REHABILITATION SCIENCES INSTITUTE

2021 RESEARCH DAY ABSTRACT BOOK
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Conference Access Instructions:

1. Click the link below to visit the Quercus page containing the abstract book, poster presentations, schedule for the day and more!
   
   [https://q.utoronto.ca/courses/222668](https://q.utoronto.ca/courses/222668)

2. Click the link below to join the Conference Zoom to join Research Day 2021. Refer to the conference schedule for a detailed breakdown of the day.

   [https://utoronto.zoom.us/j/83805646373](https://utoronto.zoom.us/j/83805646373)
   
   Password: Research

3. Certain aspects will be delivered through breakout rooms. To access breakout rooms:

   Please note that **breakout rooms will not work** unless you use the client/desktop version of Zoom (not the browser version). [CLICK HERE](https://zoom.us) to make sure you have the most up to date version of Zoom installed on your computer before joining the conference.
Welcome
A message from the Acting Director of RSI, Dr. Yana Yunusova

Dear Students, Faculty, and Alumni,

Welcome to the RSI Research Day 2021, an exciting and highly anticipated annual event for our student and faculty community! At this event, we showcase the breadth of theoretical and clinical research conducted by our excellent students, supervised by our exceptional faculty across rehabilitation sciences. This year’s event theme is Research to Practice. The day will feature a keynote address by Nina G, who is a disability activist, author, and educator; panel discussions on academia and industry-related experiences from RSI Alumni; students’ oral and poster presentations; and an awards ceremony celebrating the great achievements and contributions of RSI students, faculty, and alumni. Today, everyone will have the opportunity to deepen their knowledge, expand understanding, and excite their passion for scientific discovery. Further, everyone will get a chance to connect with others and network with current and future collaborators.

For the first time, we welcome our alumni community to the RSI Research Day, as part of Temerty Faculty of Medicine Alumni Spring Reunion. Our former students are in academic, research, and leadership positions in higher education, government, and industry, raising the profile of rehabilitation sciences and education across these important settings and making us proud of their achievements. Many of our alumni give back to the Institute through the Mentorship program and participation in the RSI committees, including the Program and Curricula, Alumni, and Communications and Community Relations groups. We deeply thank our alumni for their important contributions!

At the end of the 2020-21 academic year, we can say that it was a difficult one; the pandemic heightened the known challenges and brought unique ones. Many of us often felt the incredible fatigue setting in over the course of the year and sometimes the lack of motivation. But whenever each of us felt down, there was someone in our circle to provide support. Special thanks to the student-led Mental Health Committee, whose contribution to our collective well-being was felt not only by the students but by the faculty as well. Another shout-out goes to the rehabINK magazine and podcast organizers for energizing us to think about some of the most important events of the last year, speaking up for social justice and action, while promoting introspection and collective reflection. Words of gratitude are also necessary to those who organized the highly attended RSI Speaker Series as well as the Leadership Rehab Rounds – the two important platforms that brought us together and closer during this year.

This day is entirely organized by our students with exceptional creativity, organizational abilities, dedication, and resilience. I would like to thank the Research Day Organizing Committee for their tireless work. Our appreciation goes to Sara Hanafy, Wade Michaelchuk, Wenfu Bao, Alana Bernick, Lauren DiNola, Erica Dove, Fiona Höbler, Anna Huynh, Anita Kaiser, Josh Shore, and Beatrice Manduchi. Special thanks to Dr. Karl Zabjek and Diane Wilshire for their organizational support.

Enjoy the day!

Yana Yunusova, Ph.D., CCC-SLP, Reg.CASLPO
Professor, Department of Speech Language Pathology
Acting Director, Rehabilitation Sciences Institute
Senior Scientist, KITE: Toronto Rehabilitation Institute-UHN
Associate Scientist, Sunnybrook Research Institute
A message from the Graduate Coordinators of RSI, Dr. Karl Zabjek, Dr. Deirdre Dawson

Welcome to the Rehabilitation Sciences Institute (RSI) Research Day 2021. The overall goal of this day is to profile the breadth and depth of theoretical and clinical research that is being conducted by our students within the programs of RSI. The research conducted by our RSI students spans the fields of occupational science and therapy, physical therapy, speech language pathology and rehabilitation science. These research activities adopt qualitative and/or quantitative methods to answer research questions that address some of the most complex health issues that confront our society today. To address these questions our students collaborate with our faculty of the RSI to address these complex health issues and perform their work at the University of Toronto, the teaching hospitals affiliated with the University of Toronto and local, national and international community partners.

The RSI research day has been conceived, developed and organized by members of the RSI research day committee which is composed and led by our students. The research day committee has given extensive thought about the focus of RSI research day and its organization. This has provided us with an opportunity to expand our knowledge of the field of rehabilitation science, and share our thoughts about the contemporary issues that we are confronted with today.

We would like to thank the RSI research day committee for their dedication to organizing the activities of today. We would like to extend our sincerest thank you to Sara Hanafy, Wade Michaelchuk, Anita Kaiser, Anna Huynh, Fiona Höbler, Josh Shore, Beatrice Manduchi, Alana Bernick, Erica Dove, Wenfu Bao, and Lauren DiNola.

Karl F. Zabjek, PhD
Professor & Graduate Coordinator, Rehabilitation Sciences Institute,
Associate Professor, Department of Physical Therapy, University of Toronto

Deirdre R. Dawson, PhD, OT Reg. (Ont.)
Professor & Graduate Coordinator, Rehabilitation Sciences Institute,
Professor, Department of Occupational Science & Occupational Therapy, University of Toronto
Senior Scientist, Rotman Research Institute, Baycrest
A message from the Rehabilitation Sciences Graduate Students’ Union

RSI Research Day is a student-led initiative that is organized and supported by the Rehabilitation Sciences Graduate Students’ Union (RSGSU). After a successful first ever virtual Research Day in 2020, the RSGSU is thrilled to welcome you once again to another virtual showcase of student research within RSI. We also wish to acknowledge the hard work, creativity, and resilience demonstrated by RSI students, faculty and staff in the past year that has enabled continued research progress despite challenging circumstances.

Research day is an opportunity to come together as a community, highlight the diversity of research at RSI and recognize the achievements of our students, faculty, and staff in our community. We hope this forum enables learning, encouragement, and meaningful connections among attendees.

We would like to thank the 2021 RSI Research Day Committee co-chairs Sara Hanafy and Wade Michaelchuk, as well as the student committee members and department representatives for their hard work and dedication to make this event possible.

To learn more and find out how to get involved, email us: rehabsciencegsu@gmail.com and follow us on Twitter: @RSGSU, Instagram: @uoft_rsi, and Facebook: Rehabilitation Graduate Student Union.

Sincerely,

The RSGSU Executive Team
Land Acknowledgement

We wish to acknowledge this land on which the University of Toronto operates. For thousands of years, it has been the traditional land of the Huron-Wendat, the Seneca, and the Mississaugas of the Credit. Today, this meeting place is still the home to many Indigenous people from across Turtle Island and we are grateful to have the opportunity to work on this land.

We encourage you to take a moment to reflect on what being on this land means to you and what opportunities it affords you. We also encourage you to take time to read and reflect upon the impact of Colonialism in Canada within Indigenous communities. The Truth and Reconciliation Report Summary is a great starting point and identifies 94 calls to action. Additional resources and ways to support local Indigenous communities can be found below.

- Donate to the [Toronto Aboriginal Support Services Council](#).
- Donate to [Canadian Charities Helping Indigenous communities in Canada](#).
- [Next 150](#) has a detailed list of actions and practices you can take today and highlights and amplifies indigenous authors and voices.
- [Beyond 94](#) is an initiative that tracks the progress of the 94 calls action set out in the Truth and Reconciliation Report.
- Learn about events and current research through the [Tkaronto Indigenous Peoples Portal](#).
- Learn more about the [treaties in Ontario](#).
- [Whose Land](#) is a web-based app that uses technology to assist users in identifying Indigenous Nations, territories, and Indigenous communities across Canada.
**RSI Research Day**  
Thursday, May 27th, 2021  
9:00 a.m. – 2:30 p.m.

Link: [https://utoronto.zoom.us/j/83805646373](https://utoronto.zoom.us/j/83805646373)  
Password: Research

## MORNING SESSION

### 9:00 – 9:10  
**Opening Remarks**  
*Zoom, Main Room*  
- Dr. Yana Yunusova, PhD, Acting Director of RSI  
- Dr. Joshua Barker, PhD, Dean, School of Graduate Studies & Vice-Provost

### 9:10 – 9:40  
**Keynote Address**  
*Zoom, Main Room*  
- Nina G, disability activist, author, and educator

### 9:40 – 10:05  
**Student Presentations: 3 Minute Presentations**  
*Zoom, Main Room*  
- Why do some people exercise post stroke but not others?  
  *Azadeh Barzideh, PhD Candidate*  
- Quantification of fibrosis using MRI in head and neck cancer patients  
  *Vivian Che, MSc Student*  
- The relationship between periarticular muscle properties and knee pain in post-menopausal women without obesity  
  *Siwen Liu, MSc Student*  
- Walking groups after moderate to severe traumatic brain injury  
  *Enrico Quilico, PhD Candidate*  
- Muscle Matters: An exploratory study on lower limb isokinetic strength and reactive balance performance post-stroke  
  *Tyler M. Saumur, PhD Candidate*  
- Coping mechanisms among youth and young adults with autism spectrum disorder in competitive employment  
  *Abirami Vijayakumar, MSc Student*

### 10:05 – 10:15  
**Break – Meditation Session**  
*Zoom, Main Room*  
- Sonya Tomas, certified coach, meditation facilitator
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<tr>
<td>10:15 – 11:00</td>
<td><strong>Student Presentations: 7 Minute Presentations</strong></td>
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<td><em>Zoom, Main Room</em></td>
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|            |   - Validation of the Patient Reported Outcomes of Fracture Healing (PROOF) Questionnaires for Evaluation of Pediatric Upper Extremity Fracture  
|            |     *Lauren DiNola, MSc Student*                                         |
|            |   - Using activity-based therapy for individuals with spinal cord injury or disease: rehabilitation hospital therapists’ perspectives  
|            |     *Hope Jervis Rademeyer, PhD Candidate*                                |
|            |   - Exploring a telerehabilitation approach to active rehabilitation for youth with concussion  
|            |     *Josh Shore, MSc Student*                                             |
| 11:00 – 11:30 | **Poster Presentations (#1-19) and Judging**                           |
|            | *Zoom, Breakout Room*                                                   |
| 11:30 – 12:15 | **Lunch and Networking Session (Moderator: Dr. Kristina Kokorelias)**   |
|            | *Zoom, Main Room*                                                       |
| **AFTERNOON SESSION** |                                                                  |
| 12:15 – 1:00 | **Concurrent Panel Discussion**                                         |
|            | *Zoom, Breakout Room*                                                   |
|            | 1. **RSI Alumni Working in Academia**                                   |
|            |   - Laura Desveaux PT, PhD  
|            |     Scientific Lead, Institute for Better Health & Learning Health System Program Lead at Trillium Health Partners |
|            |   - Mika Nonoyama, PhD, RT  
|            |     Associate Professor, Faculty of Health Sciences at Ontario Tech University & Health Clinician Scientist at SickKids |
|            |   - Rosalie Wang, PhD, OT Reg. (Ont.)  
|            |     Assistant Professor, Department of Occupational Science & Occupational Therapy, University of Toronto & Affiliate Scientist at Toronto Rehabilitation Institute |
|            | 2. **RSI Alumni Working in Industry**                                   |
|            |   - Diana Frasca, MSc, PhD  
|            |     Strategic and Institutional Research Initiatives (SIRI) Specialist at York University |
|            |   - Bimal Lakhani, PhD  
|            |     VP Product & Lead Scientist at HealthTech Connex Inc. |
|            |   - Heather McPherson  
<p>|            |     President &amp; CEO at Women’s College Hospital |</p>
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<td><strong>Break – Stretching Session</strong></td>
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<td><strong>Awards Ceremony</strong></td>
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<td>- Three Minute Presentation Competition</td>
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<td>2:15 – 2:30</td>
<td><strong>Closing Remarks</strong></td>
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<td>- Sara Hanafy, Research Day Co-Chair, PhD Candidate</td>
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<td>- Wade Michaelchuk, Research Day Co-Chair, PhD Candidate</td>
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Sponsorships

Thank you very much to our valued sponsors!

