

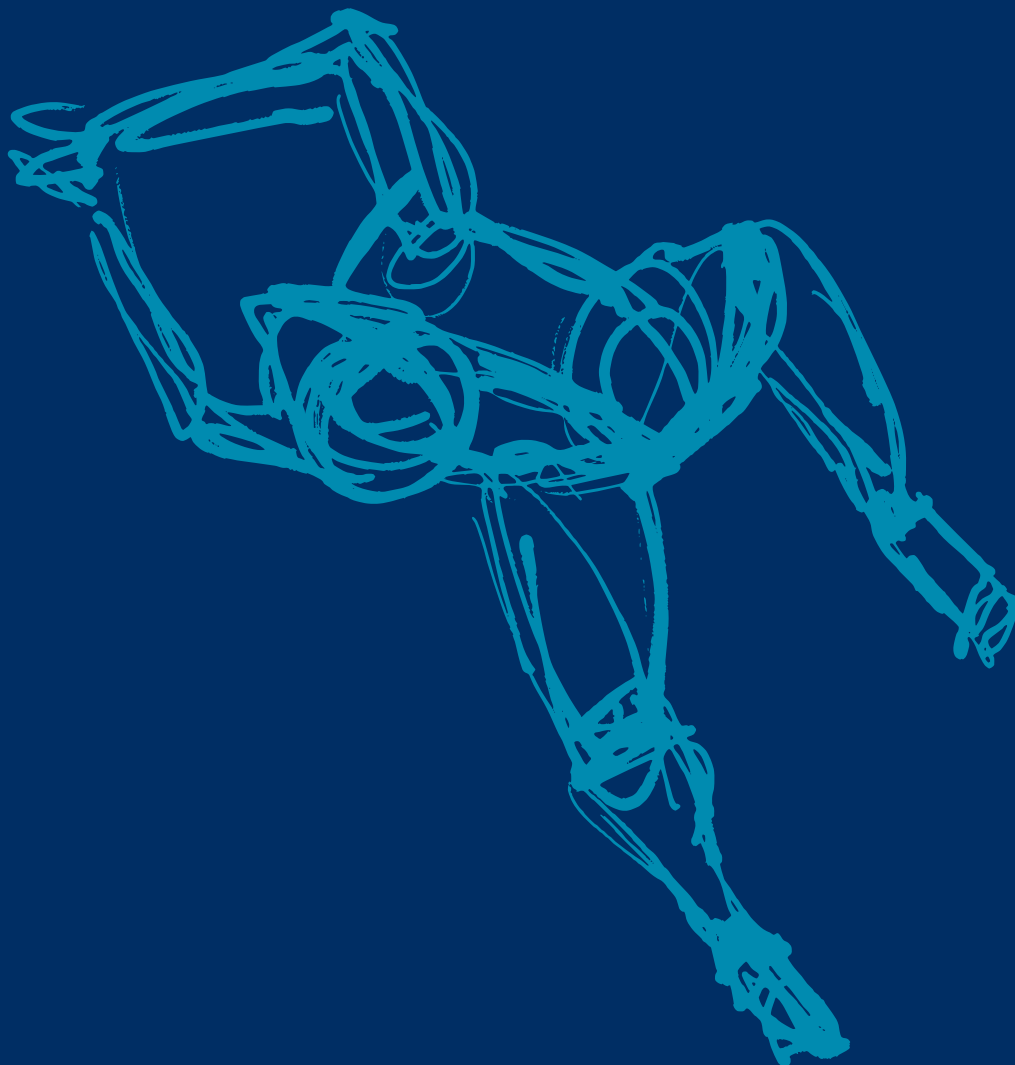


UNIVERSITY OF TORONTO
FACULTY OF KINESIOLOGY & PHYSICAL EDUCATION

THE 21st ANNUAL BERTHA ROSENSTADT

**NATIONAL UNDERGRADUATE
RESEARCH CONFERENCE**

KINESIOLOGY AND PHYSICAL EDUCATION



Virtual Conference • March 26, 2021

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21st 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

Time Zone

The start and end times for all sessions are in the Eastern Time Zone (ET).

Platform

The Conference will be hosted on Zoom. As we are transitioning from an in-person conference to a virtual experience, we wanted to share details with you regarding how the conference will run.

- Participants will receive access to all sessions a few days prior to the conference with Meeting ID's and Passcodes.
- Feel free to enter and exit sessions as often as you need.
- Each session will be facilitated by a moderator who will welcome all the attendees, provide session housekeeping details, introduce the speakers, and facilitate questions.
- Attendees can ask questions using the chat function or by virtually raising their hands if they wish to use the audio. Moderators will monitor the questions and hold all questions until the appropriate time in the session.
- Please refer to the Guidelines for Presenters and Attendees for further instructions and information on using Zoom.

If you have any questions regarding the conference, please contact Francine Zucco at francine.zucco@utoronto.ca.

Schedule at a Glance

Time	Item	Zoom Session
9:00 a.m. – 9:15 a.m.	<u>Welcome</u> Prof. Ira Jacobs, Dean, Faculty of Kinesiology and Physical Education, U of T	Main Room
9:15 a.m. – 10:15 a.m.	<u>Keynote</u> Prof. Brenda Wastasecoot, Indigenous Studies, U of T	
10:15 a.m. – 10:45 a.m.	Break	Main Room
10:45 a.m. – 12:00 p.m.	Block 1 Presentations	Session 1A - Cardio-Respiratory Physiology Session 1B - Motor Learning / Cognitive Function Session 1C - Sport Psychology Session 1D - Biomechanics and Sport Medicine
12:00 p.m. – 1:00 p.m.	Lunch and Networking Break	Main Room
1:00 p.m. – 2:30 p.m.	Block 2 Presentations	Session 2A - Sport Psychology and Physical Cultural Studies Session 2B - Physical Cultural Studies Session 2C - Skeletal Muscle Physiology and Nutrition Session 2D - Cardio-Respiratory Physiology and Interventions Session 2E - Exercise Interventions and Implications
2:30 p.m. – 3:00 p.m.	Break	Main Room
3:00 p.m. – 4:15 p.m.	Block 3 Presentations	Session 3A - Sport Psychology and Physical Cultural Studies Session 3B - Biomechanics and Motor Learning Session 3C - Muscle Cell Physiology Session 3D - Exercise Interventions and Clinical Populations
4:15 p.m. – 4:30 p.m.	Break	Main Room
4:30 p.m. – 5:00 p.m.	<u>Closing Remarks</u> Prof. Catherine Amara, Director of Undergraduate Studies, Faculty of Kinesiology and Physical Education, U of T	Main Room

Keynote Speaker

Brenda Wastasecoot

**Assistant Professor, Indigenous Studies,
University of Toronto**

Dr. Wastasecoot is a member of the York Factory Cree Nation, born and raised at Churchill, Manitoba. Dr. Wastasecoot's pedagogic forte is grounded in her stories of historic trauma, relating stories to students from her own personal experience of being a Native



girl during the 60's. She has extensive experience in the counselling field and taught at Brandon University for nine years in the First Nations & Aboriginal Counselling Degree program, before completing her PhD in the Adult Education & Community Development program at OISE.

To Do No Harm: Working Together Towards Understanding the Needs of Indigenous Communities

How can students and researchers prepare themselves to be helpers and allies to Indigenous communities as health practitioners? In addition to understanding that they are entering an already established landscape of Indigenous health and healing practices, health practitioners also need to know the history of settler - Indigenous relations and how they have eroded understandings of Indigenous ways of health and healing.

Professor Wastasecoot will provide stories and examples of Indigenous ways of health and healing as a Ininu Iskwew (Cree Woman) with lived experience. How do we reconnect these lines of communication and understanding?

Presentations

Each session will have 5-6 presentations and will be facilitated by two moderators. Each presenter is allocated 15 minutes, which includes a verbal presentation (approx. 12 minutes), questions and answers, and time for transition between presenters. Attendees can ask questions using the chat function or by virtually raising their hands. Moderators will monitor the questions and hold all questions until the appropriate time in the session.

Presentations Schedule

Block 1: 10:45 a.m. – 12 p.m.

Session 1A - Cardio-Respiratory Physiology	
10:45 a.m.	<p><i>Investigating the Relationship Between Arterial Stiffness and Performance in Elite Swimmers</i> By: Kaitlyn Lee Co-Authors: Jamie F Burr, Trevor J King Faculty Advisor: Trevor King McMaster University</p>
11:00 a.m.	<p><i>The effects of breathing exercises on dyspnea in COPD</i> By: Emily Cascone Faculty Advisor: Catherine Amara University of Toronto</p>
11:15 a.m.	<p><i>Examining the acute effects of emergency contraceptives on vascular function both in cell and human models</i> By: Rachael Moorhouse Co-Authors: William JS, Kamal MJ, Parise G, MacDonald MJ Faculty Advisor: Maureen MacDonald McMaster University</p>
11:30 a.m.	<p><i>The Effects of Acute Intermittent Hypoxia on Postprandial Triglyceride Levels in Individuals with or without Obstructive Sleep Apnea</i> By: Nicholas Goulet Co-Authors: Renée Morin, Jean-François Mauger, Pascal Imbeault Faculty Advisor: Pascal Imbeault University of Ottawa</p>
11:45 a.m.	<p><i>Is cardiovascular disease risk elevated in older Canadian adults with osteoarthritis?</i> By: Marium Kiwan Faculty Advisor: Dylan Kobsar McMaster University</p>

Session 1B - Motor Learning / Cognitive Function

10:45 a.m.	<p><i>Investigating the relationship between aerobic fitness and executive functioning performance in young adults with Attention Deficit Hyperactivity Disorder</i> By: Cindy Li Co-Authors: Michelle Ogrodnik Faculty Advisor: Jennifer Heisz McMaster University</p>
11:00 a.m.	<p><i>On the influence of imperceptible audio-visual temporal offsets on the performance of a rhythmic tapping task</i> By: Sophia Masterson-Pinedo Co-Authors: Damian Manzone, Richard Chen Faculty Advisor: Luc Tremblay University of Toronto</p>
11:15 a.m.	<p><i>Is there an association between global cognitive function and heart rate variability in individuals with stroke?</i> By: Eric Huynh Co-Authors: K. Moncion, L. Rodrigues, E. Wiley, K.S Noguchi, M. Roig, & A. Tang. Faculty Advisor: Ada Tang McMaster University</p>
11:30 a.m.	<p><i>Aging and the weighing of neck sensory information in the perception of verticality.</i> By: Amin Mostofinejad Co-Authors: Rachel Goodman, Damian Manzone, and Goran Perkic Faculty Advisor: Luc Tremblay University of Toronto</p>
11:45 a.m.	<p><i>Describing Picking in Wheelchair Basketball: Video and IMU Analyses</i> By: Adam Di Salvo Faculty Advisor: Scott Thomas University of Toronto</p>

Session 1C - Sport Psychology

10:45 a.m.	<p><i>"Unmasking" training habits of Men's and Womens' Varsity Basketball Players during the COVID-19 Pandemic</i> By: Tiffany Reynolds Faculty Advisor: Eryk Przynucha Lakehead University</p>
11:00 a.m.	<p><i>Hazing in Dance: An Unexpected Setting for Degrading Initiations</i> By: Edina Bijvoet Faculty Advisor: Ashley Stirling University of Toronto</p>

11:15 a.m.	<i>Sex Differences in Coping Strategies in Athletes</i> By: Rowena Cai Faculty Advisor: Katherine Tamminen University of Toronto
11:30 a.m.	<i>Athletes' experiences of neglect and their perceived effects on mental health</i> By: Bahar Dastaran Mamaghani Faculty Advisor: Gretchen Kerr University of Toronto
11:45 a.m.	<i>Punishment-induced injuries from the perspective of sports medicine clinicians</i> By: Ali Doroodchi Faculty Advisor: Ashley Stirling University of Toronto

Session 1D - Biomechanics and Sport Medicine	
10:45 a.m.	<i>A Literature Review and Study Proposal to Quantify and Compare Passive Lumbar Flexion Stiffness Before and Following Prolonged Ergometer Rowing</i> By: Kyle Farwell Faculty Advisor: Tyson Beach University of Toronto
11:00 a.m.	<i>Quantification of the Hip Joint Symmetry Using 3D CT Scan Derived Morphological Models</i> By: Ryan Lau Faculty Advisor: Timothy Burkhart University of Toronto
11:15 a.m.	<i>Considerations for assisted jump training: Maximizing the potential benefits</i> By: Brenaven Kugamoorthy Faculty Advisor: David Frost University of Toronto
11:30 a.m.	<i>Demonstrating Frontal Plane Knee Control Across More Tasks is Associated with Higher Performance</i> By: Joshua Taylor Faculty Advisor: David Frost University of Toronto
11:45 a.m.	<i>Surgical vs. Non-surgical Treatment for Femoroacetabular Impingement in Young, Physically Active Females</i> By: Margaret Harrington Faculty Advisor: Timothy Burkhart University of Toronto

Block 2: 1 p.m. – 2:30 p.m.

Session 2A - Sport Psychology and Physical Cultural Studies	
1:00 p.m.	<i>Examining How Future Healthcare Professionals Educate Themselves on Social Justice Issues That Affect Their Patients</i> By: Erin Sullivan Faculty Advisor: Simon Darnell University of Toronto
1:15 p.m.	<i>Gender-Based Violence against Trans* Individuals: A Media Analysis of Mary Gregory's Experience in Powerlifting.</i> By: Raiya Thomure Co-Authors: Aalaya Milne Faculty Advisor: Ashley Stirling University of Toronto
1:30 p.m.	<i>Investigating the link between abuse and physical activity among women university students</i> By: Sophia Chuon Gutierrez Co-Authors: Ross Murray Faculty Advisor: Catherine M. Sabiston University of Toronto
1:45 p.m.	<i>Sport and Acculturation of Chinese International Students</i> By: Jian Kun Zhan Faculty Advisor: Adam Ehsan Ali University of Toronto
2:00 p.m.	<i>Psychological Effects of Bracing or Taping of the Ankle in Jumping Athletes</i> By: Robert Colquhoun Faculty Advisor: Paolo Sanzo Lakehead University

Session 2B - Physical Cultural Studies	
1:00 p.m.	<i>Filipinos in medicine: Access to facilitators and overcoming barriers to medical education in Canada</i> By: Angela Betina Dela Cerna Faculty Advisor: Margaret MacNeill University of Toronto
1:15 p.m.	<i>Does Celebrating Multicultural Diversity through the Expression of Movement challenge Whiteness among Post-Secondary Students?</i> By: April Bayona Faculty Advisor: Janelle Joseph University of Toronto

1:30 p.m.	<p><i>Calls to Action and Settler Passivity: National Sport Organizations and the TRC</i> By: Yasmin Rajwani Co-Authors: Audrey R. Giles, Dr. Shawn Forde Faculty Advisor: Auey Giles University of Ottawa</p>
1:45 p.m.	<p><i>Digital Media & Body Awareness Project: Fitness Media and the Construction of Body Awareness by Young Women Before & During COVID-19</i> By: Nieve Iannarelli Faculty Advisor: Margaret MacNeill University of Toronto</p>
2:00 p.m.	<p><i>A Plain Language Adaptation to the Beyond Cold Water Bootcamp for Inuvialuit Communities in the Northwest Territories, Canada</i> By: Nia Contini Co-Authors: Audrey Giles Faculty Advisor: Auey Giles University of Ottawa</p>
2:15 p.m.	<p><i>Digital media and exercise during the COVID-19 pandemic: A feminist social media study of young women in the Greater Toronto Area</i> By: Jamie Le Faculty Advisor: Margaret MacNeill University of Toronto</p>

Session 2C - Skeletal Muscle Physiology and Nutrition	
1:00 p.m.	<p><i>The Influence of the Resistance Exercise Training Variable Sets on Skeletal Muscle Strength and Hypertrophy in Healthy Younger Adults: A Systematic Review and Meta-Analysis</i> By: Alysha D'Souza Co-Authors: Joshua A.J. Keough, Alexandria M. Verboom, Lydia Z. Lin, Thomas Yau, Brad S. Currier, Jonathan Mcleod, Giulia Coletta, Stuart M. Phillips Faculty Advisor: Stuart Phillips McMaster University</p>
1:15 p.m.	<p><i>Resistance training elicits increases in satellite cell content, irrespective of sex</i> By: Paul Babits Faculty Advisor: Daniel Moore University of Toronto</p>

1:30 p.m.	<p><i>The Effect of Resistance Training Load on Skeletal Muscle Strength, Hypertrophy, and Functional Outcomes, in Older Adults: A Systematic Review and Meta-Analysis</i></p> <p>By: Lydia Lin Co-Authors: Alysha D'Souza, Joshua Keogh, Alexandria Verboom, Thomas Yau, Bradley Currier, Giulia Coletta, Jonathan McLeod Faculty Advisor: Stuart Phillips McMaster University</p>
1:45 p.m.	<p><i>The impact of coactivator-associated arginine methyltransferase 1 on skeletal muscle mitochondrial morphology during fasting-induced atrophy</i></p> <p>By: Kevin Gilotra Co-Authors: Kevin Gilotra, Derek W Stouth, Tiffany L vanLieshout, Vladimir Ljubicic Faculty Advisor: Vladimir Ljubicic McMaster University</p>
2:00 p.m.	<p><i>Effect of Ketone Supplementation on Oxygen Uptake and Exercise Efficiency: A Literature Review</i></p> <p>By: Piera Rooke Co-Authors: Devin McCarthy Faculty Advisor: Martin Gibala McMaster University</p>

