



REHABILITATION SCIENCES INSTITUTE

2018 RESEARCH SHOWCASE

ABSTRACT BOOK



UNIVERSITY OF
TORONTO

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Welcome

A message from the Director of RSI, Dr. Angela Colantonio

I wish to begin by recognizing all who have made our student led annual Rehabilitation Sciences Institute Research Day so special this year. Our students have worked hard to prepare another exciting event that showcases their research and knowledge transfer abilities. We are so proud of their scientific and other leadership achievements. I also wish to thank faculty, staff and sponsors who made this day possible.



Our research day is the highlight of another amazing year for RSI. We continue to receive guests from across Canada and the globe. Our alumni launched our first spring reunion event which ended up being sold out in record time. Further, together with our students we launched our first alumni mentorship speaker series and alumni/student speed-mentoring event. It has also been a historic year for new major gifts to support students and related research. I thank Dr. Patty Rigby, Dr. John Wedge, Dr. Susan Rappolt, Professor Diane Gasner, and Dr. Douglas Salmon from RTW Integrated Health Management for their incredible generosity.

This year, we welcome Mr. Antony Duttine from the Pan American Health Association, who graciously accepted our invitation to be a keynote speaker. Also thanks to Anita Balakrishna, who shared her knowledge on diversity issues. Please enjoy all the great presentations today and wish you all a fantastic day!

A message from the Graduate Coordinator of RSI, Dr. Dina Brooks

We are very pleased to welcome you to the RSI Research Showcase. Our mission is to prepare students to be leaders in the rehabilitation sciences. As you will see today, our students strive for research excellence. Research Day represents a unique forum through which key research findings can be showcased to our community to advance science and practice. As rehabilitation is a multidisciplinary enterprise, the research presented by our outstanding students will capture the depth and breadth of the field.

As Graduate Coordinator, one of the most rewarding parts of the position has been interacting with our talented students. Their passion and commitment to learning is truly inspiring and today you will have the opportunity to experience it at the poster and oral presentations.



A message from the Rehabilitation Sciences Graduate Students' Union



The RSI Research Day is a student-led initiative that is organized and supported by the Rehabilitation Sciences Graduate Students' Union (RSGSU). Welcome to another year and another exciting research showcase of our student body. We, as the RSGSU, are excited to take part in highlighting all of our hard work and the diversity of our research. The RSI Research Day is a unique event as it is organized *for* the

students, *by* the students. This event is a great environment to support our students, meet new people, and learn something new.

"Research is formalized curiosity. It is poking and prying with a purpose." -Zora Neale Hurston

Ask challenging questions, encourage each other, and most importantly, have fun!

To learn more and find out how to get involved, email us: rehabsciencegsu@gmail.com and follow us on Twitter: [@RSGSU](https://twitter.com/RSGSU) and Facebook: [Rehabilitation Graduate Student Union](https://www.facebook.com/RehabilitationGraduateStudentUnion)

Sincerely,
The RSGSU Executive Team

Nirsan Kunaratnam
Ivona Berger
Faryn Starrs

Kristina Kokorelias
Ahmed Hassan

2018 Research Day Committee

Tyler Saumur
PhD Student

Chen Xiong
PhD Student

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Kristina Kokorelias
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Fiona Höbler
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MSc Student

Andrea Hung
MSc Student

Mary Boulos
MSc Student

Dr. Dina Brooks
Graduate Coordinator

Dr. Rena Park Helms
Associate Professor

Diane Wiltshire
Business Officer

A special thank you to the following staff members for their ongoing assistance:

Loida Ares
Administrative Coordinator

Rob Page
Manager of Information Technology

Jessica Boafo
Administrative Assistant

Schedule of the Day


RSI Research Day

Thursday, May 10th, 2018

9:00 a.m. – 5:00 p.m.

Chestnut Residence and Conference Centre


89 Chestnut St, Toronto, ON M5G 1R1

MORNING SESSION	
9:00 – 9:30	<p>Registration <i>Chestnut 2nd Floor</i></p> <p>Poster Set-up <i>The Ballroom West</i></p>
9:30 – 10:30	<p>Faculty & Student Assembly <i>Ballroom Centre</i></p> <ul style="list-style-type: none"> ❖ Guest Speaker – Anita Balakrishna, M.Ed (cand), LLB (law), BA (Honours) Diversity Strategist, Faculty of Medicine, University of Toronto “Pathways to Inclusion: The Opportunities and Challenges of Journeying Beyond Diversity” <div style="display: flex; align-items: flex-start;">  <p>Anita Balakrishna is currently the Diversity Strategist at the University of Toronto’s Faculty of Medicine. Her main areas of interest, experience and expertise over the past 15 years have been in human rights advocacy, the promotion of equity in workplaces and academic environments, and inclusion policy and practice within organizations. Anita has worked as a human rights lawyer, community advocate for law reform, college professor, conflict resolution specialist, and human rights and diversity educator. She is currently pursuing an M.Ed in Adult Education and Community Development at the Ontario Institute for Studies in Education (OISE) and is also training as a yoga therapist.</p> </div>
10:30 – 10:40	<p>Refreshment Break <i>Ballroom West</i></p>
10:40 – 11:00	<p>Opening Remarks <i>Ballroom Centre</i></p> <ul style="list-style-type: none"> ❖ Dr. Angela Colantonio, PhD, RSI Director ❖ Dr. Trevor Young, MD, PhD, FRCPC, FCAHS, Dean, Faculty of Medicine and Vice Provost, Relations with Health Care Institutions
11:00 – 11:45	<p>Student Presentations: 3 Minute Presentations <i>Ballroom Centre</i></p> <ul style="list-style-type: none"> ❖ Test-retest reliability of force plate-based balance measures within sub-acute stage of post-stroke recovery. Raabeae Aryan, PhD student ❖ Reactive stepping ability of individuals with incomplete spinal cord injury Katherine Chan, MSc student ❖ Exploring children's perspectives of social inclusion in a recreation setting Brydne Edwards, PhD candidate

	<ul style="list-style-type: none"> ❖ Prevalence of Severe Dysphagia in Patients Up to 5 Years following Completion of Curative Radiotherapy for Head and Neck Cancer. Elissa Greco, PhD candidate ❖ Researching brain injury: Co-constructing knowledge with children through arts-based research methods. Katie Mah, PhD candidate ❖ Understanding the Use of Motor Learning Strategies during Physiotherapy Intervention for Children with Cerebral Palsy. Jennifer Ryan, MSc student ❖ Critical Service Components of Vocational Programming for Persons with Traumatic Brain Injury. Hussein Salehmohamed, MSc student ❖ Executive control and its relationship to aphasia therapy outcomes. Tijana Simic, PhD candidate ❖ Parsing out the Relationship between Contractile and Connective Elements in the Human Trapezius. Mikaela L. Stiver, PhD candidate ❖ Balance confidence and other factors related to physical activity participation in youth with cerebral palsy. Megan Towns, PhD candidate ❖ Perspectives of children with disabilities around supports for weight management. Meaghan Walker, MSc student ❖ Autism Inside Out: building new understanding through insider perspective. Christie Welch, PhD candidate
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11:45 – 12:00	Refreshment Break <i>Ballroom West</i>
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AFTERNOON SESSION	
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12:00 – 1:00	<p>Keynote Speaker <i>Ballroom Centre</i></p> <ul style="list-style-type: none"> ❖ Mr. Antony Duttine, DrPH (cand), MSc Advisor on disability and rehabilitation at the Pan American Health Organization “Rehabilitating Rehabilitation: How Will Science Shape the Future of our Profession” <div style="display: flex; align-items: flex-start; margin-top: 10px;">  <div style="flex-grow: 1;"> <p>Antony Duttine is the advisor on disability and rehabilitation at the Pan American Health Organization, the Regional Office of the Americas for the World Health Organization. In this role, Antony is responsible for providing support to the 52 member states and territories contained within the Region on the issue of disability and rehabilitation. A physiotherapist by profession Antony worked in the UK health service for several years, before embarking on a career in international health and development. He worked in Namibia for two years as a VSO volunteer and then spent 7 years with Humanity and Inclusion (formerly Handicap International), initially in Afghanistan and then working on global rehabilitation advocacy. He joined PAHO in September 2017. Antony is also a research fellow and doctoral student at the London</p> </div> </div>
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	<p>School of Hygiene and Tropical Medicine, where his research focus is around the development of a support programme for families of children with congenital Zika syndrome.</p> <p>Rehabilitation has been largely overlooked in the global health and international development agenda. However, there is a growing sense that this may be slowly changing within the new sustainable development goal era. In this talk, Antony Duttine will give his perspectives on how rehabilitation has been (and often continues to be) perceived from different actors and sectors and what we, as a sector, must do to ensure that we keep pace with global developments in continuing to show the value of our work. Central to this endeavor is the growing importance of rehabilitation science and the role of data in the coming decades.</p>
1:00 – 2:15	<p>Lunch and Networking <i>Ballroom Centre & West</i></p>
1:10 – 1:40	<p>Poster Judging Session 1 <i>Ballroom West</i></p>
1:45 – 2:15	<p>Poster Judging Session 2 <i>Ballroom West</i></p>
2:15 – 2:55	<p>Student Presentations: 7 Minute Presentations <i>Ballroom Centre</i></p> <ul style="list-style-type: none"> ❖ Working through the challenges of conceptualizing rurality in disability research. Michelle Duncanson, PhD candidate ❖ The Effect of Multi-Session tDCS on Cognitive Performance in Youth with Concussion: A Pilot and Feasibility Study. Keelia Quinn de Launay, MSc student ❖ HIIT the Road Jack: The Effects of Exercise on Piano Learning. Dana Swarbrick, MSc student
2:55 – 3:05	<p>Break <i>Ballroom West</i></p>
3:05 – 3:55	<p>Panel Discussion <i>Ballroom Centre</i></p> <p><i>Synergy of Successful Mentorship</i></p> <p>Facilitator: Dr. Stephanie Nixon, PhD PT, Department of Physical Therapy and RSI</p> <ul style="list-style-type: none"> ❖ Dr. George Mochizuki, PhD, Department of Physical Therapy, RSI Research: Interests in developing strategies for reversing the changes in neuromotor control of movement that occur after stroke. ❖ Dr. Elizabeth Rochon, PhD, Department of Speech-Language Pathology, RSI Research: Interests lie in identifying the nature and components of linguistic and cognitive impairments subsequent to brain damage, and in developing new treatment approaches for language impairments in aphasia. ❖ John Shepherd, MSc Student, RSI ❖ Tyler Saumur, PhD Student, RSI
3:55 – 4:40	<p>Awards Ceremony & Wrap-up <i>Ballroom Centre</i></p>

4:40 – 5:30	Networking with Reception <i>Ballroom West</i>
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Sponsorships

Thank you to our valued sponsors!

Gold Level



Silver Level



Dr. Angela Colantonio:
 Chair in Gender, Work, and Health



Dr. Larry Robinson
 on behalf of



International Centre for Disability
 and Rehabilitation (ICDR)

Dr. Nora Cullen

Bronze Level

Student Oral Presenters

3 Minute Presenters



Raabeae Aryan
PhD student



Katherine Chan
MSc student



Brydne Edwards
PhD candidate



Elissa Greco
PhD candidate



Katie Mah
PhD candidate



Jennifer Ryan
MSc student



Hussein Salehmohamed
MSc student



Tina Simic
PhD candidate



Mikaela Stiver
PhD candidate



Megan Towns
PhD candidate



Meaghan Walker
MSc student

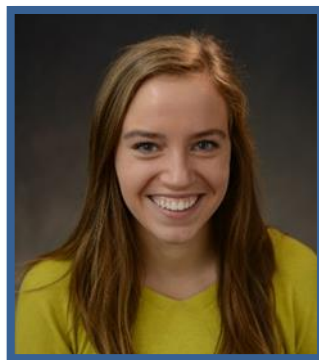


Christie Welch
PhD candidate

7 Minute Presenters



Michelle Duncanson
PhD candidate



Keelia Quinn de Launay
MSc student



Dana Swarbrick
MSc student

Awards and Contests

We appreciate our sponsors and in-kind donors for making these opportunities possible.

Three Minute Presentation Competition

The top 3 presentations will win a student travel award.

Submit your ballot by 1:00pm! The winners will be announced at the **Awards Ceremony at 3:55pm!**

Poster Competition

We have 4 student travel awards up for grabs:

- ❖ Best Poster – MSc
- ❖ Best Poster – PhD
- ❖ Best Poster – People’s Choice
- ❖ Best Poster – CIHR Gender, Work and Health award

Submit your ballot by 2:15pm! The winners will be announced at the **Awards Ceremony at 3:55pm!**

Social Media Contests



What better way to kick off RSI Research Day 2018 than with a giveaway! Here how’s to win:

Step 1: Like us on [Facebook](#) **OR** follow us on [Twitter](#) (@RSIUofT) to enter.

Step 2:

- If you entered through Facebook, LIKE our #RSIResearchDay post on May 10th!
- If you entered through Twitter, all you have to do is RETWEET the #RSIResearchDay #Giveaway post!

If you already like us on Facebook or follow us on Twitter, simply proceed to **Step 2** for your chance to win!

The **deadline** to enter is **Thursday, May 10th, 2018 at 3:00pm!**

All contest winners will be announced at the Networking with Reception event starting at 4:40pm in Ballroom West.

Make sure to also join the conversation by using the hashtag **#RSIResearchDay**

Good luck!

Abstracts

3 Minute Presentations

in order of the schedule

Presentation #1

Test-retest reliability of force plate-based balance measures within sub-acute stage of post-stroke recovery

Raabeae Aryan, Rehabilitation Sciences Institute, University of Toronto; Andrew H. Huntley, Toronto Rehabilitation Institute, University Health Network; Elizabeth L. Inness, Toronto Rehabilitation Institute, University Health Network; Kara K. Patterson, Department of Physical Therapy, University of Toronto; Mochizuki, G., Heart and Stroke Foundation Canadian Partnership for Stroke Recovery, Sunnybrook Research Institute; Avril Mansfield, Toronto Rehabilitation Institute, University Health Network.

Field of Research: Movement Science

Funding: Heart and Stroke Foundation Canadian Partnership for Stroke Recovery, Ministry of Research and Innovation

Background: Impaired balance is one of the primary contributors to increased fall-risk post-stroke, which is a major concern in the stroke population. Clinicians should use standardized balance measures as an integral part of stroke assessments to detect balance problems. Force plate measures have frequently been used to provide researchers with objective insights into the specific balance problems experienced by people with stroke. However, these measures have yet to be completely standardized in stroke population, especially within the sub-acute stage of stroke recovery, when medical status changes very quickly.

Objectives: The objective of this study was to explore the test-retest reliability of force plate measures of balance for use in the sub-acute stage post-stroke.

Methods: 25 participants with sub-acute stroke (age= 61.0 ± 12.6 years; 39.9 ± 21.6 days post stroke) completed two quiet standing trials within one day. They were asked to stand as still as possible on two adjacent force plates for 30 seconds with open eyes. Centre of pressure (COP) under each foot separately and under both feet combined was calculated offline. Reliability of force plate measures was determined through establishing intra-class correlation coefficient and 95% confidence intervals for relative reliability (ICC3, 1), and standard error of measurement (SEM) and minimal detectable change (MDC95) for absolute reliability.

Results: Reliability was high for mean anterior-posterior speeds of COP (ICC3, 1 (total)= 0.91; ICC3,1 (more-affected side)= 0.92; ICC3 ,1 (less-affected side)= 0.90), root mean square of anterior-posterior speed of total COP (ICC3, 1= 0.91), and weight bearing asymmetry (ICC3, 1= 0.89). Reliability was moderate for root mean square of medio-lateral displacements of total COP (ICC3, 1= 0.79), root mean square of medio-lateral speed of total COP (ICC3, 1= 0.76), inter-limb anterior-posterior synchrony (ICC3, 1= 0.75), and symmetry index (ICC3, 1= 0.72).

Implications: High reliability of the findings of this study is in line with other studies in the chronic stroke population. Our future work will evaluate the validity of commonly-used (e.g., time-domain), and potentially clinically meaningful (e.g., non-linear, frequency-domain) force plate measures of balance in

quiet standing. This study will suggest the best force plate measures that are not only standardized but also informative and feasible to use in clinical practice.

Presentation #2

Reactive stepping ability of individuals with incomplete spinal cord injury

Katherine Chan, Rehabilitation Sciences Institute, University of Toronto; J. W. Lee, Institute of Biomaterials and Biomedical Engineering, University of Toronto; Janelle Unger, University of Toronto, Toronto Rehabilitation Institute Rehabilitation Sciences Institute; J. Yoo, Institute of Biomaterials and Biomedical Engineering, University of Toronto; Kei Masani, Toronto Rehabilitation Institute, University Health Network; Kristin E. Musselman, Toronto Rehabilitation Institute, University Health Network.

Field of Research: Movement Science.

Funding: Ontario Neurotrauma Foundation.

Background/Purpose: Every year up to 75% of individuals with incomplete spinal cord injury (iSCI) experience one or more falls, most often while walking [1]. One way to prevent a fall after a loss of balance is to take a reactive step. Our main objective was to compare the reactive stepping ability of individuals with iSCI to that of sex- and age matched able-bodied (AB) adults as well as young AB adults (18-35 years).