Platinum Level

Silver Level

Bronze Level
Donors

Thank you very much to our valued donors!

Silver Level

Dr. Angela Colantonio

Team Optimize

Bronze Level

Dr. Larry Robinson
Chief of Rehabilitation Services
Nina G was the only woman who stuttered in the stand-up comedy world when she started nine years ago. She co-produced the Comedians with Disabilities Act, a national touring comedy show featuring exclusively comedians with disabilities. She also produced the first compilation album to feature Disabled Comedy Only.

Nina’s brand of comedy reflects the experiences of many with disabilities. She tours the country as a conference keynote speaker including at a TEDx talk at San Jose State University. A Huffington Post contributor, she has a doctorate in psychology, teaches at a Bay Area Community College, and lives in Oakland, California. Stutterer Interrupted: The Comedian Who Almost Didn’t Happen is her second book.
Student Oral Presenters
3 Minute Presenters

Azadeh Barzideh
PhD Candidate

Vivian Che
MSc Student

Siwen Liu
MSc Student

Enrico Quilico
PhD Candidate

Tyler M. Saumur
PhD Candidate

Abirami Vijayakumar
MSc Student
7 Minute Presenters

Lauren DiNola
MSc Student

Hope Jervis Rademeyer
PhD Candidate

Josh Shore
MSc Student
Panelists: RSI Alumni Working in Academia

Laura Desveaux PT, PhD
Scientific Lead, Institute for Better Health & Learning Health System Program Lead at Trillium Health Partners

Laura is a scientist and physical therapist whose work draws on behavioural psychology and implementation science to design and evaluate interventions that aim to optimize care. To understand what makes an initiative successful and how to scale it, her team examines what drives behaviour, how and why things work, and the process, mechanisms of change and the contextual factors that characterize success (and failure). This approach provides insights into what works best, for whom, and in what circumstance and helps inform how to effect change at a system level. She collaborates with health system decision-makers to bridge the research to practice gap by helping them apply the principles of implementation science and behaviour change to their work. Laura is also the founder and Executive Director of Women Who Lead, an organization dedicated to support the career advancement and leadership development of women in the health sector.

Rosalie Wang, PhD, OT Reg. (Ont.)
Assistant Professor, Department of Occupational Science & Occupational Therapy, University of Toronto & Affiliate Scientist at Toronto Rehabilitation Institute

Rosalie Wang is an Assistant Professor in the Department of Occupational Science and Occupational Therapy, University of Toronto. She is an Affiliate Scientist at Toronto Rehabilitation Institute and a member of their AI and Robotics in Rehabilitation team. Dr. Wang’s research focuses on developing and implementing technology to enable daily activity participation and social inclusion of seniors. She is leading research in robotics for post-stroke rehabilitation and on the use of information and communication technologies by seniors with cognitive impairments. As an AGE-WELL investigator she leads a national project on enhancing equitable access to assistive technologies.

Mika Nonoyama, PhD, RT
Associate Professor, Faculty of Health Sciences at Ontario Tech University & Health Clinician Scientist at SickKids

Dr. Mika Nonoyama is a registered respiratory therapist with a PhD in the Rehabilitation Sciences from the University of Toronto. She completed post-doctoral fellowships at Toronto Rehabilitation Institute and the University of Toronto’s Lawrence S. Bloomberg Faculty of Nursing. She is currently an associated professor in the Faculty of Health Sciences at Ontario Tech University, a Health Clinician Scientist at SickKids in the Respiratory Therapy Department and Child Health Evalitative Sciences, and a status-only assistant professor in the Department of Physical Therapy and Rehabilitation Sciences Institute at the University of Toronto. Twitter @mikaRRT.
Panelists: RSI Alumni Working in Industry

Heather McPherson

President & CEO at Women’s College Hospital

Heather McPherson is the President & Chief Executive Officer of Women’s College Hospital (WCH). Heather is a highly recognized healthcare executive with extensive experience in clinical, academic and health system leadership.

Heather is an innovative leader who has been instrumental in establishing clinical programs and services that close the health gaps for patients – not only at Women’s College Hospital but throughout the province. With her unparalleled ability to partner across the healthcare system, build high-performance teams and foster a culture of excellence, she has created transformative solutions including the operationalization of WCH’s new building and the evolution of the hospital’s ambulatory model of care. Throughout her career, Heather has focused on the evaluation and improvement of the systems of clinical care delivery and redefining what it means to be a patient: engaged, empowered, and understood.

Heather is a passionate advocate for a multifaceted and comprehensive approach to health. She is a registered Occupational Therapist and holds a Master of Science in Rehabilitation Science from the University of Toronto. She is also an adjunct lecturer in the Department of Occupational Science and Occupational Therapy in the Temerty Faculty of Medicine, University of Toronto.

Bimal Lakhani, PhD

VP Product & Lead Scientist at HealthTech Connex Inc.

As VP Product and Lead Scientist at HealthTech Connex Inc. in Surrey, BC, Bimal leads the translation of research into advanced neurotechnologies and medical devices. Passionate about brain structure, neuroplasticity, and neurorehabilitation, he integrates his background as an academic researcher into product ideation, development, and release. Bimal completed his B.Sc. in Kinesiology at the University of Waterloo, M.Sc. and Ph.D. degrees in Rehabilitation Science at the University of Toronto, and a Post-Doctoral Fellowship at the University of British Columbia’s Brain Behaviour Lab.

In his current role, Bimal works closely with scientists, clinicians, engineers, and industry partners to apply research findings and develop novel techniques, products, and practices for impact in brain assessments. This includes strategic, tactical, and operational planning, product development, device rollout management, and implementation of intellectual property guidelines and quality assurance programs.

Bimal is also known for his love of sports, music, and cheeseburgers – when he’s not immersed in the latest brain research, you are likely to find him cheering on all Toronto based sports teams (Go Leafs and Raptors!) and wandering around the city critiquing which restaurant has the best burger patty to bun ratio.
Diana Frasca, MSc, PhD

Strategic and Institutional Research Initiatives (SIRI) Specialist, at York University

Dr. Diana Frasca obtained her M.Sc. (2006) and Ph.D. (2015) from the Rehabilitation Science Institute, University of Toronto, co-supervised by Drs. Robin Green and Bradford McFayden. Her M.Sc. work examined environmental enrichment in older adults and her doctoral work focused on social multi-tasking after traumatic brain injury. She then completed a post-doctoral fellowship at the University of Sydney (2016) with Prof. Janette Vardy, examining mindfulness in women with cancer-related cognitive impairment.

Dr. Frasca currently works at York University as a SIRI Specialist in the Office of Research Services, Vice-President Research and Innovation. Her role there includes supporting the development of large-scale grant applications (e.g., SSHRC Partnership, CIHR Collaborative Health Research Program, New Frontiers in Research Fund Transformation), Canada Research Chair nominations, and other tri-council awards. In addition, since 2014, she has taught various courses at Sheridan College in the Faculty of Health and Community Services.
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 award.
Submit your ballot by 12pm! The winners will be announced at the afternoon Awards Ceremony!

Poster Competition
We have 6 student awards up for grabs:
Best Poster – MSc
Best Poster – PhD
Best Poster – People’s Choice (MSc)
Best Poster – People’s Choice (PhD)
Best Poster – Sex and Gender Award
Best Poster – Social Justice Award
Submit your ballot by 1:30pm! The winners will be announced at the afternoon Awards Ceremony!

RSI Recognition Awards
Student Recognition Awards
Alumni Recognition Awards
Faculty Recognition Awards
Thank you for your nominations/submissions!

Social Media Contests

What better way to kick off RSI Research Day 2021 than with giveaways! Two contests below:

1. Lead-up Contest (Deadline: May 26th @ 11:59pm EST)

Participate in our lead-up contest through Instagram, Twitter, or both for the chance to win 1 of 5 signed copies of Nina G’s book Stutterer Interrupted: The Comedian Who Almost Didn’t Happen.

To participate via Instagram, you must:
- Follow us on Instagram (@uoft_rsi)
- Be a current RSI student attending the Research Day conference
- Tag us (@uoft_rsi) and share an Instagram story explaining what you love about your research in any format (text, video, gif, etc.)
To participate via Twitter, you must:
- Follow us on Twitter (@RSIUofT)
- Be a current RSI student attending the Research Day conference
- Tag us (@RSIUofT) in a tweet with the hashtag #RSIResearchDay explaining what you love about your research in one-two sentences and share a GIF that describes your research

*Important notes: Participating on both platforms increases your odds of winning! A max of two ballot entries will be allotted per person—one if you participate on one of the two platforms, and two if you participate on both platforms. This means additional social media posts beyond your original post(s) will not lead to additional ballot entries in the draw for the prize.

2. Event Day Twitter Raffle (Deadline: May 27th @ 1:00pm EST)

To participate, follow us on Twitter (@RSIUofT), keep your eyes peeled for the #RSIResearchDay #Giveaway post that will be shared on May 27th, then RETWEET it to be entered into the draw for 1 of 3 Mastercard/Visa gift cards!

All contest winners will be announced live at the Awards Ceremony on May 27th

Good luck!
Abstracts
3 Minute Presentations
(in order of presentation)
Presentation #1

Why do some people exercise post stroke but not others?

Azadeh Barzideh, KITE–Toronto Rehabilitation Institute, University Health Network; Rehabilitation Sciences Institute, University of Toronto; Avril Mansfield, Toronto Rehabilitation Institute; Liz Inness, Toronto Rehabilitation Institute, University Health Network.

Field of Research: Movement Science

Background/Purpose: Less than half of people with stroke participate in aerobic exercise (AE) during rehabilitation post stroke despite research repeatedly showing that AE improves cardiorespiratory fitness and helps to promote recovery in this population. Many studies have explored the barriers and facilitators to AE prescription from the physiotherapists’ point of view, while only one study has investigated patients’ perspectives on AE participation. Additionally, these studies have examined physiotherapists’ and patients’ perspectives separately, without considering how they may interact. In this study, we aim to understand the barriers and facilitators to AE participation following a stroke by incorporating the views of both physiotherapists and patients.

Methods: To collect the data, all participants will be interviewed one-on-one. Stratified purposeful sampling will be used to invite people with stroke to semi-structured interviews near the end of their rehabilitation stay, or soon after discharge. Data collection from patients will continue until no new themes emerge (commonly ~12 participants). We will recruit at least 12 patients who participate in AE exercise and 12 who do not, to better understand how their perceptions of AE may differ. All the treating physiotherapists (~25 individuals) will be invited to take part in the study. Chart-stimulated recall will be used for interviewing the physiotherapists. This will help us better understand their clinical decision-making process, and if they have encountered any barriers or facilitators when prescribing AE for their four most recently discharged patients. All interviews will be audio-recorded and transcribed verbatim. Data analysis will be performed using the framework method procedure, enabling a combined inductive-deductive analysis approach with the help of a research assistant.

Results: We expect that this study will provide an in-depth analysis of the barriers and facilitators to participating in AE during rehabilitation for people with stroke.

Research to Practice Implications: Our aim is to close the gap between best practice guidelines and current practices to develop interventions that can increase participation in AE. This way, we will be able to help improve cardiorespiratory fitness, vascular health, and the quality of life of those living with a stroke.

Funding: Heart and Stroke Foundation of Canada (Supervisor); Canadian Institutes of Health Research (Supervisor)
Presentation #2

Quantification of fibrosis using MRI in head and neck cancer patients

Vivian Che, Rehabilitation Sciences Institute, University of Toronto; Nicolin Hainc, University Health Network; Eugene Yu, University Health Network; Rosemary Martino, University of Toronto.