Session 2D - Cardio-Respiratory Physiology and Interventions

1:00 p.m.	<p><i>How Exercise Impacts School-Aged Children's Long Term Memory</i></p> <p>By: Gabriella Adibe Faculty Advisor: Julia Sinclair Carleton University</p>
1:15 p.m.	<p><i>Exploring the Mediating Role of Trait Mindfulness in the Relationship Between Estimated Cardiorespiratory Fitness and Heart Rate Variability</i></p> <p>By: Amna Ismaili Co-Authors: Maryam Marashi Faculty Advisor: Jennifer Heisz McMaster University</p>
1:30 p.m.	<p><i>The effect of 4 weeks of local lower limb heating therapy on cardiorespiratory fitness in young, healthy, recreationally active males and females</i></p> <p>By: Christina Pizzola Co-Authors: Christina Pizzola, B.Sc. Kin.; Jem Cheng, MSc.; Maureen MacDonald, PhD Faculty Advisor: Maureen MacDonald McMaster University</p>
1:45 p.m.	<p><i>Effects of Exercise on COVID-19</i></p> <p>By: Brenaven Kugamoorthy Faculty Advisor: Catherine Amara University of Toronto</p>

2:00 p.m.	<i>Pathophysiology of Extenuated Fatigue in ME/CFS and COVID-19</i> By: Mohamed Elsayed Elghobashy Co-Authors: Arthur Cheng Faculty Advisor: Arthur Cheng York University
2:15 p.m.	<i>Exploring Changes in Intermyofibrillar Mitochondria in Male and Female CARM1 mKO Mice Following Chronic Exercise</i> By: Anne-Sophie Sraka Co-Authors: Anne-Sophie J Sraka, Rozhin Raziee, Tiffany L vanLieshout, Derek W Stouth, Vladimir Ljubcic Faculty Advisor: Tiffany vanLieshout, Vladimir Ljubcic McMaster University

Session 2E - Exercise Interventions and Implications

1:00 p.m.	<i>Overview of the Rehabilitation Techniques for Patients Undergoing Recovery from Covid-19 (Sars-Cov2)</i> By: Eptehal Nashnoush Faculty Advisor: Bousquet Dalhousie University
1:15 p.m.	<i>Neck Exercise Interventions Following Cervical Spine Dysfunction and Implications for Concussion: A Narrative Review.</i> By: Genevieve Ammendolia Tomé Faculty Advisor: Michael Hutchison University of Toronto
1:30 p.m.	<i>Investigating the Impact of an Acute Exercise Break Between Online Lectures on Student Memory and Comprehension</i> By: Kobika Selvarajah Co-Authors: Michelle Ogrodnik Faculty Advisor: Jennifer Heisz McMaster University
1:45 p.m.	<i>Changes in Physical Activity and Well-being among Cancer Survivors during the COVID-19 Pandemic</i> By: Natalie Cuda Co-Authors: Tabaczynski, Allyson; Whitehorn, Alexis; Bastas, Denise Faculty Advisor: Linda Trinh University of Toronto

2:00 p.m.	<p><i>Changes in Inflammatory Cytokines and Irisin in Response to High Intensity Swimming in Adolescents versus Adult Male Swimmers</i> By: Malcolm Sanderson Co-Authors: Brandon McKinlay, Alexandros Theocharidis, Rozalia Kouvelioti, Baraket Falk, Nota Klentrou Faculty Advisor: Nota Klentrou Brock University</p>
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Block 3: 3 p.m. – 4:15 p.m.

Session 3A - Sport Psychology and Physical Cultural Studies	
3:00 p.m.	<p><i>Exploring Athletes' Experiences of Neglect in Sport</i> By: Mona Emam Faculty Advisor: Gretchen Kerr University of Toronto</p>
3:15 p.m.	<p><i>A Narrative Analysis of Diet and Nutrition Information on Instagram: A Critical Cultural Studies Perspective</i> By: Mia Workman Faculty Advisor: Margaret MacNeill University of Toronto</p>
3:30 p.m.	<p><i>Athlete identity, social identity, and anxiety symptoms among varsity athletes during severe social restrictions</i> By: Alfred Min Co-Authors: Ross Murray Faculty Advisor: Catherine M. Sabiston University of Toronto</p>
3:45 p.m.	<p><i>Exploring the Effects of Non-dual Knowing on the Anxious Self</i> By: Garima Saini Faculty Advisor: Michael Atkinson University of Toronto</p>
4:00 p.m.	<p><i>A Literature Review on the Effectiveness of Dyadic and Group Exercise Interventions</i> By: Stephanie South Faculty Advisor: Katherine Tamminen University of Toronto</p>

Session 3B - Biomechanics and Motor Learning

3:00 p.m.	<p><i>The role of trunk and lower extremity neuromuscular control contributions to non-contact anterior cruciate ligament injuries: A literature review</i> By: Anita Borhani Faculty Advisor: Timothy Burkhart University of Toronto</p>
3:15 p.m.	<p><i>Contributions of proprioception to the different phases of limb trajectory amendments</i> By: Richard Chen Co-Authors: Rachel Goodman Faculty Advisor: Luc Tremblay University of Toronto</p>
3:30 p.m.	<p><i>Representing Bodies with Missing Limbs</i> By: Klara Samuels Faculty Advisor: Timothy Welsh University of Toronto</p>
3:45 p.m.	<p><i>Ankle Mobility Influences Low-Back Control While Performing Tasks that Don't Require Ankle Mobility</i> By: Kyle Farwell Faculty Advisor: David Frost University of Toronto</p>
4:00 p.m.	<p><i>Validation of the Star Balance System against the Traditional Star Excursion Balance Test</i> By: Tiffany Tiu Faculty Advisor: Timothy Burkhart University of Toronto</p>

Session 3C - Muscle Cell Physiology

3:00 p.m.	<p><i>Investigating Adaptations in Subsarcolemmal Mitochondria in Response to Chronic Exercise in Skeletal Muscle-Specific CARM1 Knockout Mice</i> By: Rozhin Raziee Co-Authors: Anne-Sophie J Sraka, Tiffany L vanLieshout, Derek W Stouth, Vladimir Ljubcic Faculty Advisor: Vladimir Ljubcic McMaster University</p>
3:15 p.m.	<p><i>Non-invasive methods for at-home assessment of postprandial glycemic control</i> By: Beata Friesen Faculty Advisor: Jenna Gillen University of Toronto</p>

3:30 p.m.	<i>Protective Proteins in the Repeated (Contralateral) Bout Effect</i> By: Fiona Huang Faculty Advisor: Marius Locke University of Toronto
3:45 p.m.	<i>The Role of AMPK on Denervation-Reinnervation Cycling within Skeletal Muscle across the Lifespan</i> By: Stephanie Mattina Co-Authors: Sean Y. Ng Faculty Advisor: Vladimir Ljubicic McMaster University

Session 3D - Exercise Interventions and Clinical Populations	
3:00 p.m.	<i>The COVID-19 Pandemic's Influence on Physical Activity in a Cancer Survivor Population and an Apparently Healthy University Population</i> By: Brenden Degiacomo Faculty Advisor: Ian Newhouse Lakehead University
3:15 p.m.	<i>The Development of a Resistance Exercise Protocol for Concussion Rehabilitation: A Descriptive Case Series</i> By: Matthew Loenhardt Faculty Advisor: Michael Hutchison University of Toronto
3:30 p.m.	<i>The effect of exercise on anthracycline induced cardiotoxicity</i> By: Stephanie Jane Kendall Faculty Advisor: Scott Grandy Dalhousie University
3:45 p.m.	<i>Demographic, Medical, and Clinical Correlates of Moderate-to-Vigorous Physical Activity in Cancer Survivors during the COVID-19 Pandemic</i> By: Golnaz Ghazinour Faculty Advisor: Linda Trinh University of Toronto
4:00 p.m.	<i>The Impact of Resistance Training Load on Skeletal Muscle Strength and Hypertrophy in Healthy Younger Adults: A Systematic Review and Meta-Analysis</i> By: Joshua Keogh Co-Authors: Alysha D'Souza, Alexandria Verboom, Lydia Lin, Thomas Yau, Brad S. Currier, Jonathan Mcleod, Giulia Coletta, Stuart Phillips Faculty Advisor: Stuart Phillips McMaster University

Abstracts

(in alphabetical order by surname)

Adibe, Gabriella

How Exercise Impacts School-Aged Children's Long Term Memory

Faculty Advisor: Julia Sinclair

Carleton University / Faculty of Arts and Social Sciences

Children in elementary school typically sit at a desk for long periods of time and listen to their teacher dispense knowledge. There is a long history of this practice in schools and yet it remains uncertain as to whether this structure of learning supports students. Research about young people highlights the importance of exercise and body movement, however these practices are rarely incorporated into teaching and learning in the classroom. In my research project, I explore how cardiovascular training impacts elementary school aged children's long-term memory. My research finds that body breaks should be conducted in the classroom to help optimize academic performance, and supports a reevaluation of the frequency of exercise in the classroom. My findings are important for Canadian schools and suggest that educators should reconsider the facilitation of course material by having exercise compliment a child's learning style to help them store the information in their long-term memory. My findings suggest that long-term memory improves when exercise is incorporated into the learning process. In my thesis, I argue that exercise regiments should be implemented in schools to help students achieve higher marks and excel in their academic studies. The problem in Canadian schooling is that many children are not getting enough time to get up and be physically active. In my study, I argue exercise should be incorporated in teaching practices because it is a supportive way to help children with their memory and other aspects of their health. My study explores the incorporation of exercises into teaching and learning practices.

Ammendolia Tomé, Genevieve

Neck Exercise Interventions Following Cervical Spine Dysfunction and Implications for Concussion: A Narrative Review.

Faculty Advisor: Michael Hutchison

University of Toronto / Faculty of Kinesiology and Physical Education

Background: Headache, dizziness and neck pain are common symptoms of a sport-related concussion. Cervical spine dysfunction is common following concussion due to rapid head acceleration associated with the mechanism of injury. Neck exercises have been suggested as a way to help reduce neck pain. Objective: To summarize the research examining the effectiveness of neck exercise interventions for concussion rehabilitation to inform a proposed protocol delivered remotely for sport-related concussion patients. Methods: Database searches (PubMed, MEDLINE via Ovid, and Web of Science) were conducted in July and August 2020 using concussion and neck-injury key words. Data from each study was extracted and summarized, and descriptive statistics were performed. Key attributes and findings informed a proposed protocol for sport-related concussion patients. Results: Ten studies were included in this review. The average age of the study populations was 39.8 years. Patient populations were most commonly chronic neck pain (7/10), followed by concussion (2/10), and trapezius myalgia (1/10). The most common duration of the exercise interventions was 6 weeks (range= 6-12) with two sessions (range= 1-3) of physiotherapy per week. Of the ten studies, five studies focused on endurance, four studies were strength, and one study compared the effects of strength training versus endurance training. The two most frequent exercises prescribed were isometric cervical flexion and dynamic craniocervical flexion. The most frequent outcome measures evaluated were neck pain and

neck disability using self-reporting methods. Nine of the ten studies demonstrated improvement in their outcome measures. Implications: Research has consistently reported reductions in neck pain and disability. Therefore, these findings provide justification to be included in a sport-related concussion population for neck rehabilitation.

Bayona, April

Does Celebrating Multicultural Diversity through the Expression of Movement challenge Whiteness among Post-Secondary Students?

Faculty Advisor: Janelle Joseph

University of Toronto / Faculty of Kinesiology and Physical Education

While Canadian post-secondary institutions appear diverse, White norms and privileges remain hidden - one example being the lack of diversity in student and/or faculty populations. This study focuses on whether celebrating multicultural diversity through the expression of movement can help challenge Whiteness among undergraduate university students. Specifically, the study looks at whether this provides the opportunity for students to become further aware and engage in a critical reflection on Whiteness in post-secondary institutions. This study looks at three individual interviews to analyze students' experiences and thoughts when participating in movement cultures from Indigenous and racialized communities. One hour online Zoom semi-structured interviews were conducted with University of Toronto (U of T) undergraduate students who have participated in a U of T Move with Culture workshop. Participants state that while diversity is present within the U of T community, more work could be done to further diversify the faculty-professor population. Analysis of interview transcripts indicates that participating in the Move with Culture workshops has increased participants' historical knowledge, awareness, and/or appreciation of these movement cultures from Indigenous and racialized communities. Although the results are not generalizable, the author concludes that participating in the Move with Culture workshops can be a potential and effective way for students to hear the stories, voices, and experiences of individuals from Indigenous and racialized communities. Students do not explicitly engage in a critical reflection of the dominant presence of Whiteness hidden within post-secondary institutions in these workshops. However, participating in movement cultures can be an effective start towards this critical reflection by encouraging intercultural communication and awareness. Post-secondary institutions should look at implementing similar workshops so students can participate in novel experiences which can create meaningful opportunities to connect and further their awareness of various cultures from Indigenous and racialized communities.

Bijvoet, Edina

Hazing in Dance: An Unexpected Setting for Degrading Initiations

Faculty Advisor: Ashley Stirling

University of Toronto / Faculty of Kinesiology and Physical Education

Despite its notoriety, hazing is widely prevalent in a variety of different group environments, but remains especially prevalent in the sports world (Diamond et al., 2016; Fields et al., 2007; Hamilton and Scott, 2012; Hoover, 1999; Hoover and Pollard, 2000). This is likely because hazing can function to maintain a hierarchical group structure and to assert strength, both of which are inherent in sports culture. Research on hazing in sports seems to be fixated on traditional and mainstream sports, excluding other sports like dance from the research. It can be postulated that this gap may be related to dance's association with femininity, as it is well documented in the literature that hazing can serve as a platform for new members to assert masculinity (McCreary & Schutts, 2019), however this reasoning is illogical as research has shown that hazing is more closely tied to sports culture rather than gender (Hamilton & Scott, 2012). Subsequently, the purpose of this study was to gain insight into the hazing practices which occur in dance environments. Given the lack of relevant scholarly literature on hazing in dance,

this study attempts to fill a major gap in the literature. Hazing procedures, perspectives, and repercussions were examined by interviewing dancers who had experienced hazing. The methodology was qualitative, and semi-structured interviews were used during data collection. Data were analyzed using thematic analysis (Braun & Clarke, 2006), and codes were used to assist in the process of identifying themes within the data. Results for this study will be presented along with recommendations for future research. Given the devastating consequences that can ensue after hazing, it is crucial that more is learned about its association with dance such that the dance community can become more aware of the hazing that occurs in these environments.

Borhani, Anita

The role of trunk and lower extremity neuromuscular control contributions to non-contact anterior cruciate ligament injuries: A literature review

Faculty Advisor: Timothy Burkhart

University of Toronto / Faculty of Kinesiology and Physical Education

BACKGROUND: Anterior cruciate ligament (ACL) injuries are one of the most prevalent sport-related injuries, with an annual occurrence of over 250,000 in the United States alone. These injuries are disabling and costly, leading to life-long complications. Approximately 70% of ACL injuries are non-contact and often occur during landing, cutting, and pivoting tasks. The identified mechanisms of injury include non-physiologic external knee valgus and internal rotation moments, and anterior translation of the tibia. Trunk, hip, and ankle neuromuscular control have been studied independently and identified as contributing factors to these undesirable motions. **OBJECTIVE:** The purpose of this review was to describe the role of trunk and lower extremity neuromuscular deficits in non-contact ACL injuries. **FINDINGS:** Poor trunk proprioception and stability was associated with greater knee abduction moments (KAMs). Ipsilateral trunk lean and lateral trunk angle were positively associated with increased KAMs and knee abduction angles (KAAs) in those who sustained an ACL injury. Excessive ipsilateral trunk lean was suggested to be a compensatory mechanism in response to contralateral pelvis drop due to poor control of hip musculature. Hip adduction, internal rotation, and flexion upon initial contact were identified as risk factors, suggesting aberrant gluteus medius and hamstring muscles activation. Additionally, improper eccentric co-activation of the hamstrings was found to be detrimental to knee joint stiffness, increasing the tibia's susceptibility to anterior translations imposed by the quadriceps muscles. However, co-contraction of the ankle plantar flexors appears to contribute to knee joint stability and stiffness by counteracting anterior tibial translation moments and increasing joint compression. Moreover, greater ankle dorsiflexion upon initial contact was associated with a greater risk of injury. **PRACTICAL APPLICATION:** Understanding the neuromuscular contributions to non-contact ACL injuries allows for the design and implementation of injury prevention training programs to improve trunk and lower extremity control during high-risk maneuvers.

