle cell swelling. Creatine saturation in myocytes is increased by an average of 20-40% in short term supplementation. The available creatine is used to enhance the capacity and restoration of phosphocreatine levels for the phosphagen system. When paired with resistance training, muscle biopsies have shown that creatine supplementation increases protein kinase B alpha (PKBa) mRNA which upregulates protein and glycogen synthesis. Protein augmentation and increased capacity of the phosphagen system both contribute to general improvements in performance recorded in resistance athletes. Endurance athletes do not usually experience improved performance after creatine consumption which may be due to the osmotic effect that creatine has on muscle cells resulting in a higher body mass. However, the increase in glycogen as a result of PKBa upregulation may provide benefits in high-intensity endurance training. The role of creatine supplementation in sport athletes remains unclear as it improves sprint speed and muscle power yet shows no difference in sport-specific performance. Finally, while the use of creatine as an ergogenic aid is yet to show any adverse effects, it's efficacy in long-term interventions still requires further research.

SESSION E-III: Nutrition and Exercise Science
Time: 1:10 p.m.
Location: WSB67

The Effect of Isocaloric Dairy and Dairy-free Alternative Beverages on Post-exercise Anabolism in Active Adolescents.

Presenter: Alessia Magno

Co-author(s): Nicki Pourhashemi 1, Hugo J.W. Fung 1, Ines Kortebi 1, David Nachman 1, Kaitlyn Ryu 1, Daniel West 2, Daniel R. Moore 1

Faculty Advisor: Daniel Moore, PhD

University of Toronto

Fat free mass (FFM), which includes muscle and bone, is influenced by physical activity and nutrition (e.g. protein intake). Whole-foods have different quantities and qualities of protein, the latter of which is influenced by amino acid (AA) pattern. Dairy beverages can support higher post-exercise muscle protein synthesis rates and training-induced FFM growth in adults compared to some plant-based sources. However, little is known about the anabolic (i.e. growth) potential of different dairy and plant-based beverages on post-exercise anabolism in growing adolescents. Using a within-subject single-blind randomized crossover design, 4 adolescent females and 7 adolescent males (12.3 ± 1.4yr, aPHV=0.6 ± 0.7yr, 47.5 ± 7.6 kg FFM) performed a simulated soccer match prior to consuming hourly beverages over 5h providing isoenergetic (~4.7 kcal/kg FFM) quantities of 2% milk (MILK) or plant-based soy (SOY), almond (ALMOND), and rice (RICE) alternative beverages (0.3, 0.35, 0.06, 0.01g protein/kg FFM, respectively). Beverages included [13C]phenylalanine as an indicator amino acid to determine its partitioning between excretion in the breath (F13CO2) and retention in the body for protein synthesis. Breath samples were collected over the final 1.5h of recovery to determine 13CO2 enrichment and CO2 production rate (VCO2) during metabolic and isotopic steady state to determine F13CO2. Preliminary results revealed a main effect for beverage ($p<0.01$) for F13CO2 with ALMOND being greater than RICE (3.08 ± 0.97 umol/kgFFM and 2.20 ± 0.48 umol/kgFFM, respectively; P=0.017). MILK (-2.45 ± 0.69 umol/kgFFM) and SOY (2.39 ± 0.51 umol/kgFFM) were intermediate and not different (p=0.34) from any other beverage. This study shows MILK, SOY and RICE are similar in the ability to support post-exercise protein synthesis in adolescents whereas ALMOND is inferior to RICE.

SESSION E-III: Nutrition and Exercise Science
Time: 1:25 p.m.
Location: WSB67

Modified Breath Test to Determine Anabolic Sensitivity Across Physical Activity States Within Remote and Controlled Settings

Presenter: David Nachman
Co-author(s): Ines Kortebi, Hugo J.W. Fung, Nigel LeGood, Daniel W. West
Faculty Advisor: Daniel R. Moore, PhD
University of Toronto