Field of Research: Speech-Language Pathology

Background/Purpose: Head and Neck Cancer (HNC) patients undergoing radiotherapy (RT) often develop fibrosis where the radiated muscles become scarred and tight. They may experience dysphagia (swallowing disorders) because of this change in muscle structure. Dysphagia affects the patient’s ability to eat and drink, and can negatively impact their quality of life (QoL). There is currently no valid and reliable method to quantify fibrosis, so any improvement or decline is rated perceptually by the clinician or by the patient. The purpose of this study is to develop and validate a method to quantify fibrosis in HNC patients using Magnetic Resonance Imaging (MRI), and compare MRI measurements with gold standard measurements of muscle contraction using videofluoroscopy (VFS).

Methods: This study will have a retrospective design and all REB requirements for accessing patient records to run data collection and analyses will be completed. The inclusion criteria for this current study are completion of at least two VFS studies, at least two MRIs, and that each VFS and MRI pair must have been done within 45 days of each other. Two raters will take MRI measurements of fibrosis volume using the VITREA software. For these same patients, the VFS data has already been collected for previous studies, which includes the Pharyngeal Constrictor Ratio measure of area using SwallowTail software. We will statistically analyze the divergent validity of fibrosis volume and muscle contraction area using Pearson’s correlation coefficient, and analyze interrater reliability using intraclass correlation.

Results: We have determined that 28 participants meet the inclusion criteria. The gold standard VFS data has already been collected, cleaned, and inter-rater reliability established. Currently, we are seeking ethics approval and commencing MRI data collection. We expect to see an increase in the fibrosis measurements over time after RT is completed, and we anticipate that the fibrosis measurements will have an inverse relationship with the VFS measurements, showing the impact of fibrosis on swallowing function.

Research to Practice Implications: Many HNC survivors are younger and are facing long-term complications, including fibrosis, which adversely affects swallowing and QoL. The successful development of the MRI measurement will result in an objective tool to determine how fibrosis develops, what factors impact fibrosis, and whether rehabilitative treatments can reduce fibrosis to improve life after cancer.

Funding: Canada Research Chair Tier II in Swallowing Disorders, PCORI (Supervisor)
Presentation #3

The relationship between periarticular muscle properties and knee pain in post-menopausal women without obesity

Siwen Liu, Rehabilitation Sciences Institute, University of Toronto; Toronto General Hospital Research Institute; Vahid Anwari, Rehabilitation Sciences Institute, University of Toronto; Toronto General Hospital Research Institute; Nima Yazdankhah, Toronto General Hospital Research Institute; Kenneth Tam, Faculty of Kinesiology and Physical Education, University of Toronto; Andy Kin On Wong, Toronto General Hospital Research Institute, Dalla Lana School of Public Health (Division of Epidemiology), University of Toronto; Rehabilitation Sciences Institute, University of Toronto.

Field of Research: Movement Science

Background: Knee osteoarthritis (KOA) is a leading cause of disability in Canada. Postmenopausal women have a higher KOA risk potentially due to declining female sex hormone levels that decrease muscle quality. Nearly 40% of KOA patients do not have obesity, making weight-loss not a suitable first-line therapy option for them, yet they are still understudied. Previous studies showed that lower muscle and higher fat composition in the mid-thighs and mid-calves may relate to knee pain and functional limitation. Presently, it is unknown whether muscles closer to the knee joint (periarticular muscles) better relate to these KOA outcomes. Periarticular muscles are already visible on knee magnetic resonance images used for KOA management, but their role in KOA is unclear.

Purpose: To examine how periarticular muscle volume (distal end of thighs, proximal heads of calves), fat volume, and fat percentage, relate to knee pain and function in postmenopausal women without obesity (PMW-WO).

Methods: This cross-sectional study has recruited 55 participants from the community to date. Inclusion: PMW-WO (body mass index <30.0 kg/m2, 50-85 years old) with varying degrees of knee pain. Exclusion: Those with rheumatoid arthritis, existent joint replacements, or contraindications for MRI. Participants’ knees were scanned using MRI to capture muscle and fat. Images were analyzed using a fully automated segmentation algorithm developed by our lab. Participants completed three pain questionnaires to assess various pain types, and a stair climb, walk, and chair stand test to reflect knee function. Multivariable linear regression models will be used to determine how muscle properties relate to knee pain scores and functional measures.

Results: Lower muscle volume and higher fat volume and percentage will be associated with more knee pain and poorer functional outcomes.

Research to Practice Implications: Results can help pinpoint targets for informing KOA status in a high-risk population of women. Considering that MRIs are expensive, opportunistically examining muscle from the same knee MR images obtained for standard of care can also add value to current clinical practice with minimal added cost. Using this information to inform on KOA status can potentially lead to a paradigm shift in how we manage/treat non-overweight postmenopausal women with KOA in Canada.

Funding: Canadian Institutes of Health Research (Supervisor)
Presentation #4

Walking Groups after Moderate to Severe Traumatic Brain Injury

Enrico Quilico, Rehabilitation Sciences Institute, University of Toronto; Bonnie Swaine, University of Montreal; Shane Sweet, McGill University; Lindsay Duncan, McGill University; Shawn Wilkinson, Concordia University; Angela Colantonio, University of Toronto.

Field of Research: Social and Cognitive Rehabilitation, Occupational Science

Background/Purpose: Physical activity (PA) is recommended after moderate-severe TBI (m-s TBI) to improve community participation, mood, and quality of life. However, promoting PA participation after m-s TBI is challenging due to elevated PA barriers after injury and the current COVID-19 context, which led to the closure of community gyms and fitness centres. In the process of co-creating a pilot community-based PA program for adults with m-s TBI, outdoor group walking activities demonstrated potential through high participation rates and minimal supports for program users. The purpose of this participatory study was to explore the perceived experiences of adults with m-s TBI involved in the walking group activities to better understand the types of outcomes that resulted and to assist with the development of a formalized walking intervention to support health outcomes after m-s TBI.

Methods: Participatory methods were used with participants involved in the pilot community-based PA program. A convenience sample of 14 adults with m-s TBI were recruited (10 program participants, 4 program mentors) for semi-structured focus groups that were audio-recorded. Data were then transcribed verbatim and thematic analyses generated codes and themes to represent responses. Supplemental data about tailoring walking activities with program mentors were collected through log-book entries.

Results: Preliminary analyses identified themes related perceived outcomes of the walking groups: physical outcomes with improved balance and energy, social outcomes with expanding social contacts in the community and group dynamics, and psychological outcomes with increased confidence and positive affect. Log-book data about tailoring walking group activities to users with m-s TBI support the coherence of the findings. Results support the perceived benefits of tailored walking group activities after m-s TBI, and the future development, implementation, and evaluation of a formalized walking group program in the community.

Research to Practice Implications: Future research about testing the feasibility of outdoor walking group activities in the community for adults with m-s TBI will be discussed, in addition to the Practice Implications about running walking group activities in the COVID-19 context.

Funding: Social Sciences and Humanities Research Council of Canada (SSHRC) Insight Grant (Supervisor); Sport Canada SPRI Grant; Canada Research Chair’s Program (Supervisor)
Muscle Matters: An exploratory study on lower limb isokinetic strength and reactive balance performance post-stroke

Tyler M. Saumur, Rehabilitation Sciences Institute, University of Toronto; Azadeh Barzideh, Rehabilitation Sciences Institute, University of Toronto; David Jagroop, KITE-Toronto Rehabilitation Institute, University Health Network (KITE-TRI, UHN); Cynthia Danells, KITE-TRI, UHN; Elizabeth L. Inness, KITE-TRI, UHN, University Health Network; George Mochizuki, School of Kinesiology and Health Science, York University; Stephen D. Perry, Department of Kinesiology and Physical Education, Wilfrid Laurier University; Sunita Mathur, Department of Physical Therapy, University of Toronto; Avril Mansfield, KITE-TRI, UHN.

Field of Research: Movement Science

Background/Purpose: Following a stroke, many individuals have difficulty responding to a loss of balance (i.e. poor reactive balance control). It has been postulated that asymmetries in muscle strength between limbs may contribute to this poor balance control. While these impairments can increase the risk for falls, the association between muscle strength and reactive balance control has not been studied.

Purpose: To explore the relationship between lower limb isokinetic strength and reactive balance performance in individuals with chronic stroke.

Methods: Five adults 6 months post-stroke were exposed to 10 balance perturbations resulting in a forward step. Reactive step timing measures (foot-off and swing time) and steps to recover balance were collected through force plates and video data, respectively. Isokinetic knee extensor and flexor peak torque was assessed using computerized dynamometry at 60°/s during muscle shortening (concentric) and lengthening (eccentric) contractions. Strength asymmetries were calculated as the torque ratio between the less affected (LA) and more affected (MA) limb. Pearson correlations were calculated, however p-values were not reported due to the small sample size.

Results: Foot-off (r-value range: -0.270 to +0.386) and swing time (r-value range: -0.258 to +0.061) had weak correlations with isokinetic strength for both limbs; however, concentric knee extensor asymmetries and flexor asymmetries had a strong positive correlation with foot-off time when weight-bearing on the LA limb (r-values: 0.982 and 0.925) and a moderate negative correlation with swing time when weight-bearing on the MA limb (r-values: -0.627 and -0.740). Number of steps to recover balance was negatively correlated with knee extensor and flexor concentric strength for both limbs, with stronger correlations observed in the LA limb (r-value range: -0.754 to -0.978).

Research to Practice Implications: Poor step timing and greater steps needed to recover balance are two features of reactive stepping associated with falls. The present findings suggest that greater leg strength on the weight-bearing limb optimizes step time and that fewer steps are needed to recover balance in those with greater knee extensor and flexor concentric strength. Thus, exercises that target knee extensor and flexor concentric strength and minimize between-limb asymmetries may enhance stability following a loss of balance and improve step timing.

Funding: Ontario Graduate Scholarship; Toronto Rehabilitation Institute Student Scholarship; UTFA Al Miller Memorial Award; Mary Gertrude l'Anson Scholarship
Coping Mechanisms Among Youth and Young Adults with Autism Spectrum Disorder in Competitive Employment

Abirami Vijayakumar, Rehabilitation Sciences, University of Toronto; Melanie Penner, Autism Research Centre, Holland Bloorview Kids Rehabilitation Hospital; Shannon Scratch, Bloorview Research Institute, Holland Bloorview Kids Rehabilitation Hospital; Sally Lindsay, Bloorview Research Institute, Holland Bloorview Kids Rehabilitation Hospital.

Field of Research: Social and Cognitive Rehabilitation, Rehabilitation Health Services Studies

Background/Purpose: Successful integration into employment is often an ongoing issue for individuals with autism spectrum disorder (ASD). A primary barrier to successful employment includes being unable to cope with the social demands of work because people with ASD are more likely to experience higher levels of stress and anxiety. The purpose of our study was to explore how youth and young adults with ASD cope with stress and anxiety (i.e., normal/typical anxiety) in competitive employment.

Methods: A phenomenological qualitative study was conducted involving in-depth, semi-structured interviews with a purposive sample of 12 youth and young adults with ASD aged 15-30 who were employed or had work experience. We analyzed our data using interpretative phenomenological analysis.

Results: Findings indicated that stress and/or anxiety inducers for participants in the workplace included: challenges with social communication at work, tasks at work, impact of COVID-19 on employment experiences, past trauma/experiences impacting ability to work, and personal experiences with disability disclosure. Participants reported using the following coping strategies to combat work-related stress and/or anxiety: (1) problem-focused (i.e., finding ways to solve issues at hand), (2) emotion-focused (i.e., using strategies to reduce negative feelings and emotions related to stress), and/or (3) resilience (i.e., pushing through the situation despite feeling stressed and/or anxious). Participants also identified workplace barriers and facilitators, which may impact future occurrences of stress or anxiety.

Research to Practice Implications: Uncovering stress and/or anxiety inducers in a workplace setting can help employers be better informed of the potential barriers that are present for employees with ASD, which can lead to better inclusion on the job. The findings from this study have the potential to improve employment outcomes, transition skills, and overall mental health among youth and young adults with ASD in competitive employment.

