

THE 20<sup>th</sup> ANNUAL BERTHA ROSENSTADT  
NATIONAL UNDERGRADUATE  
RESEARCH CONFERENCE  
KINESIOLOGY AND PHYSICAL EDUCATION



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UNIVERSITY OF TORONTO  
FACULTY OF KINESIOLOGY & PHYSICAL EDUCATION



# WELCOME TO THE 20<sup>TH</sup> 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.

## CONFERENCE SITE

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

## PARKING

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

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

## WI FI ACCESS

Access Point: kpeguest

Password: Events\_2019



## SCHEDULE OF EVENTS

Time	Item	Location – Topic
8:30-9:00 a.m.	Registration & Refreshments	2 <sup>nd</sup> Floor Benson Lobby & Lounge
9:00-9:10 a.m.	Welcome	Benson 307
9:15-10:30 a.m.	Breakout Sessions I	Various presentations in rooms: BN 307, BN 302, BN 304, and WS 2007. See order of the day below.
10:30-10:45 a.m.	<b>BREAK</b>	2 <sup>nd</sup> Floor Benson Lounge
10:45-12:15 p.m.	Breakout Sessions II	Various presentations in rooms: BN 307, BN 302, BN 304, and WS 2007. See order of the day below.
12:15-1:15 p.m.	<b>LUNCH</b>	2 <sup>nd</sup> Floor Benson Lounge
1:15-2:30 p.m.	Breakout Sessions III	Various presentations in rooms: BN 307, BN 302, BN 304, and WS 2007. See order of the day below.
2:30-2:45 p.m.	<b>BREAK</b>	2 <sup>nd</sup> Floor Benson Lounge
2:45-4:00 p.m.	Breakout Sessions IV	Various presentations in rooms: BN 307, BN 302, BN 304, and WS 2007. See order of the day below.
4:00-4:15 p.m.	<b>BREAK</b>	2 <sup>nd</sup> Floor Benson Lounge
4:15-5:30 p.m.	Keynote: Dr. Bareket Falk  Award Presentation and Closing Remarks	<i>“The increase in muscle strength with growth: Is it only size that matters?”</i> (BN307)

### ABOUT THE KEYNOTE SPEAKER



Dr. Bareket Falk is a pediatric exercise physiologist from Brock University, with a wide interest in children’s responses to exercise and the physiological effects that physical training may have on healthy children, as well as on children with chronic diseases. Her current work focuses on the effect of growth, maturation and physical activity on muscle function and on bone development. Bareket Falk is currently the Editor-in-Chief of the journal *Pediatric Exercise Science*.

***The increase in muscle strength with growth: Is it only size that matters?***

Children are not as strong as adults. One reason is that they are smaller and have smaller muscle mass. However, even when body size is taken into account (i.e., when muscle strength is scaled to size), children’s strength is still lower than adults’. There are many other well-documented differences between children and adults, related to muscle performance. These include lower muscle power and explosive strength, yet greater muscle endurance in children. Children’s response to resistance training is also different from that of adults in that they exhibit little if any muscle hypertrophy. All of these age-related differences are related to changes in muscle function which occur with growth. For example, as children grow, they are able to recruit more of their motor unit pool during maximal contraction. We suggest that it is specifically the faster, more powerful, type-II motor units that are increasingly recruited with growth. Such age- or maturity-related changes can have implications to training recommendations, as well as to rehabilitation strategies. This lecture will discuss the evidence supporting changes in muscle function during growth and how these changes are manifested during performance.

## PRESENTATION INSTRUCTIONS

*Each presenter is allocated 15 minutes, which includes a verbal presentation (approx. 12 minutes), questions and answers, and time for transition between presenters. Please upload and test your presentation between 8:30am and 9:00am for Session I or II OR between 12:15pm and 1:15pm for Session III or IV.*

## ORDER OF THE DAY

**Registration and Refreshments:** 8:30 a.m. – 9:00 a.m. (2<sup>nd</sup> Floor Benson Lobby & Lounge)

**Welcome:** 9:00 a.m. – 9:10 a.m. (Benson 307)

**Session I: 9:15 a.m. – 10:30 a.m.**

BN 307	
9:15 a.m.	<p><b><i>A systematic review and meta-analysis of branched-chain amino acid supplementation on resistance training-induced gains in muscle mass and strength</i></b>                      By: Mirette Mounir                      Co-Authors: Robert Morton and Matthew Fliss                      Faculty Advisor: Stuart Phillips                      McMaster University</p>
9:30 a.m.	<p><b><i>A novel approach to assessing skeletal muscle morphologic changes following resistance exercise training with heavier and lighter loads using ultrasonographic measures of muscle axial cross-sectional area</i></b>                      By: Sean McKellar                      Co-Authors: Morton, R.W., Fliss, M.D, Sidhu, R., Baker, S.K., Phillips, S.M                      Faculty Advisor: Dr. Stuart Phillips                      McMaster University</p>
9:45 a.m.	<p><b><i>Muscle fibre cross-sectional area and fibre type changes following resistance exercise training with heavier and lighter loads in young men</i></b>                      By: Rajbir Sidhu                      Co-Authors: Rob Morton, Matt Fliss, Sean McKellar, and Chris McGlory                      Faculty Advisor: Dr. Stuart Phillips                      McMaster University</p>
10:00 a.m.	<p><b><i>Effects of 4 Weeks of High-Intensity Interval Training on Cardiorespiratory Fitness and Endothelial Function in Patients with Coronary Artery Disease</i></b>                      By: Roma Dhamanaskar                      Co-Authors: E.C. Dunford, S.E. Valentino, J. Dubberley, E. Lonn, M.J. Gibala, S. M. Phillips, M.J. MacDonald                      Faculty Advisor: Dr. Maureen MacDonald                      McMaster University</p>
10:15 a.m.	<p><b><i>Investigating the Feasibility of High Intensity Interval Training (HIIT) Post-Stroke</i></b>                      By: Hayley Ng                      Co-Authors: Kevin Moncion, Kenneth Noguchi, Elise Wiley</p>

Faculty Advisor: Dr. Ada Tang  
McMaster University

### BN 302

9:15 a.m. ***Investigating the Effects of Glucose on Neural Excitability using Short-Interval Intracortical Inhibition in Healthy Males***

By: Yohanan Levin  
Co-Authors: Stephen Toepp, Claudia Turco  
Faculty Advisor: Dr. Aimee Nelson  
McMaster University

9:30 a.m. ***An observational study examining the effect of habitual versus non-habitual caffeine consumption on the MEP recruitment curve in healthy males***

By: Roshni Ravi  
Faculty Advisor: Dr. Aimee Nelson  
McMaster University

9:45 a.m. ***The Effects of Caffeine on the Neuroendocrine Stress Response***

By: Benjamin Divito  
Co-Authors: Catherine Amara  
Faculty Advisor: Catherine Amara  
University of Toronto

10:00 a.m. ***The effect of acute changes in progesterone on the exercise pressor reflex***

By: Mengxin Tang  
Co-Authors: Ava Khaksar, Yasmine Coovadia  
Faculty Advisor: Charlotte W. Usselman  
McGill University

10:15 a.m. ***The positive effects of isometric handgrip exercise on the cardiovascular health of post-menopausal women***

By: Victoria Melo  
Faculty Advisor: Dr. Danielle Bentley  
University of Toronto

### BN 304

9:15 a.m. ***Investigating the Relationships between Load & Recovery Metrics during Women's Field Hockey Matches***

By: Alexander Klas  
Faculty Advisor: Dr. Ira Jacobs & Dr. Jason Vescovi  
University of Toronto

9:30 a.m. ***Emphasis on Speed Requirements for Endurance Performance***

By: Ben Devito  
Faculty Advisor: Dr. Taha  
University of Toronto

9:45 a.m. ***Using the Mobility Screen to 'rule out' mobility restrictions amongst varsity rowers and soccer players***

By: Madalyn Tworzyanski

	<p>Co-Authors: Marcus Piggott, Adrian Lightowler, David Frost  Faculty Advisor: Dr. David Frost  University of Toronto</p>
10:00 a.m.	<p><b><i>Dynamic Fit of the Foot and Ankle during Ice Hockey Skating</i></b>  By: Tony Jakji  Co-Authors: Curt Dewan  Faculty Advisor: David J Pearsall  McGill University</p>
10:15 a.m.	<p><b><i>Do the feet influence the interpretation of frontal plane knee position while jumping?</i></b>  By: Anthony Lopes  Faculty Advisor: David Frost  University of Toronto</p>
<b>WS 2007</b>	
9:15 a.m.	<p><b><i>The effects of systemic AMPK activator MK-8722 in the skeletal muscle of mice with Duchenne Muscular Dystrophy</i></b>  By: Ian Diffey  Faculty Advisor: Dr. Vladimir Ljubcic  McMaster University</p>
9:30 a.m.	<p><b><i>The effects of acute exercise-induced AMPK activation in the skeletal muscle of myotonic dystrophy type 1 mice</i></b>  By: Leon Chi  Co-Authors: Alexander Manta, Sean Ng, Mark Mackie  Faculty Advisor: Dr. Vladimir Ljubcic  McMaster University</p>
9:45 a.m.	<p><b><i>Nuclear Factor Kappa B (p50) content Following Different Types of Muscle Contractions</i></b>  By: Melissa Stapleton  Faculty Advisor: Dr. Marius Locke  University of Toronto</p>
10:00 a.m.	<p><b><i>The Ergogenic Potential of Nutrition for Post-Exercise Collagen Protein Synthesis: A Mechanistic Investigation</i></b>  By: Maksym Holowaty  Faculty Advisor: Dr. Daniel Moore  University of Toronto</p>
10:15 a.m.	<p><b><i>The Detection of HSP72 in Isolated Single Fibers from Rat Soleus and White Gastrocnemius Muscles</i></b>  By: Samuel Grossman  Faculty Advisor: Dr. Marius Locke  University of Toronto</p>

**Break #1:** 10:30 a.m. – 10:45 a.m. (2<sup>nd</sup> Floor Benson Lounge)

**Session II: 10:45 a.m. – 12:15 p.m.**

BN 307	
10:45 a.m.	<p><b><i>A Three-Dimensional Architectural Analysis of the Innervation of Tibialis Anterior Muscle</i></b>                      By: Jinyuru Yang                      Co-Authors: Silviu Agotici, Dr. Kei Masani, Dr. Paul B. Yoo                      Faculty Advisor: Dr. Catherine Amara, Dr. Anne Agur                      University of Toronto</p>
11:00 a.m.	<p><b><i>The relationship of the vastus medialis and vastus lateralis in boys vs. men</i></b>                      By: James Maynard                      Co-Authors: Woods, S., Dotan, R., Jenicek, N., Falk, B.                      Faculty Advisor: Dr. Bareket Falk                      Brock University</p>
11:15 a.m.	<p><b><i>Does the Method of Defining the Eccentric Phase of a Countermovement Jump Influence Rate of Vertical Force Development Calculations?</i></b>                      By: Robert Mackowiak                      Co-Authors: Malinda Hapuarachchi, Tyson Beach                      Faculty Advisor: Dr. Tyson Beach                      University of Toronto</p>
11:30 a.m.	<p><b><i>An Investigation of Various Stretching Techniques on Hamstring Flexibility in Healthcare Students</i></b>                      By: Alysha Duivesteyn                      Faculty Advisor: Dr. Paolo Sanzo                      Lakehead University</p>
11:45 a.m.	<p><b><i>Does Anthropometry Influence the Body Position Required to Reach Low-Lying Objects without Flexing the Spine?</i></b>                      By: Tyler King                      Faculty Advisor: Dr. Beach                      University of Toronto</p>
12:00 p.m.	<p><b><i>Teaching, Coaching, and Learning an Artistic Gymnastic Skill</i></b>                      By: Ashley Abou-Akl and Naomi Pham                      Faculty Advisor: David Cooper                      University of Toronto</p>
BN 302	
10:45 a.m.	<p><b><i>Relationship between computer-related neck and upper back pain, and depression in secondary and post-secondary students: a literature review</i></b>                      By: Joseph Helmy                      Faculty Advisor: Lynda Van Dreumel                      University of Toronto</p>

11:00 a.m.	<p><b><i>Can Racialized Athletes be Ambassadors of Peace? Liverpool F.C.'s Mohamed Salah and his Impact on the Global Muslim Identity</i></b>  By: Zeana Hamdonah  Faculty Advisor: Simon Darnell  University of Toronto</p>
11:15 a.m.	<p><b><i>Breaking down homelessness in Toronto: sociocultural, structural, and personal considerations</i></b>  By: Angela Lam  Faculty Advisor: Aditi Mehta  University of Toronto</p>
11:30 a.m.	<p><b><i>Strengths-Based Practice in the Health Care Setting</i></b>  By: Clement Chow  Faculty Advisor: Ashley Stirling  University of Toronto</p>
11:45 a.m.	<p><b><i>Crossing the ocean for school is not an easy task</i></b>  By: Danni Zhang  Faculty Advisor: Dr. Michael Atkinson  University of Toronto</p>
12:00 p.m.	<p><b><i>Ditching, Snitching, and Stitching Back Together Ontario's 2015 Grades 1-8 Health and Physical Education Curriculum</i></b>  By: Mark Corsetti  Faculty Advisor: Caroline Fusco  University of Toronto</p>

**BN 304**

10:45 a.m.	<p><b><i>A Comparison of Heart Rate Variability Responses between Concussion and Musculoskeletal Injury</i></b>  By: Danielle Corallo  Faculty Advisor: Dr. Michael Hutchison  University of Toronto</p>
11:00 a.m.	<p><b><i>An Exploration into Sports Related Concussion Management in Nova Scotia</i></b>  By: Sarah Charnock  Faculty Advisor: Dr Colin King  Acadia University</p>
11:15 a.m.	<p><b><i>Examination of Gastrointestinal Permeability following Acute Sport-Related Concussion</i></b>  By: Jinyuru Yang  Co-Authors: Dr. Alex Di Battista  Faculty Advisor: Dr. Michael Hutchison  University of Toronto</p>
11:30 a.m.	<p><b><i>Exploring the utility of 24-heart rate variability (HRV) to characterize sleep disturbance post-concussion</i></b>  By: Joseph Carere</p>

11:45 a.m.	<p>Faculty Advisor: Michael Hutchison University of Toronto</p> <p><b><i>Varsity Athletes' Experience of Pain and Discomfort Following Concussion</i></b> By: Rebecca Burt Co-Authors: Faculty Advisor: Lynda M. Mainwaring, Ph.D., C.Psych University of Toronto</p>
12:00 p.m.	<p><b><i>Perceived Psychological Stress and Concussion</i></b> By: Brenaven Kugamoorthy Co-Authors: Faculty Advisor: Michael Hutchison University of Toronto</p>

**WS 2007**

10:45 a.m.	<p><b><i>An Optimal Velocity for Online Limb-Target Regulation Processes: Somatosensory Edition</i></b> By: Sadiya Abdulrabba Co-Authors: Rachel Goodman, Valentin Cranic, Luc Tremblay Faculty Advisor: Dr. Luc Tremblay University of Toronto</p>
11:00 a.m.	<p><b><i>A weight on the mind: the effects of wrist weight on execution, imagination and perception</i></b> By: Katrina Innanen Co-Authors: Faculty Advisor: Tim Welsh University of Toronto</p>
11:15 a.m.	<p><b><i>Audiovisual Cueing Enhances Personalized Rhythmic Training</i></b> By: Selina Malouka Co-Authors: Tristan Loria, Valentin Crainic, Michael H. Thaut , &amp; Luc Tremblay Faculty Advisor: Luc Tremblay University of Toronto</p>
11:30 a.m.	<p><b><i>Is expertise an influencing factor on the transfer of motor skills amongst musicians?</i></b> By: Aran Singh Bains Faculty Advisor: Joyce L. Chen University of Toronto</p>
11:45 a.m.	<p><b><i>Postural stability in adults living with intellectual disability following a dance intervention.</i></b> By: Emma Chen Co-Authors: Mary Roberts and Sarah DiPasquale Faculty Advisor: Mary Roberts Concordia University</p>

12:00 p.m.	<p><b><i>Perception of gait symmetry during split-belt walking is not affected by Parkinson's Disease</i></b>          By: Roger YJ Wei          Co-Authors: Dorelle C. Hinton, David Conradsson, Caroline Paquette          Faculty Advisor: Caroline Paquette          McGill University</p>
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**Lunch:** 12:15 p.m. – 1:15 p.m. (2<sup>nd</sup> Floor Benson Lounge)

**Session III: 1:15 p.m. – 2:30 p.m.**

BN 307	
1:15 p.m.	<p><b><i>Improved aerobic capacity does not influence changes in lean body mass measured by DXA following resistance exercise training</i></b>          By: Aidan Hatt          Co-Authors: Mia Costa-Parke, Kathy Manta, Alex Brown, Aaron Thomas, Chris Mcglory, Gianni Parise          Faculty Advisor: Gianni Parise          McMaster University</p>
1:30 p.m.	<p><b><i>Associations between Fat Free Mass and Exercise Physiological and Perceptual Outcomes in People with Chronic Obstructive Pulmonary Disease.</i></b>          By: Kaveh Gaynor-Sodeifi          Co-Authors: Jade Fraser, Lauren Tracey, Emily Koch, Dennis Jensen, Hayley Lewthwaite, Dennis Jensen          Faculty Advisor: Dennis Jensen          McGill University</p>
1:45 p.m.	<p><b><i>Do brief bouts of body weight interval training affect cardiorespiratory fitness in inactive adults?</i></b>          By: Linda Archila          Co-Authors: William Bostad          Faculty Advisor: Martin Gibala          McMaster University</p>
2:00 p.m.	<p><b><i>The Relationship Between Cardiorespiratory Fitness and Flow Mediated Dilation, Low-Flow Mediated Constriction and Total Vessel Reactivity in the Brachial Artery</i></b>          By: Christopher Gupta          Co-Authors: Vanessa I. Rizzuto          Faculty Advisor: Dr. Maureen J. MacDonald          McMaster University</p>
2:15 a.m.	<p><b><i>The Relationship Between Shear Rate Components of Resting Blood Flow and Flow-Mediated Dilation in the Brachial Artery</i></b></p>

	<p>By: Hanieh Rahimi  Co-Authors: Jem Cheng, Julia Totosy de Zepetnek, Jason Au, Maureen MacDonald  Faculty Advisor: Dr. Maureen MacDonald  McMaster University</p>
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**BN 302**

1:15 p.m.	<p><b><i>Omega-3 fatty acid supplementation attenuates skeletal muscle-disuse-atrophy during two weeks of unilateral leg immobilization in healthy young women.</i></b>  By: Erin K Webb  Co-Authors: Mohammad I., Kamal M., Bahniwal R., Gorissen S.M.H., Hector A and McGlory C  Faculty Advisor: Dr. Stuart Phillips  McMaster University</p>
1:30 p.m.	<p><b><i>The Effects of L-Citrulline on Blood-Lactate Removal Kinetics Following Maximal-Effort Exercise</i></b>  By: Benjamin Divito  Co-Authors: Mackenzie McLaughlin, Ira Jacobs  Faculty Advisor: Ira Jacobs  University of Toronto</p>
1:45 p.m.	<p><b><i>Phosphoproteomic analysis of human skeletal muscle following acute resistance and endurance exercise</i></b>  By: Ibrahim Mohammad  Co-Authors: Chris McGlory, Amy J. Hector, Martin Macinnis, Troy A. Hornberger  Faculty Advisor: Dr. Stuart Phillips  McMaster University</p>
2:00 p.m.	<p><b><i>The Influence of Aerobic Training and Resistance Training on Satellite Cell Pool Expansion</i></b>  By: Anamaria Costa-Parke  Co-Authors: Aaron Thomas, Dr. Chris McGlory, Katherine Manta, Alex Brown, Aidan Hatt, Gianni Parise  Faculty Advisor: Gianni Parise  McMaster</p>
2:15 a.m.	<p><b><i>The effect of aerobic training on capillarization and its role in the hypertrophic response following resistance exercise.</i></b>  By: Alex Brown  Co-Authors: Aaron Thomas, Kathy Manta, Mia Costa-Parke, Aidan Hatt, Chris McGlory, Gianni Parise  Faculty Advisor: Dr. Gianni Parise  McMaster University</p>

**BN 304**

1:15 p.m.	<p><b><i>The Effects of Heat Stress and Acute Exercise on the Unbound Fraction of Caffeine</i></b>  By: Kaye Melgar Dizon  Co-Authors: Mackenzie McLaughlin</p>
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	<p>Faculty Advisor: Dr. Ira Jacobs University of Toronto</p>
1:30 p.m.	<p><b><i>The Phenotypic Expression of Athletes with Atrial Fibrillation</i></b> By: Rebecca Laundos Faculty Advisor: Dr. Jack Goodman University of Toronto</p>
1:45 p.m.	<p><b><i>Gait Retraining and Risk Factors for Tibial Stress Fractures in Runners: A Review</i></b> By: Robert Lawand Faculty Advisor: Dr. Tyson Beach University of Toronto</p>
2:00 p.m.	<p><b><i>Varsity Rowing and Soccer Athletes are Physically Fit but not Physically Literate</i></b> By: Marcus Piggott Co-Authors: Adrian Lightowler, Dr. Frost Faculty Advisor: Dr. Frost University of Toronto</p>
2:15 a.m.	<p><b><i>The End of Possession Soccer?</i></b> By: Ahmed-Yahya Ali Faculty Advisor: Professor Timur Taha University of Toronto</p>

**WS 2007**

1:15 p.m.	<p><b><i>The Dual Tasking Texting Effect of Cell Phone Technology on Walking</i></b> By: Asher Harley Mendelsohn Faculty Advisor: Dr. Carlos Zerpa Lakehead University</p>
1:30 p.m.	<p><b><i>Does a single-bout of aerobic exercise differentially influence executive function during stages of the menstrual cycle?</i></b> By: Kennedy Dirk Faculty Advisor: Matthew Heath Western University</p>
1:45 p.m.	<p><b><i>Shear stress strains cognition: Linking cerebral blood flow and cognitive performance</i></b> By: Kalle Hendrik Amolins Faculty Advisor: Dr. Kurt Smith, Dr. Ian Newhouse Lakehead University</p>
2:00 p.m.	<p><b><i>Differences in Resting State Functional Connectivity Between Masters Athletes and Healthy Elderly</i></b> By: Alisha Atri Co-Authors: Alexandra Potvin-Desrochers Faculty Advisor: Caroline Paquette McGill University</p>