Introduction: Dietary amino acids (AA) are essential in supporting the development, growth, and maintenance of lean body mass. The two primary fates of exogenous AA are to support whole-body protein synthesis (PS) or be oxidized as an energy source. The partitioning of AA towards PS is increased through resistance exercise (i.e., anabolic sensitivity) or reduced via inactivity (i.e., anabolic resistance). Our lab has previously developed a non-invasive "breath test" using a [1-13C]leucine isotope tracer administered with an optimal protein dose (0.25g/kg body mass; modeling egg protein) to determine anabolic sensitivity across physical activity states. However, utilizing a suboptimal protein dose (0.125g/kg body mass) may be more relevant for detecting subtle differences in anabolic sensitivity. Methods: Using a randomized cross-over design, 12 healthy participants (6F/6M; 18-35yrs) will consume a beverage (i.e., 0.125g/kg protein, 0.75g/kg carbohydrates) enriched to 5% with [1-13C]leucine over a range of physiogical conditions: habitually active rested in the lab (HA-L) and at home (HA-H) to determine test variability; following a bout of whole-body resistance exercise (RE), to increase anabolic sensitivity, and; after 3 days of step-reduction (i.e., <2000 steps/day) (SR), to increase anabolic resistance. Breath samples will be collected to determine exogenous leucine oxidation (Ox) and net leucine retention (Ox - intake) over a 5hr post-prandial period. Results: Preliminary results (n=2) revealed Ox for RE was -5.3 to +21.7% of HA-L whereas SR was -12.1 to +5.2% of HA-H. As a result, net leucine retention for RE was -19.3 to +11.0% of HA-L while SR was -7.2 to +9.4% of HA-H. Variability in Ox between HA-L and HA-H was ±7.3 to ±14.0%. Conclusion: Further data collection is required to determine whether the modified breath test can detect more subtle differences in anabolic sensitivity across physical activity states, and to assess its reproducibility within an at-home and in-lab setting.

SESSION E-III: Nutrition and Exercise Science
Time: 1:40 p.m.
Location: WSB67

Practical strength training combined with protein supplementation to improve muscle mass, strength, and physical function in overweight/obese older individuals

Presenter: Arraksana Nanthakumar
Co-author(s): Janssen, TAM., Lowisz, CV., McKendry, J., Lim, C., Phillips, SM.
Faculty Advisor: Dr. Stuart Phillips
McMaster University

Background: While some uncertainty exists regarding the onset of the age-related loss of muscle mass and strength (termed sarcopenia), it appears to be an unavoidable consequence of aging. Without intervention, sarcopenia impairs physical function and increases the risk of morbidity and mortality. Resistance training (RT) and protein consumption are two potent lifestyle interventions that act synergistically to delay/prevent sarcopenia. Purpose: We aim to investigate the effects of a 12-week lower-load RT protocol in combination with protein supplementation on muscle mass, strength, and physical function in overweight/obese older men and women. Methods: Eighty overweight/obese (BMI≥25-40kg/m^2) older (60-85yr) men and women will be recruited to consume their normal diet plus 50g of protein daily (2x 25g servings). Participants will also perform a 12-week lower load (30-50% 1RM) RT program, consisting of 3 weekly training sessions, alternating between upper and lower body machine-based exercises. Participants will perform 3 sets of 20-25 repetitions for 3 upper- and 3 lower- body exercises, with the third set until voluntary muscular failure. A dual energy x-ray absorptiometry (DXA) and bioelectrical impedance analysis (BIA) will be completed to assess body composition, dynamometry to assess leg and handgrip strength, and a battery of tests (gait speed test/timed-up-and-go/repeated chair stand/stair climb test) to measure physical function pre- and post-intervention. Expected Results & Conclusions: We hypothesize that lower-load RT combined with protein supplementation will increase muscle mass and strength and improve physical function in older overweight/obese men and women. Preserving muscle mass and strength is vital for maintaining physical independence and promoting healthy aging. Significance: The current study will further our knowledge of nutritional and exercise strategies to prevent/delay age-related muscle loss.

SESSION E-III: Nutrition and Exercise Science
Time: 1:55 p.m.
Location: WSB67

The Impact of an Oral Ketone Monoester Supplement on Cerebral Blood Flow and Cognitive Function in Older Individuals with Subjective Memory Complaints

Presenter: Michaela Nikpal
Co-author(s): Geoff Coombs
Faculty Advisor: Jeremy Walsh, PhD
McMaster University

Subjective Memory Complaints (SMC) are self-reported feelings of forgetfulness that cause concern about memory abilities in older individuals who classify as having no cognitive impairment in psychometric testing. However, the presence of SMC increases the risk of further cognitive decline and may be accompanied by glucose hypometabolism and decreased cerebral blood flow (CBF) in the aging brain. The use of ketone supplementation has been previously reported to increase CBF and improve cognition in obese adults. However, the effects of ketone supplementation on CBF and cognition in SMC populations have yet to be determined; therefore, this research study aims to evaluate the effects of a single dose oral ketone supplement in older adults with SMC. Data collection is ongoing for a double-blinded randomized controlled trial study design (n=8/24 completed) in adults between the ages of 55-75 with SMC. Testing includes three study visits: one familiarization visit and two data collection sessions with either a ketone drink or a taste-matched placebo. CBF calculated from internal carotid and vertebral arteries is measured via phase-contrast MRI performed 30 minutes after ketone ingestion. Psychometric testing includes the Digit Symbol Substitution Test (DSST), the Stroop Task, and the N-back Test are used to assess cognitive abilities before and after ingestion of the drink. Additional measures of blood ketone levels, heart rate, and blood pressure are measured at baseline, 30 minutes, and 90 minutes after ingestion. The data collected from these visits will help to understand the role of acute exogenous ketone supplementation on CBF, cognitive performance, and how alternative fuels for the brain could help prevent cognitive decline in the elderly population.