Funding: SSHRC Master’s Scholarship
7 Minute Presentations
(In the order of presentation)
Validation of the Patient Reported Outcomes of Fracture Healing (PROOF) Questionnaires for Evaluation of Pediatric Upper Extremity Fracture

Lauren DiNola, Hospital for Sick Children; Rehabilitation Sciences Institute, University of Toronto; Unni Narayanan, Hospital for Sick Children.

Field of Research: Movement Science

Background/Purpose: In children, long bone fractures of the upper extremity are common injuries and it is uncertain with such a variety of treatment methods which treatments are best. To date, there are no Patient Reported Outcome Measures (PROM) available specifically for pediatric fractures, so we are developing a PROM called Patient Reported Outcomes of Fracture healing (PROOF) for upper extremity fractures. The purpose of this proposed study is to (i) evaluate the reliability and internal consistency; (ii) establish construct validity; (iii) compare children’s responses to their parents’ responses; (iv) evaluate the responsiveness of the PROOF questionnaires for upper extremity fractures.

Methods: 200 patients and their parents will be recruited from the Hospital for Sick Children within 3 weeks of injury. They must have an upper extremity fracture, between the ages of 0 and 18 years old and be able to comprehend the purpose of the study. These include traumatic fractures of the clavicle, humerus, elbow, forearm, wrist and hand. Respondents of the PROM are children 8 years and older and/or their parents. Recruitment can occur in the fracture clinic during the patient’s appointment or virtually (phone and zoom call). Participants will be invited to participate in the following aspects: test-retest reliability (two administrations of the PROOF evaluated using intraclass correlation coefficient), construct validation (one-time administration of the PROOF and the relevant established questionnaires evaluated using t-test), and/or the responsiveness (2 to 4 longitudinal assessments of the PROOF over the course of fracture healing, evaluated using ANOVA). Sex and gender are included in the analysis.

Results: If the PROOF questionnaire is shown to be reliable, valid and responsive to evaluate upper extremity fracture outcomes in children, these measures will have the potential to be adopted widely in all kinds of clinical research of children’s fractures.

Research to Practice Implications: Clinicians and researchers will be able to use this questionnaire to provide Canadian and other investigators a more sensitive and meaningful instrument to measure outcomes in the broad array of fractures. The PROOF will be able to be used clinically, for clinical trials and for comparative effectiveness research of children’s fracture treatments around the world, where the results of which can inform patient/parent preferences and shared decision making.

Funding: Canadian Institutes of Health Research (Supervisor), Canadian Orthopaedic Foundation (Supervisor).
Presentation #2

Using activity-based therapy for individuals with spinal cord injury or disease: rehabilitation hospital therapists’ perspectives

Hope Jervis Rademeyer, Rehabilitation Sciences Institute, University of Toronto; Cindy Gauthier, University of Toronto; José Zariffa, KITE–Toronto Rehabilitation Institute, University Health Network; Kristen Walden, Praxis Spinal Cord Institute; Tara Jeji, Ontario Neurotrauma Foundation; Shane McCullum, Stan Cassidy Centre for Rehabilitation; Kristin Musselman, University of Toronto.

Field of Research: Practice Science, Rehabilitation Technology Science

Background/Purpose: To help people with spinal cord injury/disease (SCI) meet their functional goals through a restorative approach, rehabilitation seeks to achieve neuroplasticity. To promote neuroplasticity, activity-based therapy (ABT) targets activation of the neuromuscular system below the level of the spinal cord lesion. High level technologies (e.g., virtual reality, functional electrical stimulation), can increase therapy intensity to levels where neuroplasticity is more likely to occur. Currently, the extent of uptake of ABT and these associated technologies in Canadian clinical practice is unknown. This study aims to understand if and how physical (PTs) and occupational therapists (OTs) use ABT and associated technologies for hospital rehabilitation of Canadians living with SCI.

Methods: Focus groups included licensed PTs (n=12) and OTs (n=10) employed at nine rehabilitation hospitals in Canada. A semi-structured interview guide was created using the Theoretical Domains Framework to gather focus group data. For data analysis, interpretive description was used. This methodology is well-suited to understand clinical phenomena and inform clinical applications. Following principles of interpretive description, two PT researchers (HJR, CG) highlighted phrases and inserted marginal memos into transcripts to jointly develop themes and categories. Using an iterative approach, themes and categories were modified in consultation with a third reviewer (KEM) as appropriate. NVivo 12 was used to manage the data.

Results: Three themes influenced therapists’ use of ABT and associated technologies for SCI rehabilitation. 1) Therapists’ decision-making approach to ABT included therapist roles, site-specific dynamics and goal setting. 2) Therapist perceived individual factors could increase or prevent the likelihood of ABT use by therapists. 3) ABT and technology access noted visible and invisible barriers, and how technology was used for ABT.

Research to Practice Implications: In Canadian rehabilitation hospitals, variable uptake of ABT and associated technologies suggests that therapist education about ABT and site-specific implementation strategies are needed. To support hospital therapists in implementing ABT (e.g., knowledge sharing, equipment ratings), a resource network connecting stakeholders (e.g., therapists, researchers) together would be valuable, such as, the recently formed Canadian ABT Community of Practice.


Funding: Ontario Graduate Scholarship; Toronto Rehab Institute Scholarship; Lois Snelling Award; Ontario Early Researcher Award (Supervisor); Canadian Institutes of Health Research (Supervisor); Praxis Spinal Cord Institute (Supervisor).
Presentation #3

Exploring a Telerehabilitation Approach to Active Rehabilitation for Youth with Concussion

Josh Shore, Rehabilitation Sciences Institute, University of Toronto; Emily Nalder, Department of Occupational Science and Occupational Therapy, University of Toronto; Michael Hutchison, Faculty of Kinesiology and Physical Education; Nick Reed, Department of Occupational Science and Occupational Therapy, University of Toronto; Anne Hunt, Department of Occupational Science and Occupational Therapy, University of Toronto.

Field of Research: Rehabilitation Health Services Studies, Occupational Science

Background: Active rehabilitation involving low-intensity exercise, education, and support promotes recovery in youth with concussion. However, active rehabilitation is typically delivered in-person at specialized clinics, which limits accessibility for youth due to a lack of services in their communities or logistical challenges to attending in-person sessions.

Purpose: (1) To develop an active rehabilitation intervention for youth with concussion designed for remote service delivery; and (2) To evaluate the feasibility and preliminary impact of the intervention.

Methods: The Tele-Active Rehabilitation intervention was developed according to the Medical Research Council guidance for complex interventions. It is a 6-week program delivered through weekly videoconferencing appointments and involves: (1) Aerobic exercise; (2) Coordination drills; (3) Comprehensive education and support. Feasibility was evaluated in a mixed methods study using a pre-post case series design. Feasibility indicators include recruitment, retention, adherence, technology usability, and satisfaction. Preliminary intervention impact was evaluated through pre- to post-intervention changes on the Post-Concussion Symptom Inventory (PCSI), Canadian Occupational Performance Measure (COPM), and Brief Illness Perception Questionnaire (BIPQ). Feedback questionnaires and qualitative interviews were conducted with youth and their parents to understand their experiences. Quantitative data was summarized using descriptive statistics and interviews were analyzed thematically.

Results: Three participants completed the study. Four feasibility indicators achieved success and one approached success. All participants reported improvements in symptoms (PCSI) and illness perception (BIPQ) following the intervention. Clinically significant positive changes were also observed in occupational performance and satisfaction (COPM). Youth and parents reported high satisfaction with the intervention. Interviews revealed that participants valued individualization of the intervention and appreciated the convenience and comfort of engaging in the program from home. Barriers and facilitators to success and areas for improvement have been identified.

Research to Practice Implications: Tele-Active Rehabilitation is a feasible intervention and warrants more rigorous evaluation. Remote delivery of active rehabilitation may increase access to care that improves recovery and promotes a timely return to activities in youth with concussion.

Funding: CIHR Canada Graduate Scholarship, Ontario Graduate Scholarship, Hilda and William Courtney Clayton Pediatric Research Fund.
Poster Abstracts
Movement Science

The integration and synthesis of knowledge from basic sciences, social sciences and applied sciences for the purpose of studying questions related to understanding the prevention of movement-related impairments, and the maintenance, enhancement and rehabilitation of human physical activity for persons whose physical capabilities are, or are perceived to be, challenged by disease and injury.
Poster #1

Understanding the Neuromechanical effects of Concussion on Balance Responses and Recovery to a Virtual Environment and Gait Perturbation

Calaina Brooke, Rehabilitation Sciences Institute, University of Toronto; Stephen Perry, Rehabilitation Sciences Institute, University of Toronto.

Background/Purpose: Between 2008 and 2016, in Ontario, there were 1.3 million incidents resulting in a concussion diagnosis. Symptoms of concussion can be diverse however; balance deficits are one of the most common, presenting in 30% of diagnosed cases. Being able to respond to visual and proprioceptive stimulus is important, as everyday tasks can occur in visually and physically dynamic environments such as walking through a grocery store or standing on a bus. When observing postural control, it has been demonstrated that those with concussion have a greater reliance on visual input when compared to healthy controls. Virtual reality (VR) has become more commercially available and has the ability to create dynamic visual environments. VR has shown promise as a balance assessment tool, with high sensitivity to detect ongoing balance deficits after a concussion. VR and moving platform perturbations have been previously implemented in a military based case-study and were uniquely able to elicit balance deficits from the concussed participant. The proposed study will build on this work, seeking to understand how this paradigm can be applied to a general population.

Methods: To determine the effects of concussion on sensorimotor integration balance responses using visual and physical perturbations. It was hypothesized that concussed individuals will have impaired balance responses and be unable to control COM movement during a physical and visual perturbation under a dynamic gait condition when compared to healthy controls. Participants will be recruited from the University Health Network Concussion Clinic. The participants will be outfitted with VICON reflective markers and the Worldviz HTC Vive VR headset. Three gait conditions will be tested: 1) a control with no perturbation; 2) the unexpected moving platform perturbation; and 3) the virtual environment perturbation.

Anticipated Results: A-P, M-L COM sway, and lateral step variability will be increased in concussed individuals in response to the physical and visual perturbation compared to healthy controls.

Research to Practice Implications: The proposed study aims to determine if balance deficits are provoked by situations of increased sensory stimuli which could affect the ability of a person to complete everyday tasks. The use of VR will create a visually stimulating environment while engaging visuomotor systems involved in maintaining balance in hopes to inform rehabilitation programs to help determine when to return back to activities of daily living.

Funding: Natural Sciences and Engineering Research Council of Canada Discovery Grant (Supervisor).
Poster #2

Intramuscular Architecture of the Digital Bellies of the Flexor Digitorum Profundus: a 3D Modelling Study to Analyze Functional Differences

Emma S. Campisi, Division of Anatomy, Department of Surgery, University of Toronto; John Tran, Division of Anatomy, Department of Surgery, University of Toronto; Mai Lan Johnston, Division of Anatomy, Department of Surgery, University of Toronto; Anne M.R. Agur, Division of Anatomy, Department of Surgery, University of Toronto.

Background/Purpose: The investigation of the muscle architecture of flexor digitorum profundus (FDP) is imperative to understanding the role of FDP in digital (2-5) movements. To date, no studies have quantified 3D morphology/architectural parameters of the digital bellies of flexor digitorum profundus (FDP), both important determinants of relative excursion and force generation capabilities of a muscle. The purpose of this study is to model and quantify in 3D the morphology and architectural parameters of the digital bellies of FDP in situ to compare morphology, and excursion/force generation capabilities between bellies.

Hypothesis: Each digital belly of FDP has unique architecture and different relative functional capabilities.

Methods: The fiber bundles/ aponeuroses of the bellies of FDP were serially dissected and digitized (MicroScribe® Digitizer) in 5 embalmed specimens. The skeleton was laser scanned using a FARO® Quantum FaroArm®. The data were reconstructed into 3D models (Autodesk® Maya®). Fiber bundle length (FBL), pennation angle (PA) physiological cross-sectional area (PCSA) were quantified. The 3D morphology and architectural parameters were compared between digital bellies.