Methods: Thirty-eight individuals participated: 12 (9F) with iSCI, 12 sex- and age-matched AB adults, and 14 (7F) young AB adults. Donned in a harness, participants adopted a forward lean with 8-12% body weight support through a horizontal cable, at waist height, tethered to a rigid structure. The cable was released unexpectedly, simulating a forward fall. Behavioural responses were observed (i.e. single step, multi-step, fall) and motor response timing of the stepping leg (i.e. foot-off, swing time, foot contact) was calculated using force plate signals and a load cell signal attached to the horizontal cable prior to release.

Results: The behavioural responses were significantly different between groups ($\eta^2=43.8$, $p < 0.01$); AB matches showed more multi-steps and participants with iSCI showed more multi-steps and falls compared to young AB adults. Average timing of foot-off ($p=0.371$), foot contact ($p=0.191$), and swing ($p=0.186$) of the stepping leg were not significantly different between groups.

Summary/Implications: Individuals with iSCI have reduced ability to take reactive steps compared to AB individuals, as demonstrated by the higher occurrence of multi-steps and falls. However, these behavioural differences are not attributed to motor response timing in the stepping leg. Further investigation is required to identify the deficits in balance recovery in regards to step length, step placement, and electromyography activation during reactive stepping.

References:

1. Brotherton, S. S., Krause, J. S., & Nietert, P. J. (2007). Falls in individuals with incomplete spinal cord injury. *Spinal cord*, 45(1), 37.

Presentation #3

Exploring children's perspectives of social inclusion in a recreation setting

Brydne Edwards, Bloorview Research Institute; Debra Cameron, University of Toronto; Gillian King, Bloorview Research Institute; Amy C. McPherson, Bloorview Research Institute.

Field of Research: Social and Cognitive Rehabilitation.

Funding: University of Toronto.

Background: Despite efforts to promote social inclusion in childhood, Canadian children/youth with disabilities continue to be socially excluded. Integrating children/youth with disabilities into community recreation programs with their typically developing peers is one strategy assumed to promote inclusion during childhood. However, the social processes facilitating social inclusion in recreation settings are not fully known and children's/youth's perspectives are missing from the literature. Drawing on the perspectives of children/youth with and without disabilities who participated in the same inclusive arts-based recreation program, this study aimed to explore: (a) how social inclusion is perceived and experienced; (b) how social inclusion is fostered and promoted, and; (c) whether the program influenced their thoughts or perspectives outside the program.

Methods: This study adopted a generic qualitative methodology (Kalhke, 2014). 17 children with and without disabilities who were registered for the same integrated arts-based program were recruited. Each child participated in two semi-structured interviews. Three two-hour observations were also conducted while the child/youth participated in the program's activities. Inductive thematic analysis was used to analyze interview and observation data (Braun & Clarke, 2006).

Results: This study's preliminary results illustrate children's/youth's unique perspectives and experiences of social inclusion in a recreation setting. This study helps clinicians, scientists and program developers to appreciate the importance of such inclusion experiences, and to consider how meaningful inclusion experiences can be facilitated at a program level. Implications: By drawing on children's/youth's perspectives and behaviour, this study informs how social inclusion can be understood, fostered and promoted in a recreation setting.

Presentation #4 & Poster #38

Prevalence of Severe Dysphagia in Patients Up to 5 Years following Completion of Curative Radiotherapy for Head and Neck Cancer

Elissa Greco, Rehabilitation Sciences Institute, University of Toronto; Jolie Ringash, Princess Margaret Cancer Centre, University Health Network; George Tomlinson, Department of Medicine, University Health Network, Mount Sinai Hospital; Rosemary Martino, Rehabilitation Sciences Institute, University of Toronto.

Field of Research: Speech-Language Pathology.

Background: The long-term prevalence of dysphagia post radiotherapy (RT) for head and neck cancer (HNC) is unknown. Our purpose was to compare the yearly prevalence and build a predictive model for severe dysphagia, marked by G-tube, in these patients up to 5 years after RT.

Methods: With a cross-sectional design, we identified HNC patients treated with RT from September 2011-July 2016 at Princess Margaret Cancer Centre, which inserts prophylactic G-tubes. Excluded patients had: oral cancer, surgery/previous RT for HNC; HNC recurrence; or, dysphagia unrelated to HNC. Included patients were stratified by year post RT. We conducted descriptive, chi-squared and logistic regression analyses to compare patients with vs without G-tube.

Results: Overall, 757 patients were included, mean age was 62.8+11.4 years. Patients were: male 622 (82.2%); HPV+ 458 (60.5%); stage IV 577 (76.2%); and, 484 (63.9%) had chemotherapy (CT). Tumour sites were: 482 (63.7%) oropharynx; 110 (14.5%) nasopharynx; 26 (3.4%) hypopharynx; 76 (10.0%) larynx; and, 63 (8.3%) unknown primary. There were no baseline demographic, cancer or treatment differences between strata. Yearly G-tube prevalence post RT from available patients, 670 (88.5%), was: Yr 1-5 (7.6%); Yr 2-4 (2.5%); Yr 3-9 (5.9%); Yr 4-10 (7.1%); and, Yr 5-7 (4.6%). Across the years, we identified no significant relation between G-tube in situ and primary cancer site, HPV status, age, CT or time since RT.

Implications: Our findings are the first to show that severe dysphagia persists up to 5 years post RT, peaking in years 1 and 4. These estimates are critical to design future therapeutic clinic trials.

Presentation #5

Researching brain injury: Co-constructing knowledge with children through arts-based research methods

Katie Mah, Bloorview Research Institute; Laura R. Hartman, Bloorview Research Institute; Brenda M. Gladstone, Dalla Lana School of Public Health, University of Toronto; Gillian King, Bloorview Research Institute in Toronto; Nick Reed, Bloorview Research Institute.

Field of Research: Occupational Science.

Funding: Kimel Family Scholarship in Paediatric Rehabilitation; Bloorview Research Institute Fellowship.

Background: It is increasingly understood that children have the capacity for insight into their experiences and the ability to contribute to a more complete understanding of the health phenomena that affect them through engagement in research. Despite this, the inclusion of certain populations of children in research remains limited. For children with brain injury, the exclusive use of the dominant paradigm may constrain their participation in research, creating the potential for the underrepresentation of this group in research and an incomplete knowledge base from which to inform clinical practice.

Methods: We critically examine the field of childhood brain injury through: reviewing existing literature, paying particular attention to whose knowledge is privileged and how experience is studied, and; reflecting on assumptions about children and knowledge ingrained in current research practices.

Results: In the field of childhood brain injury, there is a wealth of research in which adults (e.g., parents, teachers, clinicians) speak on behalf of children and studies that seek to measure experience objectively. Current research practices are shaped by underlying assumptions about children (i.e., their capacities, abilities, and vulnerabilities) and the role of knowledge (i.e., whose knowledge is counted as evidence and how knowledge is acquired). These practices preclude children from actively contributing to research that concerns them.

Implications: Only by changing our research practices will we be able to yield new insight in the field and broaden the evidence base upon which clinical practice is built. For the field to evolve, we must adopt a research orientation that understands children as capable of having insight into and sharing their experiences, and actively engages children in co-constructing knowledge about their experiences. We propose adopting an interpretivist orientation and using arts-based research methods as adjuncts to traditional research methods to co-construct knowledge with children about their brain injury experiences. To make the case for our approach we present an exemplar from an in-progress arts-based research project using drawing as method as an adjunct to traditional qualitative interviewing.

Presentation #6:**Understanding the Use of Motor Learning Strategies during Physiotherapy Intervention for Children with Cerebral Palsy**

Jennifer Ryan, Rehabilitation Sciences Institute, University of Toronto; Danielle Levac, Northeastern University; Nick Reed, Rehabilitation Sciences Institute, University of Toronto; Virginia Wright, Rehabilitation Sciences Institute, University of Toronto.

Field of Research: Movement Science.

Funding: Bloorview Children's Hospital Foundation Chair in Pediatric Rehabilitation.

Background/Purpose: A common goal for children with cerebral palsy (CP) is acquisition and transfer of motor skills learned in physiotherapy into everyday life (motor learning [ML]) (1,2). Motor learning strategies (MLS) are the observable therapeutic actions of the physiotherapist (PT), involving the selection and manipulation of ML variables during intervention, based on client- and task-specific factors (3), and are thought to promote ML by stimulating neuroplasticity (4). Studies in children with CP often credit the efficacy of a treatment approach to its ML properties, but often fail to specify how the treatment was ML-focused or how the PT's clinical decision-making influenced ML (5-7). While the Motor Learning Strategies Rating Instrument (MLSRI-20) identifies the ML-content in a physiotherapy session by measuring the extent to which various MLS are observed (8), it does not indicate a PT's intentions in choosing the MLS. The purpose of this study was to explore PT's experiences using MLS in physiotherapy sessions for children with CP.

Methods: A descriptive interpretive paradigm was used to explore MLS use from a treating PT's perspective. Individual semi-structured interviews were conducted with PTs (n=8) involved in a Holland Bloorview study that provided traditional, gait-based physiotherapy and/or robotic-assisted gait training using the Lokomat® for children with CP. Data were inductively analyzed via a modified version of the constant comparison method (9) and directed content analysis (10), using the MLSRI-20 as a framework.

Results: Preliminary findings indicate that PTs use MLS based on static, dynamic, proactive, and reactive factors. Static aspects include the child's individual characteristics and PT preferences. Dynamic factors reflect how MLS use may change over time based on a child's progress and evolution of the child-PT interaction. Proactive factors include how PTs reflect upon past sessions and plan for an upcoming intervention. Reactive factors are the actions a PT takes to promote learning within the session. The individual child is at the forefront of MLS use, while the treatment approach plays a secondary role.

Summary/Implications: Study results demonstrate how the interactions among the PT, child, and treatment approach influence MLS use. Research and clinical implications include determining the best fit between treatment approach and MLS use based on the individual child.

Presentation #7

Critical Service Components of Vocational Programming for Persons with Traumatic Brain Injury

Hussein Salehmohamed, Rehabilitation Sciences Institute, University of Toronto; Emily Nalder, Department of Occupational Science and Occupational Therapy, University of Toronto; Carolyn Lemsky, Department of Psychiatry, University of Toronto; Bonnie Kirsh, Department of Occupational Science and Occupational Therapy, University of Toronto.

Field of Research: Occupational Science

Funding: CIHR, SSRC.

Background: Each year over 160,000 Canadians sustain an acquired brain injury (ABI) with majority occurring in the working age population. The supported employment (SE) model has shown to be efficacious in helping persons with ABI acquire and sustain meaningful work. However, various barriers to the model's implementation with high fidelity exist, resource allocation being frequently cited.

Objective: To investigate and examine the effectiveness of vocational services provided to persons with TBI at March of Dimes (MoDC), a leading disability employment agency in Canada, and to determine how congruent the services are with the SE model.

Methods: A cross-sectional study of MoDC clients with ABI. Two part study. 1) A chart review of clients who have had an ABI and requested MoDC services from January 2014 to June 2017 (n=85). A modified fidelity scale was used to assess the congruency of the services provided by MoDC to the SE model. Thematic analysis using a deductive approach was used to describe services accessed by clients. Logistic regression will be used to analyze the relationship between the services accessed by clients and their employment outcomes. 2) Individual semi-structured interviews will be conducted with clients who have experienced a prior ABI and have reached the 1st milestone (6 weeks of employment) with MoDC. Thematic analysis employing an inductive approach will be used to analyze the transcripts. Preliminary

Results: 1) Chart Review: 44.7% of clients gained employment while receiving services from MoDC. The types of services they received were wide ranging and client-specific. Of the 11 service items in the modified SE Fidelity Scale, clients received an average of 6.6 services.

Implications: There is a need to understand what services are offered to client with ABI in aiding them to return to work, and how consistent they are with the evidence-based SE model. This study aims to provide an introduction into types of services clients with ABI access and how they perceive them.

Presentation #8:**Executive control and its relationship to aphasia therapy outcomes**

Tijana Simic, Rehabilitation Sciences Institute, University of Toronto; Gary Turner, York University; Devora Goldberg, University of Toronto; Craig Chambers, University of Toronto; Tali Bitan, University of Haifa; Carol Leonard, University of Ottawa; Elizabeth Rochon, University of Toronto.

Field of Research: Speech-Language Pathology.

Funding: Toronto Rehabilitation Institute, Canadian Partnership for Stroke Recovery.

Background: Although aphasia therapy can be very beneficial, it remains difficult to predict how individuals will respond to treatment; language impairments measured clinically are not accurate predictors of real-life communication. Some research suggests that executive control (EC) ability may be a good predictor of aphasia therapy success. EC is comprised of a diverse but related group of cognitive processes recruited during goal-oriented and novel tasks. Our systematic review found that better EC performance was related to greater language improvements after therapy in 10/15 studies. However, EC assessment was highly variable and poorly defined across studies.

Purpose: We aimed to examine whether specific EC processes measured pre-treatment were predictive of naming improvements after structured naming therapy.

Methods: Participants were treated 3 times a week for five weeks using the Phonological Components Analysis (PCA) naming therapy. Naming accuracy was assessed pre, post, four- and eight-weeks after therapy. The EC processes assessed were: updating working memory (revising relevant and irrelevant information), shifting (switching task sets) and inhibition (resisting distractors). Composite scores were created for each EC process. Participants were: 10 adults (mean age = 55.5, SD= 15, range= 35 - 79) with mild to severe aphasia (mean WAB AQ= 67.8, SD=13.9, range=39.6 - 85.2), post single left-hemisphere stroke (months post-onset mean= 18.1, SD= 20.1, range= 6 - 74).

Results: Preliminary findings demonstrate significantly improved naming accuracy on treated words pre- to post-treatment ($p < 0.01$); this was maintained at four- and eight-week follow-ups ($p < 0.01$). Treatment effect sizes at all time points were large. Multiple linear regressions were used to analyze the effect of EC on naming accuracy difference scores. Analyses reveal that EC is not predictive of naming performance immediately after treatment; however EC processes are significant predictors of treatment maintenance.

Summary: Though preliminary and based on a small sample, these data suggest that distinguishable EC processes may play an important role in consolidating learned material, and maintaining treatment improvements over time, and are a promising prognostic indicator of language recovery in post-stroke aphasia.

Implications: Findings from this study could help to elucidate the role of EC in predicting language recovery, which may impact how individuals with aphasia are assessed and treated in the future.

Presentation #9:**Parsing out the Relationship between Contractile and Connective Elements in the Human Trapezius**

Mikaela L. Stiver, Rehabilitation Sciences Institute, Faculty of Medicine, University of Toronto; Dinesh Kumbhare, Toronto Rehabilitation Institute, University Health Network; Anne M. R. Agur, Rehabilitation Sciences Institute, Faculty of Medicine, University of Toronto.

Field of Research: Movement Science.

Funding: Canadian Institutes of Health Research (CIHR) Vanier Canada Graduate Scholarship, University Health Network Educational Advancement Stipend

Background /Purpose: Musculoaponeurotic morphometry has only recently begun to be comprehensively examined for select skeletal muscles. Without a fundamental understanding of these attributes, the certainty with which clinicians may interpret musculoskeletal imaging, assess pathology, and evaluate recovery associated with these muscles is inherently restricted. The primary purpose of this pilot study was to quantify and describe the 3D musculoaponeurotic architecture of trapezius.

Methods: The connective and contractile tissue elements of trapezius in 3 embalmed specimens were meticulously dissected, serially digitized at the fibre bundle (FB) level with a MicroScribe® digitizer, and modelled with Autodesk® Maya®. The connections between connective and contractile elements (musculoaponeurotic junctions) were mapped on the 3D models and compared between specimens. Architectural parameters were also computed for the entire muscle and partitions thereof.

Results: FBs throughout the muscle volume span between independent medial and lateral aponeuroses, resulting in extensive regions of musculoaponeurotic junction. In the inferior trapezius, FBs decrease in length from superficial to deep, inserting laterally into a rhomboid-shaped aponeurosis that extends inferomedially from the base of the scapular spine. Superficial FBs of the middle trapezius insert medially on both the medial and lateral aponeuroses, whereas the deep FBs insert more laterally. In the superior trapezius, there is minimal connective tissue present along the clavicular attachment site.

Summary/Implications: The results of this pilot study warrant further investigation into the musculoaponeurotic morphometry of trapezius. Clinically, these data could provide insights into musculoskeletal disorders commonly associated with trapezius, such as myofascial pain syndrome.

Presentation #10 & Poster #47:

Balance confidence and other factors related to physical activity participation in youth with cerebral palsy

Megan Towns, Rehabilitation Sciences Institute, University of Toronto; Sally Lindsay, Bloorview Research Institute; Kelly Arbour-Nicitopoulos, Faculty of Kinesiology and Physical Education, University of Toronto; Avril Mansfield, Toronto Rehabilitation Institute; Virginia Wright, Bloorview Research Institute.

Field of Research: Practice Science

Funding: Holland Bloorview Chair in Paediatric Rehabilitation

Background/Purpose: Youth with cerebral palsy (CP) participate in physical activities (PA) less frequently than typically-developing peers. In adults with physical disabilities, balance confidence, a person's belief in their ability to maintain balance in a given activity or situation, is a strong predictor of activity, participation, and community re-integration. The influence of balance confidence has not been studied in youth with CP, but could be a key predictor of PA participation. We sought to understand whether participation in PA by youth with CP was influenced by balance confidence.