2:15 a.m.	<p><b><i>Effects of Exercise Intensity on Exercise-Induced Neuoplasticity</i></b>          By: Prabhav Gogna          Faculty Advisor: Dr. Aimee Nelson          McMaster University</p>
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**Break #2:** 2:30 p.m. – 2:45 p.m. (2<sup>nd</sup> Floor Benson Lounge)

**Session IV:** 2:45 p.m. – 4:00 p.m.

BN 307	
2:45 p.m.	<p><b><i>The effects of heavier and lighter loads on skeletal muscle hypertrophy and strength in upper versus lower limbs while training to volitional fatigue</i></b>          By: Matthew Fliss          Co-Authors: Robert W Morton, Sean R McKellar, Rajbir Sidhu, Chris McGlory, Jatin G Burniston          Faculty Advisor: Dr. Stuart Phillips          McMaster University</p>
3:00 p.m.	<p><b><i>Effect of Single-Leg Aerobic Training on Satellite Cell Proliferation and Muscle Capillarization</i></b>          By: Katherine Manta          Co-Authors: Aaron Thomas, Chris McGlory, Alex Brown, Anamaria Costa-Parke, Aidan Hatt, Gianni Parise          Faculty Advisor: Gianni Parise          McMaster University</p>
3:15 p.m.	<p><b><i>Effects of an Acute Bout of Exercise on Bone Adipose Tissue Sclerostin Expression in Obese and Normal Weight Mice</i></b>          By: Matthew Nasato          Co-Authors: Nigel Kurgan          Faculty Advisor: Panagiota Klentrou          Brock University</p>
3:30 p.m.	<b><i>No presentation</i></b>
3:45 a.m.	<b><i>No presentation</i></b>
BN 302	

2:45 p.m.	<p><b><i>The Effect of the Fit Fat Index on Global Self Worth and Perceived Athletic Competence in Children</i></b>  By: Gregory Borschneck  Co-Authors: Laura St. John, Stephanie Babij, Scott Veldhuizen, John Cairney  Faculty Advisor: Laura St. John, John Cairney  University of Toronto</p>
3:00 p.m.	<p><b><i>Do healthier children have more grit? Examining the role of physical activity between grit and mental health in children and adolescents</i></b>  By: Karina De Lisa  Faculty Advisor: John Cairney  University of Toronto</p>
3:15 p.m.	<p><b><i>Impact of PLUS 2.0 on first year university students.</i></b>  By: Nithin Jacob  Faculty Advisor: Dr. Matthew Kwan  McMaster University</p>
3:30 p.m.	<p><b><i>Accessibility to Peer Support Strategies for Managing Critical Incident Exposure among Paramedics</i></b>  By: Paige Jefferson  Faculty Advisor: Dr. Kathryn Sinden &amp; Dr. Joann Vis  Lakehead University</p>
3:45 a.m.	<p><b><i>Bridging gaps: Determining best practices for fitness program planning for immigrant seniors</i></b>  By: Hibaq Mohamed  Faculty Advisor: Catherine Amara  University of Toronto</p>

**BN 304**

2:45 p.m.	<p><b><i>Investigating Current Practice for Facilitating Peer Support Amongst Special Olympic Athletes: A Content Analysis</i></b>  By: Natasha Bruno  Co-Authors: Krystn Orr, James Noronha, Kelly Arbour-Nicitopoulos  Faculty Advisor: Dr. Kelly Arbour-Nicitopoulos  University of Toronto Faculty of Kinesiology &amp; Physical Education</p>
3:00 p.m.	<p><b><i>The influence of the coach athlete relationship on athletes' sport performance: A review of literature</i></b>  By: Nicole Godman  Faculty Advisor: Ashley Stirling  University of Toronto</p>
3:15 p.m.	<p><b><i>A narrative approach to understanding retirement from professional sport</i></b>  By: Faheem Moolla  Faculty Advisor: Katherine Tamminen  University of Toronto</p>
3:30 p.m.	<p><b><i>Recommendations to Alleviate Body Image Concerns in Girls Sport</i></b>  By: Ambareen-Rose Velji  Co-Authors: Benjamin Sylvester, Eva Pila, Catherine Sabiston</p>

3:45 a.m.	<p>Faculty Advisor: Catherine Sabiston University of Toronto</p> <p><b><i>NFL National Anthem Policy: A Narrative Policy Analysis of Media Framing and Audience Understandings</i></b> By: Barinderjit Sangha Faculty Advisor: Margaret MacNeill University of Toronto</p>
<b>WS 2007</b>	
2:45 p.m.	<p><b><i>The Short-Term Effects of Mindfulness Meditation on Worrisome and Intrusive Thoughts in Young Adults with Attention Deficit Hyperactivity Disorder (ADHD)</i></b> By: Marie-Claire Lister Faculty Advisor: Dr. Erin Pearson Lakehead University</p>
3:00 p.m.	<p><b><i>Comparing Physical Activity and Sedentary Behaviours of Children and Youth with High versus Low-functioning Autism Spectrum Disorder</i></b> By: Téa Christopoulos Co-Authors: Rebecca Bassett-Gunter Faculty Advisor: Dr. Kelly Arbour-Nicitopoulos University of Toronto</p>
3:15 p.m.	<p><b><i>Exploring the Relationship between Fitness and Executive Functioning in Young Adults with Attention Deficit Hyperactivity Disorder</i></b> By: Rachel Loebach Co-Authors: Michelle Ogrodnik Faculty Advisor: Dr. Jennifer Heisz McMaster University</p>
3:30 p.m.	<p><b><i>Demographic and Medical Correlates of Light Physical Activity in Kidney Cancer Survivors</i></b> By: Princess Ulona Faculty Advisor: Linda Trinh University of Toronto</p>
3:45 a.m.	<p><b><i>Physical Activity Communication between Oncology Healthcare Providers and Kidney Cancer Survivors</i></b> By: Denise Bastas Faculty Advisor: Linda Trinh University of Toronto</p>

**Break #3:** 4:00 p.m. – 4:15 p.m. (2<sup>nd</sup> Floor Benson Lounge)

**Keynote, Awards, & Closing Remarks:** 4:15 p.m. – 5:30 p.m. (BN 307)



## ABSTRACTS

(in alphabetical order by surname)

**Abou-Akl, Ashley and Pham, Naomi**

***Teaching, Coaching, and Learning an Artistic Gymnastic Skill***

Faculty Advisor: David Cooper

University of Toronto / Faculty of Kinesiology & Physical Education

Teaching, coaching, and learning are very closely linked together. The purpose of this presentation is to highlight the stages of how a gymnastics' coach would teach a gymnast how to perform a handstand in a safe and correct way. It focuses on the importance of providing both visual images and verbal explanation. As such it contributes to the body of knowledge that already exists in how to teach a handstand. Handstands are a fundamental skill in male and female artistic gymnastics, thus they should be rehearsed with proper technique for both safety and performance purposes. Incorrect technique can result in serious injuries that can lead to a negative appraisal of participating in gymnastics and potentially sport all together. This can further hinder physical activity levels resulting in a reduction in one's quality of life. Visual, kinesthetic, and verbal cues are just a few examples of essential aspects when teaching a skill, considering that there are numerous learning styles an individual can possess. The goal of this presentation is to introduce the ways one can properly execute a handstand by breaking the skill down into components and providing the gymnast with the tools necessary to physically and mentally perform this skill successfully. Our presentation is an example of incorporating various forms of teaching and coaching styles that a gymnast may choose to perform a handstand. Teaching and learning cues are provided in both the video and presentation to simplify the complex terminology often used in gymnastics culture. Gymnastics has one of the highest sport injury rates and it is evident that through proper implementation of skills, regarding technique and form, these rates can be reduced.

**Abdulrabba, Sadiya**

***An Optimal Velocity for Online Limb-Target Regulation Processes: Somatosensory Edition***

Faculty Advisor: Dr. Luc Tremblay

Co-Author(s): Rachel Goodman, Valentin Cranic, Luc Tremblay

University of Toronto / Faculty of Kinesiology & Physical Education

Spatial targets in our environment may not be static in nature and require people to correct initial hand trajectories, in order to accurately reach a new target location. For example, when reaching towards an opponent (e.g., stiff arm in American football), the opponent will likely move, and the arm trajectory would require adjusting to accurately reach the new position of the player. Many studies have shown that humans can adjust for imperceptible shifts of visual targets during an upper-limb reaching task (e.g., Goodale et al., 1986; Tremblay et al., 2017). Yet, many voluntary actions require reaching to non-visible body parts (e.g., swatting a mosquito on your arm). Recently, it has been shown that, in the absence of visual feedback, humans can correct the trajectory of a reaching limb, when the other limb is displaced (Manson et al., 2019). However, that study did not allow the determination of which sensory cue of the displaced limb allows individuals to correct the trajectory of the reaching limb. Specifically, humans could use signals from the muscle spindles (e.g., Ia primary afferents) and/ or tactile information (e.g., Meissner corpuscles). Accordingly, the current study tested whether humans can use tactile cues to correct the trajectory of an unseen limb. Participants performed an upper-limb pointing task with their right index-finger from a home position to a brief somatosensory stimulus (i.e., vibrotactile cue, 40 ms) on their left index finger. On each trial, a second somatosensory stimulus was presented after the onset of the reaching movement. The secondary stimulus was either presented on the same finger as the first stimulus (i.e., left index finger) or "jumped" to another finger (i.e., left middle finger). The participant was asked to adjust their limb trajectory based on the secondary stimulus. Repeated measures ANOVA on [what variables??] were conducted to analyze the influence of "jump" vs. "no-jump" trials and failed to reflect any trajectory amendments arising from the presentation of the secondary target. As a result, tactile stimuli may not provide critical information about spatial target locations for the control of voluntary actions, at least in the way visual feedback can (Tremblay et al., 2017). Alternatively, these results appear to support the concept of sensory gating, where tactile information may be "suppressed" during voluntary movements (e.g., Chapman et al., 1987; see Juravle et al., 2017 for a review).

**Ali, Ahmed-Yahya**

***The End of Possession Soccer?***

Faculty Advisor: Professor Timur Taha

University of Toronto / Faculty of Kinesiology & Physical Education

France claimed the 2018 Men's Football World Cup, and a major theme was the success of counter-attacking teams throughout that tournament. This style of play was arguably the reason for France's success in comparison to teams using a possession-based style (i.e. when a team maintains on average more than 55% possession of the ball throughout the game). Spain (2010) and Germany (2014) are former winners of the World Cup who prefer this style of play. Both teams experienced earlier than expected exits in 2018. As such, this paper hypothesizes that a team's style of play has an impact on their success. To prove this, 63 games from the 2010-2018 World Cups were analyzed, primarily focusing on France, Germany and Spain with an additional counter-attacking team included at each tournament. The data collected from each game included: a) the amount of time for teams to reach the final third; b) the number of opposing players that were behind the ball when they entered the attacking third; c) the number and types of passes used to reach the final third (short, medium, or long); and d) the number of entries into the final third. Additional statistics from the official FIFA database were also analyzed for all three World Cups. Upon initial assessment, the data suggests counter-attacking teams reached the final third quicker and met fewer opposing players across all three World Cups. In 2010 and 2014, the champions Spain and Germany respectively averaged the most entries into the final third. Additionally, Spain averaged the most shots on target at 6.5 shots per game in 2010, while Germany averaged the second most shots on target in 2014 at 10.1 shots per game. In 2018, France averaged the third most entries into the final third and shots on target with Germany and Spain averaging the highest in these categories.

**Amolins, Kalle Hendrik**

***Shear stress strains cognition: Linking cerebral blood flow and cognitive performance***

Faculty Advisor: Dr. Kurt Smith, Dr. Ian Newhouse

Lakehead University, School of Kinesiology

**Abstract Background:** Engaging in acute bouts of submaximal aerobic exercise increases cerebral blood flow (CBF). Concomitant increases in flow and intra-arterial shear stress (SS) mechanically trigger the release of a cascade of endothelial markers known to enhance cognitive performance. In contrast to the aforementioned exercise response, it is unknown if acute reductions in CBF and SS will attenuate cognitive performance in otherwise healthy adults. **Purpose:** This study aims to quantify the impact of acute elevations and reductions in brain blood flow and shear stress on cognitive performance. **Methods:** Participants (n=10; ♂=5; ♀=5; 18-35 years) each performed cycling exercise (~65% of Heart rate max) and hyperventilatory hypocapnia (-10 mmHg PaCO<sub>2</sub>) interventions to increase or decrease CBF and SS for 15 minutes respectively. Transcranial colour duplex sonography was used to measure intra-arterial diameter, velocity, blood flow and SS in the middle cerebral artery (MCA) prior to, during, and following each intervention. Cognitive performance was assessed prior to and following each intervention. **Results:** Exercise increased MCA diameter ( $\Delta d=24.72\%$ ;  $SD=6.60\%$ ), flow ( $\Delta Q=44.00\%$ ;  $SD=24.72\%$ ) and SS ( $\Delta SS=13.38\%$ ;  $SD=13.75\%$ ) during and following exercise. Hyperventilation reduced MCA diameter ( $\Delta d=-11.26\%$ ;  $SD=5.47\%$ ), flow ( $\Delta Q=-41.40\%$ ;  $SD=15.09\%$ ) and SS ( $\Delta SS=-16.92\%$ ;  $SD=18.83\%$ ) during and following hyperventilation. Exercise did not enhance cognitive performance as compared to baseline, whereas cognitive performance was reduced following hyperventilation as compared to baseline and exercise. **Conclusions:** This study is the first to associate reduced brain blood flow and intra-arterial shear stress with an acute attenuation in cognitive performance in healthy humans. This finding highlights the importance of acute endothelial stimulation in the maintenance of cognitive capacity in both healthy and diseased states.

**Archila, Linda**

***Do brief bouts of body weight interval training affect cardiorespiratory fitness in inactive adults?***

Faculty Advisor: Martin Gibala

Co-Author(s): William Bostad

McMaster University/ Department of Kinesiology

Cardiorespiratory fitness (CRF) relates to the coordinated action of the heart, lungs, and muscles to uptake oxygen during exercise. Low CRF is associated with an increased risk of death by all causes. Limited time can prevent individuals from meeting the recommended 150 minutes of moderate- to vigorous-intensity aerobic exercise each week. Brief sessions of high intensity interval training, which consist of alternating periods of relatively high and low intensity exercise, are a time effective way of improving CRF. Body weight interval training (BWIT) involves exercises that use body weight as resistance. BWIT has previously been associated with improvements in CRF and aspects of muscular fitness in moderately active individuals. It is unknown if CRF will be affected by brief bouts of BWIT performed by inactive individuals at a self-selected pace. The present study aims to investigate if low volume BWIT affects CRF in inactive but otherwise healthy adults, as indicated through the peak oxygen uptake (VO<sub>2</sub> peak) attained on a cycle ergometer. Twenty adults were randomized into a training or non-training control group. Over six weeks, the training group is completing the 11 minute exercise program three times per week while the non-training group is maintaining their inactive lifestyle. Exercise sessions consist of five 1 minute body weight exercise intervals, each separated by 1 minute of active recovery. CRF and muscular fitness measures like hand grip strength, vertical jump height, and wall sit time will be measured before and after the six week period. Results are pending, though we hypothesize that six weeks of brief BWIT will improve both CRF and aspects of muscular fitness in inactive adults. Through targeting both CRF and muscular fitness, body weight interval training may be an effective exercise mode that can be easily implemented due to the lack of specialized equipment and brief duration.

**Atri, Alisha**

***Differences in Resting State Functional Connectivity Between Masters Athletes and Healthy Elderly***

Faculty Advisor: Caroline Paquette  
McGill University / Kinesiology

Introduction: The functional connectivity (FC) of a brain region called the medial prefrontal cortex (mPFC), which is involved in working memory and executive function, has been found to change in resting state-FC studies involving athletes and older adults, separately (Raichlen et al., 2016; Ferreira & Busatto, 2013). The purpose of this study was to investigate the changes in resting state-functional connectivity of the mPFC in masters athletes (MA) compared to healthy elderly (HE) controls. Methods: The study included 27 participants, 15 masters athletes (8 women) and 12 healthy elderly (6 women). The mean age at the time of scan was 80 years old (SD = 5) for masters athletes and 81 years old (SD = 5) for healthy elderly. The region of interest, the medial prefrontal cortex, was made up of 12 masks obtained from the Brainnetome Atlas (Fan et al., 2016). Between-group analyses were performed using a mixed-effect model in FSL. Individual connectivity values were obtained and plotted against cognitive scores, aerobic fitness, and peak work rate. Results: First, there was decreased connectivity in the MA group between the right BA 24 caudodorsal seed and BA 9. Second, there was increased FC in the MA group between the right BA 24 caudodorsal seed and sub-gyral white matter. Third, there was decreased FC in the MA group between the left BA 24 rostroventral seed and the right precentral gyrus, inferior frontal gyrus. Finally, there was decreased FC in the MA group between the left BA 32 subgenual seed and the right superior parietal lobule. Conclusion: The results obtained from this study provide further evidence that prolonged exercise can cause changes in functional connectivity during resting state.

**Bains, Aran Singh**

***Is expertise an influencing factor on the transfer of motor skills amongst musicians?***

Faculty Advisor: Joyce L. Chen

University of Toronto / Faculty of Kinesiology & Physical Education

Within sport contexts, some individuals experience greater rates of performance improvement compared to others. Previous research has shown the transfer of motor skills to be one possible explanation within sport-specific tasks. However, very few studies have investigated transfer within the music domain. The purpose of this study is to examine whether expert pianists (EP) are better able to transfer their motor abilities to a novel motor task compared to non-musicians (NM). We will test two groups of healthy adults (18-35y): EP (n=12) and NM (n=12). EP have 10+ years of formal piano training and are actively practicing. NM have less than 4 years of formal or self-taught music training and are not actively practicing any instrument. Participants will squeeze a force transducer between their thumb and index fingers to manipulate the position of an on-screen cursor; the goal being to

maximize time spent within the red targets (i.e percent time on target (%ToT)). Participants will undergo skill acquisition (6 blocks of 20 trials) and return for a ~24h retention test (1 block of 20 trials). The dependent variable is %ToT. We will perform a two-way repeated measures ANOVA (factors: expertise, blocks) to determine if improvement differences exist across blocks of practice as a function of expertise. Additionally, we will perform an independent t-test on the change score between retention and block 6 performance to determine the degree of learning. We expect EP to show greater improvement throughout skill acquisition. Furthermore, we expect a greater change score between retention and block 6 performance for EP compared to NM. Our findings have potential implications for teaching and learning motor skills. If expertise influences transfer, early learning of fundamental motor abilities may be beneficial. If expertise does not influence transfer, learning may be specific to the context in which the task is performed.

**Bastas, Denise**

***Physical Activity Communication between Oncology Healthcare Providers and Kidney Cancer Survivors***

Faculty Advisor: Linda Trinh

University of Toronto / Faculty of Kinesiology & Physical Education

Background: The benefits of physical activity (PA) in kidney cancer survivors (KCS) include improvements in quality of life (QoL), fatigue, and physical functioning. However, only 26% of KCS are sufficiently physically active to accrue these benefits. The majority of cancer survivors prefer PA information from their oncologist. Oncologists have the potential to facilitate behaviour change both during and after cancer treatment. Purpose: The purpose of this study is to evaluate the: 1) attitudes, knowledge, barriers and facilitators for PA counselling in oncology healthcare providers (OHP) working with KCS; and 2) the use of the PA guidebook "Get Active, Sit Less!" which was developed specifically for KCS to become physically active. Methods: Using a cross-sectional design, OHP for KCS were recruited through the Kidney Cancer Research Network of Canada (KCRNC). OHP completed a self-reported survey administered online addressing attitudes, knowledge, confidence and competence counselling PA to KCS and using the guidebook, as well as current PA counselling practices. Data will be analyzed to determine frequencies and percentages of responses to determine trends in PA counselling for this population. Expected Results: It is anticipated that OHP will have positive attitudes towards physical activity counselling, however will lack competence and knowledge of PA and guidelines. It is also expected that OHP will make few PA recommendations consistent with the current guidelines. Expected barriers include lack of time and knowledge, while expected facilitators include education and training. Conclusion: Knowledge of the barriers and facilitators for PA counselling by OHP will help enhance PA counselling practices for KCS. This has the potential to increase PA behaviour among KCS for better QoL and health outcomes.