Results: Fiber bundles of each digital belly had a distal attachment to the superficial and deep surfaces of an internal aponeurosis. This aponeurosis was continuous with the external tendon. Architectural parameters varied between the digital bellies. Mean FBL of the 2nd and 4th digital bellies were similar (78.9+/−18.5mm) and about 17 mm longer than the 3rd belly and 10mm longer than the 5th. The 2nd and 3rd digital bellies had the largest mean PCSA, and the 4th belly the smallest. Mean PA was similar in all bellies (range 5.6–8.8 degrees).

Research to Practice Implications: The relative functional capabilities of the digital bellies vary, with the 2nd digit having the greatest relative excursion and force generating capabilities as evidenced by the largest mean FBL and PCSA. Of the remaining digital bellies, the 4th had the greatest relative excursion capability and the 3rd the largest relative force generating capability. Further in vivo study is needed to document architectural changes during hand movements to enhance our understanding of the role of each FDP belly.
Test-Retest Reliability of an Online Version of the Beat Alignment Task in Neurotypical Adults and People with Stroke

Sarah Gregor, Rehabilitation Sciences Institute, University of Toronto; Avril Mansfield, KITE–Toronto Rehabilitation Institute, University Health Network; George Mochizuki, School of Kinesiology and Health Science, York University; Joyce Chen, Faculty of Kinesiology and Physical Education, University of Toronto; Kara K. Patterson, Department of Physical Therapy, University of Toronto.

Background/Purpose: Rhythm-based interventions, like walking to a beat, are gaining popularity as adjunct for neurorehabilitation. Music background and rhythm abilities may impact the effectiveness of these interventions; accurate measurement of rhythm is important. A common tool to measure rhythm is a computerized test called the Beat Alignment Test (BAT) that is typically delivered in person, yet the test-retest reliability of this tool is unknown. This study aims to determine the feasibility of online delivery and the test-retest reliability of the BAT in adults with and without stroke.

Methods: Neurotypical adults and adults with stroke (> 6 months) completed the BAT online 3 times, separated by 2 to 4 days. The BAT included a perception task (identifying whether tones overlaid on music matched the beat of the music) and a production task (tapping to the beat of music). Beat perception was quantified as the percentage of correct responses over 17 trials. Beat production was quantified as the mean difference in timing between participant taps and the beats of musical stimuli, averaged over 24 trials. Participants completed demographic and music background questionnaires, rated the feasibility of the BAT online using a 5-point Likert scale (e.g. “I found the rhythm perception test easy to do online”), and reported any technical difficulties.

Results: Data collection is ongoing. To date, 35 neurotypical adults and 17 adults with stroke have participated. The stroke group was older, yet both groups had similar musical backgrounds and were primarily female. Only 29 neurotypical adults (82.86%) and 11 (64.70%) persons with stroke completed all 3 sessions. Participants mostly withdrew due to technical difficulties (e.g. incompatible software). The stroke group reported a lower feasibility score for the BAT online (3.7/5 vs 4.4/5). Preliminary analysis identified an ICC = 0.47 (CI: 0.25-0.68) and ICC = 0.57 (CI: 0.22-0.84) for the perception component of the BAT in neurotypical and stroke participants, respectively, and an ICC = 0.73 (CI: 0.56-0.85) and ICC = 0.31 (CI:-0.049-0.70) for rhythm production.

Research to Practice Implications: Online administration of the BAT is more feasible for neurotypical adults than people with stroke. Preliminary analysis suggests poor-moderate test-retest reliability of the BAT for both groups. Future work will need to determine if in-person delivery with a researcher, typical practice pre-pandemic, improves reliability.

Funding: Peterborough KM Hunger Graduated Scholarship, Toronto Rehabilitation Institute Graduate Scholarship, Marguerite Harland Smith Graduate Award in Rehabilitation Sciences; Canadian Partnership for Stroke Recovery Catalyst Grant (Supervisor).
3D Anatomy of the Innervation of the Cervical Zygaphysical Joints for Image-Guided Nerve Ablation

John R. Han, Division of Anatomy, Department of Surgery; Rehabilitation Sciences Institute, University of Toronto; Philip W.H. Peng, Department of Anesthesiology and Pain Medicine, University of Toronto; Anne M.R. Agur, Division of Anatomy, Department of Surgery; Rehabilitation Sciences Institute, University of Toronto.

Background/Purpose: Fifty-five percent of patients with back pain report cervicofacet joint involvement. Image-guided nerve block (NB) and radiofrequency ablation (RFA) of the medial branches of the posterior rami are used to manage cervicofacetogenic pain. NB/RFA require precise knowledge of the course of the sensory innervation to the cervical zygaphysical joints (CZPs) relative to soft and bony tissue landmarks. No 3D studies investigating the sensory innervation to the CZPs were found in the literature. The purpose was to capture and model in 3D the course of the sensory innervation to C3-C7 CZP and identify soft and bony tissue landmarks that could be used to localize the nerves with image-guidance systems.

Methods: Two formalin-embalmed specimens were used. The branches given off the medial branches of C3-C7 posterior rami were serially dissected and digitized (Microscribe® G2X Digitizer) to their termination. Skeletal features were also digitized. The data were reconstructed in 3D using Autodesk® Maya®. The models were used to document the course of the nerves innervating C3-C7 CZP. The relationship of the nerves supplying the CZP capsules to soft and bony tissue landmarks were determined.

Results: The innervation pattern of the CZP varied regionally. C6/C7 facet joint was innervated by fine branches from C6 and C7 medial branches. C3 to C5 capsular branches formed a nerve plexus lying on the posterior surface of the articular pillar. Branches from this plexus extended anteriorly to innervate the CZP in this region. --Landmarks specifically localizing the capsular branches to the CZP include posterior aspect of the articular pillar and deep segmental intermuscular tendons of semispinalis capitis. The posterior intertransversarii can also be used as landmarks.

Research to Practice Implications: The results of this 3D pilot study provide the anatomical basis for the development of novel image-guided NB/RFA protocols that could enable precise targeting of capsular branches to the CZP.
Poster #5

Spatial Characteristics of Reactive Stepping among People Living with Chronic Incomplete Spinal Cord Injury/Disease

Matthew Heffernan, Rehabilitation Sciences Institute, University of Toronto; Jae W. Lee, Institute of Biomedical Engineering, University of Toronto; Katherine Chan, Rehabilitation Sciences Institute, University of Toronto; Janelle Unger, Rehabilitation Sciences Institute, University of Toronto; Susan Marzolini, Rehabilitation Sciences Institute, University of Toronto; Tim Welsh, Faculty of Kinesiology and Physical Education, University of Toronto; Kei Masani, Institute of Biomedical Engineering, University of Toronto; Kristin Musselman, Department of Physical Therapy, Rehabilitation Sciences Institute, University of Toronto.

Background/Purpose: Approximately 78% of people with incomplete spinal cord injury/disease (iSCI/D) fall at least once per year. Prevention of falls requires intact reactive balance responses, such as taking a reactive step. We have demonstrated that individuals with iSCI/D are more likely to require multiple reactive steps to maintain balance after a simulated forward fall compared with able-bodied (AB) individuals.

Purpose: To investigate potential contributors to this behavioral difference, we compared the spatial characteristics of reactive stepping between individuals with chronic motor iSCI/D and AB individuals of similar age and sex.

Methods: Twelve individuals with chronic motor iSCI/D (3 males, 53.6±15.2 years old) and eleven AB individuals (3 males, 54.8±14.0 years old) were included in a cross-sectional study. The Lean-and-Release test, which simulates a forward loss of balance, was used to elicit reactive stepping. A horizontal cable, attached at waist height, was released when 8-12% of a participant’s body weight was supported in a forward lean position. Each participant underwent up to 10 Lean-and-Release trials in a single session. Kinematic (i.e. 3D motion capture) and kinetic (i.e. 4-cell force plate system) data were recorded. Step length, width, and length-width vector normalized for participant height were calculated for the first reactive step of each trial. Standard deviation between trials was calculated to represent the variability in step length, width, and length-width vector within a participant.

Results: Normalized step length (p=0.94), width (p=0.52) and length-width vector (p=0.63) did not differ between groups. Participants with iSCI/D showed greater variability in step length (p=0.02), width (p=0.01) and length-width vector (p=0.01).

Research to Practice Implications: Significant differences in step variability between groups may contribute to behavioral differences in reactive stepping. Future research should investigate whether balance interventions decrease variability in the step length and width of reactive stepping following iSCI/D.

Funding: Toronto Rehab Graduate Student Scholarships; Ontario Neurotrauma Foundation and Praxis Spinal Cord Institute (Supervisor).
Muscle Oxygenation of Respiratory Muscles During Inspiratory Threshold Loading and Intermittent Neck Flexion Maneuvers

Melissa Miles, Department of Physical Therapy, Rehabilitation Sciences Institute, University of Toronto; Dmitry Rozenberg, Institute of Medical Science, University of Toronto; Division of Respirology, University Health Network; Darlene Reid, Department of Physical Therapy, University of Toronto.

Background/Purpose: Evaluating muscle oxygenation can provide insight into metabolic stress, recruitment strategies, and limitations of the working muscle. Of particular interest are the inspiratory muscles due their role in ventilation both at rest and at higher ventilatory loads that occur during exertion and in several diseases. Since different types of inspiratory muscle training can improve the strength and endurance of these muscles, a better understanding of their oxygenation patterns during different training modalities is warranted.

Purpose: To quantify the relative changes of muscle oxygenation and deoxygenation of the scalenes (SA), diaphragm (DIA), and sternomastoid (SCM) during prolonged submaximal intermittent neck flexion (INF) versus submaximal inspiratory threshold loading (ITL) until task failure in healthy young adults.

Methods: This study is a secondary analysis of a randomized, single-blind cross-over, repeated measures design. Twelve healthy adults performed the ITL or INF tests in random order on separate days. Near infrared spectroscopy (NIRS) was used to monitor deoxy-(HHb), oxy-(O2Hb) and total hemoglobin (tHb) of the SA, DIA and SCM. Maximal inspiratory pressures (MIP) for ITL and maximum voluntary contraction (MVC) for neck flexion were determined. Next, participants performed the first submaximal test – ITL or INF targeting 50±5% of the MIP or MVC, respectively, until task failure. After a rest, they performed the other test until task failure. Two days later, they performed ITL and INF but in opposite order. Borg scale assessed breathlessness and perceived exertion.

Results: The mean age of the participants included was 24.4 ± 0.9 and the average body mass index was 23.3 ± 2.3. Mean endurance times for ITL and neck flexion were 40.1 minutes and 23.5 minutes, respectively (p<0.05). Participants reported lower scores of Borg’s ratings of breathlessness during INF compared to ITL (p<0.05). Changes in NIRS parameters will be analyzed from baseline to end exercise and at isotime using two-way repeated measures of analysis of variance.

Conclusion: INF might be preferable for some individuals since both INF and ITL recruited similar inspiratory muscles, could be sustained for prolonged periods of time and yet, Borg’s rating of perceived exertion were lower for INF compared to ITL. Another advantage of INF is that no specialized equipment is required. Further analysis of NIRS parameters is required to support or refute this postulate.

Funding: Ontario Graduate Scholarship; Sandra Faire and Ivan Fecan Professorship in Rehabilitation Medicine (Supervisor).
Effects of Transcutaneous Spinal Cord Stimulation on the Motor-Evoked Responses of Lower-Limb Muscles across Different Postures in the Able-Bodied Individuals

Shirin Tajali, Motion & Adaptation Science Lab, KITE–Toronto Rehabilitation Institute, University Health Network; Kai Lon Fok, Motion & Adaptation Science Lab, KITE–Toronto Rehabilitation Institute, University Health Network; Naotsugu Kaneko, Motion & Adaptation Science Lab, KITE–Toronto Rehabilitation Institute, University Health Network; Dimitry Sayenko, Department of Neurosurgery, Houston Methodist Research Institute, Manvel, USA; Kei Masani, Motion & Adaptation Science Lab, KITE–Toronto Rehabilitation Institute, University Health Network.