Methods: Qualitative descriptive methodology was used. Through semi-structured interviews with 8 youth with CP in Gross Motor Function Classification System (GMFCS) levels I-III, 8 typically-developing youth (9-17 years old), and 8 parents of youth with CP, we examined the perceived influence of balance confidence on participation in specific PA and environments. Analysis involved a general inductive and constant comparative methodology. It was informed by a theoretical approach that assumed people employ agency in their behaviour selection, which is influenced by factors such as goals, social supports, and self-regulation.

Results: Youth with CP in GMFCS levels I-II reported decreased balance confidence in several PA/environments, especially team/group PA, PA such as cycling, skating, walking on steep, uneven, or loose, or slippery surfaces. They and their parents reported avoiding activities as a result of low confidence more than youth with CP in GMFCS level III or typically-developing youth. Youth in GMFCS level III indicated low balance confidence in relatively fewer activities, but noted that they used equipment, participated in sports designed for youth with physical disabilities, and often had assistance, which made them feel more confident. Balance confidence was rarely noted by typically-developing youth. Rather, they felt that other physical and social factors affected their PA choices, including strength and coordination, previous sports experience, fear of letting teammates down, and perceived support of and cohesion with coaches/instructors.

Summary/Implications: The influence of balance confidence and other factors on PA participation may differ between youth with CP and typically-developing youth. Promoting PA participation in youth with CP may also vary between different GMFCS levels and require different interventions than for typically-developing youth.

Presentation #11 & Poster #23:

Perspectives of children with disabilities around supports for weight management

Meaghan Walker, University of Toronto; Dr. Amy McPherson, University of Toronto; Stephanie Nixon, University of Toronto; Jess Haines, University of Guelph

Field of Research: Rehabilitation Health Services Studies.

Funding: Kimel Family Graduate Scholarship in Pediatric Rehabilitation.

Introduction: Overweight and obesity (OW/OB) rates are increasing among Canadian children, currently affecting approximately one third of five to seventeen year olds. As these rates rise, there is an increased risk of secondary health conditions that can affect both immediate and future physical and psychosocial wellbeing. These physical and psychosocial consequences are compounded when a child has a pre-existing disability, frequently hindering independence, mobility and social participation. Numerous weight management treatment programs have been created over the past few years. However, such programs tend to be designed for children without pre-existing disabilities, resulting in a lack of services and supports for this high-risk population.

Objectives: To understand the expectations, experiences and recommendations of children with disabilities regarding the supports needed for weight management and wellness.

Methods: Individual semi-structured interviews were conducted with children between the ages of 10 to 18 with a diagnosis of either Autism Spectrum Disorder (n=10) or Spina Bifida (n=10) who had higher weights. Thematic analysis using a phenomenological approach was used to analyze the transcripts. Emerging themes were discussed by the entire team.

Preliminary Results: Preliminary results suggest that most participants did not see weight as an issue in their daily life at home. However, they did suggest that in health care settings they become more sensitive and feel “sad” and “embarrassed”. Further, most children reported being routinely excluded from conversations with their HCP about weight, and wished to be included. Lastly, participants suggested that they wanted to participate in weight management programs that involved hands-on activities in a fun learning environment. Final results of analysis will be presented.

Implications: It is essential that research exploring weight management in children with disabilities captures first-hand experiences and perspectives from children to ensure that effective programs and supports can be established to best meet the needs of this high-risk population. This study provides a first step towards identifying the ways in which clinicians and researchers can best support this population.

Presentation #12:**Autism Inside Out: building new understanding through insider perspective**

Christie Welch, University of Toronto; Helene Polatajko, University of Toronto; Patty Rigby, University of Toronto; Margaret Fitch, University of Toronto.

Field of Study: Occupational Science

Background / purpose: People with autism are increasingly using blogs to share their experiences. This opens exciting opportunities for qualitative research in autism, which to date, has been sparse (Tager-Flusberg, & Kasari, 2013). This descriptive qualitative study builds on our previous research which found that, at least for some people, autism is a deeply embodied experience, characterized by intermittent “brain-body disconnect” which causes difficulty initiating and inhibiting physical movement. These difficulties are compounded by persistent confrontation with harmful and incorrect assumptions made by people who do not have autism.

Methods: For this phase of study, we analyzed content of 53 blogs, written by people who identify as having autism. Blogs were sourced through “actually autistic” blog hub, as well as snowball searching through links embedded in originally identified blogs. Analytic methods followed structure proposed by Braun and Clarke (2006): a recursive process of coding, collating, mapping, reviewing, creating clear themes and then reporting using compelling extracts.

Results: Preliminary results indicate that “brain-body disconnect” is a common topic discussed on autism blogs. Harmful assumptions held by people who are not autistic, especially assumptions pertaining to low intelligence and lack of empathy were discussed on all blogsites we sampled. Bloggers with autism are also discussing a wide variety of topics including their perspectives on autism research and intervention.

Implications: The writings of these bloggers offer insights into experiences of autism: its strengths and its challenges. It also offers direct advice for ways to improve research and intervention. The writings analyzed in both phases of study occasionally support and other times challenge the research practices, body of literature and interventions currently used in autism. The emphasis the bloggers place on “mind-body” connection, suggests this may be a productive area for future autism research and intervention.

References:

1. Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3, 77-101.
2. Tager-Flusberg, H., & Kasari, C. (2013). Minimally verbal school-aged children with autism spectrum disorder: The neglected end of the spectrum. *Autism Research*, 6(6), 468-478.

7 Minute Presentations

In the order of presentation

Presentation #1:**Working through the challenges of conceptualizing rurality in disability research.**

Michelle Duncanson, Rehabilitation Sciences Institute, University of Toronto.

Field of Research: Rehabilitation Health Services Studies

Funding: University of Toronto Graduate Student Stipend.

Background: Many disabled people live in rural areas across Canada, yet research examining the experiences of living with disability is primarily urban focused (Soldatic & Johnson, 2017). The term 'rural' is firmly rooted in Western scholarly discourses about space, place and society, but a stable and universalized definition of rural is challenging as it changes dependent on the research focus (Cloke, 2006). 'Rural' communities are diverse having unique social and organizational structures and rurality is known to influence individual life outcomes, opportunities, and notions of identity in different ways than urban centers (Soldatic & Johnson, 2017). However, it is only recently that disability studies scholars have begun to focus on rurality. Rurality can present challenges conceptually, but its consideration in disability studies research is important because it can be both constraining and/or positively supportive (McPhedran, 2011).

Purpose/Methods: The aim of this presentation is to highlight the challenges of conceptualizing notions of rurality in disability studies research. A focus group with members of a local cross disability agency was used to provide insight about how various smaller municipalities, within a larger region, have changed over time and how these changes have influenced the level of "ruralness" of these municipalities.

Results: This information is an example of how local social and organizational structures (within different municipalities) embedded within broader socio-cultural systems, have over time morphed these municipalities into rural hybrids. The implications of these changes have real significance in the lives of disabled people in the region such as availability and access to various services and supports (employment, transportation, etc).

Implications: Rurality is not a monolith, it is complex and diverse; therefore, this information contributes to a broader understanding of the importance and challenges of consideration of rurality in disability studies research.

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2. McPhedran, S. (2011). Disability and Community Life: Does Regional Living Enhance Social Participation? *Journal of Disability Policy Studies*, 22(1), 40-54. doi:10.1177/1044207310394448
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Presentation #2 & Poster #29:

The Effect of Multi-Session tDCS on Cognitive Performance in Youth with Concussion: A Pilot and Feasibility Study

Keelia Quinn de Launay, Bloorview Research Institute; Stephanie Cheung, Bloorview Research Institute; Lily Riggs, Bloorview Research Institute; Nick Reed, Bloorview Research Institute; Nicolas Iuorio, Bloorview Research Institute; Deryk Beal, Bloorview Research Institute.

Field of Research: Social and Cognitive Rehabilitation.

Funding: Canadian Graduate Scholarship (Master's) through the Canadian Institute of Health Research (CIHR), Kimel Graduate Student Scholarship in Paediatric Rehabilitation through the Bloorview Research Institute (BRI).

Background: Concussions are a rising public health concern, affecting over 94,000 Canadians annually. Notably, children and youth are disproportionately affected by concussion, having higher injury rates and slower recovery times than adults. Despite increased recognition of the persisting cognitive challenges in working memory and attention that can result from these injuries, therapeutic interventions to treat these symptoms are not well developed. Transcranial direct current stimulation (tDCS) is a form of non-invasive brain stimulation which regulates cortical activity to promote adaptive plasticity for cognitive recovery and skill reacquisition. While it has shown to be a promising tool for brain injury recovery in children and adults, the efficacy and feasibility of a multi-session tDCS intervention for a youth concussion population remains unknown.

Purpose: In the current study, we explore the (1) potential clinical efficacy and (2) feasibility of implementing a tDCS intervention for persisting cognitive symptoms in youth with concussion.

Methods: We implement a pilot quasi-randomized control design to investigate whether three sessions of tDCS to the left dorsolateral prefrontal cortex, paired with a dual N-back working memory task, (1) influences cognitive performance, and (2) is a feasible and tolerable intervention for youth post-concussion. Cognitive performance is assessed by reaction time and accuracy scores on the dual-task across sessions, and feasibility is evaluated through questionnaire-based measures of the subjective experience of using the device. Considering the pilot sample size, the influence of tDCS is primarily being assessed through visualization, descriptive statistics, and exploratory analyses.

Results: A total of N=13 youth have participated in the study. Preliminary results show (1) that youth with persisting concussion symptoms demonstrate significant improvements in performance on a challenging dual-task across three sessions, with a trend towards tDCS enhancing increases in accuracy. (2) Participants report receiving tDCS as relatively tolerable, further supported by the lack of participant attrition and adverse effects. Summary/Implications: This study is the first step towards the development of novel therapeutic interventions for youth with persistent concussion symptoms, as it will inform future clinical trials aimed at best understanding how to merge clinical practice and advancements in brain stimulation technology.

Presentation #3:**HIIT the Road Jack: The Effects of Exercise on Piano Learning**

Dana Swarbrick, Rehabilitation Sciences Institute, University of Toronto; Luc Tremblay, Faculty of Kinesiology and Physical Education, University of Toronto; Catherine Sabiston, Faculty of Kinesiology and Physical Education, University of Toronto; Sandra Trehub, Department of Psychology, University of Toronto; David Alter, Toronto Rehabilitation Institute, University Health Network; Dina Brooks, Department of Physical Therapy, University of Toronto; Joyce Chen, Sunnybrook Research Institute.

Field of Research: Movement Science.

Funding: NSERC Canada Graduate Scholarships-Master's, University of Toronto Fellowship.

Background: Exercising after practice improves retention of motor skills (Roig et al., 2012). Specifically, high-intensity interval training (HIIT) after practice of a motor skill leads to better task performance one day and one week later compared to low-intensity interval training (LIIT) or no exercise (Thomas et al., 2016). Neurochemicals released during HIIT are presumed to enhance neuroplastic mechanisms related to learning during early consolidation (Skriver et al., 2014). The facilitating effects of HIIT have been demonstrated for the learning of implicit motor sequence tasks. However, little is known about the impact of HIIT on the consolidation of explicit motor skills in the context of real-world learning. Piano playing is a real-world task that involves explicit learning of motor sequences. In this exploratory study, we hypothesized that adults who perform HIIT after piano-sequence learning would exhibit better retention of the learned sequence than those who perform LIIT.

Methods: We recruited healthy volunteers between the ages of 18 and 35 who were non-musicians. Participants underwent a graded maximal exercise test (GXT) to determine their cardiorespiratory fitness (VO_{2peak}) and their maximum power output (W_{max}). At least one day later, participants practiced a piano sequence before completing an interval exercise protocol (IEP). The IEP consists of 3 repetitions of alternating intervals of 2-min low-intensity and 3-min high-intensity cycling (HIIT group: 60% & 90% W_{max} ; LIIT group: 8% & 12% W_{max}). Participants were tested on the piano sequence one hour, one day, and one week after initial practice. Performance was quantified by pitch and rhythm accuracy, which are defined as the proportion of correct key presses and correct timing of presses, respectively.

Results: We analysed data from 16 participants ($n=7$ HIIT, $n=9$ LIIT) using a two-way mixed ANOVA with between-subjects factor of intensity (HIIT, LIIT), and within-subjects factor of retention interval (1 hr, 1 day, 7 days), and gender, fitness, and baseline performance during acquisition as covariates. This preliminary analysis revealed no main effect of intensity for pitch or rhythm accuracy (pitch: $F(1,12) = 0.016$, $p = 0.902$, $\eta^2 = 0.001$; rhythm: $F(1,12) = 0.256$, $p = 0.623$, $\eta^2 = 0.023$).

Implications: Preliminary analysis provides no evidence that HIIT enhances consolidation of piano learning. However, definitive conclusions must be reserved until data collection is complete.

Poster Abstracts

in order of field of research, then alphabetical order by last name

Movement Science

Poster #1:

Biomechanical evaluation of nosing design on stair navigation in post-stroke patients and healthy older adults

Sanaz Agha, Rehabilitation Science Institute, University of Toronto; Iris Levine, Toronto Rehabilitation Institute, University Health Network; Roger Montgomery, Toronto Rehabilitation Institute, University Health Network; Alison C. Novak, Toronto Rehabilitation Institute, University Health Network.

Funding: Toronto Rehabilitation Institute student award.

Background: Falls are a major public health problem. Although falls are usually non-fatal, they are serious enough to require care and may result in significant financial burden, especially for older adults. As an environmental risk factor, stairs are one of the most common locations for a fall. On average, one-half of the population can expect to have a minor fall on outdoor stairs during their lifetime and one in eight will have a serious fall. In 2010, stair falls in Canada resulted in approximately \$954 million in total healthcare costs. Many factors influence the risk of falls on stairs, including stair design. The stair nosing (the horizontal projection beyond the edge of the step run) is a feature intended to provide greater accommodation of the foot during descent; however, there is little evidence regarding the effect of stair nosing design on falls risk.

Methods: We evaluated the impact of stair nosing shapes and textures on biomechanical measures of fall risk (foot clearance, overhang) during stair navigation. Twenty healthy (68.88 ± 5.11 years) and fifteen post-stroke (69.31 ± 5.73 years) older adults navigated a seven-tread staircase three times per condition, at a self-selected speed, with step-over-step pattern. Eight sets of interchangeable treads combined nosing shapes (square, round, tapered, no nosing) and surfaces (wood, carpet). Motion capture was used to track the motion of 14 regions of the foot relative to the tread edges.

Preliminary Results: The following results are from four participants from each group, processed to date. During ascent foot clearance was higher in stroke participants (19 ± 6 mm) than healthy participants (4 ± 1 mm). Greater clearance might indicate a more cautious strategy. Additionally, overhang was greater during descent for healthy participants (42 ± 5 mm) than post-stroke participants (25 ± 6 mm). Greater overhang is associated with less fear of falling and faster walking speed. Tapered wood in ascent (23 ± 11 mm) and round wood in descent (16 ± 4 mm) resulted in the highest overall minimum clearances. The no nosing condition had greater overhang confirming the disadvantage of decreasing tread length.

Summary/Implications: Ongoing data analysis will permit statistical analyses to improved stair design and give effective recommendations to building codes and accessibility standards. The result from this study could also Facilitate the development of effective intervention strategies in fall prevention programs in older adult with and without mobility impairment.

Poster #2:**The effect of walkway incline on dynamic stability in ankle foot orthosis users and healthy older adults**

Jennifer Bautista, Rehabilitation Sciences Institute, University of Toronto; Vicki Komisar, Department of Biomedical Physiology and Kinesiology, Simon Fraser University; Rebecca Greene, School of Human Kinetics and Recreation, Memorial University of Newfoundland; Alison C. Novak, Toronto Rehabilitation Institute, University Health Network.

Background/Purpose: Many individuals with neurological pathologies wear ankle foot orthoses (AFOs) to improve function and alignment of the ankle-foot complex. While AFOs can aid balance by blocking an inappropriate motion, it is also possible that restricting ankle range of motion could negatively impact balance. Since, walking on slopes typically involves increased range of motion at the ankle, individuals who wear AFOs may find sloped gait more challenging. Currently, it is unknown how walkway incline affects dynamic balance in people who wear AFOs and healthy older adults during overground walking. Therefore, the purpose of the study is to determine how walkway incline angle affects dynamic balance in people with lower motor neuron pathologies who wear AFOs and healthy older adults.

Methods: Four AFO users with lower motor neuron pathologies, four age and sex matched controls, and ten healthy older adults walked up and down slopes ranging from 0-8 degrees in two degree increments. Individuals in the AFO group completed the protocol with and without their AFO. Kinetic and kinematic data was collected using force plates and motion capture. Perceived exertion and difficulty were collected to compliment biomechanical findings. Three participants per group have been analyzed.

Results: Preliminary results indicate that the AFO group performed more similarly to healthy controls, while wearing their AFO. Margin of stability was affected by both walkway angle and orthotic intervention. Peak anterior center of mass velocity was reduced during uphill walking, and was lowest for all slopes for AFO users not wearing their AFOs.