SESSION E-III: Nutrition and Exercise Science
Time: 2:10 p.m.
Location: WSB67

Rate of fat oxidation in recovery from high-intensity interval exercise is influenced by the nutritional composition of post-exercise snacks

Presenter: Erica Petrucci
Co-author(s): Alexa Govette, Mirey Karavetian, Celine Bailleul, Sara Gagnon, Stephanie Estafanos, Andrea R. Josse, Jenna B. Gillen
Faculty Advisor: Dr. Jenna Gillen
University of Toronto

Introduction: Rates of whole-body fat oxidation are elevated for ~3hr following intense exercise when participants abstain from food or drink ingestion post-exercise. However, it is common for many individuals to eat following exercise, which may influence whether elevations in post-exercise fat oxidation are observed. This may be especially true for high-carbohydrate snacks due to increases in blood insulin, which suppresses fat oxidation. Limited research has explored how high- compared to low-carbohydrate snacks influence fat oxidation post-exercise. Purpose: To determine how isoenergetic low- and high- carbohydrate post-exercise snacks influence the rate of whole-body fat oxidation in recovery from high-intensity interval exercise (HIIE). Methods: Seventeen females with overweight/obesity (37±6 yr, 38.1±8.1 kg/m^2) completed two metabolic trials in the mid-follicular phase of two consecutive menstrual cycles. Following a 12hr overnight fast, participants completed a session of HIIE involving 10x1-min cycling intervals at ~90% maximal heart rate interspersed with 1-min recovery. Within 15min of HIIE, participants consumed 240kcal of low-carbohydrate Greek yogurt (GY; 26%/13%/61% carbohydrate/fat/protein) or high-carbohydrate pudding (PP; 100%/0%/0%) in a randomized and counterbalanced order. Blood samples were obtained for measurement of blood glucose at pre-exercise and every 30 min following the post-exercise snack for 3 hours. Respiratory exchange ratio (RER) and rates of whole-body fat oxidation were determined via 10-min pulmonary gas exchange measurements at pre-exercise and every 1-hour post-exercise for 3 hours. Results: Postprandial mean blood glucose concentration was lower in GY than PP (5.1±0.5mmol/L vs. 5.9±0.9; $p<0.0001$). RER was lower in GY vs. PP at 1hr (0.69±0.04; 0.74±0.05; $p=0.0088$), 2hr (0.72±0.03 vs. 0.78±0.05; $p<0.0001$) and 3hr post-exercise (0.69±0.03 vs. 0.74±0.06; $p=0.0037$). Fat oxidation rates were higher in GY vs. PP at 1hr (0.17±0.03 vs. 0.14±0.03 g/min; $p=0.0031$) and 2hr post-exercise (0.16±0.02 vs. 0.10±0.03 g/min; $p<0.0001$). Conclusion: Low-carbohydrate post-exercise snacks better support increased fat oxidation following HIIE in women with overweight/obesity.

SESSION E-IV: Nutrition and Exercise Science
Time: 2:35 p.m.
Location: WSB67

The Effect of High versus Low Dose Ketone Monoester Ingestion on Heart Rate Variability and Perceived Stress

Presenter: Aidan Underwood

Co-author(s): Aedan Rourke, Geoff B Coombs, Jenna Nash, Cara Pekos, Michaela Nikpal, Rebecca Liski, Adriana Odisho, Bardi Abbasi and Jeremy J, Walsh