Background/Purpose: Transcutaneous spinal cord stimulation (TSS) has positive effects in enhancing motor function in individuals with spinal cord injury (SCI). However, there is a lack of understanding on the neurophysiology of TSS especially on the effects of posture on spinal motor-evoked responses (sMERs) in the lower limb muscles. Notably, the nature of sMER responses seems to largely depend on the physiologic state such as posture, joint position, and loads. Therefore, it is essential to investigate sMER across different postures to explore the best posture for spinal stimulation. To date, the effects of passive standing has not well investigated while it is widely used in both acute and chronic SCI care.

Objectives: To expand our understanding of the effects of TSS on the sMERs in the different postures.

Methods: To date, three able-bodied participants were participated in this experiment and double pulse TSS stimulation was applied at the level of T11-T12 and in four different postures including: (1) lying, (2) sitting, (3) standing, and (4) supported standing. In the supported standing condition, participants were asked to stand on a standing frame while trunk, pelvis and knees were mechanically supported resulting in minimal muscle activations at the legs. Surface electromyogram (EMG) signals were recorded from the soleus (SOL), medial head of gastrocnemius (MG), tibialis anterior (TA), vastus medialis (VM), rectus femoris (RF), and biceps femoris (BF) in the dominant leg. The recruitment curve for each muscle was collected by increasing stimulation intensity of TSS from 10 to 100 mA, with 5 stimuli at each intensity.

Results: sMERs were found to be largest in the supine posture for all studied muscles. There was a decreasing trend in sMERs when body posture changed from laying to sitting or standing. In addition, there was a trend toward greater muscle responses in the supported standing condition than standing for most of the studies muscles.

Research to Practice Implications: Upright posture (standing & sitting) was associated with reduced sMER compared with laying posture which may indicate the importance of vestibular information (head position relative to gravity) in the modification of spinal reflexes. Also, reduced muscle tension and proprioceptive information in the passive standing condition compared to standing may be responsible for changes in the sMER between the two conditions.

Funding: Wings for Life Research Grant (Supervisor).
Background/Purpose: Myopathy has been described as an adverse effect of glucocorticoids (GC) which can lead to considerable morbidity. The evidence on GC-induced myopathy in asthma has not been well described. To facilitate evidence-based practice, we aimed to review the evidence of GC-induced myopathy in people with asthma, and the underlying characteristics of GC (type, dosage, and duration) associated with myopathy.

Methods: A systematic review (PROSPERO CRD42020142448) was performed, with a search strategy using MEDLINE, EMBASE, CINAHL, and Cochrane CENTRAL databases. Studies were included if they comprised adults or adolescents with asthma, taking systemic GC, and measures of muscle impairments. Methodologic quality was evaluated using the National Heart, Lung, and Blood Institute Quality Assessment Tool.

Results: Nine studies met the eligibility criteria. Six studies focused on patients with GC-dependent asthma; three studies included patients with acute exacerbation requiring critical care admission for mechanical ventilation. The methodologic quality of most studies was fair or good (n=7). Two studies reported significantly lower inspiratory muscle function in outpatients with GC-dependent asthma taking oral GC daily (≥10mg), compared to those who were not on regular oral GC. Three studies did not find significant differences in respiratory or limb muscle function between the two groups. Studies on patients with asthma exacerbation taking GC intravenously reported 11-36% suffering from limb muscle weakness during or after their ICU stay. However, one study showed that only patients who were on both intravenous GC and neuromuscular blocking agents developed myopathy, but not those who were on only intravenous GC (41% vs 0%). Two studies with GC-dependent asthma reported significant associations between dosage of oral GC use and inspiratory and limb muscle function, whereas four studies did not find any significant correlations among the characteristics of oral GC and respiratory or limb muscle size or function.

Research to Practice Implications: There were inconsistent results from studies on GC-induced myopathy in people with asthma, and the association between type, dosage and duration of GC and myopathy. Future studies should use a commonly accepted operational definition of myopathy, utilize a cohort study design, measure the cumulative dosage of GC, and integrate possible confounding factors in the analysis.

Funding: Ontario Respiratory Care Society Fellowship Award; The Lung Health Foundation; Diane Gasner Graduate Scholarship; Rehabilitation Sciences Institute Departmental Award.
A basic science dedicated to the systematic study of human occupation. Using both qualitative and quantitative methods of inquiry, it addresses the form, function, and meaning of human occupation and its relationship to health and well-being. The science informs and is informed by many other disciplines including psychology, anthropology, sociology, human movement science, medical science and economics.
Employment and Accommodation Needs in Individuals with Traumatic Brain Injury: A Pilot Study

Sara Hanafy, Rehabilitation Sciences Institute, University of Toronto; Angela Colantonio, Rehabilitation Sciences Institute, University of Toronto; Sarah Munce, KITE–Toronto Rehabilitation Institute, University Health Network; Sally Lindsay, Bloorview Research Institute, Holland Bloorview Kids Rehabilitation Hospital.

Background/Purpose: Traumatic brain injury (TBI) is a leading cause of disability worldwide. Sex and gender influence employment in TBI. A large facilitator to employment in TBI is having workplace accommodation, however in many cases accommodations are unavailable or may not fit the needs of the individual. Further, it is unknown how the Coronavirus Disease 2019 (COVID-19) pandemic is impacting employment and accommodations for persons with TBI. This study aims to investigate sex and gender specific workplace accommodations in persons with TBI, while considering the impact of COVID-19 on transitioning to work and on mental health in adults with TBI.

Methods: The proposed research is a pilot study with an observational cross-sectional design. Sixty adults with TBI, including men, women and gender diverse people within the age range of 18-65 years inclusive, will be recruited. An online survey will be self-administered through Research Electronic Data Capture. The survey includes questions on demographics (e.g., sex, gender, age, ethnicity, injury severity, mechanism of injury); questions from the Canadian Survey on Disability 2017 on employment status, requirements and unmet needs for workplace accommodations; and questions from Statistics Canada on the impact of COVID-19 on work status.

Results: Data collection is in progress. Planned analyses include multinomial logistic and multivariable linear regression analyses to evaluate the relationships between the predictor (i.e., sex, gender) and main outcome variables (i.e., the number and type of accommodations needed, change in employment status and mental health due to COVID-19). Descriptive statistics, between-group comparisons for sex and gender, and sex-specific and gender-specific stratification will be completed to understand emerging trends.

Research to Practice Implications: Sex and gender influences in TBI can serve to inform rehabilitation professionals, employers and persons with TBI, to enable sex- and gender-sensitive interventions for community participation practices. Findings from this study will contribute to the body of evidence on sex- and gender-specific workplace accommodations, while bridging the knowledge gap of how to improve transition to work in persons with TBI. Results will also further the understanding of the specific needs of men, women and gender-diverse persons with a disability during community participation post-discharge, including during unprecedented times.

Funding: Toronto Rehabilitation Institute Student Scholarship; CIHR-SSHRC Partnership Grant, “Healthy and productive work” (Supervisor); Social Sciences and Humanities Research Council (SSHRC) Institutional Explore Grant (Supervisor). Dr. Angela Colantonio is supported in part by the Canada Research Chairs Program in Traumatic Brain Injury in Underserved Populations.
Poster #10


Samira Omar, Rehabilitation Sciences Institute, University of Toronto; Stephanie Nixon, Rehabilitation Sciences, Department of Physical Therapy, University of Toronto; Angela Colantonio, Rehabilitation Sciences, Department of Occupational Science & Occupational Therapy, University of Toronto.

Background/Purpose: Current understandings of the etiology of traumatic brain injury (TBI) and trajectory of care lack consideration for the inclusion of Black populations and the impact of institutional racism and its related intersections. Black persons with TBI have unmet needs along the care continuum, including opportunities for meaningful participation and vocation, resulting in occupational deprivation. While integrated care is seen as an appealing approach to service delivery, little is known about what this means for Black people with TBI.

Purpose: This novel critical transdisciplinary scoping review examined the literature on integrated care pathways that consider Black people living with TBI. The following are the objectives:(a) summarize the extent, nature, and range of literature on care pathways that consider Black populations, (b) summarize how Blackness, race, and racism are conceptualized in the literature, (c) determine how Black people come to access care pathways, and (d) identify how care pathways in research consider the mechanism of injury and implications for human occupation.

Methodological Approach: Six databases were searched systematically, identifying 178 articles after removing duplicates. In total, 43 articles on integrated care within Black persons with TBI were included in this review. Narrative synthesis was conducted to analyze the data and presented as descriptive statistics and a narrative.

Results: All studies were based in the United States, where 81% reported racial and ethnic disparities across the care continuum. Sex, gender, and race are used as demographic variables where statistical data were stratified by race in only 9% of studies. Black patients are primarily denied access to care, experience lower rates of protocol treatments, poor quality of care, and lack access to rehabilitation. Racial health disparities are disconnected from racism and are displayed as symptoms of a problem that remains unnamed.

Research to Practice Implications: The findings illustrate how racism becomes institutionalized in research on TBI care, demonstrating the need to incorporate the voices of Black people, transcend disciplinary boundaries, adopt an anti-racist lens in education and training, and examine diverse geographical contexts as there is a lack of research on this topic outside of the United States. These findings have implications for care pathways and how Black people experiencing TBI navigate the care continuum.

Funding: Toronto Rehabilitation Student Scholarship; Health System Research Fund Program Awards, ‘Integrating Brain Injury, Mental Health, and Addictions’, Ministry Grant No. 267 (Supervisor). Dr. Angela Colantonio is supported in part by the Canada Research Chair Programs in Traumatic Brain Injury in Underserved Populations.
Poster #11

Finite Element Modelling of the Distribution of Saphenous Nerve in the Leg: A 3D Anatomical Study for Percutaneous Nerve Stimulation to Treat Overactive Bladder Syndrome

Michael Peng, Division of Anatomy, Department of Surgery, University of Toronto; Paul B. Yoo, Institute of Biomaterials and Biomedical Engineering, University of Toronto; Anne M.R. Agur, Division of Anatomy, Department of Surgery, University of Toronto.

Background/Purpose: Percutaneous saphenous nerve (SN) stimulation is an emerging treatment for overactive bladder (OAB) syndrome. The literature consists of descriptive accounts, photographs, and medical images of SN distribution. However, these resources are not adequate to construct high fidelity finite element models to simulate SN stimulation. The purpose is to document and model in 3D the course of the branches of SN relative to bony/soft tissue landmarks to enable assessment of electrode placement for percutaneous SN stimulation.

Methods: The SN along with bony and soft tissue landmarks will be digitized (MicroScribe® G2X) and laser scanned (FARO® Quantum FaroArm®) in four embalmed specimens. The digitized and laser scanned data will be registered and modelled (Autodesk® Maya®). The 3D models will be used to determine optimal stimulation sites and to construct a finite element model of SN stimulation with engineering collaborators.

Results: SN has an extensive subcutaneous network comprised of the infrapatellar and medial crural cutaneous branches (MCC). The MCC consist of an anterior (AB) and posterior (PB) branch, which further ramify to supply the medial aspect of the leg. The AB gives off multiple smaller branches as it courses distally deep to the great saphenous vein to the foot. Superiorly, AB lies just posterior to the medial border of the tibia and inferiorly, on its medial surface. The PB lies on the crural fascia superficial to the medial head of gastrocnemius and terminates superior to the ankle.

Research to Practice Implications: The novel 3D data is the first providing a cartesian coordinate-based map of the distribution of the AB and PB of the MCC of SN. This high-fidelity data will facilitate more accurate modelling of electrode placement for percutaneous SN stimulation and provide the necessary detail to translate these findings to the clinical setting.