Summary/Implications: Initial results suggest that both walkway incline and orthotic intervention can affect gait stability. Understanding how walkway incline angle affects stability is vital for guiding safer ramp design. Additionally, this study will provide clinicians with information about how orthotic intervention affects their patients, potentially affecting brace prescription and design.

Poster #3:**Quantifying the Spatio-Temporal Gait Characteristics of Rollator Users with Multiple Sclerosis using Ambulatory Monitoring Technology**

Justin Chee, Rehabilitation Sciences Institute, Institute of Biomaterials & Biomedical Engineering, University of Toronto; Kara Patterson, Rehabilitation Sciences Institute, University of Toronto; Alex Mihailidis, Rehabilitation Sciences Institute, Institute of Biomaterials & Biomedical Engineering, University of Toronto.

Funding: MS Society of Canada Doctoral Studentship.

Background/Purpose: Persons with multiple sclerosis (PwMS) use rollators (i.e. four-wheeled walkers) to compensate for their mobility problems; however, they continue to experience adverse events (e.g., falls) and difficulties with balance during device use. Having the capacity to measure the spatio-temporal (ST) characteristics of PwMS as they walk in everyday environments may help us better understand and address the challenges they face. Therefore, in the present study, we seek to determine if rollator-based mobile sensors can be used to: a) accurately detect ST gait outcomes used in clinical tests for PwMS; and b) distinguish between PwMS at different levels of ambulatory ability.

Methods: Twenty rollator users with multiple sclerosis (MS) were asked to use an instrumented rollator while performing three bouts of normal walking (10-m) before and after a 6-Minute Walk Test (6-MWT) at Sunnybrook Health Sciences Centre. Tri-axial movement of the upper trunk, both feet, and the assistive device was measured using mobile ambulatory monitoring sensors (e.g. accelerometer, gyroscope, etc.) at each position. All participants possessed a clinical diagnosis of MS and belonged to a range of clinical categories from fully ambulatory (EDSS 3.0-5.5) to requiring bilateral assistance (EDSS 6.5). We compared a variety of ST outcomes measured with the mobile devices to those collected with an instrumented walkway (i.e., GAITRite).

Results: All participants (n = 20) completed the cross-sectional study. Strong agreement was found between the mobile devices and clinical tools for ST outcomes, including cadence (ICC 0.995 (0.954-1.00); $p < 0.001$; n=5) and step time (ICC 0.954 (0.512-0.995); $p = 0.008$; n=5). Furthermore, the mobile devices were capable of detecting significant inter-individual differences in several ST outcomes (e.g., velocity, single-support time, etc.) for PwMS at different levels of ambulatory ability (n=11).

Summary/Implications: Rollator-based ambulatory monitoring devices can accurately measure a variety of ST outcomes in PwMS and be used to distinguish between different clinical sub-groups of the population. This work may lead to an improved ability to track disease progression in PwMS and the development of a novel assistive mobility device that enhances MS patient outcomes using an on-board biofeedback training intervention.

Poster #4:**Reliability and validity of stroke-specific protocols for the 10-metre and 6-minute walk tests: preliminary results**

Darren K. Cheng, Rehabilitation Sciences Institute, University of Toronto; Michelle Nelson, Lunenfeld-Tanenbaum Research Institute-Sinai Health System, Bridgepoint Collaboratory for Research and Innovation; Dina Brooks, Rehabilitation Sciences Institute, University of Toronto; Nancy M. Salbach, Rehabilitation Sciences Institute, University of Toronto.

Funding: DC - University of Toronto Fellowship from the Department of Physical Therapy; University of Toronto Fellowship from the Rehabilitation Sciences Institute; NS - Canadian Institutes of Health Research (CIHR) New Investigator Award.

Background: International stroke rehabilitation guidelines recommend the 10-metre walk test (10mWT) and 6-minute walk test (6MWT) to measure walking speed and walking capacity, respectively, post-stroke. However, current recommended protocols for administering these tests vary in instructions, walkway dimensions, and level of assistance to walk permitted. Furthermore, the recommended 30-metre (m) walkway for the 6MWT is inaccessible in many hospital settings. Ongoing research has yielded standardized stroke-specific 10mWT and 6MWT protocols that allow assistance and include instructions for people with aphasia, but reliability and validity have yet to be evaluated. Objectives: This study will evaluate test-retest reliability, measurement error, and construct validity of stroke-specific protocols for the 10mWT and the 6MWT conducted twice using a 30-m and a 15-m walkway (i.e. 6MWT30m and 6MWT15m).

Design: This is a quantitative cross-sectional study.

Methods: Participants are recruited from inpatient, outpatient, and community settings. Two assessments are completed 1-2 days apart. Data on sociodemographic, stroke characteristics, and limb strength are collected at time 1. The 10mWT, and two 6MWTs, are completed at time 1 and 2. A sample size of 32 adults is anticipated. In preliminary analyses, walk tests at time 1 and 2 were compared using median scores and Bland-Altman plots were constructed for test-retest reliability, and minimal detectable change (MDC) was computed for measurement error. Correlations between walk test performances and limb strength were examined for construct validity.

Results: Preliminary results include data from 4 men and 5 women (median age 58), 1-9 months post-stroke, and 8 with ischemic stroke were analyzed. Median 10mWT speed was 1.2m/s at time 1 and 2. Median 6MWT15m distance was 348m at time 1 and 370m at time 2. Median 6MWT30m distance was 380m at time 1 and 393m at time 2. MDC for the 10mWT, 6MWT15m, and 6MWT30m were 0.62m/s, 77m, and 98m, respectively. Spearman correlations between walk tests ranged from 0.39 to 0.76, and between walk tests and limb strength ranged from -0.54 to -0.23. Implications: Support for valid and reliable standardized test protocols will promote their use in clinical and research settings. Their use will; allow detection of improvement and deterioration of walking ability during rehabilitation; help improve patient education about their walking ability; and facilitate comparison across studies, patients, and within patients across settings.

Poster #5:

One, Two, Three-Stepping to the Beat Post-Stroke: Investigating the relationship between Rhythm Ability and Temporal Gait Asymmetry

Lucas D. Crosby, Rehabilitation Sciences Institute, University of Toronto; Jennifer S. Wong, University of Toronto; Joyce Chen, Sunnybrook Research Institute; Jessica Grahn, Department of Psychology, Western University; Dina Brooks, Rehabilitation Sciences Institute, University of Toronto; Kara K. Patterson, Department of Physical Therapy, University of Toronto.

Funding: CIHR Collaborative Projects

Background: Temporal gait asymmetry (TGA; a gait phase inequality between limbs) is an impairment affecting more than half of individuals post-stroke, and is generally resistant to gait interventions. TGA is associated with long-term negative consequences such as musculoskeletal injury, compromised balance, and gait inefficiency, thus novel interventions that target TGA are needed. Firstly, understanding the underlying mechanisms of TGA is required. One mechanism may be rhythm ability. Healthy gait features regular, reciprocal movements (inherent rhythm), whereas TGA can be described as impaired gait rhythm. The purpose of this study is to investigate how measured TGA and perceived TGA relates to rhythm perception ability post-stroke.

Methods: Individuals with chronic stroke underwent a Beat Alignment Test (BAT) to quantify ability to perceive a regular beat within auditory stimuli. Participants underwent a gait assessment in silence and while syncing gait to the beat of music and a metronome. Change in TGA (measured using swing time ratio) between synced gait and baseline was determined and compared to BAT scores. Participants were asked to self-evaluate TGA after walking in silence and syncing. Level of agreement between perceived and measured TGA at silent and syncing gait was calculated separately. This agreement was compared to BAT scores.

Results: Preliminary analyses include 21 individuals with TGA. Most individuals (n=17) improved TGA when walking to auditory stimuli. However regression tests indicate that beat perception ability did not predict change in TGA between synced gait and silent (metronome: $r^2= 0.036$, $p=0.86$; music: $r^2= 0.147$, $p=0.08$). Bland-Altman analysis revealed a mean discrepancy between silent perceived and measured TGA of 0.342 (0.733) indicating that individuals are systematically incorrectly perceiving their TGA. As the mean discrepancy increases, individual's perception of TGA tends to worsen. Mean discrepancy after syncing gait was lower (0.081 (0.668)), indicating perception of TGA was more closely aligned with measured TGA. Discrepancy between perceived and measured TGA was not related to rhythm ability.

Summary/Implications: Regardless of beat perception ability, most individuals with TGA can improve symmetry by syncing gait to auditory stimuli. Beat perception ability does not appear to be associated with improvement in TGA, or the ability to perceive impaired gait rhythm. Data collection will continue to reach a sample size of 40, to determine if different trends emerge.

Poster #48:

The Mechanisms of ERK1/2 Involvement in RGC Degeneration Following Optic Nerve Axotomy

Philippe D'Onofrio, Rehabilitation Sciences Institute, Department of Surgery; Brian Choi, Rehabilitation Sciences Institute, Department of Surgery; Alireza Shabanzadeh, Toronto Western Hospital; Paulo Koeberle, Rehabilitation Sciences Institute, Department of Surgery.

Funding: CIHR

Background: Necroptosis is a significant alternative mechanism to apoptosis in inducing RGC death. Recent research has found it is important in many neurodegenerative diseases such as Alzheimer's disease, central nervous system ischemia, traumatic brain injury, and glaucoma. However, necroptosis has only recently been characterized and the peptide interactions responsible for it remain unknown. RIP1, RIP3, and MLKL are the most studied peptides related to necroptosis, however there is evidence to suggest that ERK1/2 is involved as well. This study examined the interactions of ERK1/2 with the molecules associated with necroptosis. It also looked at the localization of ERK1/2 after injury to determine if its effects on neuron death rely on interactions occurring within the nucleus or cytoplasm. The purpose of this study was to better understand the mechanisms of necroptosis with the goal of developing therapeutic treatments to oppose it or improve neuron survival.

Methods: Injury was optic nerve transection. Retinal Ganglion Cell survival was assessed by immunohistochemistry and retinas were flat-mounted and the number of cells was manually counted. Treatment were administered by intra-ocular injection through the sclera and into the vitreous chamber of the eye. Cortical neuron cultures were prepared from 1d post-natal rat pups and used within 2 weeks of culturing. Adeno-associated viruses were ordered from Viral Vectors.

Results: Results indicate that levels of p-ERK1/2 (active) peak at 12h - 1d post-axotomy. They then continually decline. These levels of expression match those of RIP3 and MLKL. Results indicate that inhibition of ERK1/2 rescues RGCs when administered at 12h or 1d, however not when administered outside of these times. RIP3 was found to interact with ERK1/2. Co-administration of an ERK1/2 inhibitor with an apoptosis inhibitor did not significantly increase RGC survival compared to administration of an apoptosis inhibitor alone. Sequestration of ERK1/2 to the cytoplasm significantly increased RGC survival.

Summary: ERK1/2 interacts with RIP3, implying that it plays a role in the initiation of necroptosis. Likewise, the time of p-ERK1/2 increase supports this notion. Co-administration of ERK1/2 and apoptosis inhibitors did not increase RGC survival, implying that they function via the same mechanism. Sequestration of ERK1/2 to the cytoplasm increased RGC survival, implying that part of its action towards inducing cell death.

Poster #6:

Prefrontal Cortex Activity during Dual Task Performance: A Comparison between Patients with Chronic Obstructive Pulmonary Disease and Healthy Adults

S. Ahmed Hassan, Rehabilitation Sciences Institute, University of Toronto; Leandro Viçosa Bonetti, Department of Physical Therapy, Universidade de Caxias do Sul; Kara K. Patterson, Department of Physical Therapy, University of Toronto; Deryk S. Beal, Department of Speech-Language Pathology, University of Toronto; Anthony C. Ruocco, Department of Psychology, University of Toronto; W. Darlene Reid, Department of Physical Therapy, University of Toronto

Funding: University of Toronto Fellowship - Rehabilitation Science; Toronto Rehabilitation Institute student award.

Background: Chronic Obstructive Pulmonary Disease (COPD) is the fourth leading cause of death and had an associated healthcare burden of \$50 billion USD in 2010. Cognitive impairment and motor dysfunction are commonly reported in COPD. However, the link between central processing and motor performance has not been studied. **PURPOSE.** To compare relative changes in oxygenated hemoglobin (O₂Hb) in the prefrontal cortex (PFC), accuracy of backwards spelling, and decrements in gait during single and dual tasks in patients with COPD, and healthy young and old adults.

Methods: Twenty healthy young (10M:10F; mean age 28±4 years), fifteen healthy old (7M:8F; mean age 61±12 years) and three adults with COPD (2M:1F; mean of 72±12 years) performed the following single tasks: (1) backwards spelling cognitive task (CT); (2) 30m preferred paced walk (PPW); (3) 30m fast paced walk (FPW); and (4) single leg stance (SLS). The dual tasks paired CT with each of PPW, FPW and SLS. The fNIRS data was processed in fnirSoft to attenuate physiological noise (e.g. heart rate) and motion artifacts. Changes in the left dorsolateral PFC O₂Hb were then calculated using the modified Beer-Lambert law. Gait parameters (e.g. velocity) were measured using a 5x0.88m pressure sensitive Zeno mat (contains 13,824 pressure sensors).

Results: The PFC O₂Hb was significantly greater during the CT compared to baseline task in the young healthy group (p=0.042) and FPW+CT relative to FPW (p=0.035) in the old healthy group, while it tended to be greater during PPW+CT relative to PPW in all three groups. Accuracy of backwards spelling decreased in young and old healthy adults while performing PPW+CT (p=0.016 and p=0.041, respectively) and FPW+CT (p=0.002 and p=0.002, respectively) compared to CT alone. Decreased velocity indicated decrement in gait within each group (p < 0.05) during FPW+CT compared to FPW in young healthy (-11.69±9.43%), old healthy (-17.30±9.91%) and COPD patients (-16.43±5.07%).

Summary/Implications: Decrements in performance of cognitive and motor tasks were found during dual tasks compared to single tasks. These findings suggest a strong association between neural PFC activity, gait and an individual's ability to perform two tasks at once. Assessing neural PFC activity may be beneficial towards devising appropriate rehabilitation interventions to reduce the risk of falls and enhance patients' quality of life.

Poster #7:

How many days would you want to practice a skill to achieve it?

Nirsan Kunaratnam, University of Toronto; Tyler Saumur, University of Toronto; Alex Kiss, Sunnybrook Research Institute; Dana Swarbrick, University of Toronto; Robert Chen, Toronto Western Hospital; George Mochizuki, Sunnybrook Research Institute; Joyce L. Chen, Sunnybrook Research Institute

Funding: NSERC, QEI-GSST Award.

Background: Practice is required to improve your shot in basketball or to play a musical instrument. Learning these motor skills can be further enhanced by non-invasive brain stimulation. Reis et al (2009) showed that anodal transcranial direct current stimulation (a-tDCS) to the primary motor cortex (M1) applied concurrently with practice of a sequential visual isometric pinch force task (SVIPT), results in better skill performance, than practice alone with sham-tDCS (s-tDCS). Interestingly, it appears that the s-tDCS group who practiced the SVIPT for 5 days did not attain the same performance level as the a-tDCS group after 1 day of practice. However, this was not experimentally tested.

Objective: To investigate how many additional days of practice it will take for individuals receiving s-tDCS to reach the same performance level as individuals who receive a-tDCS for 1 day. We hypothesize the s-tDCS group will not attain the same performance level as the a-tDCS group by the end of the study duration.

Methods: Seventy-four healthy right-handed participants (ages 18-44 years) will be randomly assigned to one of 2 groups:(1) the experimental group receives a-tDCS and (2) the control group receives s-tDCS. For both groups, anode is applied to left M1 and cathode to contralateral supraorbital area, while participants perform the SVIPT. The control group will practice the SVIPT for 4 consecutive days to determine if participants can reach the same improvements as the experimental group who practices for 1 day. In both groups, retention will be measured 24 and 72 hours after the last training session. The dependent measure is total skill learning, which is composed of both movement time and error-rate. We will perform a log-rank test whereby the event is defined as the number of participants in the control group who reach the same total skill learning as participants in the experimental group. Two-sample two-sided t-test will be used to compare group's skill measures at retention time.

Anticipated result: We expect performance of the control group never reaches the level attained by the experimental group.

Conclusions: This study will advance our understanding of the benefits of brain stimulation. It may allow us to understand how quickly and effectively we can modulate skill acquisition using tDCS. It may also inform us of the potential benefits of brain stimulation in stroke rehabilitation. If patients can improve faster with tDCS as an adjunct to their rehab therapy, this may result in a shorter rehab period.

Poster #8:

Examining longitudinal change in gait 1-year post-TBI

Conor Sheridan, Rehabilitation Sciences Institute, University of Toronto; Chelsea Mackinnon, Faculty of Music, University of Toronto; Michael Thaut, Faculty of Music, University of Toronto; Robin Green, Toronto Rehabilitation Institute; Kara Patterson, Department of Physical Therapy, University of Toronto.

Background: Gait deficits after traumatic brain injury (TBI) include reduced gait speed, asymmetry, increased step-to-step variability and difficulty dual tasking. Changes in these properties of gait in the first year post-TBI have not been characterized to date. A comprehensive understanding of gait recovery will help refine gait interventions for individuals with mobility impairments post-TBI.