Faculty Advisor: Dr. Jeremy Walsh

McMaster University

Background: Ingestion of a high dose of an exogenous monoester supplement increases markers of physiological stress, including increased heart rate, and ventilation. This may be due to metabolic acidosis caused by acute, bolus ingestion of a ketone monoester. However, the dose-response effects of ketone monoester ingestion on objective measures of stress, like heart rate variability (HRV), are currently unknown. The purpose of this study is to determine the relationship between different orally ingested ketone monoester doses and HRV to determine the effect of exogenous ketone supplementation on objective measures of stress. It is hypothesized that high doses of ketone monoester will reduce HRV, indicating increased stress response of the autonomic nervous system. Methods: Healthy, normoglycemic adults between the ages of 18 and 35 were recruited (n=8/20 collected to date). A randomized, placebo-controlled, double-blind, crossover design was used to test 3 conditions. These conditions include the consumption of 60 mL drink of either a taste-matched inert placebo drink, a low beta-hydroxybutyrate (β-OHB) dose (0.3 g β-OHB/kg body mass), or a high β-OHB dose (0.6 g β-OHB/kg body mass). HRV was measured using a 3-lead electrocardiogram with participants resting quietly in the supine position for a 5-minute recording period. HRV was measured at Baseline and 45-min post-drink consumption with the primary measure of low-frequency/high-frequency (LF/HF) given that this measure indicates the relative activation of the sympathetic and parasympathetic nervous systems, respectively. Self-reported subjective measures of arousal and feeling were also collected to assess perceived stress. Anticipated Results and Significance: It is hypothesized that HRV will decrease in the high β-OHB dose condition, as indicated by a higher LF/HF ratio. The LF/HF ratio reflects increased sympathetic nervous system activity over parasympathetic and may indicate an increased stress response following the high β-OHB dose. It is also expected that perceived stress will mirror the

SESSION E-IV: Nutrition and Exercise Science
Time: 2:50 p.m.
Location: WSB67

Does biological sex influence the glycemic benefits of high-intensity interval exercise?

Presenter: Taylor Wilcox
Co-author(s): Stephanie Estafanos, Celine Bailleul, McKinley Kennedy, Jenna B Gillen
Faculty Advisor: Dr. Jenna Gillen
University of Toronto

Introduction: Exaggerated elevations in blood glucose or insulin concentration following meals are associated with increased risk of metabolic diseases. A single session of moderate-intensity aerobic exercise can lower postprandial blood glucose and/or insulin concentration over ~24hrs. In response to high-intensity exercise, however, there is less evidence of this, especially in early post-exercise recovery. Moreover, it is unclear if females experience this benefit as there is evidence that the glucose response to exercise may differ between males and females. Purpose: To determine if high-intensity interval exercise (HIIE) improves postprandial glycemia in exercise recovery and whether this differs between sexes. Methods: Six recreationally-active males (n=5; 26±4yr; 23±2kg/m2; 43±3ml/kg/min) and females (n=1; 23yr; 21kg/m2; 40ml/kg/min) completed two metabolic trials. Participants remained seated (CON) or performed 12x1-min cycling intervals at 85% peak power output (HIIE). Heart rate (HR) and rating of perceived exertion (RPE) were measured at the end of each interval. Two hours following rest or exercise, participants consumed a "glucose challenge" (1g carbohydrate/kg body weight). Blood samples were obtained every 15-30 min for 3 hours and glucose was analyzed via glucometer for measurement of glucose mean and area under the curve (AUC). Results: There were no differences between males and females in mean HR (95±4 vs. 90±0%HRmax, $p>0.05$) or RPE (15±2 vs. 16±0, $p>0.05$) during HIIE. Following the glucose challenge, blood glucose increased and remained elevated until 120-min postprandial ($p<0.05$) but this did not differ by condition ($p=0.62$) or sex ($p=0.06$). Similarly, there were no differences between CON and HIIE in the 3h postprandial glucose mean (6.4±1.0 vs. 6.8±0.7mmol/L, $p=0.39$) or AUC (1137±183 vs. 1198±136mmol/Lx3h, $p=0.40$) in males and females. Conclusion: Preliminary data suggests no difference in postprandial glucose tolerance following HIIE or rest and no difference between sexes. However, we are currently underpowered and increased sample size is needed to confirm..

SESSION E-IV: Nutrition and Exercise Science
Time: 3:05 p.m.
Location: WSB67

Time Restricted Eating Interventions: A Network Meta-analysis of early, late, and self-selected time restricted eating windows in men and women

Presenter: Luceta Wut

Co-author(s): Rebecca A.G. Christensen, Oghogho A. Iyekekpolor, Darlene Donato, Bao-Zhu Stephanie Long, Kian Torabiardakani, Mirey Karavetian, Amy A. Kirkham