Funding: MITACS Accelerate.
Poster #12

Concussion Education in the School Setting: A Scoping Review

Kylie Mallory, Rehabilitation Sciences Institute, University of Toronto; Lauren Saly, Applied Psychology and Human Development, Ontario Institute for Studies in Education, University of Toronto; Andrea Hickling, Bloorview Research Institute, Holland Bloorview Kids Rehabilitation Hospital; Heather Colquhoun, Department of Occupational Science and Occupational Therapy, University of Toronto; Emily Kroshus, Department of Pediatrics, University of Washington, Seattle, Washington, USA; Nick Reed, Department of Occupational Science and Occupational Therapy, University of Toronto.

Background/Purpose: Concussions are a prevalent injury among youth, and youth have been found to lack concussion knowledge. Concussion education has been suggested to enhance concussion knowledge and promote positive behaviours surrounding concussion. Recent recommendations and legislation have led to an increase in concussion education provided in schools, however little is known about the delivery, development and evaluation of this education. Gaining a better understanding of concussion education implemented in the school setting will lead to tailored education and a more supportive environment. A scoping review was conducted to examine concussion education implemented within a school setting. The specific purpose of this review was to explore concussion education description, delivery, development and evaluation.

Methods: Following scoping review methodological frameworks and reporting guidance (PRISMA-ScR), six databases were searched (MEDLINE, CINAHL, EMBASE, PsycINFO, SPORTDiscus and ERIC) to identify published articles from 2002 to July 2020 that implemented concussion education in a school setting. Included studies provided a description of the concussion education and were written in English. Studies were excluded if they focused on a one-to-one treatment model or were conference abstracts, theses, protocol papers or white papers.

Results: A total of 11,373 articles were identified and screened, with 27 studies included in this review. The studies delivered education to various stakeholders within the school including students (n=12; 44.4%), coaches (n=5; 18.5%), educators (n=3; 11.1%), parents (n=1; 3.7%) and a mixed audience (n=6; 22.2%). The education delivered varied based on the format and included presentations, modules, toolkits, videos and interactive arts-based components. As well, six studies (22.2%) developed the education based on a theory, model or framework. All education included some evaluation, however the evaluation tools used, and evaluation frequency varied between studies.

Research to Practice Implications: Schools are an important setting for educating students (athletes and non-athletes), educators, coaches, parents and other stakeholders as such education has the potential to promote a more supportive and positive environment surrounding concussion. This study found substantial variability in the education delivered in schools and the need to further evaluate this education to ensure it is best-suited for school-based stakeholders.

Funding: Kimel Family Graduate Student Scholarship in Pediatric Rehabilitation; Queen Elizabeth II/Patty Rigby & John Wedge Graduate Scholarships in Science and Technology, Canadian Institutes of Health Research (Supervisor).
Unravelling the Complexities of Disclosure amongst Persons with Non-Visible Illnesses and/or Disabilities in the Workplace: A Qualitative Meta-Synthesis

Vanessa Tomas, Bloorview Research Institute; Rehabilitation Science Institute, University of Toronto; Hiba Ahmed, Bloorview Research Institute; Sally Lindsay, Bloorview Research Institute; Rehabilitation Science Institute; Department of Occupational Science and Occupational Therapy, University of Toronto.

Background: Deciding whether and how to disclose a disability at work for persons with non-visible disabilities/illnesses often involve convoluted processes that incorporate a myriad of factors. Research to date has focused on collating quantitative reports, such as disclosure frequencies, barriers and facilitators of disclosing and outcomes. More research is needed to better understand the complexities of, and experiences related to disclosure decision-making and actual navigation of disclosure/concealment.

Purpose: To understand the experiences of persons with non-visible disabilities/illnesses pertaining to disclosure decision-making and navigating disclosure/concealment at work.

Methods: We conducted a qualitative meta-synthesis using Noblit and Hare’s seven steps of meta-ethnography. Comprehensive searches were conducted via MEDLINE, CINAHL, EMBASE, APA PsycInfo, Scopus, and Sociological Abstracts. Studies were analyzed to develop conceptual categories, third-order constructs (themes), and a line-of-argument with guidance from the Disclosure Decision Making Model and Disclosure Process Model and consideration of disability type, study geography, and participant age. Methodological quality was assessed using the Qualitative Framework for Evaluation.

Results: Nineteen studies were included with 406 participants, aged 15 to 81, from eight countries, including non-visible disabilities/illnesses such as Human Immunodeficiency Virus, Multiple Sclerosis, fibromyalgia, epilepsy, learning disabilities, Juvenile Idiopathic Arthritis, and mental illnesses and disorders. Four themes were contrived for the disclosure decision making process (self- and other-focused factors, experiential reasoning, and environmental/workplace factors) and two themes were developed for the disclosure/concealment event(s) (disclosure/concealment types and logistics of and strategies for disclosure). Predicated in our third order constructs, we outline an enhanced understanding of disclosure decision-making and disclosure/concealment event(s).

Research to Practice Implications: Our results help to bolster current understandings and models of disclosure decision-making and delineate components considered and enacted when disclosing/concealing. Knowledge obtained could be used amongst vocational rehabilitation professionals and employers to better support persons with non-visible disabilities/illnesses navigate disclosure and related decisions at work.

Funding: CIHR-SSHRC Partnership Development Grant (Supervisor); Kimel Family Fund, Holland Bloorview Kids Rehabilitation Hospital (Supervisor).
Rehabilitation Health Services Studies

A multidisciplinary field of scientific investigation that studies how social factors, financing systems, organizational structures and processes, health technologies, and personal behaviors affect access to rehabilitation health care, the quality and cost of rehabilitation health care, and ultimately health and well-being. Its research domains are individuals, families, organizations, practitioners, institutions, communities, and populations.
Poster #14

Examining Referral Pathways to a Community-Based Exercise Program with a Healthcare-Community Partnership: An Interviewer-Administered Survey Using Audio Conferencing

Kyla Alsbury-Nealy, Rehabilitation Sciences Institute, University of Toronto; Sarah Munce, KITE–Toronto Rehabilitation Institute, University Health Network; Heather Colquhoun, Department of Occupational Science & Occupational Therapy, University of Toronto; Susan B. Jaglal, Department of Physical Therapy, University of Toronto; Nancy M. Salbach, Department of Physical Therapy, University of Toronto.

Background/Purpose: Community-based exercise programs with healthcare-community partnerships (CBEP-HCPs) provide safe opportunities for exercise for people with balance and mobility limitations resulting from health conditions. These programs are emerging across Canada; however, some programs experience insufficient referrals from healthcare providers, which threatens their sustainability. The purpose of this study is to describe the clinical profile of CBEP-HCP participants as perceived by program providers, the current referral pathways to CBEP-HCPs as perceived by program providers, and the strategies employed by CBEP-HCP providers to facilitate referrals from healthcare providers in small, medium, and large communities in Canada.

Methods: A quantitative, descriptive, cross-sectional study is ongoing. A survey of CBEP-HCP providers is being conducted via audio conferencing with a questionnaire administered by an interviewer. The questionnaire was evaluated for sensibility with five experts and three end-users who also pilot-tested the survey administration methods. A modified Dillman method was used for questionnaire development and participant recruitment. The sampling frame is a list of forty-eight centres running the Together In Movement and Exercise (TIME) Program across Canada. Programs will be categorized by population size into small, medium, or large communities as defined by Statistics Canada. Frequencies and percentages will be analyzed in SPSS to address the study purpose.

Results: Nineteen representatives completed questionnaires for twenty-three TIME programs. Four (17%) programs surveyed were in small communities, five (22%) were in medium communities, and fourteen (61%) were in large communities. The twenty-three programs in this sample displayed a median of four CBEP-HCP participants with stroke (IQR = 1) and a median of three CBEP-HCP participants who did not use a walking aid during the class (IQR = 3). Nineteen (83%) programs received referrals from healthcare providers. Fourteen (74%) of these programs received referrals from physical therapists, ten (53%) from physicians, and seven (37%) from healthcare coordinators. Fourteen (61%) programs used promotional materials to promote the program.

Research to Practice Implications: This study will improve our understanding of referral pathways for older adults with balance and mobility limitations to CBEP-HCPs which is necessary for future investigations on program sustainability.

Funding: Interdisciplinary Fellowship Program, Canadian Frailty Network; Heart and Stroke Foundation (Supervisor); Toronto Rehabilitation Institute Chair (Supervisor).
Poster #15

Examining whether the Social Determinants of Health Predict Engagement in Exercise among Adults Living with HIV

Nivetha Chandran, Rehabilitation Sciences Institute, University of Toronto; Sergio Rueda, Institute for Mental Health Policy Research, Centre for Addiction and Mental Health; Andrew Pinto, Li Ka Shing Knowledge Institute, St. Michael’s Hospital; Kelly K. O’Brien, Department of Physical Therapy, University of Toronto.

Background/Purpose: Physical Activity can mitigate disability and improve health outcomes for people living with HIV. The social determinants of health (SDOH) include factors that may influence engagement in physical activity. However, it is unclear how SDOH influences exercise engagement among people living with HIV.

Objectives: The objectives of this study are 1) To describe the nature and extent of exercise engagement and 2) To examine whether SDOH predict engagement among adults living with HIV enrolled in a community-based exercise (CBE) intervention.

Methods: A quantitative longitudinal study is being conducted using data collected with adults living with HIV who participated in a 25-week CBE intervention. Participants engaged in a combination of aerobic, resistive, balance and flexibility exercise, for 90 mins 3X/week with 1 weekly session supervised by fitness instructors at Toronto YMCA. Using the Public Health Agency SDOH Framework, 10/12 demographic characteristics were identified as proxies for SDOH. Objective 1: i) nature and ii) extent of exercise measured by self-reported weekly exercise logs, weekly coaching logs and YMCA usage were descriptively analyzed. Objective 2: ‘Engagement in exercise’ is defined as attending ≥72% (18/25) weekly sessions. We are conducting univariate analyses between exercise engagement and each determinant followed by logistic regression to determine predictors of engagement.

Results: Of the participants who initiated the intervention, 67/80 (84%) completed it. The majority of participants were male 72/80 (90%), median age of 51 years (Interquartile Range (IQR)(45,60)) with a median of 4 concurrent conditions besides HIV (IQR:2,7). Objective 1: Participants attended a median of 17/25 weekly sessions (68%). Nature: 99% of participants engaged in resistive exercises, 72% in aerobic exercises, 56% in flexibility exercises and 24% in neuromotor and balance exercises. Engagement in all types of exercises in one session ranged from 2-24%. Extent: Participants exercised a median of 3 days/week (IQR:2.5,5). Of the participants who reported on intensity and progression, 71% experienced an increase in intensity, 35% experienced change in progression for aerobic, 28% in resistance, 25% in flexibility and no changes in neuromotor exercises was reported. Objective 2 analysis in progress.

Research to Practice Implications: This study will enhance the understanding of the nature and extent of exercise engagement and the role of SDOH on engagement among adults living with HIV.

Funding: Ontario Ministry of Research and Innovation (Supervisor); Canada Research Chair in Episodic Disability and Rehabilitation (Supervisor); Canadian Institutes of Health Research (Supervisor).
Completion of a Phase II Outpatient Cardiac Rehabilitation Program following Transcatheter Aortic Valve Implantation or Surgical Aortic Valve Replacement: A Retrospective Review

Clement T. Chow, Rehabilitation Science Institute, University of Toronto; Anam Tahsinul, KITE Research Institute, Toronto Rehabilitation Institute; Paul Oh, KITE Research Institute, Toronto Rehabilitation Institute, University Health Network; Dina Brooks, School of Rehabilitation Science, McMaster University; Tracey J. F. Colella, Lawrence S. Bloomberg Faculty of Nursing, University of Toronto.

Background/Purpose: Referral to and enrolment in cardiac rehabilitation (CR) is considered a best practice recommendation following transcatheter aortic valve implantation (TAVI) and surgical aortic valve replacement (sAVR). However, TAVI patients are underrepresented in CR and few studies have investigated the effectiveness and completion of a structured outpatient (phase II) CR program comparing TAVI with sAVR patients. The objectives of this study were to: 1) compare the effectiveness of program completion between TAVI and sAVR patients, and 2) compare the rate of completion between cohorts.