Methods: A secondary analysis was performed on a research database containing results from over-ground gait assessments of 108 people admitted to an inpatient rehabilitation program. Spatiotemporal parameters of preferred pace (PP), max pace (MP), and dual task gait were collected. Outcome variables of interest were speed, cadence, stride length, swing time ratio, step length/time/width variability, and dual-task cost, a measure of gait automaticity. Individuals were grouped by length of post-traumatic amnesia (LPTA) as follows: 1-7 days, 1-4 weeks, and > 4 weeks. Individuals were included in the analysis if they had an LPTA > 1 day, completed 2/3 assessments, and did not require a gait aid to complete their walking trial. Random effects models were used to examine the effect of LPTA grouping and time on the gait variables of interest. All estimates were adjusted for age, sex, length of acute care stay, and multiple comparisons.

Result: A total of 66 individuals with TBI with a mean age of 39.4 (17.5) years (19 females: 47 males) were included. There were 12, 17, and 13 individuals classified with an LPTA of < 7 days, 1-4 weeks, and > 4 weeks, respectively. Speed, cadence, and stride length demonstrated significant change over time. These changes appeared earlier for individuals with less severe LPTA and later for individuals with more severe LPTA at PP and MP conditions. Measures of step time and width variability did not significantly change over time, while step length significantly decreasing between 2-5 months and increasing between 5-12 months for those with LPTA of 1-4 weeks. Swing time ratio, a measure of gait symmetry, significantly decreased over time. While dual-task cost did not significantly decrease over time.

Discussion: Measures of forward progression and symmetry, but not measures of gait variability and automaticity, appeared to significantly change over the first year post-injury. Injury severity and walking condition appeared to influence the degree of change over time. Gait interventions proven to address gait automaticity and variability, such as rhythmic auditory stimulation, should be explored.

Poster #9:

The Recovery of Postural Control Following a Concussion in Adults from the General Population

Michelle Sweeny, University of Toronto, Toronto Rehabilitation Institute, University Health Network; Jonathan Singer, University of Manitoba; Elizabeth Inness, Toronto Rehabilitation Institute; Paul Comper, Toronto Rehabilitation Institute, University Health Network; Mark Bayley, Toronto Rehabilitation Institute, University Health Network; George Mochizuki, Sunnybrook Research Institute

Funding: University of Toronto, Toronto Rehab Foundation.

Introduction: Much of what is known about the effects of concussion on balance control comes from research involving high-level athletes. The general trend shows that balance recovery occurs within the first 1-2 weeks post-concussion. However, most of this work identifies recovery using the Balance Error Scoring System (BESS), which is prone to learning effects over repeated administrations. Alternatively, posturographic measures during quiet standing with differing levels of postural challenge offer an objective approach to identifying balance deficits. In addition, due to differences between high-level athletes and adults from the general population, there is a need to determine recovery trajectories of balance deficits in this cohort.

Methods: Sixty-two participants with concussion (CONC) and n=20 healthy controls (HC) were included in the analysis. Participants were assessed at Week 1, 2, 4, 8 and 12. The assessments included 3 standardized base-of-support conditions with; Eyes Open, Eyes Closed and Dual Task (backwards 7's) and the BESS. Group differences and recovery across time was determined using a Hierarchical Growth Curve Model. In an effort to determine recovery on an individual level, CONC participants were dichotomized as "recovered" or "not recovered" based on two criteria: if the value of the Week 2, 4, 8 or 12 variable was reduced by an amount greater than natural variation in HC data over time relative to their Week 1 value and if this value fell within the 95% confidence interval (CI) of HC.

Results: The growth curve model did not show any significant group differences or any significant changes in quiet standing variables across time. The BESS test showed a trend towards a group difference ($p=0.055$); however, no significant change in BESS score was observed across time. When using the individualized approach to determine recovery, the proportion of CONC participants who were deemed "recovered" ranged from 11-29%, 4-36%, 14-39% and 14-39% across dependent variables during quiet standing at Week 2, 4, 8 and 12, respectively.

Summary: Recovery of concussion is a heterogeneous and dynamic process. In the absence of baseline values, using an individualistic approach appears to be a more sensitive method at identifying recovery. The absence of group differences and recovery across time in the quiet standing measures may be attributed to the relatively low level of task difficulty in the quiet standing tasks.

Poster #10:

A 3D Anatomical Study of the Innervation of the Glenohumeral Joint: Implication for Radiofrequency Ablation

John Tran, Rehabilitation Sciences Institute, University of Toronto; Philip Peng, Department of Anesthesia, University of Toronto; Anne Agur, Rehabilitation Sciences Institute, University of Toronto.

Background/Purpose: Osteoarthritis of the glenohumeral joint (GHJ) has been shown to negatively impact upper limb function. Managing moderate to severe GHJ pain is challenging. Radiofrequency ablation (RFA) is an emerging technique. In the literature, the target is the suprascapular nerve (SSN) as it is the only nerve with reliable landmark accessible for ultrasound (US) guided intervention of the shoulder. RFA requires precise knowledge of the course of sensory nerves innervating the capsule. No studies to date documented the innervation of the GHJ in 3D space nor in relation to US landmarks. The purpose of this study is to examine the 3D innervation patterns of the GHJ in cadaveric specimens and the key US landmarks for potential RFA.

Methods: Five specimens were serially dissected. The muscle volumes, nerves, and bony surfaces associated with the GHJ were digitized with a Microscribe® G2X Digitizer and reconstructed in 3D using Autodesk® Maya®.

Results: The GHJ was found to be innervated by articular branches of the SSN, axillary nerve (AN), and nerves to subscapularis (NS). The SSN provided a significant contribution to the superior-posterior aspect of the capsule providing 4-6 branches. The AN supplied the anterior-inferior and posterior-inferior aspects of the capsule. The AN provided 1-2 branches anteriorly and after coursing through the quadrangular space gave off an additional 1-5 branches posteriorly. The superior-anterior capsule was innervated by 1-2 branches of the NS. Landmarks to localize the articular branches innervating the GHJ included the spinoglenoid notch (SSN), superior border of the quadrangular space (AN), and inferior border of the coracoid process (NS).

Summary/Implications: The results indicate the spinoglenoid notch, superior border of the quadrangular space, and inferior border of the coracoid process could be used as landmarks to capture the nerves innervating the GHJ. To assess the feasibility of these landmarks a cadaveric needling study will follow.

Poster #11:

Skeletal limb muscle oxygenation and regional blood volume during incremental loading in interstitial lung disease

Lisa Wickerson, Rehabilitation Sciences Institute, University of Toronto; Dina Brooks, Rehabilitation Sciences Institute, University of Toronto; Sunita Mathur, Rehabilitation Sciences Institute, University of Toronto; John Granton, Toronto General Hospital Research Institute, University Health Network; Lianne Singer, Toronto General Hospital Research Institute, University Health Network; Darlene Reid, Rehabilitation Sciences Institute, University of Toronto.

Funding: Ontario Respiratory Care Society

Introduction: It is not known whether skeletal muscle oxygenation (SmO_2) decreases during exercise in interstitial lung disease (ILD). The aim was to compare SmO_2 and blood volume of knee extensors and elbow flexors during incremental loading in healthy people and people with varying severity of ILD.

Methods: We examined changes in SmO_2 and total hemoglobin, a marker of regional blood volume, by near infrared spectroscopy during incremental isotonic exercise. Loading started at 10% of maximal voluntary isometric contraction (MVIC) and increased by 10% MVIC every two minutes until task failure.

Results: 13 oxygen dependent lung transplant candidates with severe ILD (8 men, 65(5) years, FVC 59(20)% predicted), 10 non-oxygen dependent people with milder ILD (6 men, 60(9) years, FVC 81 (17)% predicted) and 13 healthy people (8 men, 60 (9) years) were included. At task failure for knee extensor and elbow flexor loading, SmO_2 decreased to similar levels across all groups, but occurred at lower total workloads in the ILD groups (all $p < 0.01$). Oxygen saturation measured by pulse oximetry was preserved. Total hemoglobin was lower in the knee extensors in severe ILD compared with healthy participants at task failure ($p=0.05$). During incremental loading, there was a decline over time for SmO_2 , oxygenated and deoxygenated hemoglobin in all three groups (all $p < 0.001$), but no between-group differences.

Conclusion: The decrease in SmO_2 in active muscles may reflect increased muscle oxygen extraction or reduced oxygen delivery during exercise. Blood flow redistribution may be reduced to the exercising muscle in the severe ILD group.

Poster #12:

Let's boogie: feasibility of a dance intervention in patients with chronic obstructive pulmonary disease

Adnan Wshah, Rehabilitation Sciences Institute, University of Toronto; Stacey Butler, West Park Healthcare Centre; Roger Goldstein, West Park Healthcare Centre; Dina Brooks, Rehabilitation Sciences Institute, University of Toronto.

Funding: The Lung Association

Background/Purpose: Despite the benefits associated with individuals with COPD engaging in pulmonary rehabilitation (PR) programs, both attendance and adherence rates are poor. Following PR, the benefits diminish by 6 months. A new innovative rehabilitative approach is needed to increase motivation to exercise and to minimize diminution of effect. Dance is a fun and interactive activity, which has shown benefits in other populations, such as Parkinson's disease and stroke. The aim of our study is to investigate the feasibility of dance intervention in individuals with COPD following PR.

Methods: Twenty patients with COPD are being recruited to participate in a 1-hour dance classes delivered twice a week for 8 weeks. The classes feature different dance types (such as partnered and non-partnered) and genres (such as salsa, ballroom and jazz) with increasing complexity. The primary outcome measure of the study is the feasibility determined by enrollment rate, attendance rate, adverse events and participants' satisfaction. The secondary clinical measures and outcomes of interest are functional capacity, balance, anxiety and depression, sedentary behavior and health related quality of life (HRQoL).

Results: To date, 14 participants have finished the program and other six are expected to finish it by the end of June 2018. Preliminary feedback indicates high participants' satisfaction with the dance program. Participants who finished the program to date stated that they enjoyed the dance classes and that they would continue participating if they could.

Implications: The results of this study will help guide a randomized controlled trial in the future.

Poster #13:**Peripheral skeletal muscle size & function in adults with cystic fibrosis: a systematic review**

Kenneth Wu, Toronto Adult Cystic Fibrosis Centre, St. Michael's Hospital; Polyana Mendes, St. Michael's Hospital; Sunita Mathurs, Department of Physical Therapy, University of Toronto.

Funding: Ontario Respiratory Care Society, Physiotherapy Foundation of Canada

Background/Purpose: Cystic fibrosis (CF) is the most common fatal genetic disease affecting multiple body systems, including the lungs and gastrointestinal system. As people with CF are living longer, secondary musculoskeletal complications have become prominent; there is increasing interests in peripheral muscle dysfunction. Several disease-specific factors may impair muscle, i.e. androgen levels, pulmonary exacerbation, pulmonary function, physical activity level, systematic inflammation, and corticosteroids use. The purpose of this study is to systematically review the literature on peripheral muscle impairment in adults with CF.

Methods: A systematic review was performed based on the PRISMA guidelines, using a combination of relevant MeSH headings and free-text terms in MEDLINE, EMBASE, CINAHL AMED, and CENTRAL. The eligibility criteria were studies with measurements of peripheral muscle size, strength, endurance, and/or function in adults (≥ 18 year or older) human subjects with CF. Reviews, meta-analysis, case studies, articles published in language other than English, and studies including both children and adults were excluded. Data extraction was done by two investigators using a standard form. Quality assessment was performed using the modified Downs and Black checklist.

Results: Out of 1,360 articles retrieved, 20 were included. The sample size ranged from 7 to 64; age from 18 to 48 years; 61% were male; BMI from 16 to 29; FEV1 from 17% to 113% predicted. 70% of studies used prospective cross-sectional designs; 20% were cohort studies; 5% randomized control trial; and 5% uncontrolled experimental trial. 90% were single centre studies. The overall quality of studies was fair to moderate. Various peripheral muscles were tested. Seven studies tested muscle size; 19 measured muscle strength; four tested muscle endurance; and two examined leg muscle function. Quadriceps muscle size and strength were the most studied ($n=4$ and 12, respectively). There was no consensus on the differences in muscle size, strength and endurance between adults with CF and healthy controls.

Summary/Implications: To date, it is still unknown if the peripheral muscles are impaired in adults with CF; and the contributions of various factors on muscle dysfunction. A meta-analysis combining the studies, and research focusing on the association between intrinsic factors of CF and the peripheral muscle function may improve our understanding of muscle dysfunction in adults with CF and lead to therapeutic strategies.

Occupational Science

Poster #14:

Exploring the needs of cancer survivors who are returning to the workforce

Ivona Berger, Rehabilitation Sciences Institute, University of Toronto; Lydia Beck, Princess Margaret Cancer Centre; Jennifer Jones, Princess Margaret Cancer Centre; Ellen MacEachen, School of Public Health and Health Systems, University of Waterloo; Bonnie Kirsh, Rehabilitation Sciences Institute, University of Toronto.

Funding: CIHR/SSHRC Healthy and Productive Work initiative, OGS

Background/Purpose: Cancer survivors have strong personal desires to resume their work roles to feel productive and meet their financial needs. However, they may be faced with physical and psychological challenges. Customized supports can help meet individual needs, but currently there is little information about how services should be provided throughout recovery and rehabilitation to improve work outcomes. Therefore, this research aims to: 1) examine cancer survivors' perspectives on supports needed when returning to work or staying in the workforce; 2) investigate sex and gender differences when returning to work or staying in the workforce; 3) explore demographic and employment factors that may influence the return to work process.

Methods: An exploratory qualitative design was used. The study had 2 phases: 1) focus groups with survivors, and 2) one-on-one semi-structured interviews. Inductive thematic analysis was used to analyze the data.

Results: This study is ongoing, and results are preliminary. The total sample includes 15 participants, 87% female and 13% male. Initial themes regarding return to work needs include: emotional support, workplace accommodation, and more accessible resources to help navigate the system.

Summary/implications: There is a growing interest in developing targeted interventions to improve work outcomes for cancer survivors. This study informs cancer rehabilitation research by developing an understanding of the supports and strategies that should be implemented to help cancer survivors return to work successfully and improve their overall quality of life.

Poster #15:

Critical policy analysis of inclusive homes for adults with intellectual/developmental disabilities (IDD)

Denise DuBois, Rehabilitation Science Institute, University of Toronto; Emily Nalder, Department of Occupational Science & Occupational Therapy, University of Toronto; Barbara Gibson, Department of Physical Therapy, University of Toronto.

Funding: SSHRC Joseph Bombardier CGS-D

Rationale: Ideally, “home” is an aspect of a sociospatial network where an individual may experience inclusion and participate in meaningful roles, routines, and relationships (13). Although deinstitutionalization broadly benefitted adults with IDD (47), the current reality is that many westernized regions, such as Ontario, are now failing to provide the quality or quantity of community homes required (8). Additionally, governments faced with this residential crisis have limited evidence available on what constitutes an optimal, or “inclusive” home for this population.

Objectives: Framed by critical occupational science (COS), this study aims to identify notions of inclusion and home in public policy as part of a multi-perspective project investigating: How is an inclusive home understood within the developmental sector network and how do these understandings translate into residential service provision for adults with IDD?

Approach: A COS approach interrogates macro-level sociopolitical forces (e.g., public policy) to surface taken-for-granted notions (e.g., about inclusion, home) and problematize how these notions might contribute to marginalization within the developmental sector network (9). This study will include analysis of 3 provincial policies and 5 developmental sector organizational policies following Bacchi's WPR approach, which has previously been applied in COS.

Results/Implications: Practically, findings will be used to (a) make recommendations about residential service provision to stakeholders in Ontario, and (b) offer alternatives to the “taken-for-granted” assumptions that influence current policies/practices. Theoretically, this project will add knowledge of macro-level forces to OS understandings of home and inclusion relevant for similar populations and other geographical contexts.

Poster #16:

Life After Sexual Assault: An Occupational Perspective

Katherine E. Stewart, Rehabilitation Sciences Institute, University of Toronto; Janice Du Mont, Women's College Research Institute, Women's College Hospital; Andrea Charise, English and Interdisciplinary Centre for Health and Society, University of Toronto; Patricia O'Campo, Dalla Lana School of Public Health, University of Toronto; Helene J. Polatajko, Department of Occupational Science & Occupational Therapy, University of Toronto

Background: Violence against women in the form of sexual assault is a human rights violation that can have devastating effects on women's lives. The negative changes to women's health following sexual assault are well established; however, broader changes to women's lives-that is, changes to occupation, both in the most common understanding of the word (i.e., job/career) and in terms of women's routines or daily activities-have only been minimally examined. This study provides a comprehensive description of what is currently known about the occupational aftermath of sexual assault that occurs in adulthood.

Methods: A narrative overview was employed to "reframe" findings from 26 longitudinal studies from the sexual assault literature using an occupational perspective.

Results: Findings suggest that while occupation is touched upon in the sexual assault literature, exploration of the occupational aftermath of sexual assault is limited, and much focus rests on the study of "health risk behaviours." Little consideration is given to the breadth and depth of all that women do in their everyday lives following sexual assault.

Implications: Further nuanced exploration of the occupational aftermath of sexual assault is warranted to deepen our understanding of life after sexual assault.