Cai, Rowena

Sex Differences in Coping Strategies in Athletes

Faculty Advisor: Katherine Tamminen

University of Toronto / Faculty of Kinesiology and Physical Education

Athletes encounter various stressors in sport, making it essential for athletes to have the ability to cope with stressors as it contributes to their performance success. There are three broad categories of coping strategies: task-, disengagement-, and distraction-oriented coping. While coping has been extensively studied, sex differences in coping in sport are not well-examined due to limited and inconclusive results. To address this issue, this study aims to examine how differences in coping between males and females can be explained by Type D personality and stress appraisal. Competitive

athletes (N = 85) were invited to complete online surveys. Participants had to be aged 16 and above (M = 22.5), who were involved in sport within the last 2 years. From these responses, 47 were female participants and 38 were male. Survey measures included (a) demographic information, (b) Type D Scale-14, (c) Precompetitive Appraisal Measure, and (d) Coping Inventory for Competitive Sport. Statistical analysis included descriptive information, correlations, and t-tests to examine the relationship between variables. Findings suggest that older athletes are less likely to exhibit Type D personality, but no correlation was found between age and the type of coping strategy used. The more years the athlete was involved in sport, the higher the primary and secondary appraisal scores. There was also a correlation between Type D personality subcomponents and coping strategies. Athletes who scored higher in negative affectivity and social inhibition tend to use less task-oriented coping but engage in more distraction- and disengagement-oriented coping. There were no statistically significant differences in appraisals or coping between male and female athletes. However, there may be a correlation between coping and Type D personality.

Cascone, Emily

The effects of breathing exercises on dyspnea in COPD

Faculty Advisor: Catherine Amara

University of Toronto / Faculty of Kinesiology and Physical Education

Increased airway resistance in chronic obstructive pulmonary disease (COPD) alters lung mechanics and increases the work of breathing. Weakened inspiratory muscles are a feature of COPD and one of the targets of pulmonary rehabilitation. Breathing exercises including yoga breathing, through their effects on relaxation as well as breathing mechanics, might improve dyspnea in COPD. This paper will investigate the impact of breathing exercises on breathing mechanics and respiratory muscle function in COPD. Secondary outcome measures include the effects of breathing exercises on psychological co-morbidities such as anxiety, and exercise tolerance. A review of literature was conducted on publications relevant to breathing exercises and its effects on shortness of breath in COPD. Related topics such as pulmonary rehabilitation, respiratory muscle strength, anxiety levels, and exercise tolerance in COPD were also reviewed. Breathing exercises have mixed effects on FEV1.0, FVC, FEV1.0 /FVC ratio, maximal inspiratory pressure (pimax), and maximal expiratory pressure (pEmax); where studies either demonstrate improvement or no effect. Completion of breathing exercises, specifically yoga breathing, reflected reduced dyspnea symptoms with no indication of worsened shortness of breath. In addition, it has generally been observed that breathing exercises improve anxiety scores, mental well-being, and exercise capacity as per the 6-minute walking test. Breathing exercises improve the observed relationship between anxiety levels, exercise capacity, and dyspnea; as the literature reports decreased exercise capacity and increased anxiety impact dyspnea. Studies show that breathing exercises can have a considerable yet variable effect on improving breathing mechanics, respiratory muscle strength, and relieving the symptom of dyspnea in COPD; with the exception of improving exercise tolerance and anxiety.

Chen, Richard

Contributions of proprioception to the different phases of limb trajectory amendments

Faculty Advisor: Luc Tremblay

Co-Author(s): Rachel Goodman

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Imagine reaching out to your alarm in the morning. As you reach to snooze, you feel pins and needles in your arms. Such lack of proprioception could impact your chances of extra minutes of sleep. It has been shown that vision and proprioception contribute differently to the different stages of planning and

control of upper-limb reaches. For instance, proprioception is used to prepare motor commands using intrinsic limb position sense (Sober & Sabes, 2006). Vision is particularly important for the online control of an ongoing action (Goodman & Tremblay, 2018; Elliott et al., 2010). However, the contribution of vision and proprioception have been suggested to differ between the initial phases of reaching (i.e., impulse regulation) versus later phases (i.e., limb-target regulation: see Elliott et al., 2010). Many studies have occluded vision to analyze visual contributions to online control. Likewise, some studies have perturbed proprioceptive feedback using tendon vibration (Ribot-Cisar et al., 1998: see also Goodman et al, 2018, 2020). Existing bodies of literature show varying support to suggestions of proprioception's important function during later phases of online control (Elliott et al., 2010). The present study used inter-trial tendon vibration to investigate the proprioceptive contributions to different phases of limb trajectory amendments. Sixteen young adults performed reaches towards three sensory target conditions (i.e., tactile, visual, bimodal). Limb trajectories were digitized using an opto-electric motion tracking system, which allowed to calculate key dependent variables (e.g., limb trajectory variability, movement endpoint biases). A within-subject, two-way repeated-measures ANOVA (2 vibration X 3 target modality) was conducted on all dependent variables. Early findings showed that participants undershot throughout the reaching trajectory with vibration as compared to without vibration. On-going analyses will assess the proprioceptive contributions to the impulse and limb-target regulation mechanisms. Overall, proprioception is expected to be important for all phases of reaching movements.

Colquhoun, Robert

Psychological Effects of Bracing or Taping of the Ankle in Jumping Athletes

Faculty Advisor: Paolo Sanzo

Lakehead University / Faculty of Kinesiology

Background: Ankle ligament injuries are among the most common musculoskeletal injuries that athletes face. This is especially true in volleyball and basketball players, who are statistically at increased risk for sustaining an injury. Ankle braces/tape have been shown to reduce the risk of sustaining an initial ankle injury, as well as the risk of reinjuring, however, there are mixed findings on the biomechanical effects of ankle bracing/taping and no research investigating the psychological effects of bracing/taping on athletes. As stress and anxiety play a role in sport performance, the purpose of this study was to examine the relationship between the use of a bracing/taping and high scores of anxiety and fear avoidance as measured by the Sport Anxiety Scale-2 (SAS-2) and Athlete Fear Avoidance Questionnaire (AFAQ). **Methods:** 23 participants were recruited (15 female, 8 male) through purposive and convenience sampling to complete each questionnaire (SAS-2 and AFAQ) under the condition "when I am wearing my brace" and "when I am not wearing my brace". Using IBM® SPSS Statistics 26, a paired samples t-test was conducted to analyze the variables of interest. **Results:** There was a statistically significant mean increase in the no brace AFAQ score compared to the braced AFAQ score, $M=3.68$, 95% CI [.79, 6.57], $t(22)=2.649$, $p=.015$, with a medium effect size. There was no statistically significant difference for the no brace SAS-2 and braced SAS-2 scores, $M = 3.86$, 95% CI [.79, 8.53], $t(22)=1.723$, $p=.100$. **Conclusion:** It can be concluded that athletes that typically use ankle bracing/taping experience higher fear avoidance when the brace/tape is not being used as demonstrated on the AFAQ questionnaire. Further research is required to fully understand the effects of bracing/taping and any biomechanical changes that occur to guide patients, clinicians, and coaches in deciding on the utility of bracing/taping.

Contini, Nia

A Plain Language Adaptation to the Beyond Cold Water Bootcamp for Inuvialuit Communities in the Northwest Territories, Canada

Faculty Advisor: Auey Giles

Co-Author(s): Audrey Giles

University of Ottawa / School of Human Kinetics

It is well documented that boating-related fatalities in the Northwest Territories (NWT) are significantly above the national average. These fatalities are exacerbated by very cold water and safety resources that lack relevance to residents of northern communities, resulting in a lack of resonance with local populations. We utilized a community-based participatory research approach to create a plain language, culturally adapted version of the "Beyond Cold Water Bootcamp" course. We conducted a focus group (n = 9) with boating safety experts to gain feedback on the first draft of the course. After making changes based on that feedback, we subsequently completed a pilot intervention online with community members in Tuktoyaktuk, NWT, and obtained their feedback through a focus group (n = 6). We analyzed the data using reflexive thematic analysis. We generated three themes from the focus group with the expert advisors: 1) demonstrating, testing, and practicing of the material should be encouraged to further understanding; 2) it is important to employ an interactive and appropriate presentation style; and 3) it is important to consider the availability of the resources in the North. We also generated three themes from the focus group with the residents of Tuktoyaktuk: 1) ice is an important concern for cold water immersion; 2) people's relationship with the land changes their willingness to take with risks, but safety interventions can be beneficial; and 3) an experienced local presenter, rather than an inexperienced southern presenter, would result in the most effective delivery of the material. These results will assist in further developing understanding of knowledge translation and mobilization for populations in Canada's North, which will hopefully contribute to lowering the incidence of boating-related fatalities.

Cuda, Natalie

Changes in Physical Activity and Well-being among Cancer Survivors during the COVID-19 Pandemic

Faculty Advisor: Linda Trinh

Co-Author(s): Tabaczynski, Allyson; Whitehorn, Alexis; Bastas, Denise

University of Toronto / Faculty of Kinesiology and Physical Education

Purpose: The COVID-19 pandemic restrictions have created challenges to physical activity (PA) participation and exacerbated existing mental health challenges of cancer survivors. The purpose of this study is to examine the associations between changes in PA and well-being in cancer survivors during the COVID-19 pandemic. Methods: An online, cross-sectional survey was administered globally to cancer survivors (≥ 18 years of age). The 20-Item Short Form Survey (SF-20) and a modified Godin Leisure Time Exercise Questionnaire were used to assess self-reported well-being and PA, respectively. Cancer survivors were categorized as non-exercisers, adopters, relapsers and maintainers based on their moderate-to-vigorous intensity PA (MVPA) levels. Paired sample t-tests compared changes in MVPA prior to and during the COVID-19 pandemic. An analysis of covariance was used to identify significant differences in well-being across the MVPA categories. Results: Cancer survivors (N=513; Mage = 48.5 ± 15.5 years) were primarily female (69.4%), were diagnosed with breast cancer (28.7%), gynecologic (11.9%) or skin (9.2%) cancer, and were 86.9 ± 83.3 months since diagnosis. Cancer survivors predominantly resided in the United Kingdom (37.0%), the United States (22.8%) and Canada (21.1%). MVPA significantly decreased during the pandemic (MDiff= - 48.1 95% CI: 32.4 - 63.7; $t(512)=6.03$, $p<.001$). There were no significant changes in mental health ($p=.22$) or social functioning ($p=.306$) between MVPA groups. Non-exercisers had significant declines in

physical functioning compared with adopters ($p < .001$), relapsers ($p = .003$) and maintainers ($p < .001$). Non-exercisers had significant declines in role functioning compared to adopters ($p = .004$), relapsers ($p = .007$) and maintainers ($p < .001$). Non-exercisers had significant declines in health perception compared to adopters ($p = .002$). Non-exercisers had significantly more pain than adopters ($p = .001$). Adopters had significantly more pain than relapsers ($p = .006$) and maintainers ($p = .005$). Conclusion: Reductions in MVPA during the COVID-19 pandemic significantly impacted well-being in cancer survivors. Health promotion should focus on increasing MVPA among cancer survivors.

Dastaran Mamaghani, Bahar

Athletes' experiences of neglect and their perceived effects on mental health

Faculty Advisor: Gretchen Kerr

University of Toronto / Faculty of Kinesiology and Physical Education

Neglect is the most common type of maltreatment in the parent-child relationship (Dubowitz, 2013) and is shown to have detrimental effects on the mental health of the child (Dubowitz & Bennett, 2007). Neglect occurs in a critical relationship when one person in a position of power fails to tend to the other person's needs for safety, security, and trust (Dubowitz, 2013). Preliminary evidence shows that neglect also occurs in coach-athlete relationships which can be very similar to a parent-child relationship in terms of authority and power (Stirling, 2009). The purpose of this study was to explore the experiences of neglect in athletes and the effects on mental health with a focus on stress, anxiety, and depression. Semi-structured interviews were used to explore the experiences of five athletes, including three Canadian national team athletes, one Varsity student-athlete, and one youth elite athlete. A qualitative analysis of the data revealed that all participants had experienced neglect, including psychological, social, educational, and physical neglect. The athletes reported several effects of neglect on their mental health, including fear of injury, fear of getting replaced by another athlete, and fear of not conforming to the "athletic body ideals". They also reported instances of decreased self-confidence, stress, anxiety, and depression when they felt their worth was devalued by their coaches. All athletes spoke about the role of the coach in influencing their mental health. To further our understanding, experiences of neglect and the influence of such experiences on mental health should be explored through an intersectional lens, and strategies to prevent such experiences should be studied.

Degiacomo, Brenden

The COVID-19 Pandemic's Influence on Physical Activity in a Cancer Survivor Population and an Apparently Healthy University Population

Faculty Advisor: Ian Newhouse

Lakehead University / Faculty of Kinesiology

Background: One measure that had to be taken to slow the COVID-19 virus was social distancing and closing non-essential businesses including gyms and cancelling all sport gatherings and events. As a result, individuals were required to self-isolate and take every pre-caution when venturing out into public. With these measures in place, it is expected that there would be a decrease of physical activity due to the new protocols and regulations set in place. Objective: The objectives of this study are to understand the impact of the pandemic on physical activity in an apparently healthy, university-aged population, and compare results to an at risk, cancer survivor population. Sub-objectives include: understanding what the determinant factors are in either increasing or decreasing physical activity; what strategies have been employed to mitigate a potential decrease in physical activity; and how have physical activity habits evolved over the course of the pandemic. Method: To be a participant, the healthy group participants must be aged 19-23 years and are apparently healthy. The participants in

the cancer survivor group must have been a participant in the WE-CAN exercise program in 2018 or 2019, and over the age of 50 years-old. This study uses a mixed methods design, quantitative data was collected first, followed by qualitative interviews. Quantitative data was collected by a Recent Physical Activity Questionnaire (RPAQ) which inquired about physical activity levels at three different periods of time: January of 2020, June of 2020, and January of 2021. Results: Preliminary analysis of the questionnaire data suggest that participants physical activity levels increased in both groups from January to June of 2020. The healthy group maintained their physical activity level from June 2020 to January 2021, whereas the cancer survivor group's physical activity levels decreased significantly by 25 percent.

Dela Cerna, Angela Betina

Filipinos in medicine: Access to facilitators and overcoming barriers to medical education in Canada

Faculty Advisor: Margaret MacNeill

University of Toronto / Faculty of Kinesiology and Physical Education

Filipinos are one of the largest immigrant communities in Canada (Stats Canada, 2020). Yet few become medical doctors (Khan et al., 2020; Young et al., 2012). Older immigrants usually start with low-wage jobs (Liboro, 2018) that may leave some of them to choose stability for their families, rather than careers with specialist entry. Medicine is financially and time demanding profession that may favor affluent ethnocultural groups (Pitre et al., 2020; Reiter et al., 2012). The purpose of this research was to uncover opportunities and challenges Filipino-identified medical students and physicians have experienced during their scholarly journey into a medical career. Elements, such as generation of immigration, support network, educational and extracurricular experiences are examined to unwrap reasons of current statistics. Semi-structured interviews were conducted via Zoom. Participants were recruited by posts on the Filipino Association of Medical Students (UT) social media pages. Participants included eight medical students and six physicians who identify as Filipino. Primary results show that participants were either born in Canada or moved at a young age. Their language preference was English, but all have foundational knowledge of the Filipino language or related dialects. They revealed they were deeply involved in extracurricular activities throughout high school and university. Parental support was common for all interviewees. One of the strongest facilitators of entry into medicine was the support network of peers from their respective undergraduate programs. Filipino immigrants, who were raised in the Canadian education system, were also most likely to pursue a medical career due to early familiarity with the application process, time to seek resources, and obtain requirements and awards. The underrepresentation of Filipino mentors as physicians served as significant barriers during the journey, however participants demonstrated great perseverance and resilience during the complicated application process with the support of families and strong networks.

Di Salvo, Adam

Describing Picking in Wheelchair Basketball: Video and IMU Analyses

Faculty Advisor: Scott Thomas

University of Toronto / Faculty of Kinesiology and Physical Education

Success in wheelchair basketball is strongly correlated to on-court mobility performance in tasks such as picking (Veegar et al, 2019). Picking is an offensive blocking technique used to generate a teammate scoring opportunity. Video is commonly used to identify and describe on-court movements (Mason et al, 2014; van der Slikke et al, 2015), however analysis is labor intensive and cannot provide in-game analysis. A three inertial measurement unit (IMU) setup may allow for rapid and less labour-intensive characterization of mobility performance in wheelchair basketball (Shepherd et al 2016; van

der Slikke et al, 2015). The objectives were to: 1) develop a systematic SportCode based description of picking; 2) determine if on-court picking movements yield a signature IMU output that can be used to classify mobility performance. The study cohort (n=6; male) were national team athletes from Japan (n=3) and Canada (n=3). The athletes' IWBP functional classification ranged from 1.5 - 4.5. Data was collected from three games, with one athlete on each team equipped with a three-IMU setup (right wheel, left wheel, frame) per contest. SportsCode was used to tag picking for athletes equipped with a three-IMU. Picking instances were flagged as successful, unsuccessful, or undetermined, and the athletes identified as the picker or pickee. IMU data was analyzed to extract speed and rotation data for each athlete (MATLAB). The tagged video data time points were synchronized with the three-IMU outputs to determine if mobility performance can be quantified by speed and rotation signatures. Canadian athletes averaged 20.3 picks per game (ppg) with an average success rate of 30%. Japanese athletes averaged 5.6 ppg with an average success rate of 30%. Systematic classification with SportsCode was possible but required approximately 5 minutes per pick to analyze, for an average of 130 minutes per game. IMU results will be presented.