**Borschneck, Gregory**

***The Effect of the Fit Fat Index on Global Self Worth and Perceived Athletic Competence in Children***

Faculty Advisor: Laura St. John, John Cairney

Co-Author(s): Laura St. John, Stephanie Babij, Scott Veldhuizen, John Cairney

University of Toronto / Faculty of Kinesiology & Physical Education

In children and youth, cardiorespiratory fitness and relative weight have proven associations with cognitive function, mental health, and self-concept. It is not understood how the factors of fitness and fatness combine to impact these affective outcomes. The purpose of this study is to analyze how this Fit-Fat relationship impacts global self-worth (GSW) and perceived athletic competence (AC) in children and youth. A total of 2,019 children were included in this analysis. with Participants completed body composition measures, the Leger shuttle run test (VO<sub>2</sub> max), and the Harter Global Self-Worth and Athletic Competence subscales. Fit-Fat scores were defined as VO<sub>2</sub> max/(waist/height). Four models were defined for each outcome; one analyzing each separately (VO<sub>2</sub> max, waist:height, fit-fat) and one accounting for all three predictors. In the final model, variables were orthogonalized to measure the contribution of Fit-Fat beyond its constituent measures. Fit-Fat and VO<sub>2</sub> max demonstrated equivalent association with GSW, however VO<sub>2</sub> max demonstrated slightly greater positive associations with AC compared to Fit-Fat scores. Fit-Fat's significant contribution to GSW and AC imply its importance as a key factor in influencing the affective elements of childhood. This finding may encourage the development of new comprehensive tools which are better able to analyze the many elements impacting the psychological aspect of childhood and youth. Word Count: 210

**Brown, Alex**

***The effect of aerobic training on capillarization and its role in the hypertrophic response following resistance exercise.***

Faculty Advisor: Dr. Gianni Parise

Co-Author(s): Aaron Thomas, Kathy Manta, Mia Costa-Parke, Aidan Hatt, Chris McGlory, Gianni Parise

McMaster University / Faculty of Science

Resistance exercise training is the most effective and accepted strategy for increasing skeletal muscle mass and strength. There is tremendous individual variability in the adaptive response to exercise and the source(s) contributing to this variability are largely unknown. Recent evidence in the literature supports the notion that capillaries may be a potential target for improving outcomes to chronic resistance exercise. Aerobic exercise training is a proven stimulus for eliciting angiogenesis and increasing capillary content. Therefore, we hypothesize that completing a period of aerobic training prior to resistance training will result in a greater increase in fibre cross sectional area (CSA) compared to resistance training alone. Immunohistochemical and fluorescent microscopy techniques were utilized to examine the effects of unilateral aerobic activity on the hypertrophic response to chronic resistance training. 14 participants (8M, 6F) completed 6-weeks of unilateral single leg aerobic training prior to undergoing 10-weeks of bilateral lower body resistance exercise training. Muscle biopsies were collected prior to aerobic training as well as prior to and post resistance training. Watt peak of the aerobically trained limb (measured through single leg V02 peak incremental ramp test) post bilateral resistance training demonstrated 10% higher watt max at V02 peak. Preliminary results (n=5) indicate that type I and type II fibre CFPE was 16% and 28% greater, respectively, in the aerobically trained leg following unilateral cycling. Preliminary results (n=5) indicate that type I and type II fibre CSA was 28% and 26% greater, respectively, in the aerobically trained leg following resistance training. These early results suggest that increased muscle perfusion may permit greater hypertrophy when paired with chronic resistance exercise training.

**Bruno, Natasha**

***Investigating Current Practice for Facilitating Peer Support Amongst Special Olympic Athletes: A Content Analysis***

Faculty Advisor: Dr. Kelly Arbour-Nicitopoulos

Co-Author(s): Krystn Orr, James Noronha, Kelly Arbour-Nicitopoulos

University of Toronto / Faculty of Kinesiology & Physical Education

Peer support for persons with intellectual and developmental disabilities can enhance experience in sport and subsequently, increase long-term participation. Despite these findings, there is a lack of literature that re-evaluates and recommends methods for coaches to enable positive peer environments. This study aims to critically evaluate the current resources available to Special Olympics Canada (SOC) coaches, with attention to the management of peer environments in the various wellness and sport programs offered. This research project is a collaboration with Special Olympics Ontario to have immediate impacts on coaching practices across SOC programs, better facilitation of high-quality peer environments and promoting maintained sport participation. Utilizing a content analysis methodology, an inductive analysis was used followed by a deductive analysis using the Quality Parasport Participation Framework. Codes and themes were identified with the purpose of increasing understanding of coaching practices in the realm of peer support and quality participation within the SOC organization. Two themes were interpreted based on the level of information provided to support the presented coaching strategies: Superficiality in Peer Support and Fostering Peer Support. Each theme is further described by sub-themes exploring the psychological, social, and quality participation elements of the coaching strategies. Findings are intended to inform best practice recommendations for behaviour change, coaching, and peer environment management strategies that can be incorporated into the current SOC coach resources to progress the facilitation of peer support and quality participation across SOC programs.

**Burt, Rebecca**

***Varsity Athletes' Experience of Pain and Discomfort Following Concussion***

Faculty Advisor: Lynda M. Mainwaring, Ph.D., C.Psych

University of Toronto / Faculty of Kinesiology & Physical Education

Introduction: Despite a large body of literature related to the psychology of pain and injury in sport, there is a lack of research exploring pain associated with concussion. The sport-related concussion literature identifies headache as a main physical symptom of concussion but pain can be experienced in a variety of ways (e.g., emotional, sensory, social, psychological, etc.). Athletes' experiences with pain and discomfort following concussion has not been explored. Therefore, the purpose of this study is to (1) explore varsity athletes' experience of pain and discomfort following concussion and (2) determine what methods were used to help manage this pain. Method: The study calls on University of Toronto varsity athletes who experienced a concussion within the past year. A small purposive sample (n= 6-8) of participants, between the ages of 17 and 28 will be recruited through social media, word of mouth, and posters around the University campus. In-depth, semi-structured interviews about athletes' subjective experience of pain and discomfort with concussion will be conducted. Interviews will be transcribed verbatim and analysed using an interpretative phenomenological analysis method. Results: The results of this study are expected to provide a rich description about athletes' physical and psychological experiences of pain and discomfort following concussion and through recovery. How this pain and discomfort are managed will also be explored. The study strives to fill a gap in the concussion literature and help us understand athletes' experiences with pain and discomfort post-concussion.

**Carere, Joseph**

***Exploring the utility of 24-heart rate variability (HRV) to characterize sleep disturbance post-concussion***

Faculty Advisor: Michael Hutchison

University of Toronto / Faculty of Kinesiology & Physical Education

Background: Sleep disturbance (SD) is any disruption to the quality or quantity of an individual's healthy sleep. Despite high prevalence rates being reported following traumatic brain injury (TBI), there remains a void of SD research in sport-related concussion (SRC). 24-heart rate variability (HRV) provides insight into autonomic nervous system (ANS) function and sleep. Therefore, it is possible SD following SRC may be obtained via 24-HRV. Purpose: To investigate the existence and nature of SD following concussive injuries with the use of 24-heart rate variability (HRV) monitoring. Methods: University of Toronto intercollegiate athletes were prospectively recruited including both healthy, uninjured athletes (n = 67) and athletes who recently sustained an SRC. Athletes who sustained a concussion were serially assessed at acute (< 7 days) post-injury (n = 33), 1-month post-injury (n=26), and 3-months post-injury (n=18). HRV recording were obtained using Firstbeat Bodyguard 2 HRV monitors (©2019 Firstbeat Technologies). Results: Sleep architecture scores were formulated with the use of ©2019 Firstbeat Technologies to establish the restoration effect of sleep, length of sleep, amount of recovery during sleep (min), amount of recovery during sleep (%), quality of recovery during sleep (HRV, ms), and self-reported sleep quality. Data to be presented will examine differences in sleep scores between healthy athletes and the concussed athletes. Also, the influence of symptoms and demographics on HRV will be explored and presented. Conclusions: The findings of this study will address the void in the literature by examining SD following SRC. Study findings will help enhance our knowledge regarding frequency and extent of SD in SRC and its potential mechanism, ultimately bettering our ability to characterize and treat concussive injuries.

**Charnock, Sarah**

***AN EXPLORATION INTO SPORTS RELATED CONCUSSION MANAGEMENT IN NOVA SCOTIA***

Faculty Advisor: Dr Colin King

Acadia/School of Kinesiology

BACKGROUND: Sport related concussions (SRC) has become more widely known and researched in recent years. Concussion is known as a functional injury that typically resolves spontaneously within 7-10 days. Many athletes report affective symptoms following SRC and current evidence suggests a link between sports-related concussion and depression symptoms in elite athletes. Various perceived challenges have been reported by athletic trainers in the US however very little research has been done to identify barriers that athletes and health care providers face in Canada. PURPOSE: To identify barriers to effective concussion management in Nova Scotia from the perspectives of various health care providers as well as the student-athletes themselves. METHODS: This cross-sectional mixed methods study involved 40 student athletes who competed at the varsity or club level at a Canadian institution and 20 health care providers with various backgrounds. The participants completed a

questionnaire and 9 from each cohort were selected to participate in a follow up semi structured interview to explore the emerging themes identified from the questionnaires. RESULTS: 45% of the athletes in this study reported their concussion recovery lasting more than 30 days while more than 60% indicated they thought their concussions were managed well. 30% of athletes did not feel supported by their coaches. HCPs identified lack of education and awareness as well as miseducation as one of the largest barriers in effective concussion management. CONCLUSIONS: Few studies have sought to identify barriers to effective concussion management. Apart from previously studied lack of knowledge, there exist other challenges that HCPs and athletes identified in this study

**Chen, Emma**

***Postural stability in adults living with intellectual disability following a dance intervention.***

Faculty Advisor: Mary Roberts

Co-Author(s): Mary Roberts and Sarah DiPasquale

Concordia University/Department of Health, Kinesiology and Applied Physiology

Postural stability is reduced in individuals living with an intellectual disability (ID), and this reduction is accentuated during periods of reduced sensorial feedback. Postural instability experienced by individuals with ID is associated with an increased risk of falls. Dance intervention has been shown to have positive effects on postural stability in children and adolescents living with Autism Spectrum Disorder. Thus, the current study aimed to assess the impact of a 12-week intervention on postural stability in individuals living with ID. 7 experimental (41 ± 13 years old) and 8 control subjects (50 ± 13 years old) were recruited from Saratoga Bridges. Prior to testing and participation, informed consent and assent was obtained. The experimental subjects then participated in a 12-week dance intervention. Center of Pressure (CoP) was assessed with 2 Wii Balance Boards® (Nintendo Co. Ltd., Japan) in pre and post trials under 4 conditions: eyes open, eyes closed and single limb stance. Non-parametric Wilcoxon analysis on SPSS 25® (IBM Corp., NY) was then used for statistical analysis ( $p < 0.05$ ). Results indicated that no significant differences were found in eyes open or single limb conditions for experimental or control groups. However, for the eyes closed condition CoP sway area and range was significantly reduced post dance intervention in the experimental group when compared to pre-results ( $p = 0.03$ ). The findings indicate that dance interventions could have a positive impact on postural stability, particularly during conditions of visual deficit. A lack of significance in other test parameters could be explained by the heterogeneity of participants. Future studies should aim at studying various dance interventions in numerous sensory deficit situations. In conclusion, increasing postural stability decreases the risk of falls. With a decreased fall risk and increased participation in activity, an improved quality of life can be achieved for individuals living with ID.

**Chi, Leon**

***Exercise-induced signaling in the skeletal muscle of myotonic dystrophy type 1 mice***

Faculty Advisor: Dr. Vladimir Ljubicic

Co-Author(s): Alexander Manta, Sean Ng, Mark Mackie

McMaster University/ Department of Kinesiology

Introduction: Myotonic dystrophy type 1 (DM1) is the most prevalent adult form of muscular dystrophy affecting roughly 1 in every 8000 people worldwide. DM1 is a genetic, multisystemic neuromuscular disorder that is characterized by progressive muscle weakness and wasting, myotonia, and insulin resistance. Stimulation of key molecules involved in regulating skeletal muscle phenotype via exercise (e.g. AMPK) may be therapeutic in the context of neuromuscular disorders. The purpose of this study is to examine intracellular signalling after a single bout of exercise in the skeletal muscle of DM1 mice. Addressing knowledge gaps in this regard can provide further insights into the pathology of DM1 and potentially provide targets for future therapeutic interventions. Methods 2-month-old human skeletal actin-long repeat (HSALR; DM1) mice and wild-type (WT) mice were subjected to a single bout of treadmill exercise. Skeletal muscle tissues from DM1 mice ( $n = 8$ ) were harvested 0, 3, 12, and 24 hours post-exercise, while WT mice tissues ( $n = 8$ ) were collected 0 and 3 hours post-exercise. Western blot analyses were used to evaluate AMPK activation status. qPCR and end-point PCR analyses were used to examine gene expression following exercise and recovery. Results AMPK activation status was significantly elevated after an acute bout of exercise in WT and DM1 mice relative to the resting state. Chloride channel (CLC-1) mRNA mis-splicing, a critical casual factor for myotonia, decreased significantly at the 12-hour post-exercise mark in DM1 mice. Discussion Results from this study show that a single bout of exercise can mitigate the mis-splicing of CLC-1 mRNA in DM1 mice. This may be due to an AMPK-related pathway, as AMPK activity is significantly elevated

following a single bout of exercise. Conclusion Exercise is an effective stimulus for AMPK activation in DM1, which can potentially mitigate the pathology associated with the disorder.

**Chow, Clement**

***Strengths-Based Practice in the Health Care Setting***

Faculty Advisor: Ashley Stirling

University of Toronto / Faculty of Kinesiology & Physical Education

The strengths-based approach is the counterpoint to the traditional “problem-focused approach” to care. It is a descriptive, rather than prescriptive, paradigm that attempts to guide healthcare providers in identifying the positive basis in their patients. A strengths-based approach to care lays the foundation for ongoing growth, development, and improvement (Hammond, 2010). It is used to reframe exceptionalities that may be socialized, and possibly stigmatized, negatively (Gottlieb, 2012). This approach encourages both providers and patients to see beyond the risks involved with certain behaviours or treating symptoms and encourages healthcare providers to work in partnership with patients to meet personalized future challenges (Hammond & Zimmerman, 2012). Preliminary research on the use of a strengths-based approach has occurred in the fields of nursing and social work, while application in other health care fields have remained unexplored. The purpose of this study was to investigate the applications of the strengths-based approach across various healthcare professions and the perceived impact this approach has on patients. More specifically, health care students’ perspectives on the use, applicability and impact of the strengths-based approach was explored. Eligible participants included University of Toronto students pursuing a degree in, or have recently graduated from a health sciences program, and also interact with patients as a healthcare provider. A qualitative methodology was employed where a set of interpretive material practices were used to reveal participants’ perspectives on the use or idea of the strengths-based approach. Data were collected by conducting 30–60 minute semi-structured interviews. All interviews were thematically analyzed to effectively and systematically identify patterns across all participants’ accounts. Results will be presented and recommendations will be posed for future research.

**Christopoulos, Téa**

***Comparing Physical Activity and Sedentary Behaviours of Children and Youth with High versus Low-functioning Autism Spectrum Disorder***

Faculty Advisor: Dr. Kelly Arbour-Nicitopoulos

Co-Author(s): Rebecca Bassett-Gunter

University of Toronto / Faculty of Kinesiology & Physical Education

Autism spectrum disorder (ASD) describes a disability that imposes impairments of social interaction, communication and behavioral flexibility. Individuals who have ASD can be loosely classified as either high-functioning ASD or low-functioning ASD, as there is no standardized measuring tool to accurately classify and diagnose a child as having either of these two classifications. There is also limited research suggesting potential ways of doing so. For example, for those who are more severely impaired and lower functioning, deficits in social interaction that characterize ASD can range from a lack of awareness of others, to abnormal peer relationships, for those with higher functioning impairment. Despite the benefits of participating in physical activity, children diagnosed with ASD are at an increased risk of physical inactivity and engage in more sedentary behaviour (SB), because of the social and behavioral deficits associated with the disability. There is a lack of research that examines the physical activity (PA) and SB of children and youth across the ASD spectrum. Therefore, the objective of this study is to compare the PA and SB of high-functioning vs low-functioning children and youth with ASD. As part of a larger national study, an online survey will act as a classification tool to be administered to the parents of children and youth, aged 4 to 17, to classify their level of ASD. Parents will also complete several measures related to their child’s PA and SB. Data will be analyzed to compare differences in PA and SB patterns of children and youth at both ends of the ASD spectrum, to determine if these movement behaviours vary as a function of children and youth being classified as high-functioning versus low-functioning ASD. This work will inform the ASD community of the importance of PA for the entire ASD population.

**Corallo, Danielle**

***A Comparison of Heart Rate Variability Responses between Concussion and Musculoskeletal Injury***

Faculty Advisor: Dr. Michael Hutchison  
University of Toronto / Faculty of Kinesiology & Physical Education

Background: Heart rate variability (HRV) represents the variability in time between consecutive heart beats and is influenced by the sympathetic and parasympathetic nervous systems. HRV has been shown to be impacted following concussion, however, these findings are not consistent. Furthermore, it is unclear whether HRV disruptions observed post-concussion are specific to brain-injury or reflect a general response associated with athletic injury. Purpose: To compare HRV responses between athletes with concussion and athletes with musculoskeletal (MSK) injury. Participants: University of Toronto athletes (n = 60), stratified into two groups: concussion group (n=30) and MSK injury group (n=30). Methods: Participants HRV measures were acquired within the first 5 days of injury and 30-days post-injury. HRV was obtained in both the supine and sitting positions for 5-minute period using a Polar Heart Rate V800 sports watch (Polar®, Quebec). HRV measures extracted and analyzed included parasympathetic nervous system (PNS) index, sympathetic nervous system (SNS) index, stress index scores, mean RR, mean HR, very low frequency power, low frequency power, high frequency power, total power, low to high frequency ratio. Symptom severity scores were also obtained by the post-concussion symptoms scale from C3 Logix test. Results: Results to be presented will include a comparing group differences post-injury and 30-days post-injury. Following initial screening of data for normality, appropriate parametric and non-parametric statistics will be conducted to examine between- and within-group differences. Also, correlations of HRV and post-injury symptoms will be presented. Conclusions: Study findings will contribute to our understanding of HRV responses post-concussion. Furthermore, findings may provide some insight into future intervention research following athletic injury.

**Corsetti, Mark**

***Ditching, Snitching, and Stitching Back Together Ontario's 2015 Grades 1-8 Health and Physical Education Curriculum***

Faculty Advisor: Caroline Fusco

University of Toronto / Faculty of Kinesiology & Physical Education

This research project's main point of analysis is the Ontario Grade 1-8 Health and Physical Education Curriculum. In 2018, the Progressive Conservative Party of Ontario repealed the former Liberal Party of Ontario's Revised 2015 Sex-Ed curriculum to fulfil an election promise. The revised curriculum (i.e., revised from the previous 1998 version) included information on; physiological names for body parts, consent, 'sexting', gender fluidity and same sex families. From literature, I surmised that it was problematic that an equity-focused sex education curriculum would be dismantled in favour of supporting normative ways of being (i.e., patriarchal heterosexual relations are given precedence). This is the reason I engaged in an examination of critical responses to the government's actions. Many voices (e.g., students, parents, school boards, and teachers) were raised through in-person and on-line protests throughout the summer of 2018. I engaged in a content analysis of online media sources (e.g., newspaper articles, journals, cartoon strips, websites, videos, and collective stories) relating to public commentary on the HPE/Sex-ed Curriculum from July 2018-January 2019. I categorized each text under type of resource, source of data, main focus, secondary focus, stakeholders concerned and perspective of the report. Thematically findings relate to concerns about sexual abuse, digital harassment and gender-based violence, marginalizing sexual minoritized youth and same-sex families, the implementation of a "Snitch Line", student resistance, the Canadian Charter of Rights and Freedoms, student safety, and LGBTQ2S+ (in)visibility. The implications for the repeal of the 2015 sex-ed curriculum will not be known for years but losing important information in the curriculum (e.g., about consent, gender fluidity, sexting etc.) may have grave implications for young people in Ontario. Thus, my overall goal was to examine the responses in ways that support the reinstatement of the 2015 Revised Grades 1-8 HPE curriculum in Ontario.

**Costa-Parke, Anamaria**

***The Influence of Aerobic Training and Resistance Training on Satellite Cell Pool Expansion***

Faculty Advisor: Gianni Parise

Co-Author(s): Aaron Thomas, Dr. Chris McGlory, Katherine Manta, Alex Brown, Aidan Hatt, Gianni Parise

McMaster / Faculty of Science

Muscle specific stem cells, satellite cells (SC), play an essential role in muscle maintenance and repair. Recent literature has begun to elucidate the important interplay and the relationship that exists between SC and endothelial cell (capillaries). There is evidence to suggest that the SC basal population may be influenced by the level of muscle capillarization, more specifically, increased capillary content has been previously correlated with greater basal SC content. The purpose of this study was to further elucidate SC pool expansion, capillary content and their relationship following a period of both aerobic and resistance training. We hypothesize that aerobically training one limb will elevate capillary and SC content in comparison to the control limb, in addition we hypothesize that capillary and SC content will remain elevated, compared to the contralateral limb, post resistance training. 14 participants (8M, 6F) completed 6-weeks of unilateral single leg aerobic training prior to undergoing 10-weeks of bilateral lower body resistance exercise training. Muscle biopsies were collected prior to aerobic training as well as prior to and post resistance training. Single leg VO<sub>2</sub> watt peak ( $p < .0001$ ), and consumption (O<sub>2</sub>mL/min) ( $p = .0032$ ) was significantly higher in the trained versus untrained leg following unilateral aerobic training. Preliminary results ( $n=5$ ) indicate that type I and type II fibre CFPE was 16% and 28% greater, respectively, in the aerobically trained leg following unilateral cycling. Preliminary results ( $n=5$ ) indicate that SC content (Pax7+ cells) is 84% greater in the aerobically trained leg following training. Preliminary results ( $n=5$ ) indicate that SC content is 300% greater in the aerobically trained leg following resistance training. Preliminary results suggest that aerobic training, aimed to increase capillary content, may aid in elevating the muscle SC pool. In addition, elevated capillary content prior to chronic resistance exercise may allow greater expansion of the SC pool in response to resistance training.

**De Lisa, Karina**

***Do healthier children have more grit? Examining the role of physical activity between grit and mental health in children and adolescents***

Faculty Advisor: John Cairney

University of Toronto / Faculty of Kinesiology & Physical Education

Poor mental health is an important issue faced by numerous children and youth in today's society. Studies have shown that over half of mental health problems begin during childhood or adolescence and may lead to poor quality of life. Evidence suggests that grit, defined as consistent perseverance and passion for long term goals, is a psychosocial trait that improves mental health status in individuals. It has also been determined that physical activity plays an important role in mental health and is associated with reduced symptoms of depression, anxiety and improved levels of self-esteem in children and youth populations. While we know that both grit and physical activity contribute positively to mental health, the literature pertaining to the relationship between all three concepts in children and adolescents is limited. Due to the prevalence and onset of mental health problems during these crucial times of growth, we seek to better understand how to prevent or improve poor mental health occurrences within this specific population. The purpose of the current study is to determine if physical activity plays a mediating or moderating role on the relationship between grit and mental health in children and adolescents. A total of 362 students between the ages of 9 and 14 (186 girls, Mage=11.7) participated in the study. Measurements of grit, physical activity level and mental health predictors were collected from participants through the use of validated questionnaires. The results of this study will be discussed in relevance to practical interventions that may improve the mental well-being of future generations of children and youth.