Faculty Advisor: Amy Kirkham, PhD

University of Toronto

Introduction: Time restricted eating (TRE) is a form of intermittent fasting where individuals eat ad libitum for 4 to 12 hours/day and then water only fast for the remaining 12-20 hours. Preliminary research has had conflicting results regarding the efficacy of TRE for weight loss. Differences in the implementation of TRE may contribute to these discrepant findings. The objective of our study is to investigate whether early (<9am start), late (>11am start), or self-selected TRE eating windows is better for weight loss. We hypothesise that early TRE will result in the greatest amount of weight loss. Methods: MEDLINE, Embase, CINAHL Ultimate, and Web of Science Core Collection were searched from inception to July 28, 2023. Randomised controlled trials (RCTs) comparing TRE to ad libitum eating in adults with obesity were included. Studies also had to report weight or body mass index to be included. Of the 3974 citations, 10 RCTs met eligibility criteria (4 early, 6 late, and 1 self-selected TRE). Mean differences (MD) were compared using a network meta-analysis with random effects with the netmeta package in R. Results: Compared to control, early (MD: 2.2 kg; 95% confidence interval (95%CI): 1.3-3.1) and late TRE (MD: 2.0 kg; 95%CI: 1.2-2.8) resulted in significantly greater weight loss ($p<0.0001$ for both) but not self-selected TRE (MD: 2.1 kg; 95%CI: -1.5-5.7, $p=0.2477$). However, all forms of TRE lost a similar amount of weight ($p>0.05$ for all). Conclusion: Early and late TRE resulted in around 2 kg greater weight loss than control. Conversely, self-selected TRE resulted in a similar amount of weight loss as early and late TRE and control. However, only 1 study examined self-selected TRE. Thus, further research is needed to determine whether self-selected TRE is less effective for weight loss than early and late TRE.

SESSION E-IV: Nutrition and Exercise Science
Time: 3:20 p.m.
Location: WSB67

The Effects of Caffeine in Endurance & Resistance Exercise

Presenter: Parsa Divanbeigi
Faculty Advisor: Dr. Mazen J Hamadeh
York University

The aim of this presentation is to provide a comprehensive overview of caffeine's metabolism, mechanisms of action, and its effects on exercise performance. Caffeine, the most widely consumed psychoactive drug, reaches peak blood plasma levels within 30-60 minutes of consumption, with a half-life of 3-5 hours. It affects various body systems, including the cardiovascular, gastrointestinal, metabolic, renal, respiratory, and central nervous systems. Administered primarily orally, caffeine's metabolism occurs largely in the liver, with its major metabolite being paraxanthine. Mechanistically, caffeine acts as an adenosine receptor antagonist, inhibits phosphodiesterase leading to increased cAMP levels, and modulates calcium release, contributing to its stimulatory effects and effects on muscle contractility. However, the major mechanism of action at non-toxic doses is the adenosine receptor antagonism, leading to the common effects of caffeine, namely wakefulness and alertness. The research highlighted looks at caffeine's ergogenic effects in both resistance and endurance modes of training. The literature for resistance exercise shows significant increases in maximal strength, muscular endurance, and power. Specifically, there is evidence for small improvement effect on isokinetic and 1RM strength (Cohen's d = 0.16, 0.2), as well as small-moderate improvement effects on muscular endurance (two reviews) and maximal voluntary contraction (Cohen's d = 0.28, 0.37, 0.38). It also demonstrates improvements in the different parameters of endurance exercise such as running time to exhaustion, and improvements in timed trials (Hedge's g = 0.392, -0.101). However, the efficacy varies with habituation, gender, and the form of caffeine consumed. Limitations in current research underscore the need for further investigation into habituation effects, particularly in resistance exercise, and the impact of different caffeine administration forms on exercise performance.

SESSION E-IV: Nutrition and Exercise Science
Time: 3:35 p.m.
Location: WSB67

The Effects of Acute Intermittent and Continuous Hypoxemia on Ketone Bodies in Healthy Young Women during the Postprandial State

Presenter: Nihal Yapici
Co-author(s): Nicholas Goulet, Alexanne Larocque, Caroline Marcoux, Vincent Bourgon, Jean-François Mauger, Ruwan Amaratunga, Pascal Imbeault
Faculty Advisor: Pascal Imbeault, PhD
University of Ottawa

Introduction: Ketone bodies are mainly composed of ß-hydroxybutyrate (ßOHB) and are crucial to providing alternative methods of fuel for our body. Reductions in O2 availability (hypoxemia) can increase circulating ßOHB levels through elevations in non-esterified fatty acids (NEFA). However, previous studies in humans are limited to healthy young men, and it remains unclear whether hypoxemia also increases ßOHB in women. Additionally, it remains unclear how different hypoxemic doses influence elevations in ßOHB. Therefore, this study evaluated the effects of different hypoxemic doses (intermittent and continuous hypoxemia) on circulating ßOHB levels in healthy young women. Methods: Twelve healthy young women (mean age [SD], 21 years [3]) were randomly exposed to normoxia (ambient air: 20.93% O2, ~98% SpO2) and intermittent hypoxemia for 6 hours following ingestion of a meal (33% daily energy expenditure) as part of a larger research project. Intermittent hypoxemia was administered at rest using 100% nitrogen until SpO2 dropped to 85%. Fifteen hypoxemic cycles were administered hourly. For this study, a sub-group of participants (n = 8) were exposed to continuous hypoxemia (simulated altitude of ~4000m above sea level; fraction of inspired O2 = 0.1200; ~80% SpO2). Colorimetric assays were used to measure plasma NEFA and ßOHB levels hourly. Data were analyzed using a linear mixed-effects model with an alpha of 0.050. Results: Plasma NEFA and ßOHB levels increased over time across all conditions (main effect of time: both $p < 0.001$). Plasma NEFA levels were similar between conditions (main effect of condition: $p = 0.053$). However, plasma ßOHB levels increased to a greater extent after 6 hours of continuous hypoxemia (39% higher than normoxia and 35% higher than intermittent hypoxemia; condition x time interaction: $p = 0.004$). Conclusion: Our results indicate that hypoxemia-induced elevations in plasma ßOHB levels are dose-dependent during the postprandial state in healthy young females