Doroodchi, Ali

Punishment-induced injuries from the perspective of sports medicine clinicians

Faculty Advisor: Ashley Stirling

University of Toronto / Faculty of Kinesiology and Physical Education

Enduring challenging exercises in training is a significant aspect of an athlete's life as it allows the athletes to improve their performance. An adverse practice in sports is the occurrence of physical conditioning as punishment, and its use as a consequence of inadequate performance or undesirable behaviour. These experiences can harm the athlete by causing physical pain and discomfort (Canadian Centre for Ethics in Sports). The use of physical conditioning as punishment in sports negatively affects the psychological, social, and physical wellbeing of the athletes through various pathways, including possible physical injury (Battaglia et al., 2020). Diversified pathways for punishment induced injuries makes its recognition challenging in a clinical setting. Sport medicine clinicians play an important role in the prevention, recognition and treatment of athletic injuries, but it is unclear what role they may play in the prevention and intervention of the use of punishment-induced training injuries. To understand how punishment induces injuries are recognized and treated by sports medicine clinicians, semi-structured interviews were completed with 11 sports medicine clinicians (n = 11), and the collected data were thematically analyzed. Results for this study will be presented along with recommendations for future research

D'Souza, Alysha

The Influence of the Resistance Exercise Training Variable Sets on Skeletal Muscle Strength and Hypertrophy in Healthy Younger Adults: A Systematic Review and Meta-Analysis

Faculty Advisor: Stuart Phillips

Co-Author(s): Joshua A.J. Keough, Alexandria M. Verboom, Lydia Z. Lin, Thomas Yau, Brad S. Currier, Jonathan Mcleod, Giulia Coletta, Stuart M. Phillips

McMaster University / Department of Kinesiology

The ideal resistance exercise training (RET) program for eliciting optimal increases in muscular strength and hypertrophy is a controversial topic. There are a multitude of variables that can be manipulated when designing RET programs, one being the number of sets completed per exercise. The American College of Sports Medicine currently advises healthy adults to complete 2-4 sets per exercise targeting a specific muscle group; however, the evidence required to justify this recommendation is surprisingly limited. Research has continued to yield conflicting results regarding

whether multi-set training elicits greater increases in muscle strength and hypertrophy than single-set training. Thus, the primary objective of this systematic review and meta-analysis is to look at the intervention sets and compare how the use of single and multiple sets during RET affects the outcome measures of muscular strength and muscular hypertrophy in a young, healthy adult population aged between 18-54 (inclusive) years. We will use a random-effects meta-analysis and meta-regression to identify how three a priori determined covariates - training status, biological sex, and training to volitional fatigue - influence the effect of set manipulation on gains in muscle strength and hypertrophy. In collaboration with a library scientist, Medline, Embase, Emtree, CINAHL, SPORTDiscus, and Web of Science databases were systematically searched on October 5, 2020. Only randomized controlled trials that investigated the manipulation of the RET variable sets in healthy young (≤ 54 years) adults for ≥ 6 weeks were included in this review. To mitigate the risk of bias, two researchers independently completed title-abstract screening, full-text screening, and data extraction, and a third independent reviewer resolved any conflicts. 28,732 articles were identified through database searching, of these articles 16,497 were removed as duplicates and 11,521 were excluded during title-abstract screening. Data extraction is ongoing; however, the results will be ready to present by the conference date.

Elsayed Elghobashy, Mohamed

Pathophysiology of Extenuated Fatigue in ME/CFS and COVID-19

Faculty Advisor: Arthur Cheng

Co-Author(s): Arthur Cheng

York University / Faculty of Health

There are increasing reports that COVID-19 infection results in persisting long-term symptoms including muscle fatigue and pain as well as symptoms of depression, and an inability to perform daily tasks. These symptoms from SARS-CoV-2 infection are closely associated with those from myalgic encephalomyelitis and chronic fatigue syndrome (ME/CFS), with ME/CFS characterized by ≥ 6 months of feelings of chronic exhaustion, whereby exercise-induced fatigue is triggered by even low levels of physical activity. The evidence of previously studied infections that link similarities in ME/CFS symptoms compared to those infected by SARS CoV-1, H1N1, and a number of other infections, makes it compelling to hypothesize the presence of connected underlying mechanisms of these diseases. This paper aims to elucidate the physiological connections between empirical data and conclusions that have previously been explored in order to identify the mechanisms causing extenuated fatigue. The results of our investigation showed a dysregulation of sympathetic and parasympathetic controls in ME/CFS patients, which ultimately leads to cardiovascular dysregulation causing reduced blood flow to skeletal muscles during physical activity. The presence of irregularities in the metabolic functioning and impairments in central activation of patients opens the door for questions into how the accumulation of metabolites and the hypoxic conditions created by reduced blood flow could be the trigger behind extenuated muscle fatigue in COVID-19 as well as ME/CFS patients.

Emam, Mona

Exploring Athletes' Experiences of Neglect in Sport

Faculty Advisor: Gretchen Kerr

University of Toronto / Faculty of Kinesiology and Physical Education

Despite the growing attention on sexual abuse among athletes, other forms of maltreatment, specifically neglect, remain under-studied. As a form of relational maltreatment, neglect is a failure to fulfill an individual's needs, trust, and sense of security in a critical relationship (Zeanah & Humphreys, 2018). A prevalence study revealed that 67% of current Canadian national team members and 76% of retired members reported having experienced at least one form of neglect (Kerr et al., 2019). While the

findings highlight the occurrence of neglect in sports, researchers have yet to explore the nature of athletes' experiences of neglect in sport. This study sought to address this gap by investigating the nature of athletes' experiences of neglect in sport. Semi-structured interviews were conducted with 3 former female national team athletes and 1 retired male, interuniversity athlete. Through a thematic analysis (Gavin, 2008), the findings indicated that the athletes experienced various forms of neglect in regards to their physical, social, educational, and psychological needs. Specifically, lack of attention to injury management, inequitable treatment, disregard of educational needs, and failure to attend to psychological challenges related to the body were among the athletes' reported experiences of neglect, all attributable to the behaviour of the coaches. These findings indicate that the athletes' experiences of neglect may take various forms and that further research to explore the effects of such incidents and preventative strategies is recommended.

Farwell, Kyle

A Literature Review and Study Proposal to Quantify and Compare Passive Lumbar Flexion Stiffness Before and Following Prolonged Ergometer Rowing

Faculty Advisor: Tyson Beach

University of Toronto / Faculty of Kinesiology and Physical Education

Background: The resistance being offered collectively by intervertebral discs, ligaments and inactive muscles to lumbar spine flexion is referred to as passive flexion stiffness (PFS). Repetitive lifting alters PFS, which has been hypothesized to increase low back injury potential. Like when repetitive lifting, competitive rowers flex their spines repeatedly while external forces are applied to the hands; this may relate to high rates of low back pain and injury reporting in rowers. The objective was to review the literature and design a study to answer the question: does prolonged ergometer rowing alter PFS? Methods: Competitive rowers (equal number females and males) with no recent history of low back pain will be recruited. They will be instrumented with skin-mounted reflective markers and surface electromyography electrodes to quantify lumbar spine flexion/extension motion and trunk flexor/extensor muscle excitation, respectively. Before and following a 60-minute ergometer rowing protocol, PFS will be quantified based on moment-angle curves derived using established methods. Although pilot work will be used to select dependent variables to be incorporated in statistical analysis, the following moment-angle curve quantities will be used to derive them: (1) breakpoints; (2) maximum spine flexion angle; and (3) maximum applied flexion moment. Rowing will be controlled at a stroke rate of 18-20 strokes per minute and a heart rate of 130-150 beats per minute, as this is standard intensity for long ergometer training sessions and is an established experimental method. A general linear model with one within-participant factor (time = pre vs. post) will be used to compare dependent variables. Expected Results: It is hypothesized prolonged ergometer rowing will reduce PFS, which will be reflected as pre- to post-ergometer: (1) widening and/or right-shifting of breakpoints; (2) greater maximum spine flexion angles; and (3) lower applied flexion moment.

Farwell, Kyle

Ankle Mobility Influences Low-Back Control While Performing Tasks that Don't Require Ankle Mobility

Faculty Advisor: David Frost

University of Toronto / Faculty of Kinesiology and Physical Education

Background: Ankle mobility can influence low-back kinematics and kinetics, and thus, low-back injury potential. In contrast to previous work focused on passive mobility, this study also examined the role of active mobility, which is influenced by coordination, strength, and body-awareness. Current research has not thoroughly examined the influence of active and passive ankle mobility on low-back control

among varsity athletes. This study examined the association between active and passive ankle mobility measured via a mobility screen and low-back control assessed while athletes performed a battery of general movement tasks that did and did not require ankle mobility. Methods: Male and female varsity athletes (n = 198) had their ankle mobility and low-back control assessed with a mobility screen and movement screen, respectively. Mobility was categorized as active, passive, or no passive. The movement screen consisted of 15 squatting, lunging, hinging, pushing and pulling tasks with varying loads, work durations and tempos. A low-back control score out of 15 was assigned based on the number of tasks completed while maintaining a neutral low-back curvature. The mean low-back control score was compared between active, passive, and no passive ankle mobility groups. Scores were further distinguished between tasks that did and did not require ankle mobility. Results: Low-back control scores were significantly higher amongst groups with active ankle mobility in comparison to those having passive mobility only, whether the comparison tasks required ankle mobility or not. Mean low-back scores were also significantly higher amongst the passive mobility group in comparison to those without passive ankle mobility. Conclusion: Ankle mobility influences low-back control; however, this relationship appears independent of whether ankle mobility was required or not. Possessing passive ankle mobility does not appear to positively influence low-back control as much as active ankle mobility. Therefore, mobility-focused interventions should integrate active tasks for maximal benefit.

Friesen, Beata

Non-invasive methods for at-home assessment of postprandial glycemic control

Faculty Advisor: Jenna Gillen

University of Toronto / Faculty of Kinesiology and Physical Education

Introduction: Exaggerated blood glucose and insulin excursions following carbohydrate consumption are characteristic features in individuals at risk for type 2 diabetes (T2D). A common method for detecting postprandial hyperglycemic and hyperinsulinemic excursions is the oral glucose tolerance test (OGTT), which involves repeated blood sampling via an intravenous catheter over 3h following ingestion of a 75g glucose drink. However, this test is time consuming and physically invasive due to ~3h of blood sampling required, which contributes to both high patient burden and healthcare costs. As a result, measurement of fasting blood glucose remains the most common diagnostic tool, however, it is not as sensitive for identifying individuals at early stages of disease development. Thus, developing new methods that address limitations of traditional OGTTs may enhance our ability to detect individuals at risk of developing T2D. The aim of this project is to determine: 1) if an at-home OGTT with repeated breath and saliva samples can provide an index of postprandial glycemic control; and 2) whether differences in glycemic control can be detected between normal-weight and obese adults. Methods: Following a 12-h overnight fast, normal-weight (n=20; 18-25kg/m²) and obese (n=20; ≥30kg/m²) adults will meet an investigator via videoconferencing and consume a 75g glucose drink enriched with 75mg (0.1%) [U-13C₆] D-glucose. Breath, capillary glucose, and saliva samples will be collected by participants at-home once fasted, and every 30 min following the drink for 3 h. Breath samples will be analysed for 13C excretion (index of glucose oxidation) via IRMS and salivary samples analyzed for insulin concentration via ELISA. Anticipated Results: We hypothesize that postprandial 13C breath excretion will be lower, and insulin concentration higher, in obese adults compared to normal-weight adults. This study will determine if an at-home OGTT can detect postprandial hyperglycemia and hyperinsulinemia, which has implications for early detection and screening of T2D.

Ghazinour, Golnaz

Demographic, Medical, and Clinical Correlates of Moderate-to-Vigorous Physical Activity in Cancer Survivors during the COVID-19 Pandemic

Faculty Advisor: Linda Trinh

University of Toronto / Faculty of Kinesiology and Physical Education

Background: Engaging in at least 150 minutes of moderate-to-vigorous physical activity (MVPA) has been shown to have many benefits for physical and mental health of cancer survivors. However, the COVID-19 pandemic has placed additional challenges to physical activity (PA) participation. It is important to understand the correlates of PA to help identify individuals who are less likely to meet MVPA guidelines and should be prioritized in PA interventions. Therefore, the purpose of this study was to investigate the demographic, clinical, and medical correlates of changes in MVPA participation during the COVID-19 pandemic in cancer survivors of mixed diagnosis. Method: A cross-sectional, online survey was distributed to cancer survivors internationally. PA levels prior to and since the pandemic were assessed via self-report using a modified version of Godin Leisure Time Exercise Questionnaire. Demographic (e.g., age, ethnicity), medical and clinical data (e.g., type of cancer) were measured via self-report. Multinomial logistic regression analysis was used to examine demographic, clinical, and medical correlates of MVPA across MVPA change classifications of non-exercisers, adopters, relapsers, and maintainers. Results: Cancer survivors (N=501) were mainly female (71.3%), White (91.0%), had a mean age of 49.1±15.6 years, and were primarily diagnosed with breast cancer (29.7%). Compared with non-exercisers, adopters were more likely to have higher education (OR=0.23, 95% CI=0.05-0.99, p=.048) and have not received radiation treatment (OR=2.74, 95% CI=1.07-7.02, p=.04). Compared with adopters, maintainers were more likely to have received radiation treatment (OR=0.34, 95% CI=0.13-0.91, p=.03) and diagnosed >5 years ago (OR=0.44, 95% CI=0.20-0.98, p=.04). Compared with relapsers, maintainers were more likely to be diagnosed >5 years ago (OR=0.47, 95% CI=0.26-0.84, p=.01). Conclusion: The COVID-19 pandemic restrictions have impacted PA participation for cancer survivors. To increase PA adoption, interventions should focus on individuals who are less educated, received radiotherapy, and are within the early survivorship period.

Gilotra, Kevin

The impact of coactivator-associated arginine methyltransferase 1 on skeletal muscle mitochondrial morphology during fasting-induced atrophy

Faculty Advisor: Vladimir Ljubicic

Co-Author(s): Kevin Gilotra, Derek W Stouth, Tiffany L vanLieshout, Vladimir Ljubicic

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Introduction: The enzyme coactivator-associated arginine methyltransferase 1 (CARM1) is known to catalyze the methylation of various target proteins, thereby altering various cellular processes. Some conditions that induce skeletal muscle atrophy, such as aging, have been shown to greatly reduce mitochondrial size, number and density within both the subsarcolemmal (SS) and intermyofibrillar (IMF) regions of muscle fibres. However, the mechanistic role of CARM1 during mitochondrial plasticity remains to be elucidated. Thus, the purpose of this study is to examine the effect of CARM1 on mitochondrial morphology under fasting-induced conditions. Methods: Wild-type (WT) and skeletal muscle-specific CARM1 knockout (mKO) mice were either fed or fasted for 48 hours. The tibialis anterior muscle was fixed and prepared for transmission electron microscopy assessment. Ten representative micrographs from a unique fibre containing a portion of the SS region adjacent to the nucleus with most of the image containing the IMF area were acquired at ×15 000 magnification. Quantification of mitochondria size and number in SS and IMF regions was achieved by manually outlining and counting mitochondria in Image J. Results: Mitochondria area and number did not differ between WT and mKO animals after 48 hours of fasting. Discussion: Our results suggest that CARM1

is dispensable for mitochondrial remodeling in response to food deprivation. Conclusion: This study furthers our understanding of CARM1 biology during skeletal muscle plasticity.

Gutierrez, Sophia Chuon

Investigating the link between abuse and physical activity among women university students

Faculty Advisor: Catherine M. Sabiston

Co-Author(s): Ross Murray

University of Toronto / Faculty of Kinesiology and Physical Education

Intimate partner violence (IPV) is defined as any act(s) committed by an intimate partner causing physical, emotional, or sexual harm to the other partner in an intimate relationship. Studies suggest that one in three Canadian women are at lifetime risk and that much of this violence is perpetrated by men against women. Generally, IPV is associated with significantly higher levels of stress in women survivors compared to women who do not report IPV. Various forms of physical activity (PA) have been shown to be an effective coping strategy for stress in some women survivors of IPV, yet most of the evidence is based on qualitative interviews. Thus, the present study describes the prevalence of IPV among university women students, and explores links between stress, theoretically informed PA beliefs, and PA behavior using data from the National College Health Assessment II (ACHA-NCHA) collected by the University of Toronto. Students [N=4752; 67.4% women] across all three campuses participated in the anonymous cross-sectional survey to understand their health and PA behaviors and beliefs. A total of 275 women reported having experienced either emotional, physical or sexual abuse from an intimate partner in the 12 months prior to the survey. Women who experienced any IPV (emotional, physical, or sexual abuse) reported significantly ($p < .001$) higher stress compared to women who did not report IPV. Women students who reported having experienced physical abuse were less likely to believe that PA helps them manage stress. However, women who believed that PA helps them manage stress were more likely to engage in moderate-to-vigorous PA (MVPA), as well as resistance training. Regardless of the type of IPV experience, belief that PA is a helpful stress management strategy ($\beta = .27, p < .001$) and confidence to engage in PA ($\beta = .22, p < .001$) were significant

Harrington, Margaret

Surgical vs. Non-surgical Treatment for Femoroacetabular Impingement in Young, Physically Active Females

Faculty Advisor: Timothy Burkhart

University of Toronto / Faculty of Kinesiology and Physical Education

Background: Femoroacetabular impingement (FAI) occurs when extra bone grows on the femur, the pelvis, or both; this can result in pain and decreased function. FAI predisposes the hip to cartilage damage and osteoarthritis. Traditionally, FAI was diagnosed and studied primarily in young athletic males. However, physically active females are also at risk of developing FAI. The primary goal of surgical and non-surgical treatments for FAI is to restore native hip joint biomechanics. Purpose: To compare patient-reported outcome measures (PROMs) and biomechanical outcomes between surgical and non-surgical female FAI patients. Methods: This study will include physically active females between the ages of 18 and 27 diagnosed and treated for FAI more than two years ago (40 surgical and 40 non-surgical patients). They will be aged-matched with 40 healthy control participants. An online survey will include five PROM questionnaires to evaluate participants' hip function, pain, physical activity, and quality of life. The participants will also submit a video of themselves performing two functional tasks (squat and side lunge). Motions at the hips, knees, and ankles will be quantified. Anticipated Results: I expect to find that there will be a positive correlation between greater hip motion and improved PROMs across all three groups. I also predict that there will be less hip motion and

greater motion at the knee and ankle in non-surgical patients compared to surgical patients. Significance: This study will help fill the gaps in knowledge related to the efficacy of FAI treatments in the young, active female population. This information will be translated to the clinicians allowing them to develop sex-specific approaches to FAI treatment. Ultimately, this will reduce symptoms and improve function, allowing FAI patients to maintain their participation in physical activity, which is critical to preventing progression to osteoarthritis.