**Devito, Ben**

***Emphasis on Speed Requirements for Endurance Performance***

Faculty Advisor: Dr. Taha

University of Toronto / Faculty of Kinesiology & Physical Education

There are many prerequisite factors that are inherently necessary for middle distance running success. The 800m and 1500m events require high velocity running above an individual's maximal aerobic speeds. The goal of this study is to analyze the relationship between prior short distance running performances and performances in the 800m and 1500m in both males and females. The top male and female runners in the 1500m and 800m events will be analyzed using prior performances in speed events. The top 100 male and female 800m runner's events consisted of races below 500m. The top 50 male and female 1500m runner's events consisted of races of below 600m. These events are a testament of their speed and will be used to compare speed values to their primary event performance. Only the individual's best performance was recorded with the date of the event. All the

information was gathered using times up until 2019 from the website Tilastopaja Track and Field Statistics. These event times will be then used in a statistical analysis using R. Theoretical results suggest that speed is a necessary developmental skill prior to elite performance in middle distance running events. This will add to the existing literature, providing further insight into the extent of speed that is required and when it should be trained for male and female competitors in the 800m and 1500m.

**Dhamanaskar, Roma**

***Effects of 4 Weeks of High-Intensity Interval Training on Cardiorespiratory Fitness and Endothelial Function in Patients with Coronary Artery Disease***

Faculty Advisor: Dr. Maureen MacDonald

Co-Author(s): E.C. Dunford, S.E. Valentino, J. Dubberley, E. Lonn, M.J. Gibala, S. M. Phillips, M.J. MacDonald

McMaster University / Faculty of Kinesiology

Introduction: Cardiorespiratory fitness (CRF) and endothelial function are predictors of cardiac mortality and overall mortality in patients with coronary artery disease (CAD). Recently, high-intensity interval training (HIIT), which consists of bouts of high-intensity exercise interspersed with bouts of low-intensity recovery, has been gaining popularity in cardiac rehabilitation settings. The literature demonstrates improvements in CRF and endothelial function with 10-12 weeks of HIIT. One of the major benefits of HIIT is that it is a time efficient exercise modality; however, the minimum amount of HIIT required to confer physiological benefits in patients with CAD is still unknown. The purpose of this study is to determine whether 4 weeks of stair climbing-based HIIT training can elicit positive changes in CRF and endothelial function in patients with CAD. We hypothesized that 4 weeks of a stair climbing-based HIIT intervention would improve CRF and endothelial function in individuals with CAD. Methods A single-arm interventional pilot study was conducted in collaboration with the Cardiac Health and Rehabilitation Centre at Hamilton General Hospital. Participants with CAD completed 6 stair climbing-based HIIT sessions over 4 weeks. Measurements of CRF, through a VO<sub>2</sub>peak test, and endothelial function, using a flow-mediated dilation (FMD) test, were taken at baseline and 4 weeks. A paired samples t-test was used to determine significant changes. Results Five male participants (59.2±5.9 years) were recruited. BMI decreased with the intervention (29.4±4.3 vs. 28.8±4.2 kg/m<sup>2</sup>, p=0.002). VO<sub>2</sub>peak (22.3±5.0 vs. 24.6±6.1 ml/kg/min, p=0.08) and FMD% did not change from baseline to 4 weeks (3.4±2.7 vs. 3.3±2.3%, p=0.84). Conclusion Four weeks of stair climbing-based HIIT improved body composition but did not improve CRF or endothelial function in patients with CAD, suggesting that a greater duration or frequency of stair climbing-based HIIT is required to confer consistent physiological benefits in this population.

**DIFFEY, IAN**

***The effects of systemic AMPK activator MK-8722 in the skeletal muscle of mice with Duchenne Muscular Dystrophy***

Faculty Advisor: Dr. Vladimir Ljubcic

McMaster University/ Faculty of Kinesiology

Introduction: Duchenne muscular dystrophy (DMD), is the most prevalent genetically inherited neuromuscular disorder, affecting approximately 1/3,500 births. DMD is caused by mutations leading to a lack of functional dystrophin protein and is currently without a cure. Chronic stimulation of key molecules that control skeletal muscle phenotype, transcription and metabolism, such as AMP-activated protein kinase (AMPK), has previously been shown to be therapeutic in the neuromuscular disorder (NMD) context. However, the underlying molecular mechanisms responsible for these adaptations are undefined. Here, we will use the novel, safe, orally-bioactive AMPK agonist MK-8722 to examine the acute response to AMPK activation in dystrophic skeletal muscle. Methods: Wild-type (WT) and dystrophic mdx mice were orally administered MK-8722, a novel, systemic-AMPK activator, or a saline control. The tibialis anterior muscles were harvested 3 hours post- or 6 hours post-gavage. Western blot and PCR analyses will be used to examine phosphorylated AMPK (pAMPK) levels, as well as AMPK activation via downstream targets peroxisome proliferator-activated receptor  $\gamma$  coactivator-1 $\alpha$  (PGC1-1 $\alpha$ ), utrophin, phosphorylated Unc-51-like activating kinase, microtubule-associated protein 1A/1B-light chain 3, and phosphorylated acetyl-CoA carboxylase (pACC). Results: MK-8722 significantly increased pAMPK levels in the muscle of mdx mice 6 hours post-administration, compared to the vehicle-treated group. MK-8722 resulted in a 30-100% increase in pACC 3 hours post-treatment in WT and mdx animals. PGC1-1 $\alpha$  protein levels were two-fold higher (p < 0.05) in

mdx mice relative to WT littermates and were not affected by the drug treatment. Conclusions: Collectively, these data demonstrate that an acute dose of MK-8722 leads to significant activation of the AMPK cascade in skeletal muscle and may be beneficial to the dystrophic pathology via the stimulation of downstream targets.

**Dirk, Kennedy**

***Does a single-bout of aerobic exercise differentially influence executive function during stages of the menstrual cycle?***

Faculty Advisor: Matthew Heath  
Western University

Background: Executive function supports inhibitory control and is improved following a single-bout of aerobic exercise. It is, however, unknown whether ovarian hormone fluctuations during the menstrual cycle differentially influences the post-exercise executive benefit. Objective: To determine whether the follicular and luteal phases of the menstrual cycle differentially influence the magnitude of the post-exercise executive benefit. Methods: Fifteen healthy, naturally-cycling females (20 ± 1 yr) with normal to corrected-to normal vision completed a cycle ergometer incremental ramp test to volition exhaustion to determine peak oxygen consumption (i.e., VO<sub>2</sub>peak) and estimated lactate thresholds (LT). Subsequently, participants completed 20-min single-bouts of aerobic exercise during the follicular and luteal phases of their menstrual cycles with exercise intensity set at 80% of LT. Prior to and after each exercise session an oculomotor assessment was completed and involved 80 pro- and 80 antisaccade trials. Antisaccades require a goal-directed eye movement mirror-symmetrical to a target and require the activation of an extensive executive network and thus provide an exemplar measure for assessing changes in executive function. Results: As expected, reaction time (RT) for prosaccades were shorter than antisaccade ( $p < 0.001$ ) and decreased from pre- to post-exercise assessments ( $p < 0.01$ ). Notably, however, the RT changes were independent of task and menstrual stage ( $p > 0.37$ ). Significance: A single-bout of aerobic exercise provides a general improvement in oculomotor control. More notably, results provide evidence that the exercise-based improvement is not influenced by the documented hormonal differences associated with the luteal and follicular stages of the menstrual cycle.

**Divito, Benjamin**

***The Effects of Caffeine on the Neuroendocrine Stress Response***

Faculty Advisor: Catherine Amara  
Co-Author(s): Catherine Amara  
University of Toronto / Faculty of Kinesiology & Physical Education

Background: Caffeine is one of the most commonly ingested psychoactive substance in the world, and is consumed daily by many in both food and drink format. Caffeine is widely reported to promote a neuroendocrine-mediated stress response in the body, and as such, consumption may have health implications for regular consumers. Purpose: To explore the mechanism by which caffeine stimulates the neuroendocrine stress axis, and determine the effects of acute and chronic caffeine consumption on health and development in adults, children, and the unborn fetus. Methods: A review of literature was conducted on literature relevant to caffeine and its effects on the neuroendocrine stress response. Results: Caffeine stimulates the hypothalamic-pituitary-adrenal axis and the sympathomedullary pathway primarily through antagonism of adenosine type 1 receptors, resulting in secretion of cortisol, norepinephrine, and epinephrine into the blood in a dose-dependent manner. High maternal blood-cortisol-concentration is associated with several negative birth outcomes for the fetus relating to physical, psychological, cognitive and emotional development. In adolescents, high blood cortisol is associated with low bone-mineral-density and reduced bone growth during puberty. In adults, high blood cortisol is associated with several negative health conditions, including low bone-mineral-density, insomnia, and depression and anxiety. Discussion: Chronic caffeine consumption has strong potential for negative health outcomes, especially with high doses of caffeine. Pregnant women and children should be considered high-risk populations for adverse side-effects from caffeine consumption, especially when consumption is chronic. Conclusion: Caffeine consumption has a considerable effect, in part through the elevation of stress-related hormones which may present health risks for certain populations. These findings suggest that a review of the caffeine consumption guidelines from Health Canada, as well as consideration of the regulation of highly-caffeinated energy drinks, are warranted.

**Divito, Benjamin**

***The Effects of L-Citrulline on Blood-Lactate Removal Kinetics Following Maximal-Effort Exercise***

Faculty Advisor: Ira Jacobs

Co-Author(s): Mackenzie McLaughlin, Ira Jacobs

University of Toronto / Faculty of Kinesiology & Physical Education

Background: During high-intensity exercise, the accumulation of lactate in muscle and blood is negatively correlated with exercise performance. Removal of lactate is a key component of acute recovery. Active recovery after high-intensity exercise, involving low-intensity exercise, enhances recovery by accelerating lactate turnover in metabolically active tissues. This process is determined largely by blood flow to these tissues. Therefore, the purpose of this research was to clarify if L-citrulline, a nutritional supplement purported to promote vasodilation, would augment the removal of blood lactate during active recovery. Hypothesis: L-citrulline ingestion will augment the rate of blood-lactate concentration decrease during active recovery, reduce the oxygen-cost of submaximal exercise, and increase time-to-exhaustion and peak oxygen uptake during a test of maximal aerobic power. Methods: Healthy university students (5 males and 5 females) were recruited to participate in this double-blind, randomized, placebo-controlled study. Participants exercised on a cycle ergometer at submaximal steady-state intensities followed by progressively increasing intensity to exhaustion, 10 min of active recovery, and then a final supramaximal intensity exercise bout to exhaustion. Fingertip blood was sampled repeatedly during active recovery. Results: Data collection is only partially completed (n=5) at this time. The protocol was successful in eliciting very high peak blood-lactate concentrations after exercise ( $11.37 \pm 1.33$  mmol/L). L-citrulline supplementation was not associated with significant changes in blood lactate kinetics during active recovery or the oxygen-cost of exercise.

**Dizon, Kaye Melgar**

***The Effects of Heat Stress and Acute Exercise on the Unbound Fraction of Caffeine***

Faculty Advisor: Dr. Ira Jacobs

Co-Author(s): Mackenzie McLaughlin

University of Toronto / Department of Pharmacology and Toxicology

Drugs are transported in blood either bound or unbound to plasma proteins. The latter, the unbound fraction ( $f_u$ ), is pharmacologically relevant because it can readily bind to target receptors to elicit a response. Acute physiological changes that are known to affect  $f_u$  include increases in blood temperature, changes in blood pH, and fluctuations in plasma protein concentrations. Such changes are normal adaptations to acute exercise. It is therefore surprising that there is very limited research published about the acute effects of exercise on the unbound/bound ratio of drugs. This study assessed the effects of acute exercise and heat stress on the  $f_u$  of caffeine in healthy humans. After abstaining from caffeine for 48h, participants ingested 3mg/kg of caffeine 45min before starting the protocol. Participants sat passively in a steam room for 10min with the objective of raising core body temperature, before engaging in an exercise protocol designed to induce fluctuations in blood pH by exercising below and above the anaerobic threshold. The exercise protocol consisted of 20min of continuous cycle exercise (55%  $\dot{V}O_{2max}$ ), followed by 10min of high intensity interval training (HIIT) cycle exercise (90%  $\dot{V}O_{2max}$ ) with alternating work: rest ratios of 20sec:40sec, in a sequential manner. Repeated venous blood samples were obtained to quantify the  $f_u$  of caffeine. The protocol was successful in increasing core body temperature by  $1.3^{\circ}C \pm 0.57^{\circ}C$  ( $p=0.05$ ) and blood pH by  $0.03 \pm 0.02$  ( $p = 0.04$ ) after passive warm-up, and decreasing blood pH by  $0.1 \pm 0.03$  ( $p < 0.001$ ) after HIIT exercise; however, blood pH did not increase significantly following continuous exercise. Caffeine concentrations and the  $f_u$  are currently being determined. Since  $f_u$  is therapeutically more important in pharmacology, this study will contribute to knowledge that may aid in the prescription of an optimized drug dose for patients who are also prescribed exercise.

**Duivesteyn, Alysha**

***An Investigation of Various Stretching Techniques on Hamstring Flexibility in Healthcare Students***

Faculty Advisor: Dr. Paolo Sanzo

Lakehead University/Student of Kinesiology

**Abstract Background:** Healthcare professionals have an increased risk of developing musculoskeletal disorders due to the nature of their work. These disorders can negatively impact quality of life and are associated with joint stiffness, muscle tightness, and numbness. Stretching exercises have been proposed to improve flexibility, which may help reduce the risk of developing musculoskeletal overuse injuries. Limited research, however, exists regarding various stretching techniques and hamstring flexibility. **Purpose:** To investigate stretching techniques (dynamic, autogenic inhibition (AI), reciprocal inhibition (RI), and static) and hamstring flexibility in Kinesiology and Nursing students measured using the 90-90 and Sit and Reach Tests. **Methods:** Participants were randomized for the order of the hamstring flexibility measuring tests (90-90 and Sit and Reach Tests) and stretching group. Each group completed one hamstring stretch that included three sets. For AI and RI tests, 10% of the participant's maximum knee extension force was applied for 6-seconds, followed by a 2-minute rest period. Post-hamstring flexibility was measured using the 90-90 (degrees) and Sit and Reach (centimeters) Tests in the same order as pre-testing. A one-way ANOVA with a significance level of  $p < .05$  was used for analysis. **Results:** Thirty-six individuals participated (12 male, 24 female; aged  $M=22.08$  years,  $SD=2.37$ ; height  $M=171.24$ ,  $SD=9.53$ ; mass  $M=77.24$  kg,  $SD=18.37$ ). A significant difference was found between static stretching and AI,  $F(3,1)=3.458$ ,  $p=.028$ ; Wilks'  $\lambda=.251$ ,  $\eta^2=.719$ , for the 90-90 Test where static stretching ( $M=12.18$  degrees,  $SD=8.79$ ) produced a greater change than AI ( $M=3.16$  degrees,  $SD=3.22$ ). No significance was found with the Sit and Reach Test. **Conclusion:** The Sit and Reach Test had no significant difference between change scores and stretching groups, while the 90-90 Test had a significant difference between static stretching and AI. Future research could explore the effects of stretching programs over a longer duration, with larger populations, and muscle activation with electromyography.

#### **Fliss, Matthew**

##### ***The effects of heavier and lighter loads on skeletal muscle hypertrophy and strength in upper versus lower limbs while training to volitional fatigue***

Faculty Advisor: Dr. Stuart Phillips

Co-Author(s): Robert W Morton, Sean R McKellar, Rajbir Sidhu, Chris McGlory, Jatin G Burniston  
McMaster University / Faculty of Kinesiology

Current resistance exercise (RE) guidelines recommend heavier-loads to increase strength, whereas lighter-loads be used to increase muscle endurance, and moderate- loads be used to maximize hypertrophy. However, when different loads are performed until volitional fatigue, hypertrophy and strength increases are shown to be similar (Mitchell et al., 2012; Morton et al., 2017; Schoenfeld et al., 2014). This study aimed to compare the effects of training to volitional fatigue using different loads for the biceps and quadriceps. Twenty healthy young men ( $22 \pm 3$  y,  $181 \pm 7$  cm,  $85 \pm 24$  kg, means  $\pm$  SD) completed thrice weekly resistance exercise sessions for 10 weeks. Each resistance exercise session consisted of three sets to volitional fatigue where each limb was randomly assigned to perform unilateral biceps curls (arms) or knee extensions (legs) with either higher-loads (8-12 repetitions at  $\sim 80\%$  one repetition maximum [1RM]) or lower-loads (20-25 repetitions at  $\sim 40\%$  1RM). Lean mass and muscle strength were measured before and after 10 weeks of RE. Muscle mass was measured in each limb via dual x-ray absorptiometry (DXA), and muscle strength was measured by unilateral 1RM and isometric peak torque. Results showed similar hypertrophy between loading conditions (arms: HR =  $0.17 \pm 0.21$  kg, LR =  $0.18 \pm 0.08$  kg, legs: HR =  $0.32 \pm 0.29$  kg, LR =  $0.29 \pm 0.32$  kg; all  $P < 0.01$ ) with no significant differences between loading conditions (all  $P > 0.05$ ). Further, there were significant increases in both 1RM maximum strength (arms: HR =  $3.2 \pm 4.8$  kg, LR =  $3.8 \pm 4.3$  kg, legs: HR =  $20.2 \pm 10.8$  kg, LR =  $23.8 \pm 10.8$ ) and maximum voluntary torque (arms: HR =  $12 \pm 15$  Nm, LR =  $11 \pm 10$  Nm, legs: HR =  $42 \pm 41$  Nm, LR =  $38 \pm 53$  Nm; all  $P < 0.01$ ) with no differences between loading conditions (all  $P > 0.05$ ). These results show that the traditional 'strength-endurance' continuum in RE is not valid. Instead, increases in muscle mass and strength occur independent of load when training to volitional fatigue.

#### **Gaynor-Sodeifi, Kaveh**

##### ***Associations between Fat Free Mass and Exercise Physiological and Perceptual Outcomes in People with Chronic Obstructive Pulmonary Disease.***

Faculty Advisor: Dennis Jensen

Co-Author(s): Jade Fraser, Lauren Tracey, Emily Koch, Dennis Jensen, Hayley Lewthwaite, Dennis Jensen

McGill University / Department of Kinesiology and Physical Education

Background: Loss of fat free mass (FFM) is commonly observed in people with chronic obstructive pulmonary disease (COPD); however, the impact of this change in body composition on exercise physiological and perceptual outcomes is unclear. Objective: This study aims to answer four research questions in people with COPD: 1) what evidence exists on associations between FFM and patient-reported and clinical outcomes?; 2) what is the association between FFM measured by dual-energy X-ray absorptiometry (DEXA) on physiological and perceptual responses to cardiopulmonary exercise testing (CPET)?; 3) what is the effect of rehabilitative exercise training (RET) on FFM?; and 4) are RET-induced changes in FFM associated with changes in CPET responses, in both physiological and perceptual domains? Methods: To address the first research question, a systematic literature review will be conducted. Studies will be included in the review if they measured FFM and report associations with patient-reported and/or clinical outcomes in people with COPD. Findings will be summarised descriptively and quantitatively, where data permits. The second question will be addressed with a retrospective analysis of cross-sectional data from 60 COPD patients with DEXA and incremental CPET data. The third and fourth questions will be addressed by retrospectively analyzing data from a longitudinal intervention-based study in 45 COPD patients. Specifically, this analysis will examine the effect of an 8-12 week RET program on DEXA-derived FFM and scrutinize the association of changes in FFM with corresponding changes in physiological and perceptual responses to constant-load CPET. Anticipated results: We anticipate that the systematic review will support associations between FFM and patient-reported and clinical outcomes, with few studies identified that specifically explore associations between FFM and CPET responses. We hypothesize that the retrospective analyses will identify positive associations between DEXA-derived FFM and CPET responses, which are amendable to a RET intervention.

**Godman, Nicole**

***The influence of the coach athlete relationship on athletes' sport performance: A review of literature***

Faculty Advisor: Ashley Stirling

Co-Author(s):

University of Toronto / Faculty of Kinesiology & Physical Education

Sport performance is influenced by many factors which impact an athlete's training and competition (D'Isanto et al., 2019). One of the important influences affecting an athlete's sport performance is the nature of the coach-athlete relationship. This is a critical and prominent relationship in an athlete's life and can affect both their sport performance (Norman & French, 2013) and broader sport experience and development in and through sport (Fraser-Thomas et al., 2005). This presentation explores the literature to-date on the importance the coach-athlete relationship in sport, with a focus on influence on how the quality of the coach-athlete relationship can affect athlete's sport performance. Gaps in the literature will be highlighted and recommendations will be posed for future research.