LIST OF PRESENTATIONS

(By last name of presenter)

Presenter (by last name)	University Name	Time	Room	Session	Topic
A. Hijleh, A.	Queen's University	9:15 a.m.	BN307	SESSION C-I	Neurophysiology and Sensorimotor Learning
Al-Kas, Y.	University of Toronto	9:15 a.m.	WS2007	SESSION D-I	Cardiorespiratory & Cardiovascular Physiology
Allam, S.	McMaster University	1:10 p.m.	BN302	SESSION A-III	Injury Rehabilitation and Exercise Interventions
Al-Naib, O.	Queen's University	9:30 a.m.	BN307	SESSION C-I	Neurophysiology and Sensorimotor Learning
Badwal, A.	University of Toronto	10:55 a.m.	BN304	SESSION B-II	Skeletal Muscle Health & Physical Activity
Berube, A.	McMaster University	9:15 a.m.	WSB67	SESSION E-I	Exercise Science & Health
Boada Herrera, D.	University of Toronto	10:55 a.m.	BN302	SESSION A-II	Biomechanics & Exercise Interventions
Borhani, M.	McMaster University	9:30 a.m.	WS2007	SESSION D-I	Cardiorespiratory & Cardiovascular Physiology
Boutanos, N.	McMaster University	1:25 p.m.	BN302	SESSION A-III	Injury Rehabilitation and Exercise Interventions
Chackal, J.	McMaster University	9:45 a.m.	WS2007	SESSION D-I	Cardiorespiratory & Cardiovascular Physiology
Chan, C.	University of Toronto	9:45 a.m.	BN307	SESSION C-I	Neurophysiology and Sensorimotor Learning
Chawla, M.	Western University	10:00 a.m.	BN307	SESSION C-I	Neurophysiology and Sensorimotor Learning
Chen, P.	University of Toronto	10:55 a.m.	WSB67	SESSION E-II	Nutrition and Exercise Science
Chong , N.	University of Toronto	10:15 a.m.	BN307	SESSION C-I	Neurophysiology and Sensorimotor Learning
Culhane, M.	Lakehead University	1:40 p.m.	BN302	SESSION A-III	Injury Rehabilitation and Exercise Interventions
De Luca, L.	University of Toronto	1:10 p.m.	WS2007	SESSION D-III	Behavioural Studies and Physical Activity
Divanbeigi, P.	York University	3:20 p.m.	WSB67	SESSION E-IV	Nutrition and Exercise Science
Dolynski, C.	University of Toronto	10:30 a.m.	BN307	SESSION C-I	Neurophysiology and Sensorimotor Learning
Domerchie, B.	McMaster University	1:25 p.m.	WS2007	SESSION D-III	Behavioural Studies and Physical Activity
Dudani, R.	Western University	11:10 a.m.	BN304	SESSION B-II	Skeletal Muscle Health & Physical Activity
Elango, S.	McMaster University	11:25 a.m.	BN304	SESSION B-II	Skeletal Muscle Health & Physical Activity
Eshaghi, D.	University of Toronto	9:15 a.m.	BN302	SESSION A-I	Biomechanics & Injury
filiz, m.	McMaster University	10:55 a.m.	BN307	SESSION C-II	Neurophysiology and Sensorimotor Learning
Fongwoo, T.	University of Toronto	10:00 a.m.	WS2007	SESSION D-I	Cardiorespiratory & Cardiovascular Physiology
Fortino, G.	University of Toronto	1:40 p.m.	WS2007	SESSION D-III	Behavioural Studies and Physical Activity
George, S.	University of Ottawa	11:10 a.m.	WSB67	SESSION E-II	Nutrition and Exercise Science
Ghaemi, A.	University of Toronto	1:55 p.m.	WS2007	SESSION D-III	Behavioural Studies and Physical Activity
Gillies, S.	McMaster University	2:10 p.m.	WS2007	SESSION D-III	Behavioural Studies and Physical Activity
Greyvenstein, D.	McMaster University	11:40 a.m.	BN304	SESSION B-II	Skeletal Muscle Health & Physical Activity
Harris, L.	McMaster University	11:25 a.m.	WSB67	SESSION E-II	Nutrition and Exercise Science
Hawthorne, S.	Queen's University	11:10 a.m.	BN307	SESSION C-II	Neurophysiology and Sensorimotor Learning
Hoh, N.	University of Toronto	9:30 a.m.	BN302	SESSION A-I	Biomechanics & Injury
Hong, R.	McMaster University	11:55 a.m.	BN304	SESSION B-II	Skeletal Muscle Health & Physical Activity
Hussain, M.	McMaster University	11:25 a.m.	BN307	SESSION C-II	Neurophysiology and Sensorimotor Learning
Isidori, A.	University of Toronto	11:10 a.m.	BN302	SESSION A-II	Biomechanics & Exercise Interventions
Jornacion, C.	McMaster University	1:10 p.m.	BN304	SESSION B-III	Skeletal Muscle Health & Physical Activity
Josh, K.	University of Toronto	2:35 p.m.	WS2007	SESSION D-IV	Behavioural Studies and Physical Activity
Joumaa, A.	University of Toronto	9:45 a.m.	BN302	SESSION A-I	Biomechanics & Injury