Huang, Fiona

Protective Proteins in the Repeated (Contralateral) Bout Effect

Faculty Advisor: Marius Locke

University of Toronto / Faculty of Kinesiology and Physical Education

Conditioning skeletal muscle with just a few lengthening contractions (LCs) prior to a subsequent greater number of LCs results in a protective phenomenon known as the repeated bout effect (RBE). Interestingly, while the RBE is conferred primarily on the ipsilateral (same side), there have also been reports suggesting an RBE for the contralateral limb, thereby resulting in a contralateral repeated bout effect (CL-RBE). While the exact mechanisms responsible for the RBE remain undetermined, cellular changes have been suggested. In agreement with this, as few as 5 LCs are known to elevate skeletal muscle heat shock protein (HSP) content, including $\alpha\beta$ -crystallin. Thus, HSPs may play a role in the RBE. The purpose of this study is to assess the relationship between RBE/CL-RBE and HSP content. To do this, tibialis anterior (TA) muscles from male Sprague-Dawley rats ($n=20$) were divided into three groups: 1) a preconditioned group where one TA muscle was subjected to 10LCs and 24 hours later both the preconditioned-limb (PC) and the non-preconditioned contralateral limb (NCL) were subjected to 60LCs; 2) A separate non-preconditioned group (N-60), where only one TA muscle was subjected to 60 LCs; 3) a control group (no contractions; CON). Twenty-four hours following the final contractions, rats were anesthetized, TA muscles were removed, and frozen in liquid nitrogen, and prepared for various analyses. As expected, HSP content was increased in all TA muscles following 60 LCs. When passive and active torque were examined and expressed as a percentage of the first contraction, statistically significant differences between groups were not detected. When compared to N-60, the NCL group did not appear to elicit any elevated recovery. These data suggest that 10 LCs do not confer a CL-RBE.

Huynh, Eric

Is there an association between global cognitive function and heart rate variability in individuals with stroke?

Faculty Advisor: Ada Tang

Co-Author(s): K. Moncion, L. Rodrigues, E. Wiley, K.S Noguchi, M. Roig, & A. Tang.

McMaster University / Faculty of Science

Introduction. Cognitive function is associated with cardiac autonomic function among older adults, but this association has not been examined in stroke. Thus, we examined if global cognitive functioning could predict cardiac autonomic function, as measured by heart rate variability (HRV) in individuals post-stroke. Methods. For this cross-sectional analysis, individuals were ≥ 6 months post-stroke and between 40-80 years old. Participants were fasted and asked not to consume caffeine or smoke 12-hours prior to HRV assessments. Heart rate (HR) data was collected using 3-lead electrocardiogram after 10-minutes of supine rest. A 5-minute HR segment was used to quantify HRV in the time (e.g., standard deviation between normal heartbeats [SDNN] and the root mean square of successive differences between normal heartbeats [RMSSD]) and frequency domains (very-low frequency [VLF], low-frequency [LF], high-frequency [HF] and low-frequency/high-frequency ratio [LF/HF]), for all

measures, higher values indicate greater autonomic function. Global cognitive function was measured using the Montreal Cognitive Assessment (MoCA). Linear regression analyses were used to examine the association between each HRV measure and MoCA scores. Results. Thirty-four participants (n=11 female, mean±SD age 63.8±10.0 years and 4.9±3.9 years post-stroke), were included in this analysis. Median MoCA score was 23 (IQR:6). Participants had a mean SDNN: 26.8±17.9ms, RMSSD: 27.6±21.4ms, VLF: 79.9±95.4ms², LF: 456.9±823.6ms², HF :379.1±651.0ms² and LF/HF ratio:2.3 ± 2.0. MoCA was not associated with SDNN (F(1,32)=0.49, p=0.49), RMSSD (F(1,32)=0.44, p=0.51), VLF (F(1,32)=0.00, p=0.98), LF (F(1,32)=0.65, p=0.43), HF (F(1,32)=0.76, p=0.39), LF/HF ratio (F(1,32)=0.00, p=0.97). Discussion. Individuals with stroke have impaired cardiac autonomic function as measured by HRV. In contrast to our hypothesis, MoCA was not associated with HRV. This suggests that the MoCA may not be a useful tool for identifying individuals with impaired autonomic function. Our results should be interpreted with caution due to our high functioning sample, which may not reflect the broader post-stroke population.

Iannarelli, Nieve

Digital Media & Body Awareness Project: Fitness Media and the Construction of Body Awareness by Young Women Before & During COVID-19

Faculty Advisor: Margaret MacNeill

University of Toronto / Faculty of Kinesiology and Physical Education

The COVID-19 pandemic has impacted every aspect of our lives, including how fitness is pursued. Research about sport/fitness and women-targeted media reveals women's bodies are usually sexualized and represented through white heteronormative frames of reference (Frederickson and Roberts, 1997). Observing idealized images has negative effects on the body image and awareness of young women (Fardouly and Holland, 2018). For example, negative self-image has been linked to mental health problems (e.g. disordered eating, eating disorders and depression (Harper and Tiggerman, 2008) and media consumption perpetuates cultures of stigma (Bruce, 2013). Digital media consumption is increasing among young adults (Calogero, 2012) and within this consumption, objectified representations of women tend to focus on depictions of women in their 20s and 30s (Calogero, 2012). The purpose of this study is to investigate how media representations of women affect the body awareness of young women, ages 18-25, who are casually physically active before and during COVID-19. A feminist lens will be used to analyze data to question what gender inequalities exist in active media productions. The research design includes semi-structured interviews via Zoom and photo elicitation to evoke discussions about fitness media. Inductive and deductive thematic coding is being applied to the interview transcripts. Preliminary findings reveal: (1) diverse reactions to similar fitness content based on factors such as mood, (2) 'self confidence' is closely tied to with the likeness of how one's body adheres to body expectations and ideals reflected in media, (3) enhancing appearance remains the key motivation for exercising to obtain social capital, thus compulsory heterosexism remains a dominant media code online. This presentation will conclude with a comparison of pre-COVID and COVID responses, as well as recommendations for further research, media practice to foster healthy online fitness culture, and extending concepts of 'self-confidence' to 'social confidence' development in online communities.

Ismaili, Amna

Exploring the Mediating Role of Trait Mindfulness in the Relationship Between Estimated Cardiorespiratory Fitness and Heart Rate Variability

Faculty Advisor: Jennifer Heisz

Co-Author(s): Maryam Marashi

McMaster University / Faculty of Kinesiology

Introduction: Mindfulness is defined as paying attention purposefully and non-judgementally to the present moment (Shearer et al., 2016). High heart rate variability (HRV) at rest has been established as an indicator of favourable response to environmental stress (Thayer et al., 2012). Mindfulness meditation has been shown to enhance HRV in controls following a stress-inducing cognitive task (Azam et al., 2015). Furthermore, regular engagement in moderate and vigorous-intensity physical activity (PA) is associated with high resting HRV (Rennie et al., 2003). Mindfulness-based interventions are shown to significantly increase cardiorespiratory fitness (CRF) levels in sedentary adults, which is a physiological adaptation to chronic PA (Martin et al., 2015). The purpose of this study is to determine if trait mindfulness (TM) partially mediates the relationship between CRF and HRV in graduate students. It is expected that TM will explain significant variance in the relationship between CRF and HRV.

Methods: 23 out of 67 thesis-based graduate students have been included in the current analyses. The study follows a cross-sectional design wherein participants with varying levels of estimated CRF and TM are assessed for their resting HRV. Estimated CRF is measured using a 6-minute walking test and resting HRV is measured using a validated smartphone application. Results: Preliminary findings show a trending negative relationship between trait mindfulness and HRV ($r = -0.10$, $p = 0.32$), a trending positive relationship between TM and CRF ($r = 0.20$, $p = 0.18$), and a significant positive relationship between CRF and HRV ($r = 0.47$, $p < 0.05$). Mediation analysis is still to be completed to determine whether TM partially mediates the relationship between CRF and HRV. Conclusion: The findings from this study aim to discover whether there is an interactive and synergistic relationship between TM and CRF in enhancing a physiological proxy of favourable stress management.

Kendall, Stephanie Jane

The effect of exercise on anthracycline induced cardiotoxicity

Faculty Advisor: Scott Grandy

Dalhousie University / Kinesiology

There is a gap in the research regarding the effects of exercise on anthracycline induced cardiotoxicity. Anthracyclines, a chemotherapeutic drug, cause cardiotoxicity indicated by left ventricular dysfunction. Currently, there is no treatment to prevent the cardiotoxic effect of anthracyclines, but the literature suggests that exercise may be an effective treatment. However, the majority of research on this subject has been conducted in animals thus, there is a need to confirm these results in cancer survivors. Therefore, the purpose of this research project is to determine if a 12-week multi-mode exercise intervention improves heart health in cancer survivors who have been prescribed anthracyclines. A retrospective analysis will be conducted based upon data collected by the ACCESS (Activating Cancer Communities through an Exercise Strategy) study. 6-minute walk test data, a predictor of aerobic fitness, will be used as a proxy measurement for heart health. A control group, consisting of cancer survivors who never received anthracyclines, and an anthracycline group will be randomly formed from the ACCESS database. The percentage improvement in 6-minute walk test data will be compared at baseline and post-exercise intervention levels. Because of the results found in the pre-clinical research, the control group will likely have greater improved changes in their heart health when compared to the anthracycline group, but the anthracycline group will still see some improvements. This research, if proven statistically, would offer evidence to support the cardiotoxic effect of anthracyclines. Such

results would suggest that exercise is an effective treatment to mitigate the damage caused by anthracyclines that cancer survivors experience.

Keogh, Joshua

The Impact of Resistance Training Load on Skeletal Muscle Strength and Hypertrophy in Healthy Younger Adults: A Systematic Review and Meta-Analysis

Faculty Advisor: Stuart Phillips

Co-Author(s): Alysha D'Souza, Alexandria Verboom, Lydia Lin, Thomas Yau, Brad S. Currier, Jonathan Mcleod, Giulia Coletta, Stuart Phillips

McMaster University / Faculty of Kinesiology

Background: Heavier-loads (HL) are widely considered sufficient and necessary to optimize resistance training (RT)-induced gains in skeletal muscle strength and hypertrophy. While RT, in novices, with any load can increase strength, RT employing HL may yield greater increases in strength and hypertrophy than RT with lighter-loads (LL). However, researchers have recently suggested that maximal hypertrophy can be achieved irrespective of RT load when performed to volitional fatigue. Objectives: The aim of this systematic review and meta-analysis is to determine if RT with HL versus LL promotes superior increases in muscle strength and hypertrophy in healthy adults. The secondary objective is to ascertain whether training status impacted the effects of manipulation of RT load. Methods: A systematic search of Medline, Embase, Emcare, CINAHL, SPORTDiscus and Web of Science was designed and executed according to the PRISMA guidelines. Included articles were randomized control trials (RCT) ≥ 6 weeks in duration evaluating the effects of RT load on skeletal muscle strength or hypertrophy. Articles were excluded if they contained: a) Persons < 18 or > 54 years old; b) Persons with, or at risk, for common chronic diseases with comorbidities; c) Persons that were injured or hospitalized; d) Obese or overweight participants; e) Non- RCT; f) Non-English text. The initial search captured 12,235 articles; following title/abstract and full text screening, eligible studies were included in the meta-analysis. Hypothesis: We hypothesize that HL RT will favour RT-induced increases in strength, and both HL and LL conditions will yield similar improvements in hypertrophy when performed to volitional fatigue. Our secondary hypothesis is that training status will influence the impact RT load has on strength and hypertrophy gains, such that trained individuals need to train with HL to attain the same relative benefits. Results: Data extraction is still underway, but full results will be available at the conference.

Kiwan, Marium

Is cardiovascular disease risk elevated in older Canadian adults with osteoarthritis?

Faculty Advisor: Dylan Kobsar

McMaster University / Department of Kinesiology

Introduction: Osteoarthritis (OA) is a degenerative joint disease and the leading cause of physical disability in Canadians. Moreover, cardiovascular disease (CVD) is the leading cause of death in the OA population and while CVD risk is often calculated using the Framingham risk score (FRS), its utility in OA populations is unclear. Therefore, the purpose of this study was to explore differences in the FRS between older Canadian males and females with and without OA. Methods: 16,872 participants over the age of 45, with no previous CVD diagnosis were curated from the baseline comprehensive dataset of the Canadian Longitudinal Study on Aging. The FRS was calculated based on the Canadian Cardiac Society criteria and compared between males and females with and without OA using a two-way analysis of covariance (ANCOVA) at an alpha level of 0.05, while controlling for the effect of age. Results: The FRS was greatest in OA males ($M=13.4$, $SD=3.5$), followed by healthy males ($M=12.1$, $SD=3.9$), OA females ($M=10.8$, $SD=4.1$), and healthy females ($M=9.0$, $SD=4.4$). After controlling for

age, the interaction effect was limited but remained significant ($p=0.04$). Specifically, we found significant differences ($p<0.001$) with large effect sizes ($d>0.86$) all post hoc comparison between males and females, regardless of OA status. However, when comparing OA males to healthy males, no significant differences were observed in FRS ($p=0.77$). Similarly, while OA females had a higher FRS than healthy females ($p<0.001$), this related to a minimal effect size ($d=0.12$). Conclusions: Males have an increased FRS as compared to females, but unexpectedly, the addition of OA status does not appear to result in a meaningful increase in risk. Longitudinal analyses are needed to determine if the true incidence of CVD is similar with OA or if the FRS is failing to detect elevated CVD risk in the OA population.

Kugamoorthy, Brenaven

Considerations for assisted jump training: Maximizing the potential benefits

Faculty Advisor: David Frost

University of Toronto / Faculty of Kinesiology and Physical Education

Background: The vertical jump is an important skill in sport, and thus is something that should be emphasized via training amongst intercollegiate athletes that want to improve their performance. Assisted jumping has become increasingly popular and holds promise as a training intervention; however, there is limited guidance regarding the most practical and effective way to employ this training method. Objective: The objectives of this project were: (1) to determine the ideal type(s) of resistance to be used for assisted jump training (e.g. mass, bands); (2) to identify the ideal body location(s) to attach the assistance (e.g. hips, trunk); and (3) to identify the ideal magnitude(s) of assistance (e.g. 10% bodyweight). This information was then used to identify the type(s) of assisted jump training that could maximize the 5 determinants of vertical jump performance (i.e. peak force, impulse, take-off velocity, flight time, trunk lean and arm swing). Methods: A review of the literature was done using key phrases "vertical jump performance" and "assisted jumping" to understand different aspects of jump performance and assisted jumping interventions. Databases used for this study include: Google Scholar, Scopus, PubMed, and Research Gate. Results: Currently there are no definitive guidelines or specific recommendations since this study is still in progress. The papers that have been examined to date show promising results regarding the use of resistance bands and 30% reduced body weight assistance in vertical jump performance, maximizing the 5 determinants of vertical jump performance. Potential Implications: It is anticipated that the findings from this project will help coaches and scientists with the design of assisted jump training interventions to maximize vertical jump height. Further, by exploring the influence of resistance type, attachment site, and assistance level on determinants of jump performance, coaches could also tailor their specific intervention to suit specific applications.

Kugamoorthy, Brenaven

Effects of Exercise on COVID-19

Faculty Advisor: Catherine Amara

University of Toronto / Faculty of Kinesiology and Physical Education

Background: There is a broad range of individual responses to the contraction of COVID-19. People with weaker immune systems, and related comorbidities are most vulnerable and have poorer responses to the virus. Following contraction, lower levels of the ACE-2 Receptor protein, a key protein involved in viral entry, increases severity of the illness. Exercise might benefit health outcomes related to COVID-19 by conferring positive effects on the ACE 2 receptor pathways, and the immune system through the proliferation of immune cells that can aid in protecting the body from infectious particles such as respiratory viruses. Objective: To examine the potential effects of exercise on immune function and ACE-2 receptor pathway that might be associated with protection against and improved

response to COVID-19 (SARS-COV 2). Methods: A literature review was conducted related specifically to the effects of exercise on COVID-19 and immune function. Related topics included, pathology of the virus, mechanisms by which COVID-19 infects the body, and vulnerable populations. Data bases that were used included PubMed, Scopus, Google Scholar. Results: Some studies, though not definitive, have reported that a regimen of regular moderate intensity resistance and cardiovascular exercise may lead to an increased production of immune cells, such as neutrophils, natural B killer cells, and CD4+ T-cells. Proliferation of these immune cells may then heighten the body's capacity to protect one from and reduce the severity of COVID-19. Furthermore, exercise may augment the ACE-2 receptor protein pathway while inhibiting the ACE receptor pathway, potentially decreasing the severity of the virus. Potential Implications: The effects of exercise on improving immune function and reducing the severity of COVID-19 has important implications for reducing vulnerability in healthy and clinical populations.