**Gogna, Prabhav**

***EFFECTS OF EXERCISE INTENSITY ON EXERCISE-INDUCED NEUROPLASTICITY***

Faculty Advisor: Dr. Aimee Nelson

McMaster University / Faculty of Kinesiology

Background: Chronic and acute exercise have been shown to be effective in improving motor learning through the facilitation of neuroplasticity in the primary motor cortex (M1). However, the optimal exercise intensity and protocol for increasing neuroplasticity is unknown, and only one previous study has specifically examined the effects of interval training. Purpose: To determine how varying the intensity of aerobic interval exercise affects exercise-induced neuroplasticity. Methods: Participants completed two randomly ordered conditions: 25 minutes of moderate-intensity interval training, as well as 25 minutes of high-intensity interval training. Transcranial magnetic stimulation (TMS) was used to measure corticospinal excitability, an indicator of neuroplasticity in M1, before and after exercise. The intensity of each condition was determined using maximum heart rate, collected during an initial familiarization session (MIIT reached 60-80% HRmax, HIIT reached 80-100% HRmax). Significant differences in corticospinal excitability were determined using motor evoked potential (MEP) recruitment curves, before and after the two types of exercise. Results: 14 young adults with a low level of recreational physical activity have participated in this study thus far. Preliminary results show an increased area under the recruitment curve (ARUC) following both moderate and high-intensity interval training, with a much greater increase following moderate-intensity exercise. Conclusion: Preliminary results indicate that both types of exercise show facilitation in corticospinal excitability.

Moderate-intensity interval exercise may cause a greater increase in neuroplasticity due to the high amounts of cortisol secreted during high intensity exercise, which are known to reduce MEPs.

**Grossman, Samuel**

***The Detection of HSP72 in Isolated Single Fibers from Rat Soleus and White Gastrocnemius Muscles.***

Faculty Advisor: Dr. Marius Locke

University of Toronto / Faculty of Kinesiology & Physical Education

Heat shock proteins (HSPs) are protective molecular chaperones that are elevated in response to various stressors including exercise. In the unstressed state, HSP72 is known to be expressed in a muscle specific manner where its expression is thought to be confined to Type 1 muscle fibers. The aim of this project was to confirm any fiber type specific expression of HSP72 in isolated muscle fibers from unstressed rat soleus and white gastrocnemius muscles. To do this, rat muscles were digested with collagenase, dissected and individual fibers treated to identify the various muscle fiber types. Isolated muscle fibers were analyzed via RT-PCR, magnetic antibody elution or enzymatic staining (NADH and alpha-glycerol phosphate) and categorized. Similar fibers were pooled and HSP72 content was assessed via SDS-PAGE followed by western blotting. While promising, further research is needed to verify the relationship between muscle fiber types and HSP72 content.

**Gupta, Christopher**

***The Relationship Between Cardiorespiratory Fitness and Flow Mediated Dilation, Low-Flow Mediated Constriction and Total Vessel Reactivity in the Brachial Artery***

Faculty Advisor: Dr. Maureen J. MacDonald

Co-Author(s): Vanessa I. Rizzuto

McMaster University/Department of Kinesiology

Introduction: Endothelial function is a novel risk factor for cardiovascular health. The reference standard for measuring endothelial function is flow-mediated dilation (FMD), where the degree of vasodilation evoked by increased blood flow is negatively correlated with cardiovascular disease risk. However, FMD only assesses the 'recruitability' of endothelial cells. Low-flow mediated constriction (L-FMC) is an additional assessment tool that may provide complimentary information about vascular resting tone and responsiveness during blood flow attenuation. The utility of L-FMC is currently unclear due to its novelty and previous observations of inconsistent responses. Total vessel reactivity (TVR) is a composite score of L-FMC and FMD but has not been extensively researched. Cardiorespiratory fitness (CRF) is often limited by aspects of the cardiovascular system; thus, greater endothelial function should correlate with improved CRF. The purpose of this study is to determine the relationships between CRF and FMD, L-FMC and TVR in the brachial artery in adults. Methods Ten participants age 35-80 will be recruited and data (graded maximal exercise test to determine CRF, and vascular measures to determine FMD and L-FMC) will be analyzed alongside retrospective data available from 84 participants (18-80 years old). Pearson correlations will be used to evaluate the relationship between CRF and FMD, L-FMC and TVR, and a multivariate regression will be used to determine the effect of age on relationships. Expected Results We predict that CRF and FMD responses will be moderately associated, however this may be mediated by age where improved CRF is correlated with greater FMD in older but not younger individuals. We also predict that L-FMC will have a stronger relationship with CRF than FMD, and TVR will be positively correlated with CRF.

**Hamdonah, Zeana**

***Can Racialized Athletes be Ambassadors of Peace? Liverpool F.C.'s Mohamed Salah and his Impact on the Global Muslim Identity***

Faculty Advisor: Simon Darnell

University of Toronto / Faculty of Kinesiology & Physical Education

Background: From banana tossing to migrant shaming, the racialized athlete is no stranger to discrimination and media misrepresentation. Mohamed Salah, the Muslim forward for Liverpool F.C. has surprisingly been embraced by the media, global audiences, and specifically the English audience. Global obsession with the "Egyptian King" has given rise to the "Salah-ism" phenomenon, with many claiming that Mohamed Salah has the potential to combat Islamophobia globally and empower Muslims in society, but little research is done to identify the qualities that attribute to his significance,

and their applicability in bridging cultural gaps between the West and the Muslim world. Theory: The framework of Edward Said's Orientalism (1978) was employed to thematically organize media reporting on Mohamed Salah, to contrast typical media reporting on Muslims, to better understand the degree of impact racialized athletes, like Salah, have in driving anti-racism rhetoric through and in the media. Methods: A media content analysis was applied, using a data set of (n=70) online media articles from global outlets, within the time period of the 2017-2018 Premier League season, when the "Salah-ism" phenomenon emerged in response to Salah's excellent performance. Results: Multiple themes pertaining to Salah's personal and professional performance were assembled and analyzed in relation to Salah's perceived global impact on the Muslim identity. Conclusion & Recommendations: Key findings about Salah's significance as a Muslim athlete will be discussed in the context of athletic activism, national identity, journalistic practice, and racism. The presenter will address the generality and applicability of the "Salah-ism" phenomenon and if other racialized athletes can become ambassadors of peace who can challenge racism through and in the media. Recommendations for future research on media representations of Muslim athletes and the implications therefore are to be suggested.

**Hatt, Aidan**

***Improved aerobic capacity does not influence changes in lean body mass measured by DXA following resistance exercise training***

Faculty Advisor: Gianni Parise

Co-Author(s): Mia Costa-Parke, Kathy Manta, Alex Brown, Aaron Thomas, Chris Mcglory, Gianni Parise

McMaster University/Faculty of Kinesiology

Resistance exercise training is the most effective and accepted strategy for increasing skeletal muscle mass and strength. There is tremendous individual variability in the adaptive response to exercise and the source(s) contributing to this variability are largely unknown. Recent evidence in the literature supports the notion that capillaries may be a potential target for improving outcomes to chronic resistance exercise. Aerobic exercise training is a proven stimulus for eliciting angiogenesis and increasing capillary content. Therefore, we hypothesize that completing a period of aerobic training prior to resistance training will result in a greater increase in lean body mass, compared to resistance training alone. 14 participants (8M, 6F) completed 6-weeks of unilateral single leg aerobic training prior to undergoing 10-weeks of bilateral lower body resistance exercise training. Performance and anthropometric measures were completed at baseline, post aerobic training and post resistance training. Single leg VO<sub>2</sub> watt peak (p<.0001), and consumption (O<sub>2</sub>mL/min) (p=.0032) was significantly higher in the trained versus untrained leg following unilateral aerobic training. Both single leg VO<sub>2</sub> watt peak (p<.001), and consumption (O<sub>2</sub>mL/min) (p=.0123) remained higher in the aerobically trained leg following resistance exercise. Resistance training resulted increases in 1 repetition maximum of both squat (p<.0001) and leg press (p<.0001). A main effect of time was observed for leg lean mass (p<.0001) as determined via DXA. Results suggest that a period of unilateral aerobic training elevates the aerobic capacity of the trained leg significantly in comparison to the non-exercising limb. Furthermore, these aerobic changes are maintained following a 10-week period of bilateral resistance training. Bilateral leg strength and lean body mass increased post resistance training. However no significant differences in lean body mass were detected between limbs. Results suggest that a that a period of aerobic preconditioning augments the training limb's aerobic capacity, however does not elicit different outcomes in lean body mass post resistance, as measured by DXA.

**Helmy, Joseph**

***Relationship between computer-related neck and upper back pain, and depression in secondary and post-secondary students: a literature review***

Faculty Advisor: Lynda Van Dreumel

University of Toronto / Faculty of Kinesiology

Computer use has become a necessity for students in the last decade. The prevalence of computer related neck and upper back pain and incidence of symptoms of depression is on the rise in students. Many studies imply a correlation between computer-related neck pain, back pain and depression. Fatigue and mental tiredness is also rising in the student demographic and is directly correlated to depression, prolonged computer use and high prevalence of neck pain. Studies also suggest that neck pain is exacerbated by depression and that prolonged computer use predisposes individuals to both neck pain and depression. OBJECTIVE: The purpose of this paper was to examine and explore the

relationship between computer-related neck and upper back pain, and depression in secondary and post-secondary students. **METHODS:** This literature review will follow the format of a narrative review. Most studies pertaining to neck pain, back pain and depression are both qualitative and quantitative, hence why a narrative review would be best suited for the purpose of this study. Google scholar and PubMed hand searches of journal articles and published systematic literature reviews were used to identify and explore current research for the young adolescent demographic in relation to computer associated neck pain and back pain and the relationship to depression. The PEO Model is used to organize the gathered data to further understand the relationships between person-environment, person-occupation and occupation-environment. **RESULTS:** Current literature pertaining to the relationships between computer associated neck pain, back pain and depression in the student population is limited and scarce. Most studies were confined to environmental risk factors, and little research has been undergone for psychosocial factors and its effect on occupation. **CONCLUSION:** Neck and back pain are assumed to be of multi-factorial origin. Individual, environmental and psychological factors all contribute to their onset and persistence. Further studies exploring the relationships between person-occupation, person-environment and environment- occupation is warranted. A protocol should be designed via a collaboration of different health care professionals to help reduce and prevent prevalence and incidence of this cycle.

### **Holowaty, Maksym**

#### ***The Ergogenic Potential of Nutrition for Post-Exercise Collagen Protein Synthesis: A Mechanistic Investigation***

Faculty Advisor: Dr. Daniel Moore

University of Toronto / Faculty of Kinesiology & Physical Education

**Introduction:** Connective tissue (CT) transmits mechanical forces from muscles to bones, helping move the skeletal system. More than 14 million CT injuries occur in North America each year. Equivocal evidence exists on the treatment, management and prevention of these injuries, due in part to tissue sampling challenges as well as an incomplete understanding of CT metabolism. Further, similar to how dietary nutrients enhance muscle remodeling, conflicting data exists as to whether or not CT is responsive to dietary interventions; thus, it is unclear whether nutritional supplementation is a viable strategy to help treat and/or prevent CT injury. **Purpose:** The purpose of this research project is to determine if traditionally anabolic nutrients, coupled with acute unilateral eccentric exercise, impact tendon and bone collagen protein synthesis (CPS) in rats. **Methods:** Thirteen 3-month old Sprague-Dawley rats were divided into 5 conditions, with feeding interventions administered by oral gavage: (i) resting control (n=2); (ii) exercise control (n=2); (iii) isocaloric exercise control (1155mg maltodextrin; n=3); (iv) Pre-Exercise-Fed (essential amino acid-collagen peptide blend fed pre-exercise, n=3); and (v) Post-Exercise-Fed (essential amino acid-collagen peptide blend fed post-exercise, n=3). Animals in conditions (ii)-(v) underwent a standardized acute unilateral eccentric exercise of the right hindlimb plantar flexors, consisting of 6 sets of 10 repetitions with 2 minutes rest between sets and 1.7 seconds between repetitions. The left hindlimb served as a contralateral control. To measure CPS, puromycin was administered 3.5 h post-feeding (or placebo) prior to tissue collection (stimulated and control - achilles tendon, tibialis anterior tendon and tibia bone) at 4 h post-feeding. Tissue collagen will be extracted and analyzed for puromycin incorporation (estimates protein synthesis) by western blot. **Hypothesis:** It is hypothesized that tendon and bone collagen will be responsive to acute unilateral eccentric exercise and enhanced with an essential amino acid-collagen peptide blend.

### **Innanen, Katrina**

#### ***A weight on the mind: the effects of wrist weight on execution, imagination and perception***

Faculty Advisor: Tim Welsh

University of Toronto / Faculty of Kinesiology & Physical Education

Perceived effort has many effects on how one thinks about and proceeds with one's daily tasks. The actor's knowledge of the world, their perceived abilities, and the effort it will take to complete the task will all be taken into account when making an estimate of distance to a target or speed at which a task can be performed (Witt et al., 2004). Past research has delved into how an individual's perceived effort of a task might affect their perceptions of that and other tasks. For example, Bhalla and Proffitt (1999) found that individuals perceived a hill to be steeper when wearing a weighted backpack, were fatigued, or had low fitness. Later, Chandrasekharan et al. (2012) found that individuals perceived movement times of another individual to be longer when the perceiver was wearing a wrist weight. This increase

in perceived movement times while the perceiver wore weights was hypothesized to occur because of the increased effort the perceiver would have had to go through execute those same movements. The present study determined if the effect of weight was consistent across individual's imagination, perception, and execution of a cyclical aiming movement task. Twenty participants imagined, perceived, and executed a series of cyclical aiming movements with and without the wearing a wrist weight. Movement times were recorded for each of the imagination, perception and execution conditions and compared across weight and no weight conditions. Results of the present study indicated no significant differences in the weight versus no-weight conditions for the imagination and perception tasks, however, movement times were significantly slower in the execution task. The results indicate that the wrist weight had a modulating effect on the individual's executed movement, but not their imagination or perception of the movement

**Jacob, Nithin**

***Impact of PLUS 2.0 on first year university students.***

Faculty Advisor: Dr. Matthew Kwan

McMaster University / Department of Kinesiology

Background: Physical literacy, as defined by Margaret Whitehead, is the "motivation, confidence, physical competence, knowledge, and understanding to value and take responsibility for engagement in physical activities for life." Thus, the four domains of physical literacy are motivation, confidence, physical competence, and knowledge and understanding. Physical literacy is arguably a precursor for physical activity. Therefore, when these four domains of physical literacy are improved, then overall physical literacy is increased and this is translated into enhanced physical activity behaviours.

Objective: The objective of this study was to test the impact of a physical literacy intervention (intervention program is named "Physical Literacy for University Students 2.0") on the domains of physical literacy and physical activity behaviours. Methods: Participants signed up to be either in the intervention or control group. Length of the study was 12 weeks. The intervention group went through a physical literacy session once a week for 12 weeks. Control group were given no instructions. Baseline, post-intervention, follow-up, and weekly questionnaire assess physical literacy domains and physical activity behaviours. Results: We are currently in the process of cleaning, analyzing and interpreting the data. Conclusions: Main findings and future research directions for this study will be ascertained once the data has been analyzed.

**Jakji, Tony**

***Dynamic Fit of the Foot and Ankle during Ice Hockey Skating***

Faculty Advisor: David J Pearsall

Co-Author(s): Curt Dewan

McGill

This study demonstrates the ability to obtain dynamic fit information of the foot and ankle during the skating start to steady skate strides using kinematic and kinetic measurements. A data set for five collegiate hockey players was completed (mean  $\pm$  SD: age =  $21.8 \pm 1.9$  years, height =  $1.81 \pm 0.05$  m, mass =  $83.3 \pm 8.0$  kg). Three acceleration strides and a constant velocity stride were examined while skating on ice. Dynamic fit between the inner skate boot and skater's foot/lower leg was assessed wirelessly in terms of ankle movement using an electrogoniometer and interface pressures between the skate boot-to-foot using sixteen flexible piezoresistive sensors. Sensors were located at discrete anatomical landmarks on the plantar, dorsal, medial and lateral surfaces of the foot, as well as on the posterior heel and leg. Regional variations in contact pressure magnitudes surrounding the foot and ankle corresponded to distinct phases of the skating stride and foot movement. This dynamic fit measurement approach provides insight to augment skate design for optimal stability and locomotion.

**Jefferson, Paige**

***Accessibility to Peer Support Strategies for Managing Critical Incident Exposure among Paramedics***

Faculty Advisor: Dr. Kathryn Sinden & Dr. Joann Vis

Lakehead University/ School of Kinesiology

Background: Paramedics are frequently exposed to critical incidents (CI) which often lead to increased mental stress. Peer support is a valuable tool for alleviating stress in a helpful, trusting and supportive

environment. However, paramedics are not always willing to engage in peer support strategies, which prevents individuals from properly processing critical incidents, increasing the likelihood of developing post-traumatic stress injuries (PTSI). It is important to identify the burden of CI exposure and to explore the different types of, and accessibility to, effective peer support for paramedics. Purpose: The study's purpose is to identify critical incident exposure and the corresponding peer support strategies used by Superior North EMS services in Thunder Bay, Ontario. Methods: A sequential mixed-methods study design will be used. This study will seek 25 district and city paramedics from Thunder Bay. Initial participation requires participants to complete the demographic questionnaire and critical incidents inventory (CII). Responses will be analysed descriptively. Individual interviews designed to discuss different peer support strategies and their accessibility will be conducted with a subgroup of the 25 participants. Thematic analysis will be used to determine relevant themes that relate to the research purpose. Anticipated Results: Based on previous literature, paramedics have a higher exposure to critical incidents. Anecdotally, Superior North EMS suggested a difference in CI exposure between district and city paramedics. We anticipate paramedics will primarily seek support from peers and family when managing responses to CI exposure; we also anticipate district paramedics have increased exposure to critical incidents. Anticipated Conclusion: We anticipate that the study results will identify a different need between city and district paramedics for peer support. We also anticipate that CI exposure may be higher among district paramedics compared to city paramedics because of call types.

**King, Tyler**

***Does Anthropometry Influence the Body Position Required to Reach Low-Lying Objects without Flexing the Spine?***

Faculty Advisor: Dr. Beach

University of Toronto / Faculty of Kinesiology & Physical Education

Introduction: In order to reach low-lying objects without flexing the spine, performers may have to experiment with different initial body positions (e.g., by varying stance width and foot and trunk orientation). However, the available options are likely constrained by personal factors. Our objective was to examine if anthropometry influences the body position required to reach low-lying objects without flexing the spine. Methods: Shank, thigh, torso, and upper limb ("arm") length measurements were recorded for 38 participants using a commercially available testing kit. Anthropometric ratios were calculated by dividing segment/limb lengths by torso length. With the lumbar spine constrained to its near-neutral alignment, participants were asked to reach as low as possible with different foot orientations (neutral vs. externally rotated), stance widths (wide vs. narrow) and trunk inclinations (forward vs. upright). Participants were grouped based on the body position that afforded them the greatest reach displacement without flexing their spine. A general linear model was then used to compare anthropometric ratios and joint range-of-motion measures between groups. A Tukey-Kramer post hoc test was performed where a statistically significant effect was detected. Results: Arm:torso ratio was greater for participants who achieved the greatest reach displacement in the "forward, wide and externally rotated" condition ( $1.84 \pm 0.10$ ) compared to participants who achieved the greatest reach displacement in "upright, wide and neutral" ( $1.58 \pm 0.13$ ) and "upright, wide and externally rotated" ( $1.65 \pm 0.10$ ) conditions ( $p < 0.05$ ). No between-group differences were found for any other variables analyzed. Discussion and Conclusions: Arm:torso ratio should be considered when attempting to identify the body position that enables a person to reach low-lying objects without flexing the spine.

**Klas, Alexander**

***Investigating the Relationships between Load & Recovery Metrics during Women's Field Hockey Matches***

Faculty Advisor: Dr. Ira Jacobs & Dr. Jason Vescovi

University of Toronto / Faculty of Kinesiology & Physical Education

The quantification of match/training load and recovery metrics is commonplace among team sports like field hockey. However, there is a paucity of literature in women's team sports regarding the relationships between such metrics. The aim of this study was to examine the relationships between load and recovery in female field hockey players; specifically, the impact of load on the subsequent day's recovery, and the impact of recovery on the current day's load. The Canadian women's U21 field hockey team (n=16) were monitored during a 16-day European tour (8 matches and 7 training sessions) using GPS and heart rate monitors to assess the external (e.g., total and high-intensity

running distance) and internal (e.g., TRIMP and sRPE) loads, respectively. Recovery was also monitored daily with a 7-item Wellness questionnaire and Total Quality Recovery (TQR) scale. Initially, percent changes in each metric were calculated by comparing each day to the (within-player) average across the tour. There were substantial day-to-day fluctuations for load metrics, with percent changes ranging from ~+45% to ~0% to ~-80%. However, wellness showed a consistent decreasing trend across the tour. Currently, a linear-mixed model (LMM) is being performed to quantify the intra-individual correlations between load and recovery. The forthcoming LMM results will provide a better understanding of the impact of load on recovery and vice versa in an intermittent team sport. Over the course of a 2-3-week tour or major tournament (e.g., Olympic Games) it may be important for coaching staff to closely monitor training/match loads and recovery of players. In doing so, it may allow for adjustments to be made which could have implications regarding performance, fatigue management, and athlete well-being.

**Kugamoorthy, Brenaven**

***Perceived Psychological Stress and Concussion***

Faculty Advisor: Michael Hutchison

University of Toronto / Faculty of Kinesiology & Physical Education

**BACKGROUND:** Concussions are complex injuries, and researchers are trying to understand the relationship between stress and concussion. Psychological stress can be very detrimental and affect individuals' mental health, social interactions, and productivity. Researchers that have conducted studies using self-report questionnaires identify various results mainly focusing on anxiety and depression compared to stress. Few studies that have focused on the student-athletic population sometimes found elevated perceived stress scores when comparing to their healthy cohorts, and this has resulted in no significant differences. **Objective:** To examine psychological stress in student-athletes following sport-related concussion. **PARTICIPANTS:** A sample of 75 healthy and 35 concussed (acute, seven days after injury and one-month post injury) university varsity athletes. **METHODS:** Using the Health and Wellness Questionnaire, acute concussion stress scores will be compared to healthy controls. Also, to see if stress scores change over the recovery period, acute concussion stress scores will be compared to one-month post-injury scores. The Health and Wellness Questionnaire uses a 7-point self-report scale recording how stressed students feel or their quality of sleep. **RESULTS:** The statistical tests to analyse the data are in progress and will be discussed once completed. **CONCLUSION:** The prediction is that the overall stress in the acute concussed student-athletes will be the greatest followed by the one-month post-injury, and finally the healthy group. The acute concussed individuals are still trying to recover therefore facing many issues which may result in elevated stress compared to the one-month post-injury group as most athletes would have returned to play.