Rehabilitation Health Services Studies

Poster #49:

A Scoping Review on Cervical Interventions in Adults with Chronic Whiplash Associated Disorder

Charlotte Anderson, Rehabilitation Science Institute, University of Toronto; Nick Reed, Bloorview Research Institute; Euson Yeung, Department of Physical Therapy, University of Toronto; Tiffany Toong, Department of Mechanical and Industrial Engineering, University of Toronto.

Funding: Scotiabank

Background: Whiplash injuries are common in society, but clinical interventions are inconclusive on the most effective treatment. Research and reviews have been completed with the goal of determining clinical interventions that are effective for whiplash injuries and disorders, but literature has not recently been summarized on best practices for cervical spine interventions for adults with chronic whiplash.

Purpose: The objective of this scoping review is to update and expand on previous works, to provide recommendations for clinical interventions and future research in the area of cervical spine rehabilitation for adults with chronic whiplash associated disorder.

Method: The Arskey and O'Malley methodology was utilized for this scoping review. CINAHL, EMBASE, Medline, PsychInfo, Scopus, Web of Science, as well as grey literature, were searched from 2003 to April 2017. Two reviewers screened titles and abstracts for relevance to the review and content analysis was used to summarize the study findings. A total of fourteen citations were included in the final review.

Results: Exercise based interventions targeted at the cervical spine appear most beneficial for adults with chronic whiplash associated disorder. Invasive interventions still require more rigorous studies to deem their effectiveness for this population.

Summary: Further research is required to investigate and determine clinically relevant results for cervical spine intervention in patients with chronic whiplash-associated disorder.

Poster #17:

Identifying knowledge gaps for adults with traumatic brain injury and depression: A scoping review of the rehabilitation science literature

Adora Chui, Rehabilitation Science Institute, University of Toronto; Deirdre Dawson, Rehabilitation Science Institute, University of Toronto; Heather Colquhoun, Rehabilitation Science Institute, University of Toronto

Funding: Ontario Graduate Scholarship; University of Toronto Fellowship

Background/Purpose. Traumatic brain injury (TBI) is the most prevalent neurological condition in Canada, and the indirect economic costs alone are projected to be \$8.2 billion in 2031. 33.2% of Canadians living with TBI report being depressed and are six times more likely to be so than the general population. However, only 44% of those with TBI and severe depression receive appropriate mood interventions and comorbidities often preclude access to existing services. Individuals with TBI and depression are at increased risk of activity and participation limitation, experience increased disability and comorbidity, and report poorer health-related quality of life. In particular, adults with mild-moderate TBI (mi-moTBI) severity and depression may be at elevated risk due to their “invisible disabilities” where the injury and its effects are often hidden to self and others. The first aim of my doctoral work is to understand the evidence base for adults managing TBI and depression.

Methods. My objective is to identify and describe knowledge gaps in the rehabilitation literature on adults with TBI depression. I will complete a scoping review (ScR) of the rehabilitation science literature for this target group, determining the nature of the studies, describing how TBI and depression are characterized, and identifying the proportion of studies focused on mi-moTBI.

Results. The ScR will soon be underway. Since this distinct population (mi-moTBI and depression) has typically been grouped with broader populations in clinical studies, and because a ScR of TBI and depression has not been undertaken previously, I hypothesize that there are knowledge gaps in rehabilitation research for this group with “invisible disabilities.”

Summary/Implications. Existing knowledge syntheses on comorbid TBI and depression estimate depression prevalence rates, examine pharmacological interventions for depression, and include samples of mixed TBI severity. My doctoral research is unique in that I investigate populations with mi-moTBI and depression; I also examine the literature from the rehabilitation sciences perspective (with greater specificity than non-pharmacological reviews). Accounting for mi-moTBI and depression in rehabilitation research can explicate its effects on rehabilitation practice. Doing so may reduce risk of marginalization for underrepresented groups and improve their health outcomes.

Poster #18:

Parents' perspectives of physical activity participation among Canadian adolescents with Autism Spectrum Disorder

Sarah Gregor, Physical Therapy, University of Toronto; Nicole Bruni, Physical Therapy, University of Toronto; Petar Grkinic, Physical Therapy, University of Toronto; Lindsey Schwartz, Physical Therapy, University of Toronto; Aimee McDonald, Physical Therapy, University of Toronto; Patricia Thille, Patricia Thille; Sharon Gabison, Physical Therapy, University of Toronto; Barbara Gibson, Physical Therapy, University of Toronto; Patrick Jachyra, Rehabilitation Sciences Institute

Background/purpose: Adolescents (11-21 years) with Autism Spectrum Disorder (ASD) are less likely to be physically active (PAP) compared to their age-related peers. They are at higher risk of developing debilitating health conditions such as cardiovascular disease, diabetes, musculoskeletal disorders, anxiety, and depression. Given these potential health challenges, there is a need to examine how to potentially enhance PAP. Despite the health/social benefits of participation, little is known why they are predominantly inactive. Furthermore, there is a paucity of research that has examined the psychological, social, personal and structural mechanisms that influence their participation. With no previous research in Canada, this study examined parents' perspectives and experiences of physical activity participation to examine what influences their participation.

Methods: Ten in-depth interviews were conducted with parents of adolescents with ASD. Interview data was analysed thematically. Codes with common patterns were then clustered and themes were generated and supported by verbatim quotations.

Results: Key findings suggest that parents prioritized behavioural and communication interventions over physical activity throughout their adolescent's life. This prioritization was most pronounced during childhood, and the lack of participation during their formative years shaped physical activity interests in adolescence. Second, parents also described experiencing systemic challenges when accessing physical activity programs in the community. This included a lack of awareness of ASD among service providers, funding challenges, limited/few program options, and a lack of PA individualization to the needs and abilities of adolescents with ASD. Third, families experienced tremendous difficulty managing competing commitments to raise their adolescent with ASD, which contributed to tremendous strain on families. As such, parents outlined that they would benefit from support to help them balance family life, schooling, and therapies with PA in an effort to improve physical health and facilitate socialization.

Summary/implications: A family-centred, multidisciplinary collaborative approach that includes health care practitioners such as physical therapists can potentially be used to facilitate physical activity into everyday life. Efforts are needed to educate community service providers about ASD to potentially enhance participation.

Poster #19:

Towards a Family-Centered Care Model for Alzheimer's Disease: A scoping review

Kristina Kokorelias, Rehabilitation Sciences Institute, University of Toronto; Gary Naglie, Baycrest Health Sciences; Monique Gignac, Institute for Work and Health; Jill Cameron, Rehabilitation Sciences Institute, University of Toronto.

Background/Purpose: Families play an important role meeting the care needs of older adults with Alzheimer's disease, but their own health and wellbeing can be compromised as a result. The published literature highlights the need for a move to family-centered care for all populations as they have the potential to improve the well-being of patients and family caregivers. Currently, there are no models of family-centered care for individuals with Alzheimer's disease. The objective of this study was to use a scoping review methodology to review existing models of family-centered care to determine the 1) key components of the models and 2) methods of delivery (including, who delivers the model and how).

Methods: A scoping review guided by Arksey & O'Malley (2005) was conducted of family-centered care models for all populations. We searched MEDLINE, PsycINFO, CINAHL and EMBASE for research published between 1990 to May 2017.

Results: The review identified 14393 papers of which 55 papers met our criteria and were included. Family-centered care models are most commonly available for pediatric patient populations (n=39). The consistent goal of family centered care models is to develop a specific patient care plan within the context of families. To facilitate this aim, family-centered care models require: 1) collaboration between family member and health care providers, 2) consideration of family contexts, 3) communication between the care system and families and 4) flexible policies and procedures.

Summary/Implications: The review suggests that effective inclusion of families in care planning entails collaboration, communication, consideration of families' unique contexts, and flexibility. Findings can inform development and testing of a model of family-centered care for persons with Alzheimer's disease and their family.

Poster #20:

Online Concussion Resources for Canadian High School Aged Youth: A Systematic Search Strategy

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Funding: Canadian Institutes of Health Research, Rehabilitation Health Services Studies.

Background: The incidence of concussion is on the rise among youth in Canada with concussions being vastly underreported. To provide youth and their families with accessible health information, there are many concussion resources available online. The goal of these resources is to educate the consumer on current concussion guidelines including concussion prevention, identification, and management. For youth, this information must be delivered in a meaningful, relevant, and easily understandable format. The purpose of this study was to identify the number of online concussion resources that are: (1) designed for Canadian high school aged youth; and, (2) accurate according to the 2017 International Consensus Statement on Concussion in Sport.

Methods: To identify concussion resources that are designed for Canadian high school aged youth and contain accurate information, six categories of websites were searched: (1) Canadian National Sport Organizations, (2) Canadian National, Provincial and Territorial Injury Prevention, (3) Canadian Children's Hospitals, (4) Canadian National, Provincial and Territorial Government, (5) Canadian National, Provincial and Territorial Public Health, and (6) Provincial and Territorial Physical and Health Education Associations. After the initial website search, experts in pediatric concussion were consulted to advise on potential missing resources. Inclusion and exclusion criteria were then applied by two independent researchers.

Results: The initial website search yielded 415 concussion resources. An additional 26 resources were identified by expert consultation, resulting in a total of 441 resources. After applying inclusion and exclusion criteria, 38 resources made up the final sample. Despite resources being housed on youth friendly or targeted websites, 30% of resources were excluded as they were not primarily designed for youth. Only 54% of the resources identified for high school aged youth were deemed accurate according to the 2017 International Consensus Statement on Concussion in Sport.

Implications: The vast number of concussion resources online are not intended for youth and do not contain the most current and evidence-based information on pediatric concussion. Online health resources need to be updated to reflect accurate information, as well as written and designed for their target audience. When developing future concussion resources, emphasis should be placed on creating additional resources for youth to promote knowledge gain and improved health behaviours.

Poster #22:

Therapy roles in family-centred care: Negotiating expectations between parents and service providers over time

Eric Smart, Rehabilitation Sciences Institute, University of Toronto; Emily Nalder, Occupational Science & Occupational Therapy , University of Toronto; Barry Trentham, Occupational Science & Occupational Therapy , University of Toronto; Gillian King, Bloorview Research Institute.

FUNDING: Joseph-Armand Bombardier CGS Doctoral Scholarship, Kimel Family Graduate Student Scholarship in Paediatric Disability Research.

Background/Purpose: Expectations encompass a set of future-oriented beliefs that inform ongoing judgment, reasoning, and behaviour. Negotiating and agreeing upon expectations is considered in the literature to be an essential - yet largely overlooked - prerequisite to providing authentic and sustainable family-centred care.

Research Question: How do stories about parent rehabilitation journeys and service provider careers inform us about the nature, development, and range of expectations for therapy roles available, created, and negotiated across paediatric practice settings.

Objectives: 1) Explore what expectations parents and service providers have for their own roles and the roles of each other. 2) Explain whether/how/why role expectations change over time. 3) Assess the capacity of rehabilitation settings to support diverse role expectations and recommend relational- and systems-level strategies for supporting this capacity.

Methods: This study is ongoing. A collection of stories are being co-created by the researcher and participating parents and service providers. Each story illustrates particular cases of parents and service providers learning, setting, and negotiating expectations for working together across the continuum of children's rehabilitation services. Participants come from either Holland Bloorview Kids Rehabilitation Hospital, March of Dimes, or Grandview Children's Centre. Each participant takes part in a single one-hour interview with the researcher. During the interview, a timeline of parent rehabilitation journeys or service provider careers is created to help structure questions and responses.

Results: Anticipated findings will demonstrate the multiplicity of expectations parents and service providers may express themselves or encounter from others, as well as the contextual processes involved in shaping those expectations.

Summary/Implications: Our study contributes knowledge to the growing body of "second generation" research focusing not on what FCC is, but rather how FCC can be best implemented in day-to-day practice. Specifically, service providers can use study findings to help facilitate upfront and transparent conversations with parents on what can be expected over the course of different therapy sessions, programs, or rehabilitation pathways. These conversations will help remove assumptions, inform decision-making, and personalize levels of involvement and responsibility.

Poster #24:

Predictors of discharge location from acute care after Traumatic Brain Injury: A systematic review

Sareh Zarshenas, Rehabilitation Sciences Institute, University of Toronto; Angela Colantonio, Rehabilitation Sciences Institute, University of Toronto; Mohammad Alavinia, Toronto Rehabilitation Institute, University Health Network; Ramsey Centre; Susan Jaglal, Rehabilitation Sciences Institute, University of Toronto; Nora Cullen, Toronto Rehabilitation Institute, University Health Network.

Funding: TRI Graduate Scholarship, U of T fellowship.

Background/Purpose: Many studies have assessed the predictors of morbidity/mortality of patients with Traumatic Brain Injury (TBI) in acute care. However, with the increasing rate of survival after TBI, more attention has been given to discharge destinations from acute care as an important measure of clinical priorities and pathway of care. The main objective of this study was to systematically review studies on clinical and non-clinical predictors of discharge to rehabilitation facilities versus other destinations from acute care in patients with Traumatic Brain Injury (TBI).

Methods: The search was conducted using seven databases up to December 2016. A systematic review and in-depth quality synthesis were conducted on eligible articles that met the inclusion criteria.

Results: The search yielded 8,503 articles of which 18 studies met the inclusion criteria. This study demonstrated that a larger proportion of patients with TBI were discharged home than to other settings. The main predictors of discharge to a rehabilitation facility versus home included older age, white and non-Hispanic race/ethnicity, having insurance coverage, greater severity of the injury and longer acute care length of stay. Age was negatively associated with discharge to inpatient rehabilitation facilities versus other institutions. There was insufficient evidence to determine the relevance of other factors.

Summary/Implications: The results of this review provide evidence that may guide health care providers in making more informed and timely discharge decisions to the next level of care for patients with TBI. These findings also suggest the need for further studies with a stronger methodology to distinguish the predictors of discharge to specific rehabilitation facilities.

Rehabilitation Technology Sciences

Poster #25:

Assessing the Validity of the Fitbit Zip to Measure Physical Activity Among Adults Living with HIV

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Funding: University of Toronto Fellowship, Early Researcher Award with the Ontario Ministry of Research and Innovation (Dr. Kelly O'Brien).

Introduction: Adults (18 years of age and older) are comprising the largest proportion of people living with HIV. HIV is considered a chronic illness and these health-related consequences, known as disability, are multi-dimensional and episodic in nature. Physical activity can be defined as any type of bodily movement that results in energy expenditure. Measuring physical activity involves quantifying the frequency and type of movement. Measuring physical activity among adults living with HIV is important because it can help identify risks for other multimorbidity. Measuring physical activity using the Fitbit Zip may offer an inexpensive and easy to use mechanism to understand physical activity engagement. It is essential that the measurement properties of the Fitbit Zip are valid among adults living with HIV.

Purpose: To assess the measurement properties (criterion and construct validity) of a wireless physical activity monitor (WPAM) (Fitbit Zip) for its ability to measure physical activity among adults living with HIV.

Study Design: Cross-Sectional Measurement Study.

Methods: Participants wore the Fitbit Zip on the right hip while engaging in the Six Minute Walk Test (6MWT) and the Incremental Shuttle Walk Test (ISWT). Participants were video recorded using an iPad to count the number of steps taken and distance walked. Participants completed a 21-item demographic questionnaire. Participants wore the Fitbit Zip for 7 consecutive days and returned 1 week later. The participants returned to complete the International Physical Activity Questionnaire, Rapid Assessment of Physical Activity, and a Single Item Physical Activity Question. Participants Fitbit data was uploaded to the Fitbit dashboard.

Results: Average age of participants in this study was 53.2. Of the 31 participants, N=27(87%) were male. Of the 31 participants, 21(68%) participants were Caucasian-White. The average minutes engaged in moderate and vigorous physical activity were 289.8 minutes and 107.25 minutes respectively.

Conclusion and Next Steps: Objectively measuring physical activity among adults living with HIV is very important as we do not know how much physical activity this population is engaging in. Next steps will be

to conduct Data Analysis to validate the Fitbit Zip for its use to measure physical activity among adults living with HIV.

Poster #26:

Characterizing Velocity-Dependent and Velocity-Independent Features of Resistance to Passive Stretch Using Robotic Assessment Methods

Myles Resnick, Rehabilitation Sciences Institute, University of Toronto; Andrew Centen, Toronto Rehabilitation Institute, University Health Network; Catherine Lowrey, Queen's University; Stephen Scott, Department of Biomedical and Molecular Sciences, Queen's University; George Mochizuki, Sunnybrook Research Institute.

Background: Spasticity is defined as velocity-dependent hyperexcitability of the stretch reflex. Assessment of spasticity typically involves examining this velocity-dependence on resistance to passive movement; however, other velocity-independent features of resistance to movement may also be present. This study sought to determine whether velocity-dependent and velocity-independent components of resistance to passive movement were distinguishable in the elbow flexors in people with post-stroke spasticity.

Methods: Retrospective analysis of an existing dataset in which thirty individuals with stroke (13 spastic and 17 non-spastic) and 98 healthy controls were recruited. Using the KINARM Robotic Exoskeleton, participants' upper-limb was moved through range at two speeds. Catch angle, final angle, and peak velocity were the primary outcome measures. Clinical assessment of spasticity (Modified Ashworth Scale) was also performed.