Lau, Ryan

Quantification of the Hip Joint Symmetry Using 3D CT Scan Derived Morphological Models

Faculty Advisor: Timothy Burkhart

University of Toronto / Faculty of Kinesiology and Physical Education

In the instance of severe deformity, the contralateral limb is often used to restore normal anatomical structure and function to the affected side. This technique is commonly used in surgical procedures such as total hip arthroplasty (THA), correction of femoroacetabular impingement (FAI) disorders, and revision or reconstruction following fractures. There is a lack of comprehensive data related to the symmetry of the left and right hip. Quantification of relevant anatomical characteristics of the hip enables an in-depth investigation of the symmetry between left and right sides. The purpose of this study was to measure clinically relevant anatomical measurements of the hip and to quantify the symmetry between the left and right sides. Computed tomography (CT) scans of 20 cadaveric lower extremities were used for this study. The scans of each specimen were loaded into an open-source image analysis software (3D Slicer) where 3D models of the femur and pelvis were constructed. Anatomical measurements including such the femoral head diameter, acetabulum angle, acetabulum depth, and femoral neck angle were quantified. In each specimen, the hip and pair of femurs were assessed for potential differences and similarities in anatomical structure for symmetrical comparison. Based on the anatomical data collected to date, it is observed that the right femurs displayed greater neck-shaft angles and femoral head diameters by less than approximately 2 degrees and 3 mm, respectively. In contrast, the left femurs presented a greater femoral neck version and femoral length (less than 3 mm difference) compared to contralateral side. One specimen displayed an approximate 10 degree difference in femoral neck version between left and right sides. Data collection is to be continued. Thus far, the data supports that asymmetry tends to be minimal within segments of the femur and hip which warrants contralateral templating to be safe and plausible for surgical procedures.

Le, Jamie

Digital media and exercise during the COVID-19 pandemic: A feminist social media study of young women in the Greater Toronto Area

Faculty Advisor: Margaret MacNeill

University of Toronto / Faculty of Kinesiology and Physical Education

BACKGROUND: The WHO declared a state of emergency in March 2020, disrupting physical culture globally. Pre-pandemic research reveals women use social media more frequently than men to network and learn about health (Camacho-Miñano, 2019). Recent literature demonstrates women are at increased risk of severe psychological impact exacerbated by social isolation and pandemic-related

stressors (Almeida et al., 2020). While there is a lot of media attention about exercise and health during COVID, there are gaps in our knowledge about the influence of social media on exercise behaviour, affect, the consequences of lockdown regulations and closure of activity spaces, as well as the range of meanings and online experiences during isolation. **PURPOSE:** To determine the barriers and facilitators of physical activity during the COVID-19 pandemic experienced by young women. Objectives include: (1) to discover if new cultures of physical activity are emerging on digital media platforms; (2) to investigate the affective roles of online physical culture and how this impacts exercise behaviour; and (3) to contribute to feminist online media studies by uncovering the unique experiences of young women in digital physical culture. **METHODS:** A two-part interviewing process has been employed via Zoom. The first semi-structured interview explored activity levels before and during the pandemic, changes in social and physical environment, and the role of online fitness influencers. The second interview included photo elicitation using five Google Image prompts. Snowball sampling was used to recruit eight participants, ages 18 to 25. **RESULTS:** Preliminary findings about digital media use, physical culture, affect and exercise behaviour during the pandemic isolation will be presented. **CONCLUSIONS & RECOMMENDATIONS:** Conclusions about young women's exercise experiences, both online and in physical environments, will be offered. Recommendations for future research, policy and program recommendations to enhance young women's mental and physical health during a health emergency will be suggested.

Lee, Kaitlyn

Investigating the Relationship Between Arterial Stiffness and Performance in Elite Swimmers

Faculty Advisor: Trevor King

Co-Author(s): Jamie F Burr, Trevor J King

McMaster University / Department of Kinesiology

Introduction. Overtraining, which often results in a decrease in performance, has been shown to be associated with increased muscle sympathetic nerve activity. Arterial stiffness is directly influenced by sympathetic tone, and therefore might predict overtraining, and thus performance in elite athletes. The aim of this study was to determine if arterial stiffness was related to relative performance in elite swimmers. **Methods.** Data were collected at the 2019 FINA World Championships in Gwangju, South Korea. Pulse wave velocity (PWV), augmentation index 75 (AIx75), and wave reflection index were measured in 27 elite swimmers (male = 19, female = 8). Relative performance measures were calculated by comparing the percent difference between competition performances and each athlete's personal best time, with positive values indicating that the athlete recorded a personal best. **Results.** When divided into tertiles, no relationship was found between PWV ($p=0.36$), AI75 ($p=0.72$), or wave reflection index ($p=0.36$) and relative performance. However, when PWV was divided by mean arterial pressure (MAP), relative performance trended towards being different ($p=0.06$) with an increase in PWV/MAP resulting in relative performance improvements. A multiple linear regression ($p=0.02$) found that both AIx75 ($\beta = -0.067$, $p=0.03$) and wave reflection index ($\beta = 0.13$, $p=0.007$) were significant predictors of relative performance. **Discussion.** Why an increase in wave reflection index, indicating stiffer arteries, predicted an improvement in relative performance, whereas an increase in AI75 was associated with a decrease in relative performance is unclear.

Li, Cindy

Investigating the relationship between aerobic fitness and executive functioning performance in young adults with Attention Deficit Hyperactivity Disorder

Faculty Advisor: Jennifer Heisz

Co-Author(s): Michelle Ogradnik

McMaster University / Faculty of Science; Department of Kinesiology

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most common neurodevelopmental conditions characterized by inattention, hyperactivity, and impulsivity. These challenges are related to impairments in the prefrontal cortex and neural networks, which lead to deficits in higher-order cognitive processes known as executive functioning. In neurotypical individuals, research suggests that higher levels of physical activity and aerobic fitness are associated with better executive functioning. However, it is unclear if this relationship holds true for young adults with ADHD. The present study examines whether engaging in regular aerobic exercise, using estimated cardiorespiratory fitness, predicts better executive functioning in young adults with ADHD and, if so, how the magnitude of this relationship compares to neurotypical controls. Young adults in Canada are recruited to participate in the virtual experimental session. The session begins with a series of questionnaires that assess participant's demographic information, ADHD symptoms, physical activity behaviour, and mental health. Then, participants complete four cognitive tasks measuring executive functioning, which include the SART and Stroop task to assess inhibitory control, Wisconsin Card Sorting Task to gauge cognitive flexibility, and the OSPAN task to measure working memory. The session concludes with the 6-minute walk test, which is used to predict participants' estimated cardiorespiratory fitness. Although data collection is still ongoing, we hypothesize that higher cardiorespiratory fitness will predict better executive functioning performance, and that this relationship will be stronger for young adults with ADHD than neurotypical controls. This study will help to inform future interventions that aim to support young adults with ADHD overcome daily challenges in academic and occupational settings.

Lin, Lydia

The Effect of Resistance Training Load on Skeletal Muscle Strength, Hypertrophy, and Functional Outcomes, in Older Adults: A Systematic Review and Meta-Analysis

Faculty Advisor: Stuart Phillips

Co-Author(s): Alysha D'Souza, Joshua Keogh, Alexandria Verboom, Thomas Yau, Bradley Currier, Giulia Coletta, Jonathan McLeod

McMaster University / Faculty of Science, Department of Kinesiology

Background: It has been proposed that higher-load (HL; $\geq 60\%$ of one-repetition maximum, 1RM) resistance exercise training (RET) is superior to lower-load (LL; $\leq 60\%$ 1RM) RET for increasing muscle mass and strength, and maintaining physical function. However, a consensus on these questions is lacking, particularly in older adults (≥ 55 years). Emerging work suggests that LL RET may be equally effective as HL RET for increasing muscle mass and strength, and maintaining physical function, when LL RET is performed to volitional failure. To our knowledge, this thesis has not been robustly reviewed in older adults. Therefore, the current systematic review and meta-analysis was conducted to provide high-level evidence on the impacts of various RET load manipulations in older adults. Aim: The purpose of this systematic review and meta-analysis is to determine the effect of RET load manipulation on muscle strength, hypertrophy, and functional outcomes in older adults. Methods: The methodology employed PRISMA guidelines to determine the relationship between variables. The initial search of six databases yielded 28734 studies of which 37 were deemed eligible for data extraction. The meta-analysis consists of randomized controlled trials involving generally healthy, community dwelling older adults, where the RET intervention was performed for ≥ 6 weeks in duration and load was manipulated to effectively compare HL RET to LL RET. Functional outcomes were measured by a

battery of tests including 6-min walk, timed-up-and-go, sit-to-stand tests, commonly employed in geriatric research. Hypothesis: I hypothesize that manipulation of RET load (or number of repetitions) will not impact muscle strength, hypertrophy, or the magnitude of change in functional outcomes in older adults. The anticipated outcome is that LL RET will be equally beneficial as HL RET, when both forms of exercise are performed to momentary muscular failure. Results: Data extraction is ongoing, final results will be available at the conference.

Loenhardt, Matthew

The Development of a Resistance Exercise Protocol for Concussion Rehabilitation: A Descriptive Case Series

Faculty Advisor: Michael Hutchison

University of Toronto / Faculty of Kinesiology and Physical Education

BACKGROUND: Concussion, a form of mild traumatic brain injury, may include a variety of physical, cognitive, and emotional symptoms that can be exacerbated by excess exposure to environmental stimuli. Historically, due to the characterization of concussion pathophysiology, it was believed that a passive or strict rest approach to concussion rehabilitation was needed. However, the support for this hypothesis has waned over time and an active rehabilitation paradigm is now advised. Although many health professionals recommend active rehabilitation, few protocols clearly articulate specific resistance training exercises in alignment with consensus return-to-play (RTP) guidelines. **OBJECTIVE:** (1) To propose and describe a resistance exercise protocol in alignment with RTP consensus guidelines; (2) to pilot feasibility resistance exercise protocol for concussion rehabilitation delivered remotely with a mobile app. **METHODS:** Resistance exercise protocol was developed in consultation with experts in the field and well as applying principles of strength and conditioning. Pilot testing of protocol was done by a case series of patients with concussion to determine if they can reliably impose the objective RPE and heart rate goal for each stage of recovery. **RESULTS AND IMPLICATIONS:** The results of a case series concussed individuals' (n=6) will be presented. Specific findings related to alignment of target and achieved heart rate during exercise, as well as changes in symptoms in response to each resistance exercise challenge. Preliminary findings will inform a future, larger study examining the useability of a mobile application to deliver of resistance exercise remotely as part of an active rehabilitation concussion platform.

Masterson-Pinedo, Sophia

On the influence of imperceptible audio-visual temporal offsets on the performance of a rhythmic tapping task

Faculty Advisor: Luc Tremblay

Co-Author(s): Damian Manzone, Richard Chen

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If you have ever played a racing video game, you will likely be familiar with the visual countdown and simultaneous beep that signal the start of the races. But what if these signals were offset by very small intervals? Would your response be altered? The time-window-of-integration-model suggests that audio-visual stimuli presented with an offset of less than 100ms are perceived as simultaneous (Diederich & Colonius, 2015). However, it has also been observed that during motor tasks, visual feedback delays of 17ms are sufficient to impair performance (Smith, 1972). These findings suggest that the sensorimotor system is more sensitive to temporal offsets than the perceptual system. The purpose of this study was to investigate whether audio-visual temporal offsets of more and less than 100ms both influence the performance of a rhythmic tapping task. Fifteen participants will observe a series of audio-visual pairs (a flash and a beep), presented at stimulus onset asynchronies (SOAs) of -133ms, -66ms, 0ms,

+66ms, and +133ms (i.e., beep onset relative to flash onset). In response, participants will be asked to press a key on their keyboards. Also, after each set of stimulus-pair presentations, participants will also be asked to state which stimulus appeared first in each trial (flash first or beep first). The time difference between the flash and the keypress, as well as the proportion of flash first responses, will be calculated across the SOA conditions. Because the sensorimotor system has a greater temporal sensitivity than the perceptual system, it is expected that all non-zero SOA conditions will yield significant temporal differences between the keypress and the flash, whereas only the SOA conditions greater than 100ms will yield better than chance levels at detecting the temporal offset.

Mattina, Stephanie

The Role of AMPK on Denervation-Reinnervation Cycling within Skeletal Muscle across the Lifespan

Faculty Advisor: Vladimir Ljubicic

Co-Author(s): Sean Y. Ng

McMaster University / Department of Kinesiology

The age-related deterioration of muscle mass and function, known as sarcopenia, has become a prevalent issue in today's rapidly aging population. Denervation is one of the many biological factors that contribute to the pathology of sarcopenia. Transient cycles of denervation and reinnervation can be identified by the presence of fiber type grouping and co-expression of multiple myosin heavy chain (MHC) isoforms. As denervation persists with age, muscle fibers begin to atrophy, appearing small and angular. Adenosine monophosphate-activated protein kinase (AMPK) is an appealing molecular target to promote longevity in neuromuscular biology. However, its role in response to denervation-reinnervation cycling remains unknown. The current study explores the role of AMPK on morphological patterns of denervation and reinnervation within skeletal muscle across the lifespan. Experiments were conducted on the soleus (SOL) muscle of 3- and 12-month-old wildtype (WT, n=10) and AMPK β 1 β 2 skeletal muscle-specific knockout (mKO, n=10) mice. Additionally, 22-month-old WT (n=3) mice were utilized as positive controls. Immunofluorescent techniques were carried out to identify morphological alterations within skeletal muscle, which include fiber type grouping, co-expression, and small angular fibers. Aged 22mo WT animals exhibited a significantly greater proportion of fiber type grouping and co-expression relative to their younger counterparts. A trend towards significance was revealed with an increased proportion of fiber type grouping ($p=0.0513$) in the 12mo mKO animals compared to age-matched WT controls. MHC co-expression was higher ($p=0.09$) in the mKO animals relative to their WT counterparts. Analysis of small angular fibers revealed no qualitative changes with age or between genotypes. These results suggest that the absence of AMPK modestly induces premature denervation-reinnervation cycling in slow, oxidative skeletal muscle. Further examination of these metrics in fast-glycolytic skeletal muscle is necessary. Together, these findings reveal a potential therapeutic role for AMPK in the regulation of denervation-reinnervation cycling to promote healthy muscle aging.

Min, Alfred

Athlete identity, social identity, and anxiety symptoms among varsity athletes during severe social restrictions

Faculty Advisor: Catherine M. Sabiston

Co-Author(s): Ross Murray

University of Toronto / Faculty of Kinesiology and Physical Education

Increases in anxiety symptoms have emerged as a serious consequence of the COVID-19 pandemic. Studies of the mental health of high-performance athletes highlight similar trends in increases in anxiety since the onset of the pandemic. Understanding the factors that are associated with anxiety symptoms

is needed to inform sport relief and support strategies. A strong sense of social identity may help protect from and manage threats to mental health. However, current public health restrictions to social connections may attenuate social identity which may increase risk for anxiety symptoms among athletes. Furthermore, athletic identity has also been related to increases in anxiety among athletes in injury and retirement contexts that may be mimicked with the pandemic. The link between social identity, athletic identity, and anxiety symptoms among athletes affected by severe restrictions needs to be explored. Thus, the present study explored the relationship between social identity, athletic identity, and anxiety symptoms among varsity athletes one year into the COVID-19 pandemic and during severe restrictions. Varsity athletes from the University of Toronto [N =101; 38.6% men; M age = 20.1 (SD = 1.96) years] with a mean of 3.07 (SD = 1.84) years on the team completed a cross-sectional self-report survey. Social identity and athletic identity were significantly correlated ($r = .40, p < .001$). Controlling for number of years on team and gender, results from regression analysis reveal that athletic identity was significantly associated with athlete's anxiety during the pandemic ($\beta = .28, p = .02; R^2 = .10$) and social identity was not a significant correlate ($\beta = -.18, p = .15$). These findings suggest that higher scores on athletic identity may perpetuate anxiety symptoms among athletes in the context of a global pandemic. Future longitudinal research is needed to explore the mechanisms linking athletic identity and anxiety symptoms.