**Lam, Angela**

***Breaking down homelessness in Toronto: sociocultural, structural, and personal considerations***

Faculty Advisor: Aditi Mehta

University of Toronto/ Faculty of Kinesiology and Physical Education

In Toronto, homelessness is a complex system and it is both an environmental and social issue that directly resulted in almost 100 deaths in 2017. 40% of people navigating Toronto's shelter system are refugees or asylum seekers which raises concerns on the efficacy of the immigrant intake process and the ability of the government to support the current homeless population. Shelters in Toronto are often running at near-full, or over-capacity each winter. The homeless population is continually on the rise despite resources and efforts from the government, religious groups, and non-profit organizations to provide both emergency housing and sustainable, affordable options. **Objective:** The objective of this project is to understand the homelessness system and how it specifically presents itself in Toronto. **Method:** A review of scholarly literature, news articles, and various reports on homelessness was completed to gather information and gain an understanding of the issue with a focus on the causes and potential solutions in Toronto. **Results:** Data analysis is ongoing but preliminary results attest to a few key areas of interest. Factors that mainly contribute to the homelessness status in Canada are: the socioeconomic structural factors (e.g. income and housing), institutional-level failures that render people vulnerable homelessness (e.g. welfare, hospital discharge protocols, mental health and addiction centres), and personal factors (e.g. traumatic events, financial crises, addiction and mental health struggles). The unaffordable housing market is an especially apparent factor in Toronto. Access

to subsidized or affordable housing, proper housing policies, and holistic support networks are strategies that may be very effective in improving outcomes and protecting vulnerable citizens of Toronto. Conclusion: Shedding light on this issue is key in driving public awareness and encouraging political parties to take action. In understanding the system, areas or strategies for improvement can be better investigated.

**Laundos, Rebecca**

***The Phenotypic Expression of Athletes with Atrial Fibrillation***

Faculty Advisor: Dr. Jack Goodman

University of Toronto / Faculty of Kinesiology & Physical Education

Physical activity, when performed according to current recommendations, confer many health benefits including lower relative risk of certain chronic diseases and all-cause mortality. High levels of endurance training promote physiological cardiac remodeling considered to be beneficial. However, exercise performed well-beyond recommended levels have been associated with certain adverse outcomes, including a 3-5 fold increased risk of lone atrial fibrillation (LAF) in otherwise healthy middle-aged endurance athletes (EA), compared to age-matched controls. Limited phenotypic data is available describing athletes with LAF, at rest and in response to exercise. Purpose: To examine maximal exercise performance and physiological responses to prolonged intensive exercise in EA with LAF compared to age-matched EA without LAF. Hypotheses: 1. Exercise performance (VO<sub>2</sub>max) in EA with AF will be reduced. 2. Prolonged exercise capacity will be diminished, reflected by earlier and steeper heart rate elevation and ratings of perceived exertion. Methods: Participants will include 10 EA with known AF and 10 healthy (control) age- and training-matched EA between the ages of 40-65 years. Medical and exercise history questionnaires will be completed. Two study visits will be conducted. The first visit will consist of a graded maximal exercise test (cycle ergometer) to determine VO<sub>2</sub>max. Baseline measures will include body mass, height, blood pressure, heart rate, and tympanic membrane temperature. The second visit will consist of a 90-minute high-intensity exercise bout at an intensity equivalent to 70-80% of their VO<sub>2</sub>max, with 1-minute bouts of intensive effort (90% VO<sub>2</sub>max), every 9 minutes. Blood pressure, heart rate and rate of perceived exertion will be monitored throughout both protocols, with tympanic membrane temperature and body mass measured post exercise. Data Analysis: Differences between VO<sub>2</sub>max and prolonged exercise data will be analyzed using independent T-test and two-way repeated measure of analysis, respectively. Data collection is ongoing. Preliminary analysis will be presented.

**Lawand, Robert**

***Gait Retraining and Risk Factors for Tibial Stress Fractures in Runners: A Review***

Faculty Advisor: Dr. Tyson Beach

University of Toronto / Faculty of Kinesiology & Physical Education

Tibial stress fractures are prevalent in populations who engage in distance running. Causes of tibial stress fractures are multi-factorial, but there is evidence that running technique is contributory. Gait retraining has been proposed as a method to modify running technique, but its effect on biomechanical risk factors for tibial stress fractures has not been consolidated. A search of PUBMED, MEDLINE, GOOGLE SCHOLAR and U of T library databases was done to assess the effect of gait retraining on biomechanical risk factors for tibial stress fractures in recreational distance runners. Fifteen studies met inclusion criteria. Gait retraining programs that used real-time kinematic feedback, audio feedback, wearable technology or implemented a progressive minimalist footwear program accompanied by a structured exercise program were able to attenuate a runner's peak vertical foot-ground impact force, peak positive tibial acceleration, and instantaneous and average rate of vertical ground reaction force development. These changes were seen in the short term that ranged from immediately post training to one month after the gait retraining protocol. Follow up studies have provided moderate evidence to support the efficacy of gait retraining on reducing biomechanical risk factors for tibial stress fracture for periods from one to twelve months following the initial gait retraining intervention. Future work needs to be done to confirm how long gait retraining-induced technique modifications last, and if they are effective in reducing the incidence and prevalence of tibial stress fractures in distance runners.

**Levin, Yohanan**

***Investigating the Effects of Glucose on Neural Excitability using Short-Interval Intracortical Inhibition in Healthy Males***

Faculty Advisor: Dr. Aimee Nelson

Co-Author(s): Stephen Toepp, Claudia Turco

McMaster University/Department of Kinesiology

Ketogenic diets that prioritize fat and restrict carbohydrates can suppress brain activity and reduce seizure frequency in children with epilepsy. Conversely, hypoglycemia during a fasted state or impaired blood-brain glucose transport can serve to trigger seizures and involuntary muscle contractions. Evidently, glucose has the potential to produce varying effects on intracortical circuits associated with motor control. Investigating the activity of these circuits can be done using transcranial magnetic stimulation (TMS), a non-invasive tool that utilizes magnetic fields to stimulate depolarization of neuron on the surface of the motor cortex. Paired-pulse TMS (ppTMS) of the motor cortex can be used to identify short-interval intracortical inhibition (SICI), a phenomenon reflective of GABA<sub>A</sub> receptor activity. GABA<sub>A</sub> receptors are chloride ion channels that mediate the action of inhibitory signalling within the brain. This placebo-controlled double-blinded study investigated whether ingestion of a standardized glucose drink after an overnight fast had an effect on inhibitory intracortical circuits as assessed using TMS. Twenty right-handed, healthy males from McMaster University and the surrounding area received ppTMS to the portion of the left motor cortex associated with the left abductor pollicis brevis muscle. Electromyography data was analyzed to investigate the magnitude of SICI before and after the administration of 3 different standardized drinks: a glucose solution, a flavour matched sucralose solution, and water. The order of delivery was randomized across 3 different visits where participants were assessed for SICI and blood glucose monitored via finger pricks before and after each drink, and continuing for 45-60 minutes post-drink. Preliminary data demonstrates that the study protocol is well tolerated in healthy males. The results from this research will help inform future dietary interventions and considerations in populations that experience irregular neural activity.

**Lister, Marie-Claire**

***The Short-Term Effects of Mindfulness Meditation on Worrisome and Intrusive Thoughts in Young Adults with Attention Deficit Hyperactivity Disorder (ADHD)***

Faculty Advisor: Dr. Erin Pearson

Lakehead University/ Faculty of Kinesiology

Background: Two to eight percent of post-secondary students are diagnosed with Attention Deficit Hyperactivity Disorder (ADHD). Adults with ADHD can experience worrisome and intrusive thoughts: two aspects of anxiety known to impact an individual's life negatively. While pharmaceuticals are the primary treatment for these thoughts in adults with ADHD, other non-invasive methods for those who respond poorly to medication are warranted. Mindfulness is a meditation technique that uses experiential learning to emphasize viewing emotions, thoughts, and body states in an observant or non-reactive stance. To date, no research has identified the impact of the short-term effects of mindfulness meditation on worrisome and intrusive thoughts in university students. Purpose: To examine the effects of one 30-minute session of mindfulness meditation on worrisome and intrusive thoughts in university students with and without ADHD. Methods: This experimental study with repeated measures required that participants complete one 30-minute mindfulness meditation session delivered by a trained Lakehead Student Health and Wellness counsellor. Prior to and after the meditation session, the Anxious Thoughts (worry) and White Bear Suppression (intrusions) Inventories were completed. Descriptive statistics and a dependent t-test were used to analyze the data. Results: Thirteen individuals with (n = 4) and without ADHD (n = 9) participated (mean age= 21; female = 9; non-binary = 1). No significant effects were observed for worrisome and intrusive thoughts in students with ADHD (worrisome thoughts:  $t(4)=1.146$ ,  $p>0.05$ ; intrusions:  $t(4)=1.051$ ,  $p>0.05$ ). However, a significant effect was found for worrisome thoughts which decreased in students without ADHD ( $t(9)=3.330$ ,  $p<0.05$ ). Conclusion: The study results suggest that one-bout of mindfulness meditation is not a sufficient method to decrease worrisome and intrusive thoughts in students with ADHD. Future research should include a larger sample size and investigate the effects of mindful movement, as sitting meditation may be too stationary for those with ADHD.

**Loebach, Rachel**

***Exploring the Relationship between Fitness and Executive Functioning in Young Adults with Attention Deficit Hyperactivity Disorder***

Faculty Advisor: Dr. Jennifer Heisz

Co-Author(s): Michelle Ogradnik  
McMaster University / Faculty of Kinesiology

Attention Deficit Hyperactivity Disorder is a neurodevelopmental condition characterized by inappropriate levels of inattentive, impulsive and hyperactive behaviours. These behaviours occur due to deficits in higher order cognitive processes known as executive functions, which are facilitated by prefrontal brain regions and neural networks. There is considerable research to suggest that higher levels of physical activity and improved fitness can bolster executive functioning in neurotypical populations. Though the definitive mechanism of these improvements remains unclear, one potential mediator may be heightened prefrontal cortex activation. However, research on individuals with ADHD is rather limited, and the relationship between fitness and executive functioning in ADHD populations still remains unknown. The present study aims to bridge this current gap in the literature. Young adults recruited from McMaster University visit the lab for two experimental sessions. During the first session, participants complete the Conner's Adult ADHD Rating Scale to assess their symptomatology and a VO<sub>2</sub> peak test to assess their aerobic fitness levels. In the second session, participants complete four cognitive tasks of executive functioning including the Trail Making test to measure shifting, the OSPAN task to gauge working memory, the Stroop Task to evaluate inhibitory control and the SART task to assess sustained attention. During the Stroop task functional near infrared spectroscopy (fNIRS) neuroimaging is used to measure the participants' prefrontal cortex activation. Though data collection is still ongoing, we hypothesize that participants with higher fitness will perform better on tasks of executive function. Furthermore, that greater prefrontal cortex activation will mediate this relationship, as demonstrated by the fNIRS data. We are excited to explore whether this relationship is the same among participants with and without ADHD. This study will help inform future research working to support individuals faced with executive functioning deficiencies, with implications to improve their performance in academic and occupational settings.

### **Lopes, Anthony**

#### ***Do the feet influence the interpretation of frontal plane knee position while jumping?***

Faculty Advisor: David Frost

University of Toronto / Faculty of Kinesiology & Physical Education

Introduction: Despite the well-established benefits of exercise, the incidence of exercise-related injuries is increasing among active populations; perhaps because an emphasis has not been placed on how the exercise activities are being executed. Given the link between an individual's movement patterns and their risk of injury, exercise professionals must exhibit the ability to observe and interpret clients' movement patterns. The objective of this study was to contrast the conclusions drawn by exercise professionals when observing a jump squat with and without the feet visible. Methods: Twenty exercise professionals volunteered to complete an online survey involving the observation of 50 male athletes at the bottom a jump squat. Pictures of the 50 athletes were presented in 2 phases, each consisting of 25 athletes in random sequence. Exercise professionals were provided with an opportunity to observe each athlete twice; first with the feet obstructed and second with the feet in view. Professionals were asked: 'Is this athlete demonstrating proper positioning of his knees?' and given one of three options: 'yes', 'no' and 'not enough information is provided'. The observations made by each professional for each athlete were categorized as: no change between feet and no feet conditions (A), a change between feet and no feet conditions (B), and 'not enough information is provided' in the no feet condition followed by a 'yes' or 'no' in the feet condition (C). The number of A, B and C responses for each professional was computed for each group of 25 athletes. The mean and standard deviation from each phase was used to examine the influence of prior exposure to the feet condition on observations made in phase 2. Preliminary Results: In phase 1, the distribution of responses for scenarios A, B and C were 50.0%, 31.6% and 18.4%, respectively. In phase 2, the distribution of responses for scenarios A, B and C were 45.4%, 23.0% and 31.6%, respectively. There was a trend towards scenario C in phase 2, suggesting exercise professionals were learning from exposure to the no feet and feet conditions presented in phase 1. Furthermore, exercise professionals committed to an observation in the no feet condition 73.1% of the time. Conclusion: Many exercise professionals may not be using the feet to draw inferences regarding the frontal plane knee position of their clients. However, this may be something that can be altered via training as exposure to the feet and no feet conditions did alter the number of professionals who cited 'not enough information' when the feet were obstructed during phase 2. Future work is required to examine the potential benefit of interventions aimed at improving the observation skills of exercise professionals.

**Mackowiak, Robert**

***Does the Method of Defining the Eccentric Phase of a Countermovement Jump Influence Rate of Vertical Force Development Calculations?***

Faculty Advisor: Dr. Tyson Beach

Co-Author(s): Malinda Hapuarachchi, Tyson Beach

University of Toronto / Faculty of Kinesiology & Physical Education

Eccentric rate of force development (RFD) is a key construct used in evaluating athletic capabilities (Bloms et al., 2016). However, it is unknown if relationships between RFD and jump height hold across calculation methods. One study objective was to compare between RFD variables derived based on two methods – return to bodyweight and local minimum (Barker et al., 2018; Suchomel et al., 2015) – which differed based on how the eccentric phase of a countermovement jump (CMJ) was defined. Another objective was to assess the strength of relationship between RFD and CMJ height using RFD variables derived from the abovementioned methods. Twenty-five varsity student-athletes from the University of Toronto performed five CMJ jump-and-reach tasks. The following RFD variables were calculated based on the return to bodyweight and local minimum methods: absolute/relative average RFD; absolute/relative peak RFD; and time-to-peak RFD. Paired sample T-tests were used to make between-method comparisons of the RFD variables. Relationships between RFD variables and CMJ height were assessed using Pearson correlations. Significant between-method differences were found between all RFD variables analyzed. Absolute ( $p=0.026$ ,  $R^2=0.20$ ) and relative ( $p=0.047$ ,  $R^2=0.16$ ) average RFD correlated with CMJ height when using the return to bodyweight method of calculation, whereas only absolute average RFD ( $p=0.047$ ,  $R^2=0.16$ ) correlated with CMJ height when using the local minimum method of calculation. Absolute, relative, and time-to-peak RFD variables were not correlated with CMJ height ( $p>0.05$ ) regardless of calculation method used. The results demonstrate that the method used to define the eccentric phase of the CMJ can dictate whether statistical relationships exist between RFD variables and jump height. The results also question whether peak RFD variables warrant reporting in biomechanical literature, given a lack of correlation to CMJ jump height in the current investigation. This is relevant for sport scientists who use RFD variables in assessments of athletic performance potential.

**Malouka, Selina**

***Audiovisual Cueing Enhances Personalized Rhythmic Training***

Faculty Advisor: Luc Tremblay

Co-Author(s): Tristan Loria, Valentin Crainic, Michael H. Thaut, & Luc Tremblay

University of Toronto / Faculty of Kinesiology & Physical Education

Rehabilitation techniques often employ external auditory cues as a means of personalized rhythmic training to restore typical lower-limb function (i.e., gait). However, this focus often overlooks the potential of personalized rhythmic training to be used for upper-limb rehabilitation. Additional work has further shown that, relative to unimodal cues, combined auditory and visual cues elicit greater levels of neural activity, thus facilitating perception and action. The current study utilized an upper-limb sequential aiming task to investigate the effect of unimodal and bimodal sensory cues on personalized rhythmic training among neurotypical participants. The task consisted of a series of five targets positioned on a custom-built aiming board, yielding four extension and reversal movements that varied in amplitude. Prior to movement initiation, four auditory (i.e., beeps), visual (i.e., flashes), and audiovisual cues (i.e., beeps and flashes) specified each movement's duration in a blocked fashion (i.e., sensory-cue conditions). No cues were provided during movement execution and participants were instructed to match the timing specified by the sensory cues. After completing sensory-cued trials, the same movement sequence was performed in the absence of any cues (i.e., no sensory-cue conditions). It was hypothesized that presenting audiovisual cues during training would yield lower movement time errors relative to the unimodal cues in both the sensory-cue and no sensory-cue conditions. Within the sensory-cue conditions, movement time errors were significantly lower in the audiovisual relative to both the auditory and visual conditions. Critically, in the subsequent no sensory-cue conditions, audiovisual training yielded lower movement time errors than training under auditory cues alone. With regards to spatial accuracy, movements were more accurate in the auditory than the visual cue condition. Overall, this study highlights the potential for bimodal (i.e., audiovisual) personalized rhythmic training to be utilized in motor rehabilitation settings.

**Manta, Katherine**

***Effect of Single-Leg Aerobic Training on Satellite Cell Proliferation and Muscle Capillarization***

Faculty Advisor: Gianni Parise

Co-Author(s): Aaron Thomas, Chris McGlory, Alex Brown, Anamaria Costa-Parke, Aidan Hatt, Gianni Parise

McMaster University/ Life Sciences

Satellite cells (SC) play an essential role in muscle maintenance and repair. Recent literature has begun to elucidate the important interplay and relation between SC and endothelial cell (capillaries). Previous results from our lab have suggested that individuals with a higher capillary content (more perfusion) may also have greater SC activation in response to muscle damaging exercise. Aerobic exercise training is a proven stimulus for eliciting angiogenesis and increasing capillary content. Therefore, we hypothesize that completing a period of aerobic training prior to undergoing muscle damaging exercise, will augment SC proliferation in comparison to control. 14 participants (8M, 6F) completed 6-weeks of unilateral single leg aerobic training prior to undergoing 300 eccentric kicks, per leg, performed on a biodex dynamometer. Muscle biopsies were collected prior to, 24h and 48h post eccentric kicks. Immunohistochemical and fluorescent microscopy techniques were utilized to examine the effects of unilateral aerobic activity on the muscle SC response to exercise induced damage. Single leg VO<sub>2</sub> watt peak ( $p < .0001$ ), and consumption (O<sub>2</sub>mL/min) ( $p = .0032$ ) was significantly higher in the trained versus untrained leg following unilateral aerobic training. Preliminary results ( $n=5$ ) indicate that type I and type II pax7+ SC content is 100% and 78% greater, respectively, in the aerobically trained leg following aerobic training prior to muscle damaging exercise. Preliminary results ( $n=5$ ) indicate that type I and type II fibre CFPE was 16% and 28% greater, respectively, in the aerobically trained leg following unilateral cycling. Data collection is currently on-going and preliminary SC proliferation results are anticipated prior to conference date. Preliminary results suggest increasing capillary density and aerobic capacity through unilateral aerobic training may augment the SC basal pool. Further results will aid in determining whether these adaptations translate to augmented SC proliferation.

### **Maynard, James**

#### ***The relationship of the vastus medialis and vastus lateralis in boys vs. men***

Faculty Advisor: Dr. Bareket Falk

Co-Author(s): Woods, S., Dotan, R., Jenicek, N., Falk, B.

Brock University / Faculty of Applied Health Sciences

The electromyographic threshold (EMGth) has been used to demonstrate the onset of accelerated recruitment of type-II motor units in the vastus lateralis (VL) between children and adults. Other leg muscles have exhibited an EMGth in adults but have not been compared to EMGth exhibited in children. The relationships between different leg muscles of children and adults could provide more information on the motor unit activation differences we see between these two groups. Sixteen men and sixteen boys performed a progressive, intermittent isometric-knee-extension protocol to exhaustion with VL and vastus medialis (VM) surface EMG recorded throughout. EMGth was determined based on the temporal change in the EMG root mean square and were expressed relative (%) to the corresponding 1-repetition maximum. EMGthVL was 10.49% higher in boys (58.84% +/- 10.51%) than in men (48.35% +/- 10.60%,  $p=0.022$ ). EMGthVM was 5.79% higher in boys (55.09% +/- 10.29%) than in men (49.30% +/- 10.04%, NS). Differences between VL and VM EMGth were 3.76% for boys (NS) and 0.95% for men (NS). The VM and VL correlated in men (0.618, NS), but not in boys. The VM boy-men EMGth differences parallel differences found in the VL and in previous studies, supporting the notion that children do not recruit their type-II motor units to the same extent as adults.