Presenter (by last name)	University Name	Time	Room	Session	Topic
Karamanlian, E.	University of Toronto	9:15 a.m.	BN304	SESSION B-I	Physical Cultural Studies
Kazdan, N.	University of Toronto	1:25 p.m.	BN304	SESSION B-III	Skeletal Muscle Health & Physical Activity
~~Kennedy, M.~~	~~University of Toronto~~	~~11:40 a.m.~~	~~WSB67~~	~~SESSION E-II~~	~~Nutrition and Exercise Science~~
Khalaf, D.	McMaster University	2:50 p.m.	WS2007	SESSION D-IV	Behavioural Studies and Physical Activity
Kiswani, K.	University of Toronto	11:40 a.m.	BN307	SESSION C-II	Neurophysiology and Sensorimotor Learning
Koperwas, I.	University of Toronto	9:30 a.m.	WSB67	SESSION E-I	Exercise Science & Health
LaFayette, P.	Wilfrid Laurier University	9:30 a.m.	BN304	SESSION B-I	Physical Cultural Studies
Lajevardi, D.	York University	1:40 p.m.	BN304	SESSION B-III	Skeletal Muscle Health & Physical Activity
Lal, D.	University of Toronto	10:00 a.m.	BN302	SESSION A-I	Biomechanics & Injury
Lee, A.	McMaster University	11:55 a.m.	BN307	SESSION C-II	Neurophysiology and Sensorimotor Learning
Lemke, D.	Lakehead University	9:45 a.m.	WSB67	SESSION E-I	Exercise Science & Health
Lindsey, E.	Lakehead University	1:55 p.m.	BN302	SESSION A-III	Injury Rehabilitation and Exercise Interventions
Liu, H.	University of Toronto	11:25 a.m.	BN302	SESSION A-II	Biomechanics & Exercise Interventions
Macera, M.	Western University	9:45 a.m.	BN304	SESSION B-I	Physical Cultural Studies
MacMullen, M.	York University	11:40 a.m.	WSB67	SESSION E-II	Nutrition and Exercise Science
Magno, A.	University of Toronto	1:10 p.m.	WSB67	SESSION E-III	Nutrition and Exercise Science
Mahmood, H.	University of Toronto	11:40 a.m.	BN302	SESSION A-II	Biomechanics & Exercise Interventions
Maier, L.	University of Toronto	3:05 p.m.	WS2007	SESSION D-IV	Behavioural Studies and Physical Activity
Malekzadeh, R.	York University	3:35 p.m.	BN304	SESSION B-IV	Skeletal Muscle Health & Physical Activity
Mansoor, A.	University of Toronto	3:20 p.m.	WS2007	SESSION D-IV	Behavioural Studies and Physical Activity
Martinez, N.	University of Toronto	2:10 p.m.	BN302	SESSION A-III	Injury Rehabilitation and Exercise Interventions
McGee, J.	University of Toronto	1:55 p.m.	BN304	SESSION B-III	Skeletal Muscle Health & Physical Activity
Meghjee, M.	University of Waterloo	10:00 a.m.	BN304	SESSION B-I	Physical Cultural Studies
Milner, A.	University of Toronto	1:10 p.m.	BN307	SESSION C-III	Neurophysiology and Sensorimotor Learning
Moses, K.	Queen's University	1:25 p.m.	BN307	SESSION C-III	Neurophysiology and Sensorimotor Learning
Mourad, F.	University of Ottawa	10:00 a.m.	WSB67	SESSION E-I	Exercise Science & Health
Nachman, D.	University of Toronto	1:25 p.m.	WSB67	SESSION E-III	Nutrition and Exercise Science
Nanthakumar, A.	McMaster University	1:40 p.m.	WSB67	SESSION E-III	Nutrition and Exercise Science
Nikolovski, N.	University of Toronto	2:10 p.m.	BN304	SESSION B-III	Skeletal Muscle Health & Physical Activity
Nikpal, M.	McMaster University	1:55 p.m.	WSB67	SESSION E-III	Nutrition and Exercise Science
Panziera, S.	McMaster University	10:15 a.m.	WSB67	SESSION E-I	Exercise Science & Health
Patel, H.	Western University	1:40 p.m.	BN307	SESSION C-III	Neurophysiology and Sensorimotor Learning
Petrucci, E.	University of Toronto	2:10 p.m.	WSB67	SESSION E-III	Nutrition and Exercise Science
Rishi, S.	McMaster University	2:35 p.m.	BN304	SESSION B-IV	Skeletal Muscle Health & Physical Activity
Rivaya Salvadores, C.	University of Toronto	2:35 p.m.	BN302	SESSION A-IV	Injury Rehabilitation and Exercise Interventions
Roberts, M.	McMaster University	2:50 p.m.	BN304	SESSION B-IV	Skeletal Muscle Health & Physical Activity
Roy, C.	Lakehead University	2:50 p.m.	BN302	SESSION A-IV	Injury Rehabilitation and Exercise Interventions
Sabet-Poor, N.	University of Toronto	1:55 p.m.	BN307	SESSION C-III	Neurophysiology and Sensorimotor Learning
Sader, M.	McMaster University	2:10 p.m.	BN307	SESSION C-III	Neurophysiology and Sensorimotor Learning
Salah, H.	University of Toronto	3:05 p.m.	BN302	SESSION A-IV	Injury Rehabilitation and Exercise Interventions
Sarvananthan , G.	University of Toronto	2:35 p.m.	BN307	SESSION C-IV	Neurophysiology and Sensorimotor Learning