Moorhouse, Rachael

Examining the acute effects of emergency contraceptives on vascular function both in cell and human models

Faculty Advisor: Maureen MacDonald

Co-Author(s): William JS, Kamal MJ, Parise G, MacDonald MJ

McMaster University / Faculty of Science

Emergency contraceptive pills (ECPs) are widely used: approximately 1 in 10 Canadian females aged 15-24 have used ECPs in the past year. The most common ECP consists of a 1.5mg dose of levonorgestrel (LNG), a synthetic progestin. LNG is also used in 2nd generation oral contraceptive pills (OCPs), thus in both human and cell models, has only been studied in combination with exogenous ethinyl estradiol (EE). Human models using chronic exposure to 2nd generation OCPs (EE+LNG), have indicated arterial changes including decreased brachial artery flow mediated dilation (FMD) and increased central pulse wave velocity (PWV). In cell studies, LNG seems to counter the protective effects of estrogen by decreasing the number of estrogen receptors (ER) and endothelial nitric oxide synthase (eNOS) expression. However, no research exists examining how acute exposure to LNG alone, as experienced in ECP use, impacts markers of endothelial function in cell or human models. Therefore, the purpose of this study is (1) to explore the effects of acute ECP use on markers of endothelial function, and (2) to examine the impact of LNG on the nitric oxide production pathway in endothelial cells. Human participants will consume one ECP (1.5mg LNG), FMD and central and peripheral PWV being assessed pre- and post-ingestion. To examine underlying mechanisms, human umbilical vein endothelial cells will be exposed for 24hrs to three concentrations of LNG (10, 20, and 40ng/mL) congruent with human blood concentrations associated with ECP use. Following acute exposure, cells will be analyzed for protein levels of ER-alpha and eNOS, along with an assessment of nitric oxide and superoxide anion bioavailability at rest and in response to acetylcholine challenge. This study will be the first to address these significant knowledge gaps in our understanding of ECPs and their impact on endothelial function in vivo, and underlying mechanisms in vitro.

Mostofinejad, Amin

Aging and the weighing of neck sensory information in the perception of verticality.

Faculty Advisor: Luc Tremblay

Co-Author(s): Rachel Goodman, Damian Manzone, and Goran Perkic

University of Toronto / Faculty of Kinesiology and Physical Education

Imagine an older adult waking up in the middle of the night to grab a glass of water. Going from lying down to standing, the older adult will experience many sensory changes. Also, research has shown that older people are more likely to lose balance and fall than younger people (O'Loughlin et al., 1993). Furthermore, healthy aging also leads to losses in sensory signals (Redfern et al., 2009). More relevant to the current study, research has also shown that vision, neck proprioception, and vestibular information help generate an internal representation of earth's vertical (Wannaprom et al., 2018). The purpose of the current study is to investigate the contribution of vision, neck proprioception, and vestibular signals on the perception of verticality. Participants will be asked to sit upright and perform an upward reaching movement with their head in three different neck tilt conditions (i.e., head straight, head tilted, and head return). All three conditions will be performed with and without vision. The main dependent variable will be the standard deviation (SD) of the angle difference between the participant's trajectory and the earth's vertical. Based on the maximum likelihood estimation model (Ernst & Bühlhoff, 2004), it is hypothesized that without vision, the head tilted condition is expected to yield the largest SD of angle difference, indicating heavy reliance on neck proprioception and vestibular signals in the absence of vision. If the method is proving effective in eliciting significant differences across the experimental conditions in younger adults, the same procedure will also be used with older participants to ascertain the influence of ageing on the contribution of vision, neck proprioception and vestibular system in the perception of verticality. Ultimately, the findings of this series of studies could potentially help us identify older adults at higher risks of falling.

Nashnoush, Eptehal

Overview of the Rehabilitation Techniques for Patients Undergoing Recovery from Covid-19 (Sars-Cov2)

Faculty Advisor: Bousquet

Dalhousie University / Faculty of Biomedical & Electrical Engineering

Abstract In December 2019, COVID-19, a respiratory infection found to be a beta coronavirus similar to that of SARS-CoV, first appeared before spreading to a pandemic that claimed over 1.7 million lives worldwide at the date of this paper. COVID-19 patients go through several pathophysiological complications including pulmonary, respiratory, cognitive, and neuromuscular deficits. Various rehabilitation techniques are required for treating the observed complications in the patients. This paper touched upon some of the approaches used for rehabilitation such as balance therapies, cognitive therapies, position management, gait retraining, electrical stimulation, personalized medicine, and nanotechnology. Using a variety of online databases such as PubMed, Springer, ScienceDirect, SAGE Publication, and others, data review articles, case studies, trial-based, and proposal reports that contained keywords of "COVID-19," "Coronavirus Rehabilitation Techniques," and more were screened and included upon further reading. However, there were some limitations to rehabilitation methods for example, lack of clinical trial, lack of research and resources as COVID-19 is still an ongoing issue.

Goulet, Nicholas

The Effects of Acute Intermittent Hypoxia on Postprandial Triglyceride Levels in Individuals with or without Obstructive Sleep Apnea

Faculty Advisor: Pascal Imbeault

Co-Author(s): Renée Morin, Jean-François Mauger, Pascal Imbeault

University of Ottawa / School of Human Kinetics

Introduction: Obstructive sleep apnea (OSA) is a sleep disorder characterized by episodes of partial or complete obstruction of the upper respiratory airways. During sleep, OSA leads to repeated cycles of intermittent hypoxia (IH), a phenomenon where tissues are intermittently exposed to a lack of oxygen. Adults with OSA are twice as likely to report suffering from cardiovascular diseases (CVD) compared to adults without OSA. An interesting link between OSA and the increased risk of CVD involves lipid metabolism. Human trials have demonstrated that acute continuous hypoxia slightly increases plasma triglycerides (TG) and that individuals with severe OSA display a 6-fold decrease in their fasting lipid clearance rate compared to individuals without OSA during normoxia. To our knowledge, the postprandial TG response of individuals with and without OSA under IH remains unknown. Hence, the objective of this study was to characterize the acute effects of IH, a stimulated model of OSA, on postprandial TG levels. Methodology: Using a randomized crossover design with two experimental sessions, 7 participants diagnosed with OSA and 8 control participants without OSA were given a meal after which they were exposed for 6 hours to normoxia or IH (approximately 15 hypoxic events per hour) while resting in a supine position. Blood samples were taken hourly during each condition to measure plasma lipid levels. Results: The OSA group displayed greater postprandial triglyceridemia under both conditions. Irrespective of group, the peak average TG concentration in denser triglyceride-rich lipoproteins (TRL) (i.e. chylomicrons and very low density lipoproteins) was 20% higher under the IH condition (condition x time, $p = 0.036$), while IH had no effect on denser TRL in the OSA group. Conclusion: Upon normoxia, participants diagnosed with OSA showed an altered postprandial lipemic response compared to the control group, however, this altered response did not worsen under intermittent hypoxia.

Babits, Paul

Resistance training elicits increases in satellite cell content, irrespective of sex

Faculty Advisor: Daniel Moore

University of Toronto / Faculty of Kinesiology and Physical Education

Satellite cells (SC), play an integral role in the recovery from skeletal muscle damage and the facilitation of extensive muscle hypertrophy. Acute resistance exercise typically results in the elevation of type I, type II, and total myofiber (MF) SC content between 24- and 96-hours post-exercise in males, however, research in females is limited. Thus, we sought to elucidate the sex-based differences in the fibre-type-specific SC content responses to resistance exercise, in the untrained (UT) and trained (T) states. Ten young men ($23.0 \pm 4.0y$) and women ($23.0 \pm 4.8y$) completed a single bout of resistance exercise, before and after 8-weeks of whole-body resistance training. Muscle biopsies were taken from the vastus lateralis immediately prior to, 24-, and 48-hours after each bout. SC and myonuclear content were analyzed in a fiber-type specific manner using immunohistochemistry. We were unable to detect meaningful changes in type I, II, or total SC content ($p > 0.05$) after acute resistance exercise in UT and T. However, type I, II, and total SC content (SC/100 MF) was increased ($p < 0.05$) after 8-weeks of training in males and females. When expressed as SC per myonuclei, type II and total SC content was increased with training ($p < 0.05$) irrespective of sex, with type II SC content elevated ($p < 0.05$) in females independent of training status. Although the exercise protocol did not elicit acute increases in SC content, we observed similar elevations in males and females after resistance training. These

results suggest that SC responses to acute and chronic resistance exercise are similar in males and females.

Pizzola, Christina

The effect of 4 weeks of local lower limb heating therapy on cardiorespiratory fitness in young, healthy, recreationally active males and females

Faculty Advisor: Maureen MacDonald

Co-Author(s): Christina Pizzola, B.Sc. Kin.; Jem Cheng, MSc.; Maureen MacDonald, PhD

McMaster University / Department of Kinesiology

Introduction: Whole-body heat therapy has been shown to improve cardiorespiratory fitness (CRF). However, these techniques are expensive, intolerable, and inaccessible for the general population. Lower limb heating may be a more practical and manageable approach for improving CRF. This study aims to assess the effect of 4 weeks of lower limb heat therapy on estimated peak oxygen uptake (VO₂peak) in young, healthy, recreationally active males and females, as well as the feasibility of the heating protocol. Methods: Twenty participants (25±6 years) were allocated to either the heat therapy (HEAT) or control (CON) group for 4 weeks (n=10/group). HEAT involved 45-min of lower limb hot water immersion at 42°C using a commercial footbath, 3x/week, and both HEAT and CON were instructed to maintain their existing physical activity behaviours. VO₂peak will be estimated using the Modified Canadian Aerobic Fitness Test before and after the intervention period. Thermal comfort, thermal sensation, and affect will be recorded at the first and last HEAT sessions, at baseline and after heating. Intentions, enjoyment, and adherence to HEAT will be determined after 4 weeks. Expected Results: We predict that estimated VO₂peak will increase in HEAT and remain unchanged in CON. For HEAT, we predict that affect, thermal comfort, and sensation will improve between the first and last session, as participants adapt to the HEAT. We also hypothesize that HEAT participant's intentions and enjoyment will be positive after the intervention. Finally, adherence to the HEAT protocol is expected to remain high throughout the 4 weeks due to the at-home nature of the study. Significance: In recent years, CRF has been recognized as the fourth-leading risk factor, inversely related to the development of cardiovascular disease and all-cause mortality. During the COVID-19 pandemic, at-home heat therapy, may be a feasible and efficacious intervention for improving fitness in younger, healthy individuals.

Rajwani, Yasmin

Calls to Action and Settler Passivity: National Sport Organizations and the TRC

Faculty Advisor: Auey Giles

Co-Author(s): Audrey R. Giles, Dr. Shawn Forde

University of Ottawa / School of International Development and Global Studies, Faculty of Social Sciences

The Truth and Reconciliation Commission's 2015 Calls to Action identified societal measures necessary for a successful reconciliation process between Indigenous peoples and settlers in Canada, five of which were specific to sport. Half a decade after the Calls to Action were published, the response by national sport organizations (NSOs) in Canada has escaped scholarly attention. Through a lens informed by settler colonial studies, we employed summative content analysis to examine the ways in which - if at all - NSOs in Canada have implemented relevant Calls to Action. Our results indicate a lack of response, which we argue is settler silence, by most NSOs.

Raziee, Rozhin

Investigating Adaptations in Subsarcolemmal Mitochondria in Response to Chronic Exercise in Skeletal Muscle-Specific CARM1 Knockout Mice

Faculty Advisor: Vladimir Ljubcic

Co-Author(s): Anne-Sophie J Sraka, Tiffany L vanLieshout, Derek W Stouth, Vladimir Ljubcic
McMaster University / Faculty of Kinesiology

Coactivator-associated arginine methyltransferase 1 (CARM1) affects gene expression through catalyzation of arginine methylation in a target protein. This enzyme is involved in muscular, cardiovascular and metabolic disorders, as well as a variety of cancers. CARM1 may also play a role in skeletal muscle plasticity by interacting with peroxisome proliferator-activated receptor gamma coactivator 1-alpha (PGC-1 α), a molecule known to induce mitochondrial biogenesis within skeletal muscle fibres. Specifically, compared to their counterparts, mitochondria in the subsarcolemmal region of skeletal muscle may be more responsive to exercise training, one of the main inducers of skeletal muscle adaptation. Responses may vary according to sex as males and females display differences in mitochondrial function, skeletal muscle composition, and overall muscle quantity. **PURPOSE:** To determine changes to subsarcolemmal mitochondria in response to skeletal muscle-specific CARM1 knockout (mKO) and voluntary wheel running (VWR) in male and female mice. **METHODS:** Since whole-body knockouts of CARM1 are perinatally lethal, mKO CARM1 mice were utilized in this study. Male and female wildtype (WT) and mKO mice were randomly assigned to a sedentary (SED) or VWR condition for 8 weeks. Transmission electron microscopy was completed on muscle samples collected from the tibialis anterior muscle. **RESULTS:** Based on previous publications, it is hypothesized that volitional endurance exercise will increase mitochondrial count and volume, though mKO mice may experience an altered response in relation to WT mice. Additionally, female mice in this study are expected to display a greater increase in mitochondrial number and size in response to exercise compared to their male counterparts. Data analysis for this project is currently in progress. **CONCLUSION:** This ongoing study aims to increase our understanding of the functions of CARM1 in maintaining and remodeling skeletal muscle phenotype.

Reynolds, Tiffany

"Unmasking" training habits of Men's and Womens' Varsity Basketball Players during the COVID-19 Pandemic

Faculty Advisor: Eryk Przysucha

Lakehead University / Faculty of Kinesiology

Background: Covid-19 restrictions has affected negatively sports, particularly university student-athletes. The inability to maintain the regular training poses several challenges to their skill development, enhances the possibility of injuries, and aside from the physical ill-effects, also may affect their psychological well-being. Such effects may be gender specific. **Objective:** To examine how male and female varsity basketball players managed their training during the COVID-19 related restrictions. This research also aimed to delineate how, or if, the imposed restrictions impacted male and female athletes' psychological well-being, in addition to their athletic performance. **Method:** Via purposive sampling 15 male and female basketball players, from Lakehead University teams varsity teams, were recruited. The athletes, who had to be involved in at-home or other alternative training during the COVID-19 pandemic, were asked to complete via Survey Monkey Kessler Psychological Distress Scale (K10), Warwick-Edinburgh Mental Well-being Scale and "Track your Training questionnaire" (TTQ), which delineated the type of training they engaged in, its frequency and duration. Also, a short 15-to-20-minute semi-structured interview over the phone was carried out with each athlete. The independent samples t-tests will be used to examine the differences between the groups, and thematic content analysis is being used to examine the interview content. **Results:** The anticipated results will

show that the athletes remained active and likely adopted their training, however such effects are expected to be gender-specific. Based on anecdotal interaction with some of these athletes, it is expected that mental ill-effects of restrictions will be much more pronounced. Their future sport-related goals may be altered, coinciding with sense of helplessness and depression. Also, such negative feelings may impact their future academic plans. Conclusion: Being aware of training as well as psychological issues that varsity athletes are experiencing may prompt coaches, team psychologists and fitness trainers to create support

Rooke, Piera

Effect of Ketone Supplementation on Oxygen Uptake and Exercise Efficiency: A Literature Review

Faculty Advisor: Martin Gibala

Co-Author(s): Devin McCarthy

McMaster University / Faculty of Science

Nutritional ketosis refers to a physiological state where ketone bodies (KBs) are elevated above the normal basal state but below the pathological range. There is growing interest in the effect of this state on exercise responses and performance. Nutritional ketosis can be induced by very-low carbohydrate (CHO) availability, but recent studies have revealed that a "ketogenic diet" may impair both sprint (PMID: 29619799) and endurance (28012184) exercise performance. This ergolytic effect has been attributed in part to the higher oxygen cost of fat oxidation compared to CHO oxidation (24022570), and an impaired capacity of skeletal muscle to oxidize glycogen (16188909). Exogenous KB supplements are an alternative strategy to induce nutritional ketosis without the potential negative effects of prolonged low-CHO ingestion (32358802). In addition, KB supplements have been purported to spare CHO stores and improve performance outcomes (27475046). The present review examined the effects of exogenous KB supplementation on exercise oxygen uptake (VO_2), and the relationship between VO_2 and power output as a measure of exercise efficiency. Studies in well-trained males have shown VO_2 to increase with KB supplementation during submaximal exercise (30632425, 32735112). Assuming a linear relationship between VO_2 and workload, KB supplementation might be expected to result in peak oxygen uptake being reached at a lower peak power output. Since KB supplementation results in acidosis, decreases in exercise efficiency could result from the increased energetic demand in order to counter changes in blood pH. This is supported by recent work from our laboratory (33646860), that reported higher ventilation and heart rate values during submaximal exercise in endurance-trained participants following acute ingestion of a large dose of KB. Future studies that examine how ketoacidosis influences cardiorespiratory variables will help elucidate potential limitations of exogenous KB supplements.

Saini, Garima

Exploring the Effects of Non-dual Knowing on the Anxious Self

Faculty Advisor: Michael Atkinson

University of Toronto / Faculty of Kinesiology and Physical Education

As Socrates said, the first duty of a person is to know oneself. This autoethnographic study of anxiety has evolved from my contemplation of who "I" am. The existence of a fundamental self is implied in Western society, as individuals are encouraged to discover "who they really are" (Christy et al., 2019). However, Eastern spiritual traditions deny the claim that there is any identifiable, enduring self that can be found through introspection. Instead, these traditions are founded on a non-dual reality in which there is no boundary between the subject and object (Danylova, 2018). Non-dualists maintain that one achieves liberation once one acknowledges the universe as a manifestation of the Self and no longer

sees oneself as separate from other beings, but identical with them (Madaio, 2018). I used autoethnography to examine my personal narrative of experiencing non-dual discourse and meditation to treat my anxiety. I alternated between two methods of engagement with the non-dual content: studying the non-dual lectures of Rupert Spira, a non-dual spiritual teacher, and engaging in guided meditations by him. I used reflective journaling to identify common themes in my experiences with the non-dual philosophy and associated meditations. My presentation will review the difficulty of establishing myself as non-dual awareness because of Western ideologies of the self, and why non-dualistic contemplative training is beneficial for easing symptoms of anxiety disorder.