### **McKellar, Sean**

#### ***A novel approach to assessing skeletal muscle morphologic changes following resistance exercise training with heavier and lighter loads using ultrasonographic measures of muscle axial cross-sectional area***

Faculty Advisor: Dr. Stuart Phillips

Co-Author(s): Morton, R.W., Fliss, M.D, Sidhu, R., Baker, S.K., Phillips, S.M

McMaster University/Department of Kinesiology/Faculty of Science

The current gold standard for imaging muscle cross-sectional area and its subsequent change following different exercise interventions is through the use of magnetic resonance imaging (MRI). Unfortunately, MRI is costly, requires trained technicians, and is unavailable to many research laboratories. More feasible methods, such as ultrasonography (US), have been validated against MRI

for single point-in-time measurement of muscle cross-sectional area (CSA) (1). Despite these positive findings, the current US techniques require a large number of hours committed to rendering images. Moreover, we lack a strong understanding of how good US methods are in detecting changes in muscle CSA. This investigation aimed to validate a novel US cross-sectional image analysis utilizing automated panoramic stitching software Autostitch. In doing so, the novel method was compared to the previously validated (against MRI) reconstructive, multiple picture-based method of US analysis. Twenty healthy young men completed 10 weeks of triweekly resistance exercise. Training sessions consisted of three sets to volitional fatigue. Limbs were randomly assigned to perform unilateral biceps curls or knee extensions with either higher-loads (HL; 8-12 repetitions at ~70-80% one repetition maximum [1RM]) or lower-loads (LL; 20-25 repetitions at ~30-40% 1RM). US cross-sectional imaging was conducted on both the vastus lateralis and biceps brachii at pre and post time points. Quantification of CSA with Autostitch revealed significant increases following resistance training in both the vastus lateralis (HL  $1.0 \pm 2.1 \text{ cm}^2$ ; LL  $1.3 \pm 2.2 \text{ cm}^2$ ; mean  $\pm$  SD) and biceps brachii (HL  $1.4 \pm 1.0 \text{ cm}^2$ ; LL  $1.1 \pm 0.8 \text{ cm}^2$ ; mean  $\pm$  SD) with no difference between conditions (all  $P > 0.05$ ). Cronbach's alpha analysis will be performed to compare the Autostitch method to previously validated US technique in order to assess the agreement between the two at baseline and following a hypertrophic stimulus. If this novel method is found to be reliable, this technique of analysis will alleviate the time demand associated with previous US muscle CSA analysis. 1. Lixandrao M, Urganowitsch C, Bottaro M, Chacon-Mikahl M, Cavaglieri C, Min L, et al. Vastus lateralis muscle muscle cross-sectional area ultrasonography validity for image fitting in humans. J Strength Cond [Internet]. 2014;28(11):3293–7.

### **Melo, Victoria**

#### ***The positive effects of isometric handgrip exercise on the cardiovascular health of post-menopausal women***

Faculty Advisor: Dr. Danielle Bentley  
University of Toronto

Cardiovascular diseases, the leading cause of death worldwide, are often preceded by elevated resting blood pressure (BP). Although a well-known strategy for lowering resting BP is whole-body aerobic exercise, there are concerns regarding its accessibility. An alternative strategy for BP reduction is handgrip exercise, despite inconsistent protocols used throughout the literature. This research sought to elucidate the effectiveness of handgrip exercise for resting BP reduction by directly comparing two distinct handgrip protocols against a non-exercise control. Twenty-eight post-menopausal women (avg. resting SBP:  $125.3 \pm 12.5 \text{ mmHg}$ ) were randomly assigned to one of three conditions; moderate handgrip training (4x2 min sustained grips at 30% maximum grip strength with 1-min rest between each set, ZONA, n=10), high intensity handgrip training (32x5 sec intermittent grips at maximum grip strength with 5-sec rest between each set, MINT, n=9), or a non-exercise control (forearm and hand stretches, STRETCH, n=9). Exercises were completed on the non-dominant limb 4/wk for 10wks, with in-laboratory sessions to measure resting BP every 2.5 weeks. All participants reported high training compliance (avg: 104%) throughout the 10wks, with improvements in non-dominant grip strength among the two exercise conditions further confirming exercise compliance. A mixed-model ANCOVA was used to compare the time-dependent impact of training (Baseline, Midway, and End) on resting SBP reductions between the three conditions, with baseline resting SBP entered as a covariate. The analysis revealed a significant main effect of training time ( $p < 0.01$ ), a significant main effect of condition ( $p < 0.01$ ), along with a significant interaction effect ( $p < 0.05$ ) such that MINT handgrip training emerged as the most promising handgrip strategy for resting SBP reductions. This research further demonstrates the potential of handgrip exercise for resting BP reduction, while also revealing the importance of handgrip protocol design. Further research is necessary to refine the clinical applicability of such exercise prescriptions.

### **Mendelsohn, Asher Harley**

#### ***The Dual Tasking Texting Effect of Cell Phone Technology on Walking***

Faculty Advisor: Dr. Carlos Zerpa  
Lakehead University / Faculty of Health and Behavioural Sciences

Dual-tasking is a common practice to save time and increase efficiency. It is the simultaneous performance of two tasks causing a divided allocation of attentional resources. Dual-tasking is apparent in our society in the form of cell phone use while walking, especially in younger generations in which cell phones are ingrained as a normal part of daily life. This form of dual-task increases the

distractibility of the individual and alters gait characteristics, resulting in an increased risk of falls, collisions, and other pedestrian-related injuries. Additionally, the walking gait is often quantified using force platforms, however, accelerometers may present a cheaper and more versatile alternative. Purpose: Because of these concerns, this study seeks to A) explore the effect that texting on a cell phone has on the walking gait and B) validate the use of accelerometers for measuring gait characteristics. Methods: Twenty young adult participants were recruited for this study. Participants wore accelerometers placed on their dominant side ankle, knee, and hip, as well as their front and back centre of mass. The participant walked across the force platform for three conditions: regular walking, walking while reading a text, and walking while typing a text. Repeated measures ANOVAS will be conducted to examine differences among walking conditions for measures of forces and accelerations. Pearson's moment correlations will be conducted to validate the use of accelerometer measures to detect dual task walking patterns when compared to force plate measures. (Anticipated or Preliminary) Results: Preliminary results show slowing of the participants' gait velocity in relation to the cognitive demand of the task; reading a text message is slower than regular walking, though faster than writing a text message. Anticipated results may reveal significant differences between walking conditions in braking and propulsive forces and peak accelerations. There may also be a correlation between peak accelerations and force plate measures.

### **Mohamed, Hibaq**

#### ***Bridging gaps: Determining best practices for fitness program planning for immigrant seniors***

Faculty Advisor: Catherine Amara

University of Toronto / Faculty of Kinesiology & Physical Education

Over the past few decades, exercise prescription and fitness programming for seniors has grown as an area of interest within gerontological studies. This topic is particularly relevant within public policy and community programming contexts as participation rates in physical activity differ between Canadian born seniors and recent immigrants. These rates are connected to disparities that exist between both groups in relation to access to and awareness of local fitness programming suitable for their unique needs. The negative health implications associated with sedentary behaviour can disrupt the healthy aging process preventing immigrant seniors from leading active, fulfilling and independent lives. This research study was created with the intention to better inform program planning and policy decisions by determining best practices for successfully increasing participation in physical activity among immigrant seniors. A qualitative review of literature was conducted to explore cross cultural perspectives on successful aging, barriers faced by immigrant seniors seeking programming and most importantly, existing programs created to serve this population group and their efficacy. This was supplemented with qualitative data obtained through field observation in senior fitness classes at a YMCA health and fitness centre. From this review four major components of programs that lead to success were identified as: 1) A recognition of goals, 2) culturally tailored health education, 3) the provision of language resources, and 4) outreach and accessibility. Practical implications associated with the process of implementing fitness programming for this population will be addressed. Areas for future research include recommendations for program planning in relation to rural or underdeveloped municipalities, access to green space and the allocation of funds and resources to support immigrant seniors.

### **Mohammad, Ibrahim**

#### ***Phosphoproteomic analysis of human skeletal muscle following acute resistance and endurance exercise***

Faculty Advisor: Dr. Stuart Phillips

Co-Author(s): Chris McGlory, Amy J. Hector, Martin Macinnis, Troy A. Hornberger

McMaster University / Department of Kinesiology

Abstract: Skeletal muscle accounts for nearly half of human body mass and plays an important role in the ability to breathe, move, and maintain a high quality of life. Studies have shown that the loss of skeletal muscle mass, particularly with advancing age and physical inactivity, is strongly associated with early death and disease. Therefore, understanding the molecular factors that regulate the size of human skeletal muscle mass is of great societal and clinical importance. It is known that performing both resistance and endurance exercise positively influences skeletal muscle health. However, the molecular mechanisms through which exercise confers this positive influence remains poorly understood. Traditional methods to assess molecular responses of human skeletal muscle to exercise, such as immunoblotting, are often limited to the measurement of around 10-15 proteins at a time. In

the proposed investigation, we will employ novel phosphoproteomic techniques to simultaneously assess the phosphorylation status of 1000s of proteins and protein kinases in human skeletal muscle following a bout of both resistance and endurance exercise. We will also measure changes in the content of key proteins known to orchestrate skeletal muscle protein turnover. Following the identification of phosphoprotein status, kinase prediction analysis utilizing a range of bioinformatics tools will be applied to identify new signal transduction networks. We are hopeful that the data generated from this investigation using these cutting-edge techniques will advance our understanding of how exercise promotes skeletal muscle health and function.

### **Moolla, Faheem**

#### ***A narrative approach to understanding retirement from professional sport***

Faculty Advisor: Katherine Tamminen

University of Toronto / Faculty of Kinesiology & Physical Education

Background: Retirement or transition out of sport is a process that all athletes must endure, whether it be at a college level or at a professional level. Retirement has been shown to be a significant psychological stressor for athletes, especially when retirement is involuntary (Sanders & Stevinson, 2017). As evidenced by previous research in this realm, athletic retirement has been characterized either as a “process of crisis” or as a process of “rebirth” (Gairdner, 2015). The primary objective of this study is to explore of the interplay of social and psychological factors involved in the retirement experience of a high performance athlete. Purpose: This study aims to understand the process of retirement from a narrative perspective, using the stories of a retired athlete to gain a deeper insight into the process and nuances of athletic career termination and transition. The study will examine the role of social support and coping methods as they relate to positive or negative athletic retirement experiences. This study will use thematic narrative analysis as the framework to code themes in an interview with a retired athlete. Methods: 1. Semi-structured interviews will be conducted with a retired professional athlete. They will be asked questions about events occurring at various points in their life. The interview will start at childhood, when they decided to pursue an athletic career; through their athletic career and the various choices they made; culminating with life after retirement. 2. The responses of the athletes will be analyzed to develop themes that are associated with positive or negative retirement experiences. Results: Data collection and analysis are underway; common themes generated from the analysis will be presented in relation to previous findings, and the significance of the themes as they relate to retirement outcomes will be discussed. Conclusions: The presentation will conclude with future recommendation for research in this field, and highlight recommendations for athletes preparing for retirement.

### **Mounir, Mirette**

#### ***A systematic review and meta-analysis of branched-chain amino acid supplementation on resistance training-induced gains in muscle mass and strength***

Faculty Advisor: Stuart Phillips

Co-Author(s): Robert Morton and Matthew Fliss

McMaster University / Faculty of Kinesiology

Background: Nutritional supplementation is a common practice among elite and recreational exercisers. Supplementing is a multi-billion-dollar industry that is built around the growing idea that supplements, including branched-chain amino acids (BCAA), can augment resistance exercise training (RET)-induced changes in muscle mass and strength. However, to date, the results obtained from various studies have shown tremendous heterogeneity. Objective: The purpose of this meta-analysis was to evaluate the effects of chronic RET with or without BCAA supplementation on changes in muscle mass and strength. Methods: A systematic search, designed with library scientists and custom filters to isolate clinical trials, of CINAHL, Embase, Medline and SportDiscus was conducted based on a combination of search words and strings relevant to BCAA supplementation and RET. Our inclusion criteria were that articles had to be in English and that each study was a randomized controlled trial (RCT), included a group that ingested only one or all of the BCAAs and a non-supplemented control group, was at least 6 weeks in duration for RET, and included RET that was performed at least twice per week. Our initial search identified 4029 individual studies and, via screening titles and abstracts for the inclusion criteria defined above, 10 papers were selected for inclusion in this meta-analysis. Hypothesis: We hypothesized that the effect of BCAA supplementation during periods of RET result in augmented increases in muscle mass and strength. However, when BCAA-supplemented studies are compared to protein-supplemented studies, or when BCAA+protein-supplemented studies are

compared to just protein-supplemented studies, we hypothesized that BCAAs do not augment RET-induced changes in muscle mass and strength. Results: At the time of filing this abstract analysis was still underway, however, full results will be presented at the conference.

**Nasato, Matthew**

***Effects of an Acute Bout of Exercise on Bone Adipose Tissue Sclerostin Expression in Obese and Normal Weight Mice***

Faculty Advisor: Panagiota Klenrou

Co-Author(s): Nigel Kurgan

Brock University / Faculty of Applied Health Sciences (Kinesiology)

Acute exercise leads to the secretion of a number of factors from muscle (myokines), liver (hepatokines), or bone (osteokines). However, there is a lack of understanding of which (if any) exercise-regulated specific factors mediate the decrease in fat mass with repeated bouts of acute exercise (i.e., training). Furthermore, it is unclear how, obesity impacts these potential mechanisms. Wnt/ $\beta$ -catenin signaling cascade is a critical regulator of bone formation and adipogenesis. Wnt signal transduction is inhibited by sclerostin, a glycoprotein that prevents bone growth, white adipogenesis, and promotes white adipocyte beiging. Sclerostin expression within bone has been shown to increase in mice during mechanical unloading and decrease during mechanical loading. However, in humans, we observe an increase in sclerostin in the circulation immediately following an acute bout of exercise, suggesting a potential cross-talk between bone and adipose tissue during exercise. No one has assessed sclerostin protein or mRNA expression within bone or adipose tissue following an acute bout of exercise or if there is a different response in obese compared to normal weight mice. Thus, we took 40 mice and divided them into four groups: wild chow diet/sedentary, high fat diet/sedentary, wild chow diet/active, high fat diet/active. The exercised groups of each diet condition participated in an acute bout of exercise that consisted of running on a treadmill for 2 hours at 5% grade and 15 m/min. The tibia, femur and subcutaneous adipose tissue were harvested 2h following exercise and snap frozen for future mRNA and protein expression analysis. We hypothesize that there would be an increase in protein content within plasma, bone and adipose tissue, however there would only be an increase in sclerostin mRNA expression within bone. Furthermore, we speculate that the obese mice will have a blunted response following exercise.

**Ng, Hayley**

***Investigating the Feasibility of High Intensity Interval Training (HIIT) Post-Stroke***

Faculty Advisor: Dr. Ada Tang

Co-Author(s): Kevin Moncion, Kenneth Noguchi, Elise Wiley

McMaster University/ Department of Kinesiology

Individuals with stroke often experience physical disabilities and deficits that can reduce their ability to perform daily activities and physical activity, which increases their risk for cardiovascular disease (CVD), and recurrent stroke. Exercise can help break this vicious cycle. Preliminary evidence suggests that high intensity interval training (HIIT) is safe and feasible in the higher functioning individuals living with stroke, however, there is limited evidence in the lower functioning post-stroke population. Therefore, this study will investigate the feasibility of HIIT, defined as the number of minutes spent in an aerobic training zone (60-80% heart rate reserve (HRR)) during an 18-minute HIIT session, in individuals with a broader range of functional abilities after stroke. It is hypothesized that the participants will achieve heart rates in the aerobic training zone  $\geq$ 50% of the total HIIT time. Methods Participants will perform the 18-minute HIIT protocol, consisting of 10, 60-second, high-intensity intervals interspersed with 9, 60-second, low-intensity intervals. Recumbent steppers will be used to accommodate a broader range of individuals with mobility limitations. Additionally, they will perform a 3 minute warm up before and 2 minute cool down after the HIIT session. The Polar H10 HR monitors will be used to collect participants' heart rate (HR) throughout the exercise sessions. Raw HR data (in HR/second) will be extracted and the amount of time spent at 60-80% HRR will be analyzed with descriptive statistics (mean  $\pm$  SD). Results Data collection is underway and results are pending. Conclusion If HIIT is feasible in the lower functioning post-stroke population, it can provide another form of exercise to help this population achieve higher aerobic exercise intensities and therefore provide an opportunity to terminate the vicious cycle associated with stroke.

**Piggott, Marcus**

### ***Varsity Rowing and Soccer Athletes are Physically Fit but not Physically Literate***

Faculty Advisor: Dr. Frost

Co-Author(s): Adrian Lightowler, Dr. Frost

University of Toronto / Faculty of Kinesiology & Physical Education

Introduction: Fitness is critical to perform in sport; however, so too is physical literacy, or the ability to move safely and effectively across a range of patterns and physical demands. Repeatedly performing a particular movement pattern while training can help facilitate the development of physical literacy; however, if the athlete fails to possess kinaesthetic awareness, joint mobility and physical competence, this repetition may limit performance and increase injury risk. The purpose of this study was to examine the ability of rowing and soccer athletes to control knee and spine motion across a range of movement patterns and physical demands. Methods: Thirty-five varsity athletes from the University of Toronto's soccer (n=22) and rowing (n=13) teams volunteered to complete the Physical Literacy Screen (PLS), a battery of 15 randomized bodyweight tasks, each imposing a unique movement and fitness demand. The PLS exercises were used to establish participants' ability to control their knee and low back joint motion across a range of movement patterns (i.e. squat, lunge, hinge, push and pull) and physical demands (i.e. 15 repetitions, 30 seconds, 10 repetitions in 15 seconds). The PLS was administered by the University's strength and conditioning staff and recorded with 3 cameras strategically placed to capture movement in the frontal and sagittal planes. Videos were graded offline by a research assistant according to specific fitness and movement-related criteria and used to assign a physical fitness, physical literacy and 'key movement feature' score (i.e. control of knee and spine motion). Physical fitness and physical literacy were described by the number of tasks completed according to relevant fitness criteria, and fitness and movement criteria, respectively. Control of the knees was documented as poor, moderate, or good, based on the number of tasks completed with the knees, hips and feet aligned (0-3, 4-6 and 7-9, respectively). Control of spine motion was documented as poor, moderate, or good, based on the number of tasks completed with the back held in a neutral position (0-5, 6-10 and 11-15, respectively). Preliminary Results: Amongst the soccer players the mean physical fitness and physical literacy score was 12.5 and 2.5, respectively. Forty-five percent, 41% and 14% demonstrated poor, moderate, and good knee control, respectively. Amongst rowers the mean physical fitness and physical literacy score was 13.4 and 2.8 sequentially. Thirty one percent, 69% and zero demonstrated poor, moderate, and good knee control respectively. Conclusion: Both the rowing and soccer athletes had sufficient fitness to perform the screen, but lacked the physical literacy to control their knee and spine motion while squatting, lunging, hinging, pushing and pulling. Practical Application: Repeatedly performing a sport skill in training or competition with the patterns exhibited during the PLS may encourage the transfer of an undesirable movement behaviour to activities of daily living and life after sport.

### **Rahimi, Hanieh**

#### ***The Relationship Between Shear Rate Components of Resting Blood Flow and Flow-Mediated Dilatation in the Brachial Artery***

Faculty Advisor: Dr. Maureen MacDonald

Co-Author(s): Jem Cheng, Julia Totosy de Zepetnek, Jason Au, Maureen MacDonald

McMaster University/Department of Kinesiology

Endothelial function is an indication of the ability of an artery to vasodilate and is commonly assessed by the flow-mediated dilation (FMD) test. Shear rate (SR) is the frictional force of blood on the arterial wall, and previous studies generally suggest that in humans, anterograde SR (ASR) is beneficial while retrograde SR (RSR) is detrimental for arterial health. We know that, at rest, blood flow patterns vary between individuals; however, no study to date has explored the relationship between resting SR patterns and FMD. The purpose of this retrospective study was to examine the relationship between SR components of resting blood flow (ASR and RSR) and FMD in the brachial artery. Resting brachial artery SR pattern and FMD data were consolidated from previous studies conducted in the Vascular Dynamics Lab at McMaster University, yielding 179 participants. Backwards multiple regression analyses were conducted with ASR, RSR, and oscillatory shear index (OSI) as independent variables and FMD as the dependent variable. The final model, which included ASR and RSR as predictors, explained 6.7% of the variance in FMD (adjusted R<sup>2</sup> = 0.056, P = 0.002). Only ASR was an independent predictor of FMD ( $\beta$  = 0.255, P < 0.001), with greater ASR predicting improved FMD response in the brachial artery. These results affirm previous findings that increased ASR is associated with increased arterial health. Funded by NSERC.

**Ravi, Roshni**

***An observational study examining the effect of habitual versus non-habitual caffeine consumption on the MEP recruitment curve in healthy males***

Faculty Advisor: Dr. Aimee Nelson

McMaster University/Faculty of Kinesiology

Background: In North America, over eighty percent of adults consume caffeine daily with an average amount of around 210 to 238mg per day. There is currently limited research on the effects of caffeine on corticomotor excitability, which is important to consider in transcranial magnetic stimulation (TMS) protocols. Objective: The purpose of this study is to examine the influence of habitual versus non-habitual caffeine consumption on corticomotor excitability, specifically through MEPs. Methods: Right-handed, non-smoking males between the ages of 18 to 30 years old were recruited for participation. Non-habitual caffeine drinkers are defined as those who drink less than 200mg per week of caffeine. To achieve this, two groups of individuals who are either habitual caffeine consumers or non-habitual caffeine consumers were recruited. Participants completed a dietary log for caffeine consumption for the week prior to the collection, including coffee, tea, caffeinated chocolate, carbonated beverages and energy drinks. Dependent measures to assess corticomotor excitability included the motor evoked potential (MEP) recruitment curve and resting motor thresholds. Results: Preliminary data suggests that non-habitual caffeine consumers have lower thresholds than the habitual consumers. Data collection is ongoing. Discussion: With only 4 participants completed, the preliminary data suggests there may be differences between habitual versus non-habitual caffeine consumers. Conclusions: No definitive results can be concluded until further recruitment and analysis is completed. We are projected to have 24 participants by the end of the study this term.