Results: Individuals with spasticity displayed a spastic catch, decreased range of motion, and increased tone within their affected limbs. While a catch was detected more frequently during fast stretch, range of motion and degree of tone did not differ significantly across speeds. Kinematic outcome measures further identified a subset of non-spastic stroke participants as impaired.

Conclusion: Velocity-dependent (spastic catch) and velocity-independent (reduced range, high tone) impairments are detectable in individuals post-stroke, both with and without a clinical diagnosis of spasticity.

Social and Cognitive Rehabilitation Sciences

Poster #27:

Women's Long-Term Reproductive Health Outcomes after Traumatic Brain Injury: A Feasibility Study

Melissa Biscardi, Rehabilitation Sciences Institute, University of Toronto; Angela Colantonio, Rehabilitation Sciences Institute, University of Toronto; Nora Cullen, West Park; Gillian Einstein, Department of Psychology, University of Toronto; Dalla Lana School of Public Health, University of Toronto.

Funding: Toronto Rehabilitation Institute Scholarship.

Background: Traumatic brain injury (TBI) is a public health concern with 23,000 hospitalizations annually in Canada alone. Of these, approximately one-third are sustained by women. While there is limited research on women specific outcomes, existing research suggests women with TBI are more likely to report problems associated with the reproductive system when compared to age matched controls. Previous research has also indicated that premature menopause, resulting in reduced estrogen exposure, may be a risk factor for cognitive decline. Knowledge of potential long-term changes in sex hormones can guide healthcare practitioners in counselling women post TBI about reproductive decisions and hormone replacement therapies. Research has not examined long-term changes in anti-Mullerian hormone (AMH) -the gold standard indicator for time to menopause- post TBI. This study begins to fill this gap and provide objective evidence on the impact of TBI on reproductive and cognitive functioning in premenopausal women.

Objectives: In this study we examine the 1) feasibility of recruitment and study procedures; 2) extent to which premenopausal women living with TBI experience AMH deficit; 3) relationship between TBI severity and AMH levels; 4) relationship between TBI severity and cognition.

Methods: A convenience sample of 20 women will be recruited from the largest brain injury rehabilitation program in Canada. Eligible participants will be premenopausal women who sustained a TBI two or more years ago. Comparison data will be published expected ranges. Data collection will involve medical chart abstraction, the Women's Health Questionnaire and a single hormone assay. Participants will be asked to attend the research clinic to complete the study questionnaire and provide a blood sample.

Data Analysis: Data analysis will consist of descriptive statistics to report on feasibility outcomes, sample characteristics and relationships found in objectives two to four.

Implications: Despite growing consensus about its importance, hormone imbalance is not routinely assessed post TBI. Generating new knowledge about sex-specific endocrine-derived abnormalities resulting from TBI is vital for clinical decision making around reproductive decisions and possible later cognitive decline. This study will help inform a larger powered study and provide vital preliminary information on AMH and cognition in premenopausal women post TBI.

Poster #28:

Development of play and STEM skills among children with disabilities in HB FIRST® robotics program

Sukyoung Hong, Bloorview Research Institute.

Funding: Student fellowship award from the Bloorview Research Institute.

Background: Play is a critical component of a child's development that can help to foster self-determination, decision-making, and problem-solving skills. Exploring the development of play is important because limited play in early childhood can lead to social isolation and low self-esteem. Children with disabilities often have fewer opportunities to engage in meaningful play compared to typically developing children. One promising play-based intervention is through LEGO® robotics which embeds technology into a playful activity.

Objective: To understand the development of play and pediatric volition (i.e., the volitional behaviors demonstrated by each child during each robotics workshop) among children with disabilities engaged in an adapted robotics program to enhance STEM skills.

Methods: This study used a mixed method design with pre- and post- workshop surveys (asking about STEM-skills), video recorded and structured observations of each workshop. The program involved six sessions (once per week for two hours) where children learn to design and build LEGO® robotics models; explore challenges facing today's scientists; engage in team activities; and participate in a celebration event with a partner and a skilled volunteer. Approx. 20 children (aged 6-9 years old) with physical or developmental disabilities, who expressed an interest in LEGO® or robotics were recruited through Holland Bloorview Kids Rehabilitation Hospital.

Analysis: The workshop data (i.e., video recordings and observations) will be reviewed and assigned scores of particular characteristics (e.g., engagement, types of play) using pediatric volition questionnaire. Survey data will be entered into SPSS, and qualitative data (e.g., open-ended responses and observation notes) will be entered into NVIVO and analyzed thematically. Paired-sample t-tests will be used to assess differences between time 1 (beginning of the program) and time 2 (last workshop of the program).

Contribution: This research will inform the development and refinement of play and STEM-related interventions for children with disabilities to enhance their inclusion in higher education and employment.

Poster #30:

The Impact of Menstrual Phase on Outcomes of Females with Concussion

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Funding: CIHR

Background: It is largely evident that concussion rates are increasing, with research pointing towards longer recovery trajectories and poorer recovery outcomes among female concussion survivors. Females are at an increased risk of depression and suicidal ideation, along with prolonged neurocognitive impairment post-injury than their male counterparts. Despite the identification of these sex disparities, females remain an underserved population with a dearth of sex-specific literature to account for these findings. The evolving interest in hormones, specifically progesterone as a treatment for TBI led to the investigation of menstrual cycle phase as a predictor of recovery outcomes among females and the development of the withdrawal hypothesis, which proposes that the sudden withdrawal of progesterone after injury could contribute to poorer outcomes in females than males. Exploring and further addressing the influence of these hormonal changes is necessary to improve the route of recovery among female concussion survivors.

Purpose: 1) Examine whether women in the luteal phase (LP) of their menstrual cycle during time of concussive injury have greater post-concussive symptoms (PCS) than those in the follicular phase (FP); and 2) explore the nature of post-concussive symptoms (PCS) in post-menopausal women.

Methods: A prospective cohort study design of 97 females between the ages of 17 and 71 was utilized. Participants were recruited from the Hull-Ellis Concussion Clinic at the Toronto Rehabilitation Institute's University Health Network. Demographic, clinical, and menstrual cycle variables as well as PCS qualitative and quantitative data were collected as part of the clinic's routine intake. For the present study, the main outcome variable was the Rivermead Post-Concussion Questionnaire (RPCQ) scores collected at weeks one and two post-injury.

Results: Preliminary data analysis showed no significant relationship between menstrual phase and PCS scores, including post-menopausal PCS outcomes.

Summary/Implications: Duration of symptom outcomes following concussion in women is poorly understood. Although this study did not show a relationship between PCS scores and menstrual cycle phase, the inception cohort utilized added great value and novelty since most literature on the topic examines outcomes one month post-injury. This innovative project adds to this advancing area of research, enhancing understanding of the underlying hormonal contributions to PCS, further informing future research practice.

Poster #31:

Sex-Specific Alterations of the Salience and Fronto-Parietal Networks in Individuals With Post-Concussion Symptoms - Resting-State Functional Connectivity Of Large-Scale Networks.

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Funding: CIHR

Background: Concussions may be associated with a range of cognitive, neuropsychological and behavioural sequelae that extend beyond the one year post-injury period. While there is evidence that mild traumatic brain injury or concussion can disrupt network-based connectivity, there remains a significant knowledge gap regarding the influence of sex-based differences in resting state functional connectivity (rs-FC) postconcussion (Chong & Schwedt, 2015; van der Horn, Liemburg, Aleman, Spikman, & van der Naalt, 2016).

Objectives: Our primary goal was to investigate the changes in rs-FC across three largescale neural networks: 1) the Default Mode Network (DMN), 2) the Salience Network (SN) and, 3) the Fronto-Parietal Network (FPN). Our secondary objective was to explore the sex-based differences in network-based connectivity and behaviour post-concussion.

Methods: Behavioural and 3T MRI data was collected from a sample of 80 individuals (47 males) who reported a history of concussions and 31 participants (17 males) with no known history of concussion. Both seed-to-seed and seed-to-region connectivity maps were used to assess network-based connectivity using the Functional Connectivity (CONN) toolbox (Whitfield-Gabrieli & Nieto-Castanon, 2012).

Results: Network based statistics [4] was utilized to understand rs-FC differences post concussion. Concussed participants showed significant differences across both the SN and the FPN. More specifically, a functional subnetwork was observed where the frontal nodes of both the SN and FPN were hyperconnected in a fronto-insular component and the posterior nodes were hypoconnected via a parietal component when compared to control participants. Seed-to-region analyses revealed significantly reduced rs-FC between the FPN and the association cortices of the temporal, parietal and frontal lobes in concussed females relative to both controls and concussed males.

Conclusion: This study provides the first evidence for sex-specific network-based alterations in rs-FC during the chronic stages of recovery post-concussion. Notably, our findings point to a regional sex-specific alteration post-concussion.

Poster #32:

Sensitivity and Specificity of a Multimodal Approach for Concussion Management in Youth Athletes

Tiffany Toong, Rehabilitation Sciences Institute, University of Toronto; Katherine Wilson, Bloorview Research Institute; Nick Reed, Bloorview Research Institute.

Funding: CIHR Ontario Brain Injury Association, Ontario Neurotrauma Foundation.

Background/Purpose: Current medical and expert supported consensus endorses a multimodal approach to concussion management. However, the psychometric properties of individual clinical tests that make up concussion assessment batteries have yet to be adequately examined in the pediatric population. The purpose of this study is to explore the sensitivity and specificity of a multimodal approach compared to individual clinical measures for the assessment of concussion in youth athletes at symptomatic and asymptomatic time points following concussion.

Methods: A prospective longitudinal case-control design was used for this study. A sample of 945 youth athletes ages 9-18 years, completed baseline assessments using clinical measures of cognition (ImPACT), balance (BioSway), upper and lower body strength (hand dynamometer, standing long jump), and post-concussion symptoms (Post-Concussion Symptom Inventory). To date, 42 youth athletes sustained a concussion and were retested at symptomatic and asymptomatic time points post-injury. 42 age and sex-matched control participants from the baseline sample were re-tested on the same clinical measures at these same time points. Sensitivity and specificity were calculated using reliable change indices and regression based methods. One-sided 80%, 90% and 95% confidence intervals were used to detect meaningful decline in scores between time points and determine highest sensitivity and specificity.

Results: At the symptomatic assessment, the sensitivity of each clinical measure ranged from 17-79% whereas the specificity ranged from 52-95%. Combining both balance and grip assessments showed the greatest ability to identify youth athletes with and without a concussion at the symptomatic assessment. At the asymptomatic assessment, the sensitivity of each clinical measure ranged from 5%- 50%, whereas the specificity varied from 40-98%. Combining grip strength and standing long jump assessments had the greatest ability to distinguish between youth athletes with and without a concussion once self-reported symptoms resolved.

Summary/Implications: This study presents the individual and combined sensitivity/specificity values of a multimodal clinical assessment battery within an understudied youth athlete population. Our results further support the use of a multimodal testing battery to assess and manage concussion in youth athletes, particularly when self-reported post-concussion symptoms resolve.

Poster #33:

Brain communication during simple versus complex tasks as a function of performance

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Funding: Ed Odette Research Fund.

Introduction: Youth are at greater risk for sustaining a concussion while participating in sports. To these youth it is paramount to return to their sport or hobby in a manageable time frame that prevents them from missing out on sporting opportunities and/or any social related activities. It has been shown that youth tend to underplay their current symptoms and neuroimaging that symptom resolution does not always align with neural recovery. Thereby is a need to evaluate recovery in the context of tasks that are sensitive to continual underlying brain changes. For example, the use of dual-task paradigms have elicited continual disruption in performance that extends beyond symptom recovery. Therefore, the aim of this study is to evaluate brain communication patterns during single and dual tasks and evaluate the relationship to performance in youth with and without concussion.

Methods: Both groups will complete a 5-minute resting state, single (Stroop Interference and postural sway) and dual tasks (single tasks simultaneously). Brain activation was measured with functional near infrared spectroscopy (Hitachi Medical Co, Japan). Seed based approach will be used to evaluate the DLPFC via localization by 10-20 EEG coordinate estimation and verified with maximal hemodynamic activity during the Stroop task. Pearson R correlation coefficients will evaluate intra- and inter- functional connectivity. Pairwise T-test will evaluate connectivity changes between each state. Additionally, correlation analysis between connectivity results and performance (accuracy and reaction time) will be completed. Group-wise comparisons will be completed using a mixed methods approach to account for sex and age.

Results: We hypothesize that comparison between single and dual task paradigms will show differing brain connectivity patterns, with a shift from local connectivity to more global in the dual task paradigm. Furthermore, the extent of shift of connectivity will be related to better task performance. However, there will be a dual-task cost of completing two tasks at a time that will be related to connectivity measures. Finally, we hypothesize that youth with concussion will elicit differential functional connectivity patterns from youth without concussion that will be correlated to performance deficits.

Implications: The results of this study will create a better understanding of the functional connectivity patterns during single and dual tasks and providing a template of comparison to youth with a concussion.

Speech-Language Pathology

Poster #34:

Flow Tests of Barium Stimuli for Use in Videofluoroscopy

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Funding: University Health Network: Salary; National Institutes of Deafness and other Communication Disorders Grant.

Purpose: Barium is commonly used in videofluoroscopy. Recipes are needed to achieve matching flow of barium stimuli to the liquids they are intended to represent. The purpose of this study was to measure the flow of barium preparations using the International Dysphagia Diet Standardisation Initiative (IDDSI) Flow Test, which classifies thickness based on flow through a standard 10ml slip tip syringe.

Methods: We used the IDDSI Flow Test to measure different barium stimuli: a) Powdered barium (Varibar(R) thin; E-Z-HD(R); E-Z-Paque(R)) in 20% w/v and 40% w/v concentrations and thickened with starch and gum thickeners to target IDDSI levels 1-4 (slightly to extremely thick); b) Barium suspensions: Bariogel (R) (20%w/v; 40%w/v); Varibar (R) nectar, thin-honey, honey-thick (40% w/v); Varibar (R) nectar diluted to 30% w/v; c) E-Z-HD(R) powder mixed into pre-thickened liquids (40% w/v). All stimuli were tested in triplicate at room temperature, 30 minutes after mixing.

Results: Stable flow (i.e., \leq 1 ml variation across repeated tests) were achieved for all stimuli. Variations in flow were observed between starch and gum thickeners. Higher barium concentration resulted in thicker liquids. Pre-thickened liquids became thicker with the addition of barium.

Summary/Implications: The IDDSI Flow Test can be used to confirm the thickness of barium stimuli and confirm matched flow to non-barium liquids. Clinicians should be aware that the addition of barium to pre-thickened liquids results in additional thickening. Results from this study will serve as references for clinicians who wish to use stimuli of different consistencies in videofluoroscopy.

Poster #35:

Cognitive communication deficits in children with traumatic brain injury: A scoping review

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Funding: Supervisor stipend

Objective: The scoping review synthesizes the scholarly literature on cognitive communication impairments in traumatic brain injury (TBI) sustained during childhood, to identify gaps in research, and make recommendations that will further the field of cognitive communication in pediatric TBI.

Methods: MEDLINE, PsycINFO, CINAHL, and EMBASE were searched to identify peer reviewed studies that examined cognitive communication impairments in children that sustained a TBI between 3 months to 18 years of age.

Results: Twenty-eight studies met inclusion criteria with three main categories identified in relation to cognitive communication: 1) impairments according to TBI severity, 2) impairments according to age at injury, and 3) trends in recovery according to TBI severity.

Conclusions: The results of this scoping review suggest that; 1) TBI severity is not the sole predictor of performance; other factors contribute to cognitive communication outcome and recovery; 2) developing skills at time of injury are most susceptible to impairment; and 3) standard, norm-referenced language assessments are not sensitive in detecting language impairments that are secondary to cognitive impairments found in TBI. Directions for future research and suggestions for clinical practice are proposed.

Poster #36:

Using a group music intervention to support school-readiness skills in preschool children with hearing loss

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Funding: University of Toronto

Background: Researchers and therapists have long been intrigued by the potential of musical activities in childhood to facilitate the development of literacy skills. Theorists have speculated that language, reading, and music overlap in meaningful structural and functional ways that extend well beyond a simple association with audition (Patel, 2014; Tierney & Kraus, 2014) and suggest that these abilities may be scaffolded by the skills acquired through sharing or making music.

There have been some investigations of those aspects of childhood music and movement exposure that may help to scaffold development in the areas of phonological awareness (Kraus & Chandrasekaran, 2010; Moritz, et al, 2013), vocabulary, and social skills (Gerry, Unrau & Trainor, 2012). There is, unfortunately, a paucity of research on the potential benefits of music activities for children with hearing loss (HL). Since recent advances in hearing technology for this population now provides them with access to both spoken language and music, the potential benefits of the use of music is now becoming an innovative and exciting focus for research.

The goal of this quasi-randomized experimental intervention study proposal is to examine the impact of the addition of music and movement to traditional listening and spoken language therapy for preschool children with HL.

Methods: Participants will be matched and placed into a music and movement group, a craft-based group, or a control group. Pre- and post-intervention assessments focusing on outcomes in the areas of speech, language, pre-literacy, audition, balance, and social skills will be completed.