Samuels, Klara

Representing Bodies with Missing Limbs

Faculty Advisor: Timothy Welsh

University of Toronto / Faculty of Kinesiology and Physical Education

The body schema is a reference point for self-other matching processes which can facilitate social cognitive responses with others, such as imitation and empathy. The body schema becomes activated when viewing bodies that are similar to one's own and as a result, congruency between two individuals could influence how they interact and relate to one another. The Body Part Compatibility Task (BPCT) has been employed in behavioural research to understand how perceptual information of different body configurations can influence a person's ability to self-other match with the bodies of others. The purpose of this study was to assess whether individuals, who are not missing any of their limbs, are still able to represent the bodies of individuals with limb differences or amputations onto their own body schema. A BPCT using a key-press procedure was employed to measure response times to coloured targets superimposed on images of models with missing arms, missing legs, and without any missing limbs. Scores from a familiarity questionnaire were also evaluated to determine whether an individual's level of exposure to people with missing limbs could influence their ability to engage in self-other matching during the task. The results of this study reveal that spatial compatibility effects were largely present and any evidence of body part compatibility effects did not depend on the human model that was depicted. Furthermore, data from the questionnaire shows that the participants' level of familiarity with individuals who have missing limbs did not contribute to any significant differences in their response times across the three different model conditions.

Sanderson, Malcolm

Changes in Inflammatory Cytokines and Irisin in Response to High Intensity Swimming in Adolescents versus Adult Male Swimmers

Faculty Advisor: Nota Klentrou

Co-Author(s): Brandon McKinlay, Alexandros Theocharidis, Rozalia Kouvelioti, Baraket Falk, Nota Klentrou

Brock University / Faculty of Applied Health Sciences

Swimming is a popular youth sport that is considered beneficial for cardiovascular fitness. However, the potential inflammatory outcomes of high intensity swimming in younger swimmers are unclear, as is the response of irisin, a myokine released during exercise with anti-inflammatory properties. This study compared the plasma concentrations of interleukins 1-beta (IL-1 β), 6 (IL-6), 10 (IL-10), tumor necrosis factor alpha (TNF- α) and irisin in response to intense swimming between adolescent and adult male swimmers. Thirty-two swimmers (16 adolescents, 14 \pm 1 years; 16 adults, 21.5 \pm 3.1 years) completed a high intensity interval swimming trial. The intense swimming trial consisted of a maximal 200m swim followed by a high intensity interval swimming protocol consisting of 5x100m, 5x50m and 5x25m at >90% of each swimmers' maximum performance and 1:1 work-to-rest ratio. At rest, only TNF- α was

higher (33%, $p < 0.05$) in adolescents compared with adults. There was an overall significant increase in IL-1 β from pre- to post-swimming (3% in adolescents, 24% in adults), but no significant interaction. IL-10 significantly increased in both groups (+34% in adolescents, +56% in adults). IL-6 and TNF- α increased significantly (+32% and +26%, respectively) in adults, but not in adolescents (+2% and -9%, respectively). Adults showed a small, but significant decrease in irisin (-5%), with no change in adolescents. The lack of an IL-6, TNF- α and irisin response to intense swimming in adolescent swimmers may suggest a blunted inflammatory and myokine response following high intensity exercise in trained youth. These results provide an insight as to why young athletes require less time to recover from intense exercise and suggest that swimming training protocols and competition plans should likely be different between young men and adolescent boys, as the latter may be able to handle intense work with less recovery between sessions.

Selvarajah, Kobika

Investigating the Impact of an Acute Exercise Break Between Online Lectures on Student Memory and Comprehension

Faculty Advisor: Jennifer Heisz

Co-Author(s): Michelle Ogrodnik

McMaster University / Faculty of Science - Kinesiology

Restrictive public health measures and remote learning due to the COVID-19 pandemic have increased university students' time spent sedentary. Physical activity can be an effective intervention to decrease the risk of physical and mental illnesses associated with sedentary behaviour. Physical activity may also improve students' ability to learn. There is considerable research to suggest that an acute bout of aerobic exercise—a short session of exercise—can improve executive functioning. Attention and working memory are two domains of effective functioning, critical for learning and comprehension, that have been found to decrease over time into an online lecture. Fenesi et al., (2018) documented that short high-intensity physical activity breaks while watching an online lecture can benefit sustained attention and comprehension for university students. However, this has yet to be tested outside of a lab setting or with non-high intensity exercise. In this study, undergraduate students recruited from McMaster University are asked to watch two online lectures (25 minutes each) from their home learning environment. Participants are randomly assigned to complete one of three conditions: a self-selected physical activity break (10 minutes), self-selected sedentary break (10 minutes), or no break between lectures. Participants' sustained attention, as measured by mind-wandering probes during lectures, will be compared between groups. Participants will also complete multiple-choice tests immediately after learning, and again two days later to evaluate comprehension. Though our study is ongoing, we hypothesize that students who complete the physical activity break will be better able to sustain attention during the second lecture, which will translate to superior comprehension performance when compared to those who took a sedentary break or no break. The results of this work will contribute to our understanding of how exercise breaks impact learning for university students and may provide important suggestions for promoting physical activity to students engaging in remote learning.

South, Stephanie

A Literature Review on the Effectiveness of Dyadic and Group Exercise Interventions

Faculty Advisor: Katherine Tamminen

University of Toronto / Faculty of Kinesiology and Physical Education

Many individuals struggle to meet recommended physical activity levels (World Health Organization, 2020). Research has suggested that social relationships are an important determinant of health, and thus focusing on individual factors alone may be inadequate when addressing behaviour change

(Bandura, 1998; Holt-Lunstad, 2018). The purpose of this literature review was to explore the published literature on social relationships and physical activity, and in particular to determine the benefits of engaging in exercise with one or more individuals. Thus, the guiding questions for this review were: (1) Is engagement in dyadic exercise an effective way to enhance physical activity behaviour? (2) Is engagement in group exercise an effective way to enhance physical activity behaviour? and (3) Under what conditions might dyadic and group exercise be effective? The main findings from this review indicate that both dyadic and group exercise interventions are associated with increased physical activity behaviour compared to individual exercise. However, the heterogeneous findings also indicate that several moderating variables may influence this association, including relationship quality, social support, partner motivation, and group cohesion. Thus, the findings from the literature suggest that it is not merely the engagement in exercise with others that can improve physical activity, but rather it may depend on the features of the relationships. Findings also suggest that participation in physical activity with others may provide physical and mental health benefits above and beyond that of individual exercise. These benefits may be particularly important for populations such as older adults, who are prone to social isolation and disease risk. Less is known about the effectiveness of dyadic versus group exercise, and thus research could be extended in this area. Future research should also explore moderating variables, such as relationship quality, and use more accurate measures to assess relationship satisfaction, rather than type or length of relationship.

Sraka, Anne-Sophie

Exploring Changes in Intermyofibrillar Mitochondria in Male and Female CARM1 mKO Mice Following Chronic Exercise

Faculty Advisor: Tiffany vanLieshout, Vladimir Ljubicic

Co-Author(s): Anne-Sophie J Sraka, Rozhin Raziee, Tiffany L vanLieshout, Derek W Stouth, Vladimir Ljubicic

McMaster University / Faculty of Science (Department of Kinesiology)

Protein arginine methyltransferases (PRMTs) methylate arginine residues on target proteins and are critical regulators of various biological activities. Coactivator-associated arginine methyltransferase-1 (CARM1) is the most expressed PRMT in skeletal muscle and is involved in processes including muscle metabolism and myogenesis. Skeletal muscle is a highly plastic tissue that is remodeled in response to various physiological stimuli, however, the role of CARM1 in skeletal muscle biology is not yet completely understood. Skeletal muscle can adapt to stimuli including chronic exercise which can alter proteins in skeletal muscle, thus increasing oxidative capacity, substrate use efficiency, and fatigue resistance. Mitochondria are small intracellular organelles that produce ATP by oxidative phosphorylation. Within skeletal muscle, these organelles are situated in the intermyofibrillar (IMF) and subsarcolemmal (SS) regions. IMF mitochondria are located between contractile filaments and require more energy than SS mitochondria due to mechanical stress exerted by contracting myofibrils.

Although it has been established that mitochondria are altered in response to exercise and that CARM1 may interact with enzymes that regulate mitochondrial biogenesis, the exact mechanisms for these modifications require further investigation. Thus, the present study employed an eight-week voluntary running wheel exercise protocol in wildtype and CARM1 muscle-knockout (mKO) mice to assess changes in IMF mitochondrial content in response to chronic exercise. CARM1 mKO mice were generated using the Cre/loxP lineage system and at twelve weeks of age, male and female mice were randomly assigned to an exercise or sedentary control group. Mice in the exercise group had volitional access to running wheels for the duration of the experiment. Transmission electron microscopy was employed to determine mitochondrial characteristics, and images were analyzed using ImageJ software. It is hypothesized that CARM1 removal, exercise, and sex differences will lead to alterations in IMF mitochondrial size, number, and density.

Sullivan, Erin

Examining How Future Healthcare Professionals Educate Themselves on Social Justice Issues That Affect Their Patients

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Acts of discrimination exclude marginalized groups from their right to safe and preventive healthcare (Reid & Robson, 2000). In recent research, medical patients listed experiencing maltreatment and their mistrust in physicians, medical practices and the overall health care system as reasons for forgoing future treatment (Quinn et al., 2019). Discrimination by health care professionals is a heavily researched topic; however, research on how students educate themselves on social issues before entering the workforce is lacking. The purpose of this study is to further explore if and how future healthcare professionals educate themselves on social justice issues that could affect their patients. An online survey of 25 questions was posted to Facebook groups that consisted of the targeted population. The survey questions explored participants' experiences with course material, access to social justice education, course selection motives, personal values and priorities in education. After completing the survey, students had the option to participate in a virtual one-on-one semi-structured interview. Overall, 16 students participated in the study, three of whom also took part in the interview portion. The results from the surveys and interviews indicate that students intend to take courses that focus on social justice issues beyond program requirements, but those intentions are often pushed aside in favor of prioritizing biomedical courses. In turn, participants in the study most often used news sources, academic articles and social media to learn about social justice issues, yet also found the required university courses to provide a strong foundation for future self-learning. Professors also influenced students' perspectives and values regarding social justice and biomedical courses. Personal identity and experiences further contributed to participants' desire to learn about social justice issues. Overall, participants advocated for a greater interconnectedness between social justice and biomedical university knowledge within university curricula to better understand social justice issues in healthcare.

Taylor, Joshua

Demonstrating Frontal Plane Knee Control Across More Tasks is Associated with Higher Performance

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Introduction: Control of frontal plane knee motion during a single task has been shown to be beneficial in said task, such as jumping or squatting. However, demonstrating knee control (KC) across a battery of tasks may have broader implications for physical literacy and performance in various athletic endeavours. The purpose of this study was to examine the association of frontal plane KC across a battery of nine tasks and physical capacity, measured via 3RM Deadlift (DL), Broad Jump (BJ), and Yoyo (YY), in a varsity athlete population. Methods: Male (n=138) varsity athletes completed a physical competency assessment that tested their ability to control frontal plane knee motion across various movement patterns (squat, lunge, hinge) characterized by different demands (repetitions, tempo, work). A KC score (0 or 1) was assigned retrospectively to each of the nine tasks via video by the athletes' coaches, who were trained to objectively evaluate KC. On a separate visit, participants performed the DL, BJ, and/or YY. Participants did not all perform all capacity tests. KC scores were summed and categorized as total scores (sum from all tasks, 0-9), demand-based scores (0-3) and movement pattern-based scores (0-3). The associations between KC and performance were evaluated using effect sizes and ANOVAs. Results: A higher total, demand-based, and movement pattern-based KC score were all associated with higher performance in the DL, BJ, and YY. Specifically, 16 of the 27 comparisons yielded moderate or large effect sizes (ES > 0.5). Conclusions: Demonstrating

KC during a larger number of tasks was associated with higher performance. This has implications for how we prioritize KC in assessing performance and designing training programs. Simply exhibiting KC during a single task may not provide an accurate representation of an individual's physical literacy in sport, work, and/or life.

Thomure, Raiya

Gender-Based Violence against Trans* Individuals: A Media Analysis of Mary Gregory's Experience in Powerlifting.

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Trans* individuals are among the most vulnerable populations in North America, with an estimated 40% of trans* people experiencing physical assault, and 50% experiencing sexual assault within their lifetimes (Stotzer, 2009). The trans* identity, asterisk included, represents the spectrum of identities who do not conform with hegemonic understandings of a binary gender assigned at birth. With recent trans* bans trending among powerlifting federations, the violence and maltreatment experienced by trans* individuals have become unspoken injustices. This study uses an analysis of media sources to uncover the discourses and inequities faced by trans* powerlifter, Mary Gregory, following her expulsion from the 100% Raw Powerlifting Federation (Maese, 2019). Three news articles, as well as social media comments are analyzed using thematic analysis. Preliminary results show a number of transphobic themes used by Gregory's critics: invalidation of identity, immature profanity, assumption of cheating, and a combined lack of empathy and education. The manifestations and implications of the uncovered inequities will be discussed further, as well as future vital directions for the safety and inclusivity of trans* athletes in powerlifting spaces.

Tiu, Tiffany

Validation of the Star Balance System against the Traditional Star Excursion Balance Test

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BACKGROUND: The Star Excursion Balance Test (SEBT) is a valid and reliable test to assess lower extremity function. However, the SEBT requires a large footprint and a burdensome setup. The Star Balance System (SBS), consisting of the SEBT printed onto a yoga mat, was recently developed to address these limitations. However, the SBS has not been validated. Therefore, this study aimed to i) validate SBS against SEBT using clinical measures; ii) validate SBS using objective optical tracking methods; and iii) compare the performance between novices to experts on the SBS. **METHODS:** Currently, one participant has been recruited. The participant performed two trials in each of the eight directions on both systems. The reach distances were recorded with an optical tracking system by measuring the maximum distance between the feet. An expert (physiotherapist) and a novice rater also assessed the reach distance to the nearest centimeter. The mean differences in measurements between the optical tracking, expert rater, and novice rater were calculated. **RESULTS:** The mean reach distance across all eight directions and two systems was 89.2cm. The mean difference in the clinical measurement between the SEBT and SBS was 2.5cm (2.8% of mean reach distance, range: 0.5cm [posterolateral] - 6.5cm [anterolateral]). The mean difference between the optical tracking and the expert rater on the SBS was 2.11cm (2.3% of the mean reach distance, range: 0.15cm [posterolateral] - 3.95cm [lateral]). Finally, the mean difference between the expert's and the novice's rating on the mat was 1cm. **CONCLUSION:** The relatively small differences in the optical tracking and clinical measurements between systems suggests that the novel SBS may be a valid assessment

method. The minimal differences between the expert and novice indicates that the SBS may be a viable at-home assessment method.

Workman, Mia

A Narrative Analysis of Diet and Nutrition Information on Instagram: A Critical Cultural Studies Perspective

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Social media are popular platforms for health, fitness and nutrition information exchange among professionals, 'influencers', and users (Goodyear, Armour & Wood, 2018). Cultivation theory contends the more an individual interacts with specific media, the more beliefs are cultivated by the content they consume (Gerbner, 1998); thus, it is essential to study new forms of social media as they have more direct relationships with followers. Recent literature about health and nutrition media has highlighted strong discourses of healthism, neoliberalism, and disordered eating habits. Furthermore, content analyses of nutritional information found social media platforms have demonstrated some diet trends are detrimental to health (O'Shea, 2020; Keogh & Chadwick, 2019; Lynch, 2010). However, the examination of health narratives, eating habits and nutritional information is not in depth. The purpose of this study is to critically analyze the content produced by nutrition influencers on their Instagram pages to unpack dominant narratives. Five public Instagram pages run by women were studied from November 1st, 2020 until January 31st, 2021, spanning content from diet promotion and un-diet promotion sites. Preliminary Findings: Healthism, health education, weight loss, calorie-counting and commodification are common narratives across the pages. The synergy of influencer's photos and captions over time tell stories to followers that ultimately sell their brand and may change fitness and eating behaviours of their followers. The platforms contrast greatly yet narratives do shape the relationship followers have with food. In conclusion, a wide variety of nutritional information is shared amongst Instagram influencers, and the type of information an individual interacts with the most may greatly influence their relationship with food. Future research could study how narratives from both diet culture and un-diet culture affect the standpoints of young women.

Zhan, Jian Kun

Sport and Acculturation of Chinese International Students

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Canada is one of the most popular destinations for higher education to international students, and this number has expanded considerably since the last decade (Thomas & Esses, 2015). At the University of Toronto, international students make up 35% of the total undergraduate enrollment in 2019, with the vast majority (64.6%) being from China (University of Toronto, 2019). Upon arrival in Canada, international students usually undergo an acculturation process, where they experience a crossing of different cultures and new interactions with individuals from the host nation (Li et al., 2017). This acculturation process can include many challenges, including language barrier and a lack of sense of belonging. Due to the increase in international students in Canada (Thomas & Esses, 2015) and the difficulties caused by the acculturation process, it is important for scholars and school administrators to understand the challenges international students might face and provide evidence-based interventions that could help them navigate such challenges. One of the ways that this could be achieved is utilizing sport and recreation for acculturation purposes. Therefore, this study utilizes semi structured interviews to examine how sports can be utilized as a method for acculturation by Chinese international students to relate to both the home and the host culture.