Presenter (by last name)	University Name	Time	Room	Session	Topic
Sefton, S.	McMaster University	10:30 a.m.	WSB67	SESSION E-I	Exercise Science & Health
Sequeira, N.	University of Toronto	10:15 a.m.	BN302	SESSION A-I	Biomechanics & Injury
Silon, N.	University of Toronto	10:30 a.m.	BN302	SESSION A-I	Biomechanics & Injury
Smith, O.	Queen's University	2:50 p.m.	BN307	SESSION C-IV	Neurophysiology and Sensorimotor Learning
Soppitt, D.	McMaster University	3:05 p.m.	BN307	SESSION C-IV	Neurophysiology and Sensorimotor Learning
Strong, J.	Western University	10:15 a.m.	BN304	SESSION B-I	Physical Cultural Studies
Tijo, T.	Western University	3:05 p.m.	BN304	SESSION B-IV	Skeletal Muscle Health & Physical Activity
Underwood, A.	McMaster University	2:35 p.m.	WSB67	SESSION E-IV	Nutrition and Exercise Science
Varanan, M.	McMaster University	3:20 p.m.	BN304	SESSION B-IV	Skeletal Muscle Health & Physical Activity
Wang, C.	University of Toronto	10:30 a.m.	BN304	SESSION B-I	Physical Cultural Studies
Wang, S.	University of Toronto	3:20 p.m.	BN307	SESSION C-IV	Neurophysiology and Sensorimotor Learning
Wilcox, L.	University of Toronto	3:20 p.m.	BN302	SESSION A-IV	Injury Rehabilitation and Exercise Interventions
Wilcox, T.	University of Toronto	2:50 p.m.	WSB67	SESSION E-IV	Nutrition and Exercise Science
Wilson, B.	McMaster University	11:55 a.m.	BN302	SESSION A-II	Biomechanics & Exercise Interventions
WUT, L.	University of Toronto	3:05 p.m.	WSB67	SESSION E-IV	Nutrition and Exercise Science
Yamini, A.	McMaster University	10:55 a.m.	WS2007	SESSION D-II	Cardiorespiratory & Cardiovascular Physiology
Yapici, N.	University of Ottawa	3:35 p.m.	WSB67	SESSION E-IV	Nutrition and Exercise Science
Yiu, C.	University of Toronto	11:10 a.m.	WS2007	SESSION D-II	Cardiorespiratory & Cardiovascular Physiology
Yuen, J.	University of Toronto	11:25 a.m.	WS2007	SESSION D-II	Cardiorespiratory & Cardiovascular Physiology
Zabbal, A.	McGill University	3:35 p.m.	BN302	SESSION A-IV	Injury Rehabilitation and Exercise Interventions