**Sangha, Barinderjit**

***NFL National Anthem Policy: A Narrative Policy Analysis of Media Framing and Audience Understandings***

Faculty Advisor: Margaret MacNeill

University of Toronto / Faculty of Kinesiology & Physical Education

BACKGROUND: In 2018, the NFL introduced the National Anthem Policy requiring all personnel to “stand and show respect” for the U.S. national anthem. When a policy is surrounded with controversy, Hampton (2009) and Roe (1994; 2003) recommend narrative policy analysis be deployed to study the polarization of debate, such as the case of Colin Kaepernick’s activism by kneeling during the national anthem. PURPOSES: 1. To identify key meta-narratives and counterstories in North American media coverage of athlete activism and of the emergence of the National Anthem Policy; and 2. To investigate how media audiences understand and respond to debates they consume. THEORETICAL APPROACH: Media coverage of policy plays a significant role in political agenda setting, as well as the reception and success of policy (Soroka, 2002). Thus, a critical cultural studies approach to studying media agenda-setting (McComb and Shaw, 1972), representation, and policy framing serve as the theoretical lenses. METHODS: 1. Quantitative content analysis of North American online media articles about policy and sports activism (n=400, between 2016 to 2019); 2. Narrative analysis of dominant policy agenda themes in online sports media, with a focus on race, class, gender, and patriotism; and 3. Interviews with sport media audience members (n=20) RESULTS AND CONCLUSION: This presentation will offer preliminary conclusions about the impact of the policy and emerging responses from sports audiences. Recommendations to redress conflicting media discourse, open up the dialogue, and suggestions for future research will be offered.

**Sidhu, Rajbir**

***Muscle fibre cross-sectional area and fibre type changes following resistance exercise training with heavier and lighter loads in young men***

Faculty Advisor: Dr. Stuart Phillips

Co-Author(s): Rob Morton, Matt Fliss, Sean McKellar, and Chris McGlory

McMaster University/ Department of Kinesiology

The general recommendation for weight required to induce hypertrophy is a heavier load that is at least >60% of maximal strength (1 repetition maximum - 1RM). The morphological adaptations of skeletal muscle fibres following higher- vs. lower-load resistance exercise training (RET) have been well documented; however, researchers have not quantified so-called hybrid fibres. Here, we used a novel immunohistochemical procedure to quantify the RET-induced changes in fibre type-specific CSA

and distribution across a spectrum of fibre types between high load (HL) and low load (LL) RET. Healthy young men ( $22\pm 3$  y,  $181\pm 7$  cm,  $85\pm 24$  kg, means $\pm$ SD) performed 10 weeks of lower-body RET protocol which included knee extensions to volitional fatigue. Each subject had one leg randomly assigned to perform HL (three sets of 8-12 repetitions at  $\sim 70$ - $80\%$  one repetition maximum [1 RM]) and the other leg to LL (three sets of 20-25 repetitions at  $\sim 30$ - $40\%$  1RM). Pre- and post-skeletal muscle biopsies were performed on the vastus lateralis and changes in muscle fibre CSA and fiber type were analyzed through immunofluorescent staining of three myosin heavy chain isoforms (type I, IIA, and IIX) and dystrophin. Fibre types were quantified by the relative intensity in each channel (e.g., type I), which allowed for objective identification of true and hybrid fibres. Following 10 weeks of RET to volitional fatigue, type I and type II (IIA and IIX collapsed) fibre CSA increased (HL= $11\pm 23\%$ ; LL= $12\pm 25\%$ , means $\pm$ SD;  $P < 0.05$ ) with no significant difference between HL and LL ( $P > 0.05$ ). The percentage of hybrid IIA/X fibres was notably increased following RET (HL= $40\pm 10\%$ ; LL=  $97 \pm 128\%$ ;  $P < 0.05$ ), with an accompanying decrease in type IIX muscle fibers (HL=  $-21\pm 37\%$ ; LL=  $-24\pm 41\%$ ;  $P < 0.05$ ) but no change in type I or IIA fibres or difference between conditions ( $P > 0.05$ ). These findings suggest performing RET to volitional fatigue results in a shift from IIX to hybrid IIA/X fibres, which may represent a transition to IIA following 10 weeks of RET. Moreover, it appears that RET-induced fibre type-specific adaptations occur independent of load when RET is performed to volitional fatigue.

### **Stapleton, Melissa**

#### ***Nuclear Factor Kappa B (p50) content Following Different Types of Muscle Contractions.***

Faculty Advisor: Dr. Marius Locke

University of Toronto / Faculty of Kinesiology & Physical Education

Nuclear Factor Kappa B (p50) content Following Different Types of Muscle Contractions. Melissa Stapleton and Dr. Marius Locke Faculty of Kinesiology and Physical Education, University of Toronto. Nuclear factor kappa B (NF-kB) is a transcription factor that promotes an inflammatory state and may be detrimental to muscle recovery. Since specific types of muscle contractions are known to cause skeletal muscle damage and increase inflammation, we identified connections between muscle contraction types, muscle damage, and NF-kB (p50) content. To do this, one tibialis anterior (TA) muscle from Sprague-Dawley rats ( $n=5$ /group) underwent 15 electrical stimulations (three sets of five) while contracting in either a lengthening (LC), shortening (SC) or isometric (IC) manner. Two other LC groups also underwent 5 and 10 repetitions. When assessed by Western blot, a robust increase in NF-kB (p50) content following all LC conditions was detected, while a lesser response was observed following IC or SC. Similarly, muscle damage was observed only after LC and not after IC or SC. These findings suggest NF-kB (p50) in rat skeletal muscle may be involved in the inflammatory response known to occur following muscle damage.

### **Tang, Mengxin**

#### ***The effect of acute changes in progesterone on the exercise pressor reflex***

Faculty Advisor: Charlotte W. Usselman

Co-Author(s): Ava Khaksar, Yasmine Coovadia

McGill University / Faculty of Kinesiology

Clinical evidence has demonstrated a protective effect of estrogen on vascular health in premenopausal women. However, whether progesterone is also protective remains in debate. While a variety of animal, cell and human studies support vasodilatory and antihypertensive effects of progesterone, some other studies indicate the contrary. Therefore, the purpose of this study is to examine the effect of progesterone on blood pressure (BP) reactivity in young healthy women. We hypothesize that progesterone has a protective effect on the cardiovascular system, as demonstrated by attenuated BP reactivity during periods of elevated progesterone. Ten healthy premenopausal women (18-35 yrs) will be recruited for this study. Each participant will be tested during the late follicular (LF; days 10-14) and midluteal (ML; days 20-24) phases of the menstrual cycle, which correspond to low and high levels of progesterone, respectively. During each visit, subjects will complete 3 minutes of isometric ischemic handgrip (IHG) at 20% of their maximum voluntary contraction, followed by 1 min of post exercise circulatory occlusion (PECO). BP values will be obtained throughout the duration of this protocol. We will quantify the exercise pressor response as a change in the mean arterial pressure (MAP), heart rate (HR), cardiac output (Q), and total peripheral resistance (TPR). HR will be recorded using a standard 5-lead electrocardiogram. Systolic, diastolic,

and MAP will be continuously measured using photoplethysmography. This study will provide insight into the effect of progesterone on the control of blood pressure in healthy premenopausal women.

**Tworzyanski, Madalyn**

***Using the Mobility Screen to 'rule out' mobility restrictions amongst varsity rowers and soccer players***

Faculty Advisor: Dr. David Frost

Co-Author(s): Marcus Piggott, Adrian Lightowler, David Frost

University of Toronto / Faculty of Kinesiology & Physical Education

Introduction: Mobility restrictions can influence the performance of sport skills, occupational tasks, and activities of daily living. Without the requisite mobility to execute any of these movement tasks safely, performers may be forced to adapt their movement behaviours in such a way that limits performance, increases injury risk, or hinders quality of life. The primary objective of this study was to examine the prevalence of active and passive ankle, hip and shoulder joint mobility amongst the University of Toronto's Varsity soccer and rowing teams. Methods: Male and female athletes from the University's soccer (n=22) and rowing (n=13) teams volunteered to complete a 10-task mobility screen administered by the University's strength and conditioning staff. Prior to the screen, the athletes filled out a Physical Activity Readiness Questionnaire (PAR-Q), and a demographic questionnaire to document personal information such as year of study, practice hours per week, and injury history. The screen was designed to 'rule out' active and passive ankle dorsiflexion, hip flexion and shoulder flexion restrictions, and graded offline using video collected from the frontal and sagittal plane. Grades were assigned based on specific movement-related criteria (e.g. knee past toe, knee aligned with hips and feet) and used to categorize athletes as having active and passive mobility (Grade A), only passive mobility (Grade B), and no passive mobility (Grade C). The ankle, hip and shoulder were graded separately. Results: Amongst the soccer players, 14%, 23% and 64% were categorized as Grade A, B, and C, respectively for the ankle, 9%, 50%, and 41% for the hip, and 45%, 50%, and 5% for the shoulder. Amongst the rowers, 38%, 31% and 31% were categorized as Grade A, B and C, respectively for the ankle, 54%, 31% and 15% for the hip, and 69%, 23%, and 8% for the shoulder. Conclusion: The majority of soccer players do not possess (no passive mobility) or do not access (no active mobility) sufficient ankle dorsiflexion and hip flexion mobility. Greater than half of the rowers at the ankle and approximately half at the hip do not possess or access sufficient ankle dorsiflexion and hip flexion mobility to perform the Mobility Screen. This may limit performance and increase their injury risk while training and participating in sport.

**Ulona, Princess**

***Demographic and Medical Correlates of Light Physical Activity in Kidney Cancer Survivors***

Faculty Advisor: Linda Trinh

Co-Author(s):

University of Toronto / Faculty of Kinesiology & Physical Education

Background: Approximately 73.9% of kidney cancer survivors (KCS) do not adhere to the recommended physical activity (PA) guidelines of 150 minutes of moderate-to-vigorous PA (MVPA) per week. Due to various barriers, many KCS may experience difficulty performing PA at this intensity, thus light physical activity (LPA) may be viable strategy to increase PA. LPA has significant benefits on the health and quality of life (QoL) of KCS, thus understanding the participation in LPA is warranted. Purpose: To examine the demographic and medical correlates of LPA in KCS. Methods: 1985 KCS from the Alberta Cancer Registry were mailed the self-administered survey assessing demographic and medical variables and LPA using a modified version of the Godin Leisure-Time Exercise Questionnaire. Linear regression was used to investigate correlates of these LPA.. Results: 703 KCS returned complete surveys KCS were primarily male (62.9%), Caucasian (91.0%), were a mean age of 65.0±11 years, had localized kidney cancer (81.7%), and were within 68.96±55.54 months since diagnosis. KCS reported a mean of 115.7±265 minutes of LPA per week. Months since diagnosis was positively correlated with the number of minutes of LPA per week ( $\beta = 0.08$ , 95% CI=0.02-0.77,  $p < .04$ ). Conclusion: KCS who are closer to diagnosis are less likely to participate in LPA. This may be due to the lack of knowledge surrounding the perceived benefits of PA after a cancer diagnosis. Health care providers and interventionists should promote the benefits of LPA during treatment for better health outcomes

**Velji, Ambareen-Rose**

***Recommendations to Alleviate Body Image Concerns in Girls Sport***

Faculty Advisor: Catherine Sabiston

Co-Author(s): Benjamin Sylvester, Eva Pila, Catherine Sabiston

University of Toronto / Faculty of Kinesiology & Physical Education

Despite the benefits of involvement in sport, girls dropout of sport during adolescence and often do not return. One reason that girls drop out of sport is due to body image concerns. Although the awareness of body image concerns is increasing, a lack of clarity is present regarding what practices can be used to alleviate body image concerns in female athletes. The purpose of this research was to evaluate resources regarding body image in sport to understand what athletes, parents, coaches, and sport organizations can do to mitigate body image concerns. Resources (n = 54) were located by the research team and community partners (e.g., CAAWS, OPHEA) using search engines (e.g., Google and YouTube) and existing networks. All resources were coded by two raters regarding the characteristics of the resources, quality criteria, and body image material. Results show that some resources were informational and explained the problem of body image concerns (i.e., descriptive material; 39%), but few provided actionable suggestions for what people can do about it (prescriptive material; 9%). Although limited, evidence-based actionable suggestions included: Being a role model and discussing body image with important others, recognition of the body's capabilities rather than appearance, and a focus on enjoyment in sport contexts. Our results provide recommendations for athletes, parents, and coaches to help mitigate body image concerns in sport. To help alleviate body image concerns in girl's sport, athletes, parents, and coaches could implement the actionable suggestions. Research is warranted to determine the cause of the discrepancy between descriptive and prescriptive material, perhaps applied research that is more prescriptive is needed, or greater knowledge translation and mobilization is needed to disseminate body image research findings to the sport community. Key terms: Female, physique, resources, weight, physical activity, adolescents

**Webb, Erin K**

***Omega-3 fatty acid supplementation attenuates skeletal muscle-disuse-atrophy during two weeks of unilateral leg immobilization in healthy young women.***

Faculty Advisor: Dr. Stuart Phillips

Co-Author(s): Mohammad I., Kamal M., Bahniwal R., Gorissen S.M.H., Hector A and McGlory C  
McMaster University/ Department of Kinesiology

Abstract: Omega-3 fatty acid supplementation enhances muscle protein synthesis and muscle size. Whether omega-3 fatty acid supplementation attenuates human muscle-disuse-atrophy is unknown. We determined the influence of omega-3 fatty acid supplementation on muscle size, mass, and integrated rates of myofibrillar protein synthesis (MyoPS) following 2 weeks of muscle-disuse, and recovery in women. Twenty women (BMI=23.0±2.3 kg.m<sup>2</sup>, age=22±3 y) underwent 2 weeks of unilateral limb immobilization followed by 2 weeks of return to normal activity. Four weeks prior to immobilization, and throughout the duration of the trial, participants consumed either 5 g.d<sup>-1</sup> of omega-3 fatty acids (Omega-3) or an isoenergetic quantity of sunflower oil (Control). Muscle size and mass were measured Pre- and Post-immobilization, and after recovery. Serial muscle biopsies were obtained to measure integrated (daily) MyoPS. Following immobilization, the decline in muscle volume was greater in Control compared to the Omega-3 group (14% vs. 8%, P<0.05) and was not different from Pre-immobilization at recovery in the Omega-3 group; however, it was still lower in the Control group (P<0.05). Muscle mass was reduced in the Control group only (P<0.05). MyoPS was higher in the Omega-3 compared to the Control group at all times (P<0.05). We conclude that omega-3 fatty acid supplementation attenuates skeletal muscle-disuse-atrophy in young women, which may be mediated by higher rates of MyoPS. Student Researcher: Erin K. Webb Faculty Advisor: Dr. Stuart Phillips

**Wei, Roger YJ**

***Perception of gait symmetry during split-belt walking is not affected by Parkinson's Disease***

Faculty Advisor: Caroline Paquette

Co-Author(s): Dorelle C. Hinton, David Conradsson, Caroline Paquette

Department of Kinesiology and Physical Education, McGill University

BACKGROUND: Parkinson's disease (PD) leads to a decrease in gait automaticity and difficulty in perceiving gait speed differences between legs. Despite this, adults with PD can adapt to walk on a

split-belt (SB) treadmill with each leg driven at a different speed. It is not known if and how a PD-related change in the perception of each leg's speed affects this adaptation process. Examine the effect of PD on perception of gait symmetry during SB treadmill adaptation and post-adaptation. METHODS: 12 adults with PD (63±7y) and 14 healthy older adults (67±8y) participants completed a 19-minute walking trial on the SB treadmill: Tied-belt baseline (4mins), Adaptation (10 mins with 1 belt slowed to 70% of typical walking speed) and Post-Adaptation (5 mins with both belts at slow speed). Participants wore headphones playing white-noise with audio prompts to verbally indicate their perception of belt speed asymmetry (scale of completely the same to completely different). RESULTS: Adults with PD did not differ from healthy older adults in their ability to adapt gait symmetry during Adaptation and Post-Adaptation. Both groups had negative dual support symmetry (DSS) early in Adaptation that returned to baseline by the end of Adaptation. No differences were observed in DSS adaptation rate between groups. There were no significant differences between groups for perception of foot speed asymmetry during Adaptation or Post-Adaptation periods. Both groups correctly indicated speed asymmetry between their feet early in Adaptation and Post-Adaptation. Over both periods, their perceptions of foot speed were more symmetrical. CONCLUSIONS: Adults with PD had similar perception of gait speed symmetry to the healthy counterparts on a SB treadmill. Although adults with PD experience more difficulty with perception of speed asymmetry compared to healthy older adults during overground walking, this difference did not translate to the SB adaptation walking protocol.

**Yang, Jinyuru**

***A Three-Dimensional Architectural Analysis of the Innervation of Tibialis Anterior Muscle***

Faculty Advisor: Dr. Catherine Amara, Dr. Anne Agur

Co-Author(s): Silviu Agotici, Dr. Kei Masani, Dr. Paul B. Yoo

University of Toronto/Faculty of Kinesiology and Physical Education

Background: Tibialis anterior (TA), a muscle of the anterior compartment of the leg, has functionally important roles that contribute to locomotion and stability. The development of novel lower limb Functional Electrical Stimulation (FES) techniques to enhance functional activities in individuals who have neurological impairment requires precise 3D data of the intramuscular innervation patterns of the leg musculature, including TA. Knowledge of intramuscular innervation of TA is limited as studies are scarce and mainly focused on nerve entry points. Purpose: The purpose of this pilot study is to document the intramuscular innervation pattern of TA volumetrically to improve Spatially Distributed Sequential Stimulation (SDSS) techniques. Methods: One formalin embalmed TA muscle (88-year-old male) without any evidence of surgery/pathology was serially dissected, digitized, and modelled in 3D. The intramuscular innervation pattern was analyzed and incorporated into the SDSS by our collaborator. Results: To innervate TA, the deep fibular nerve gives off two secondary nerve branches: a superior and inferior branch, which ramify intramuscularly to supply the proximal third of TA, the largest part of the muscle belly. The inferior branch also gives off a long lateral branch that courses along the posterior border of TA, superficial to the interosseous membrane with the anterior tibial artery. The lateral branch was found to give off 11 small nerves that entered the middle third of TA, and 2 branches that supplied the distal third of TA. Overlapping innervation was only observed in the middle third. Conclusion: This is the first study to provide cartesian coordinate data to construct volumetric models of the intramuscular innervation of TA, as in situ. This will enable a better understanding of TA electrode placement for FES therapy to reduce rapid fatiguing by stimulating individual sub-components of the muscle and provide a clinical map of nerve regeneration following trauma.

**Yang, Jinyuru**

***Examination of Gastrointestinal Permeability following Acute Sport-Related Concussion***

Faculty Advisor: Dr. Michael Hutchison

Co-Author(s): Dr. Alex Di Battista

University of Toronto / Faculty of Kinesiology & Physical Education

Background: The gut-brain axis is a system that consists of bidirectional communication between the central nervous system (CNS) and the enteric nervous system. Moderate and severe forms of traumatic brain injuries (TBIs) have been shown to negatively impact functions of the gastrointestinal (GI) tract, specifically changes to intestinal permeability. However, it is unclear if mild TBI, such as sport-related concussion (SRC), negatively affects intestinal permeability. Purpose: To examine gut permeability between athletes with acute SRC and healthy, uninjured university athletes using blood

biomarker. Participants and Methods: University of Toronto intercollegiate athletes were recruited and stratified into two groups: acute concussion (n=30), and healthy, uninjured controls (n=61). Controls were further stratified based on history of concussion and recovery time of most recent concussion: no history of concussion (No Hx Conc; n=34), history of concussion - short recovery (Hx-Short; n=18), and history of concussion - long recovery (Hx-long; n=9). Venous blood samples were analyzed for the detection of lipopolysaccharide binding protein (LBP) by MSD GOLD 96-well immunoassay. Symptom scores were obtained by the C3Logix Symptoms Scale. Results: Data to be presented will be profiles of LBP for concussed and healthy, uninjured athletes. A two by two factorial analysis will be used to examine the differences of LBP concentrations between acute concussion and healthy, uninjured controls, and to explore the differences in sex. A Pearson Correlation/ Spearman's  $\rho$  test will be used to examine the relationship between concussion recovery time and LBP concentrations. Conclusion: Study findings will provide some insight into how concussion may impact gut permeability. Results from the study will serve a preliminary guide for future research that examines how to manage the potential changes in intestinal barrier function in athletes with SRC.

**Zhang, Danni**

***Crossing the ocean for school is not an easy task***

Faculty Advisor: Dr. Michael Atkinson

University of Toronto / Faculty of Kinesiology & Physical Education

Acculturation described by Berry (2003) is when two different cultures comes into contact with one another, and that encounter may lead to possible stress and conflicts. Bandura (2006) describes personal agency as the amount of control and options a person can act on. In recent years, according to Statistics Canada (2016) there has been a significant 10% increase (over 60,000 population) from 2004, in the international university student population within Canada. This qualitative study was done to better understand the effects of acculturation from the perspective of the international university students, and how it could limit their options in lifestyle (personal agency) which leads to stress. With a better understanding of how acculturation could possibly strip away their personal agency, from the standpoint of the international university students, specific barriers that prevents a smooth transition into the student life in Canada could be identified. The study was carried out by interviews with 4 (3=males, 1=female) international university students, all from China, who the researcher has been living with for a duration of 8 months (ethnography). The researcher would take observation notes in order to gain a better understanding of the specific stressors that international students would have to face on a daily basis. From the observation notes and interviews, 4 major barriers were identified from the experiences of the international students. The barriers were language proficiency, social support, personal identity, and accessibility. The results of this qualitative study has found that acculturation do indeed limit personal agency and could lead to stress. Through the findings of the 4 major barriers, there could be more focus into devising programs and policies to better accommodate the university international students life as a student in Canada. Reference Bandura, A. (2006). Toward a psychology of human agency. *Perspectives on psychological science*, 1(2), 164-180. Berry, J. W. (2003). Conceptual approaches to acculturation. *American Psychological Association*. Statistics Canada, S. (Ed.). (2016, October 20). International students in Canadian Universities, 2004-2005 to 2013-2014. Note 1. International students in Canadian Universities, 2004-2005 to 2013-2014 Note 1. Retrieved from &lt;<https://www150.statcan.gc.ca/n1/pub/81-599-x/81-599-x2016011-eng.htm>&gt;

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