Implications: With evidence to support the benefits of music and movement, it is hoped that practitioners will be encouraged to incorporate these elements into best practices for children with HL. Such evidence would also contribute to the development of resources guiding practice in how to best prepare this population for success in integrated classroom settings.

Poster #37:

Motor Learning in Children and Adults Who Stutter: A Scoping Review

Fiona Höbler, Rehabilitation Sciences Institute, University of Toronto.

Funding: NSERC

Background: Developmental stuttering typically emerges during a period of rapid increase in speech and language development. This is marked by increased demands of coordinated movement and learning to enable longer, more complex utterances to be produced successfully and fluently. Research has evidenced potential deficiencies in motor control processes in both children and adults who stutter. These observations raise questions regarding motor skill acquisition abilities in individuals who stutter, and how these impact the prognosis of their speech motor impairment, as well as the long-term success of behavioural modifications used in treatment approaches. This scoping study aimed to identify the evidenced abilities of both children and adults who stutter to retain, generalise and transfer learning gains from motor practice, as well as to provide a comprehensive overview of the extent, range and nature of motor learning research in this population.

Methods: This review followed the methodological framework of Arksey and O'Malley (2005), and involved a comprehensive search of the literature, including electronic databases (Embase, Medline and PsycINFO), and a manual search of references and journals. Inclusion criteria allowed for the review of studies with adult and child participants who had a diagnosis of developmental stuttering, measuring motor practice effects that may be indicative of learning.

Results: More than 3,594 citation results were found across three electronic databases and relevant journals. Results were de-duplicated, and each citation's title and abstract were individually screened by the reviewer and proofed against the inclusion criteria. Following full review of more than 200 research articles, the final selection of accepted studies that describe original research of motor learning abilities in children and adults who stutter are presented.

Summary: It is evident from the literature that the use of motor practice can improve speech motor performance in fluency and consistency, as well as in neural changes towards recovery. However, the majority of studies investigated motor practice effects within a single session. Given that increased practice with extended trials and testing over longer periods would provide a more accurate picture of the motor performance skills in people who stutter, further research of motor learning abilities in people who stutter across the lifespan is clearly warranted.

Poster #39:

Expressive and Receptive Language Skills Discrepancy in Children with Autism Spectrum Disorder: Preliminary Results

Leticia Ribeiro de Oliveira, Bloorview Research Institute; Deryk Beal, Bloorview Research Institute.

FUNDING: Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq)

Background: Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder marked by impairments in social interaction and communication, and restricted interests and repetitive behaviors. The Diagnostic and Statistical Manual of Mental Disorders, 5th edition, does not consider language impairment to be a core symptom of the disorder, but recognizes language ability as an important element for our understanding of the disorder. The language profile varies greatly across the life span and individuals with ASD. A profile defined by lesser receptive language relative to expressive language has been investigated as one possible developmentally stable trait in ASD.

Purpose: Investigate the receptive and expressive language skills in a subset of individuals with ASD from the Province of Ontario Neurodevelopmental Disorders (POND) Network through two different language assessments, one clinician administered and one caregiver report.

Method: Cross-sectional data from participants with ASD (n=249) and neuro-typical controls (n=152) were tested for significant difference between expressive and receptive language scores in the Oral and Written Language Scales (OWLS) and in the Vineland Adaptive Behavior Scales, 2nd Edition (Vineland© II), at $\eta^2 = 0.05$. Pearson correlations for receptive and expressive language scores on each of the measures were reported.

Results: As expected, participants with ASD showed poorer language ability compared to controls ($t_{353.142} = -15.796$, $p < 0.001$). Only 26% of the ASD participants presented a statistical significance difference between receptive and expressive language in opposition to 38% of the neuro-typical controls. A better receptive than expressive language, with higher prevalence in younger participants, were found in both groups. The performance in both language measures was moderately correlated when considering either receptive language scores ($r = .394$, $p < 0.001$) or expressive scores ($r = .586$, $p < 0.001$).

Summary / Implications: Contrary to popular belief, a lower production than comprehension skills were found in the ASD participants. Although the overall language ability was lower in comparison to the controls, the proportion of participants with a significant discrepancy between the expressive and receptive language was lower than in the neuro-typical children. A preliminary analysis suggests that this discrepancy may be an age-specific marker on preschools with ASD, but further analysis is needed.

Poster #40:**Discourse Coherence Analysis Provides New Insights into Cognitive Decline in aMCI**

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Funding: CIHR

Background: Discourse production requests organization, integration and coordination of linguistic units. These processes depend on cognitive skills other than language, such as memory (Glosser & Deser, 1990). Neurodegenerative syndromes commonly affect autobiographical memory recall and are often accompanied by linguistic disruption. Mild cognitive impairment (MCI) is a disorder which leads to greater than expected cognitive decline in comparison to healthy-aging, with high rates of progression into Alzheimer's disease (AD) (Artero et al., 2006). A sub-classification of MCI has been suggested based on the presence of memory impairment (amnestic MCI or aMCI) (Busse et al., 2006). Personal semantic memory (general knowledge) appears to remain intact in aMCI, however recollection of episodic details (experienced at a specific time and place) is impaired (Murphy et al., 2008). Language impairment has been observed in MCI and AD patients related to verbal fluency, naming and discourse production (Murphy et al., 2006; Henry et al., 2004; Harris et al., 2008).

Methods: The speech of 14 aMCI patients and 14 healthy controls have been analysed. Memory recall was probed and evaluated using the Autobiographical Interview (AI) (Levine et al., 2002). Participants produced narratives related to the recall of autobiographical experiences; these narratives were transcribed and segmented into utterances, which were classified as semantic or episodic details. In addition, a coherence rating scale was used in order to analyse the relevance and informativeness of these details to the topic of discourse. Details received a score from 0 to 3. The weighted average score was calculated for the whole narrative and for the semantic and episodic composites separately.

Results: As expected, aMCI patients produced fewer episodic details than controls ($p=.01$, $d=.99$). Marginally significant differences were found between groups in total coherence ($p=.08$, $d=.65$). No difference was found in episodic coherence; however, there was a marginally significant difference in semantic coherence between groups ($p=.07$, $d=1.11$).

Summary/Implications: These results suggest that analysis of coherence of semantic memory may identify early cognitive deficits in aMCI patients.

Poster #41:**Neuroimaging and neuropathology of bulbar amyotrophic lateral sclerosis: Beyond the motor system**

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FUNDING: National Institutes of Health [R01 DC009890], Bernice Ramsay Discovery Grant.

Background/Purpose: ALS is a neurodegenerative disorder with motor and extramotor (i.e., cognitive-linguistic) involvement. 30% of patients present with bulbar-onset ALS; 85% of all patients develop bulbar motor disease as ALS progresses. Bulbar ALS is associated with the fastest progression rate, shortest survival time, and a reduced quality of life. Further, bulbar ALS may be associated with an increased burden of cognitive-linguistic impairments. Theories propose that (1) bulbar-onset ALS, compared to spinal-onset ALS, is uniquely associated with extramotor impairments, and (2) Regardless of site of onset, bulbar changes and extramotor involvement may indicate a more advanced stage of the disease due to widespread cortical degeneration. The overall goal of the work was to further our understanding of bulbar ALS and its extramotor presentation by examining its neuroanatomical correlates and neuropathological changes in the brain using a multimodal approach.

Methods: STUDY 1- T1-weighted and DTI images were used to measure gray (GM) and white matter (WM) integrity in 16 ALS patients with bulbar disease and 13 healthy controls (HC). MRI metrics included cortical thickness, gray matter volume, surface area, and DTI indices of bulbar motor, language, and cognitive regions. Disease effects and associations were examined between regions and clinical measures of bulbar dysfunction. STUDY 2- Neuropathological examination of post-mortem brain tissue was conducted on 3 bulbar-onset (bALS), 3 spinal-onset with antemortem bulbar symptoms (sALS_wB), 3 spinal-onset with no antemortem bulbar symptoms (sALS_noB), and 3 HC cases. Analyses included the same regions as study 1. Regions were stained for neuronal loss, and proteinopathy (i.e., TDP-43, tau).

Results: STUDY 1- Group effects indicated increased WM pathology in left inferior frontal (IF), post. Superior temporal (pSTG), and transverse temporal (TT) gyri. Articulatory rate (SPM) was significantly correlated with bilateral GM reduction in IF and TT. STUDY 2: Results revealed that the severity and extent of involvement were related to the degree of bulbar motor dysfunction. Specifically, bALS presented with the most severe and widespread pathology, followed by sALS_wB, and sALS_noB.

Summary/Implications: Degree of neuroanatomic changes in extramotor regions may be related to the degree of bulbar motor dysfunction. Data gleans a potential co-development of bulbar motor and language involvement, suggesting that the propagation of disease is through structural connectomes.

Poster #42:

Dysphagia Following Stroke and Cerebral Palsy in Children: A Systematic Review

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Background/Purpose: Stroke is becoming increasingly recognized in children and is among the top 10 causes of mortality and lifelong morbidity. Perinatal stroke is the leading cause of hemiplegic cerebral palsy (HCP). Children with stroke and cerebral palsy often have dysphagia (feeding and swallowing problems); however, little is known about their incidence. A systematic review was conducted to determine the reported frequency of dysphagia, dysphagia-related health outcomes, and caregiver burden in children diagnosed with stroke or HCP.

Methods: Six electronic databases were searched to November 2017 and a manual search of eight relevant journals was conducted. Two blinded raters assessed abstracts and full articles for eligibility. Discrepancies were resolved by consensus. Reasons for exclusion included pre-term infants (<36wks), adults (>18yrs), and few eligible patients (n<10). Accepted articles were evaluated for quality using Cochrane's risk of bias. Data was extracted and analyzed descriptively.

Results: Of 1660 abstracts, five studies met inclusion criteria, of which three included patients with stroke and two HCP. Across studies, operational definitions of feeding and swallowing varied. Insufficient details were provided on assessment methods and timing. Thus, reported frequencies of dysphagia ranged from 24.0 to 88.6%. Only one study clearly separated feeding and swallowing impairment, with a combined frequency of 48.8%. Only one study reported dysphagia-related health outcomes and none reported caregiver burden.

Summary/Implications: These results suggest that dysphagia is common in pediatric patients with stroke and HCP; however, accurate frequency estimates remain unknown. Also unknown is its impact on health and caregivers. Therefore, there is a need for more high-level evidence.

Poster #43:

The perception of intonation in the presence of hypernasality

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Funding: Mitacs Globalink Research Award.

Background/Purpose: The present study focused on the perception of intonation (i.e., the fundamental frequency variation across an utterance) in the presence of hypernasality (excessive nasal resonance during the production of non-nasal sounds). We hypothesized that auditory-perceptual ratings of intonation would be significantly lower for more hypernasal stimuli.

Methods: Speech simulation samples were produced by one male and one female voice actor were recorded. The actors simulated three levels of intonation (monotone, normal, and exaggerated) at 4 different levels of hypernasality (normal, mild, moderate, and severe). 30 participants listened to the simulations and after each recording participants were asked to rate the intonation on a visual analog scale from 0 (monotone) to 100 (exaggerated).

Results: A mixed effects ANOVA revealed main effects of intonation ($F(2, 2828) = 236.46, p < 0.001$), and hypernasality ($F(3, 2828) = 159.89, p < 0.001$), as well as an interaction between the two ($F(6, 2828) = 28.35, p < 0.001$). Post hoc analyses found speech was rated as more monotonous as hypernasality increased.

Summary/Implications: The present study provides evidence that the presence of hypernasality in speech can affect listeners' auditory-perceptual ratings of intonation. These results support the need for instrumental measures to corroborate auditory-perceptual evaluations of speech features like intonation.

Poster #44:

Respiratory-Swallowing Coordination in Traumatic Spinal Cord Injury

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Funding: University of Toronto Fellowship

Background/Purpose: Respiratory-swallow coordination is vital for airway protection as a mechanism of preventing the penetration or aspiration of foreign material into the airway. Swallowing is typically initiated within the expiratory phase of the breath cycle. This positioning facilitates complete laryngeal vestibule closure, reducing the risk of aspiration. Inspiration after the swallow has been implicated as a risk factor for aspiration. In healthy adults, respiratory stability during swallowing has been noted across different liquid consistencies, solid textures, and bolus volumes. However, individuals with a respiratory impairment, such as those following a cervical spinal cord injury (SCI), may experience difficulties maintaining this stability as they adapt to the different textures and consistencies that compose each meal. Our study aimed to compare the patterns of respiratory coordination between a healthy adult population and individuals with a traumatic spinal cord injury during single cup sip drinking tasks.

Methods: Twenty-six healthy adults and ten participants with a traumatic cervical or upper thoracic SCI were recruited. All of the participants with a SCI demonstrated reduced respiratory tidal volume and vital capacity, with eight of the ten participants receiving respiratory therapy at the time of data collection. Participants were given cups filled with liquid, ranging in consistency from thin to extremely thick, and were asked to take a natural sized sip or teaspoon amount from each cup. Nasal airflow measurements were collected during 18 bolus trials via a nasal cannula connected to the Kay Pentax Digital Swallowing Workstation. Each signal was analyzed by two blinded raters to identify the respiratory phase pattern and respiratory pause duration for each swallow. Any discrepancies were resolved through discussion between the two raters.

Results: Analyses comparing the respiratory phase pattern and pause duration for the first and subsequent swallows between groups is currently underway. Preliminary results suggest a three-fold increase in the frequency of post-swallow inspiration for individuals with a traumatic spinal cord injury as compared to the healthy adults.

Summary/Implications: These results will inform our understanding of the coordination between respiration and swallowing in individuals with a traumatic SCI, and guide clinical decision making regarding the assessment and treatment of swallowing disorders related to respiratory discoordination.

Poster #45:

Hyoid Kinematic in Patients with Amyotrophic Lateral Sclerosis (ALS): a Pilot Analysis

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Funding: Ontario Graduate Scholarship, Toronto Rehabilitation Institute Student Scholarship.

Background/Purpose: Several kinematic parameters of hyoid movement have been shown to vary as a function of bolus volume and thickness in healthy individuals (Nagy et al., 2015; Nagy et al., 2014). However, modulation of hyoid movement has not been explored in patients with neurodegenerative disease. The purpose of this study was to (1) characterize hyoid kinematics in a pilot sample of patients with ALS and (2) explore differences in hyoid movement related to bolus volume and liquid thickness.

Methods: Videofluoroscopy (VF) was collected from 26 adults (15 male) diagnosed with ALS, aged 30-75 (mean 63). Blinded raters tracked hyoid position frame-by-frame to obtain measures of hyoid kinematics (e.g., speed and range of movement) in three directional planes (anterior [X], superior [Y], and hypotenuse [XY]). Hyoid position was tracked relative to C4 and measures were normalized to the length of a cervical spine scalar (C2-C4). Mixed model repeated measures ANOVAs were performed to identify effects of bolus volume and thickness on hyoid kinematics, with an additional factor of ALS-onset type (bulbar vs. spinal).

Results: A main effect of volume was observed for peak and average superior hyoid velocities [Y], and peak/average speed along the hypotenuse [XY]. Pairwise comparisons revealed that 20mL bolus volumes yielded faster hyoid speed/velocities compared to 1mL boluses. No statistically significant differences were identified based on liquid thickness. Non-significant trends were identified with respect to ALS-onset type and hyoid kinematics.

Summary/Implications: Sip volume, but not liquid thickness, modulates hyoid movement in patients with ALS. Compared to previous data with healthy individuals, our results suggest altered motor accommodation of hyoid movement in patients with ALS.

Poster #46:

Associating the Bulbar and Respiratory Dysfunctions in Patients with Amyotrophic Lateral Sclerosis

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Funding: National Institutes of Health

Background/Purpose: Amyotrophic lateral sclerosis (ALS) is a rapidly progressing neurodegenerative disease affecting spinal, respiratory and bulbar muscle function. More than 80% of patients with ALS will exhibit bulbar (i.e., speech and swallowing) dysfunction as the disease progresses. An instrumental assessment protocol based on physiological motor speech subsystems (i.e., articulatory, resonatory, phonatory and respiratory) has been developed to improve clinical bulbar assessment. This protocol can detect early functional changes and track the disease progression. The subsystem measures, however, may be dependent on respiratory function. This study examines the association between select subsystem measures and clinical respiratory measures in patients with ALS.

Methods: 159 patients with ALS underwent neurological, clinical and bulbar motor testing. Clinical respiratory measures (i.e., forced vital capacity (%FVC) and peak expiratory airflow) were obtained. All participants performed speech-related tasks to obtain subsystem measures: syllable count, articulatory rate, nasal airflow, nasalance, fundamental frequency, oral pressure and speech pausing measures. Simple linear regression was used to examine the association between each subsystem measure and each clinical respiratory measure. Multiple comparisons were accounted for using the false discovery rate controlling procedure.

Results: %FVC accounted for 13.8% of the shared variance in the percentage of time spent pausing during passage reading ($p < 0.001$) and for 20.3% of the shared variance in the mean phrase duration during passage reading ($p < 0.001$). All other correlations were insignificant after adjusting for multiple comparisons.

Summary/Implications: The results suggest the articulatory, resonatory and phonatory subsystem measures are not highly influenced by respiratory function and are validated as appropriate for bulbar function testing. Percentage of time spent pausing and mean phrase duration are closely linked to respiratory function.