Methods: A retrospective database review of 615 patients referred to CR following TAVI (n = 158; 26%) and sAVR (n = 457; 74%) was conducted between December 2015 and December 2019. The 6-month program included aerobic or resistance training, education, psychosocial and dietary counselling. Within-group (baseline versus discharge) and between-group comparisons of change (peak oxygen uptake (VO2peak), body mass index, Center for Epidemiologic Studies Depression score, and resting or peak heart rates and systolic blood pressures), and rate of program completion were examined using t-test and chi-square analyses.

Results: Overall, 62% of patients (n = 381) referred to CR enrolled in our program (TAVI: n = 86; 54% versus sAVR: n = 295; 65%; P = 0.03). Of the enrolled cohorts, 55% of TAVI (47/86) and 61% of sAVR (179/295) patients completed the program (P = 0.38). Peak oxygen uptake improved for TAVI (15.9 ± 3.7 to 18.1 ± 4.1 mL/kg/min; P < 0.0001) and sAVR (19.4 ± 6.0 to 22.7 ± 6.8 mL/kg/min; P &lt; 0.0001) patients. Over 75% of both TAVI (n = 21) and sAVR (n = 95) patients who completed the program obtained > 6% VO2peak increases at discharge. No statistically significant differences were found in other outcomes of interest.

Research to Practice Implications: Cardiac rehabilitation enrolment was significantly higher in sAVR compared to TAVI patients; the rate of program completion did not differ significantly between the enrolled cohorts. Program completion led to significant improvements in cardiorespiratory fitness (i.e., VO2peak) which can confer overall health and mortality benefits. In future studies, targeting improved referral strategies and identifying enrolment barriers for TAVI patients is necessary to ensure for optimal patient benefit.

Funding: Frederick Banting and Charles Best Canada Graduate Scholarship-Master (CGS-M).
Poster #17

Social Support and Living Situation of Older Adults With Hip-Fracture: A Retrospective Cohort Study

Alexandra Krassikova, Rehabilitation Sciences Institute, University of Toronto; Steven Stewart, KITE–Toronto Rehabilitation Institute, University Health Network; Aileen Davis, Institute of Health Policy, Management and Evaluation, University of Toronto; Jennifer Bethell, KITE–Toronto Rehabilitation Institute, University Health Network; Katherine McGilton, KITE–Toronto Rehabilitation Institute, University Health Network.

Background/Purpose: Sustaining a hip-fracture is a life-changing event negatively affecting older adults. Although, social support is a known determinant of health outcomes, the relationship between social support and living situation of older adults with hip fracture remains under researched. For this study social support is conceptualized using the Finfgeld-Connett framework, where social support is seen as being composed of emotional and instrumental support. The objectives were to examine the relationship between two domains of social support and living situation: 1) after discharge; 2) 3-months after discharge; and 3) 6-months after discharge from an inpatient rehabilitation facility in a sample of older adults with hip fracture.

Methods: Emotional support was measured as frequency of interaction with someone one week prior to hip fracture, whereas instrumental support was measured as help received in instrumental activities of daily living. Logistic regression was performed to examine the association between social support and living situation.

Results: Majority of study participants (N=139) were older (mean age 81.31), female (77.70%), had no cognitive impairment (68.35%), were not married (58.99%), and lived with someone (51.80%) in their own house (71.95%). Older adults with more emotional support were more likely to be discharged home, however little can be said about the effect of the association (OR 6.80, 95% CI 1.08, 22.31, P<.001). Persons receiving more instrumental support had less odds of living at home 3-months (OR 0.41, 95% CI 0.21, 0.78; P=.007) and 6-months after discharge (OR 0.59, 95% CI 0.38, 0.91, P=0.017).

Research to Practice Implications: By understanding the interplay between social support and living situation of older adults with hip fractures, institutionalization incidents can be reduced and their rehabilitation potential can be maximized.

Funding: Canadian Institute of Health Research Best and Wise Practices Grant (Supervisor).
Assessing the inter-rater and intra-rater reliability of the Physical Therapy Competence Assessment for Airway Suctioning (PT-CAAS)

Erin Miller, Rehabilitation Sciences Institute, University of Toronto; Brenda Mori, Department of Physical Therapy, University of Toronto; Kelly O’Brien, Department of Physical Therapy, University of Toronto; Dina Brooks, School of Rehabilitation Science, McMaster University.

Background/Purpose: Suctioning is a technique used to clear mucus from the lungs. To assess the clinical competence of physical therapists (PTs) who perform suctioning, we developed the Physical Therapy Competence Assessment for Airway Suctioning (PT-CAAS). The PT-CAAS’s inter-rater and intra-rater reliability have not yet been assessed. The objectives of this study were: 1) to develop scoring rules for the PT-CAAS; and 2) to obtain estimates of the PT-CAAS’s inter-rater and intra-rater reliability, when used to assess PTs who perform suctioning with adults.

Methods: To develop scoring rules for the PT-CAAS, an expert advisory committee was formed. To assess reliability, we used a series of 9 videos of suctioning being performed by a PT in a simulated learning environment. We used a repeated measures design, where two replicate sets of measurements were made by each participant on a sample of subjects (i.e., the 9 videos) using an on-line version of the PT-CAAS. Participants were PTs with suctioning experience, who were recruited using an electronic study invitation. Data were analyzed using a repeated measures model for the concurrent assessment of inter-rater and intra-rater reliability. Intraclass correlation coefficients (ICCs), lower 1-sided 95% confidence intervals (CIs) and standard error of measurements (SEMs) were calculated.

Results: Through discussion, the expert advisory committee and investigators arrived at a unanimous decision on scoring. Twenty participants then completed initial video scoring and re-scoring. All participants were PTs registered to practice in either Ontario (n=16, 80%) or Alberta (n=4, 20%). The domain/sub-domain ICC estimates for inter-rater reliability ranged from 0.569 (lower 95% CI: 0.395; SEM: 0.963) for infection control to 0.759 (lower 95% CI: 0.612; SEM: 0.722) for post-suctioning assessment and care. The inter-rater ICC for overall performance was 0.752 (lower 95% CI: 0.602; SEM: 0.660). The domain/sub-domain ICC estimates for intra-rater reliability ranged from 0.759 (lower 95% CI: 0.197; SEM 0.721) for infection control to 0.860 (lower 95% CI: 0.544; SEM: 0.550) for post-suctioning assessment and care. The intra-rater ICC for overall performance was 0.867 (lower 95% CI: 0.559; SEM: 0.483).

Research to Practice Implications: Our results show evidence of moderate inter-rater reliability and good intra-rater reliability. Improved assessor training is one strategy that might improve the PT-CAAS’s inter-rater reliability.

Funding: Ontario Respiratory Care Society Fellowship, Ontario Graduate Scholarship.
The Reliability of the Body Language Coding Scale (BLCS) for Children with Autism Spectrum Disorder (ASD) during Physical Activity

Ilana D. Naiman, Rehabilitation Sciences Institute, University of Toronto; L. Black, Department of Physical Therapy, University of Toronto; S. Martin, Department of Physical Therapy, University of Toronto; Nathan Di Franco, Department of Physical Therapy, University of Toronto; M. Dusseault, Department of Physical Therapy, University of Toronto; K. Harvey, Department of Physical Therapy, University of Toronto; Carolyn Kierulf-Monaghan, Department of Physical Therapy, University of Toronto; Jessica Bryan, Bloorview Research Institute; Kelly P. Arbour-Nicitopoulos, Kinesiology and Physical Education, University of Toronto; F. Virginia Wright, Bloorview Research Institute.

**Background/Purpose:** Autism Spectrum Disorder (ASD) is characterized by intense, repetitive, or restricted interests, and deficits in social communication including challenges using body language. In my doctoral thesis, I developed the Body Language Coding Scale (BLCS) to interpret body language of children with ASD during physical activity (PA). One barrier expressed by parents of children with ASD is exclusion from activities since instructors often lack understanding about their communication. The rational for BLCS development was that if instructors could better understand the body language of children with ASD, they might be able to better support them in PA. BLCS creation was based on literature review and experience, and iteratively modified over the video observation of 10 children with ASD. The BLCS divides body language cues into Positive (n=10), Negative (n=7) and Neutral (n=2) categories. The purpose of this study was to assess BLCS reliability. Due to its rigorous development process, I hypothesized reliability would be good to excellent based on Koo and Lee’s targets for Intraclass Correlation Coefficient (ICC).

**Methods:** 26 videos (~40mins each) of children with ASD (ages 6-12 years, able to follow complex 3-step instructions) completing the Ignite Challenge, a 13-item advanced gross motor skills assessment, were viewed by BLCS-trained PT student raters. The four raters were assigned to one of two pairs, and each pair independently rated ~13 videos using the BLCS and then re-rated 6-7 videos. ICCs assessed inter- and intra-rater reliability.

**Results:** Intra-rater reliability was excellent for Positive (ICC 0.91) and Negative (0.94) categories and good for Neutral (0.84) category. Inter-rater reliability was good for Positive (0.89) and poor for Negative (0.39) and Neutral (0.00) categories.

**Research to Practice Implications:** The BLCS showed promising results. Raters’ comments on scoring challenges and item reliability results led to modifications and a BLCS version 2. Its reliability, validity and feasibility is now being evaluated. With successful results, this scale may change how children with ASD participate in PA programs. The next step will be to use the BLCS-v2 in a community-based inclusive PA program (Igniting Fitness Possibilities) to explore whether BLCS use by instructors is associated with improved PA participation of children with ASD.

**Funding:** Chair of Pediatric Rehabilitation (Supervisor).
Poster #20

Exploring the Experiences of Pelvic Health Physiotherapists in Canada: Preliminary Results from a Qualitative Descriptive Study

Stephanie Scodras, Rehabilitation Sciences Institute, University of Toronto; Jacquie Ripat, Department of Occupational Therapy, University of Manitoba; Euson Yeung, Department of Physical Therapy, University of Toronto; Susan B. Jaglal, Department of Physical Therapy, University of Toronto; Heather Colquhoun, Department of Occupational Science and Occupational Therapy, University of Toronto; Nancy M. Salbach, Department of Physical Therapy, University of Toronto.

Background/Purpose: Pelvic health physiotherapy (PHPT) is considered an advanced and complex area of practice involving the assessment and treatment of people with pelvic health conditions. PHPT education is not standardized in Canada, which may lead to diverse experiences and challenges. Little is known about the experiences of pelvic health physiotherapists working in Canada. This study aims to explore the education and practice experiences of pelvic health physiotherapists in Canada.

Methods: Following a qualitative descriptive methodology, I conducted semi-structured interviews with 20 pelvic health physiotherapists (19 females, 1 male) with <1 to >10 years of PHPT experience, working in private practice (85%) and hospital (10%) settings in 6 provinces. Interviews were audio-recorded and transcribed verbatim. I analysed the qualitative data using a reflexive thematic analysis approach situated in an interpretivist paradigm.

Results: Five themes were identified. ‘The Right Fit’ represents physiotherapists’ satisfaction with filling a clinical need in society and the gratification from working with patients with pelvic health conditions. ‘Mutual Vulnerability’ represents the shared physical and emotional vulnerability that is experienced by the patient and provider due to the intimate nature of practice. This leads physiotherapists to take steps to communicate clearly and sensitively, and prioritize the therapeutic alliance with their patients. ‘Breaking out of the Silo’ represents physiotherapists’ process of integrating the pelvic floor with the rest of the body and moving beyond treating physical components, often adopting a biopsychosocial approach to treat the whole person. ‘An Ongoing Learning Process’ reflects that learning does not have an endpoint and involves formal education, learning from experience, seeking advice and information from reputable sources, and sharing knowledge with others. Pelvic health physiotherapists feel ‘Responsibility and Accountability’ towards patients and the physiotherapy profession. These factors act as a flexible boundary that dictates how pelvic health physiotherapists can and should act but expands with the growth of the field.

Research to Practice Implications: PHPT is a rewarding and intimate practice that requires physiotherapists to adopt sensitive and holistic approaches to working with patients. Physiotherapists feel responsible to engage in ongoing learning to meet patient needs in this growing field.

Funding: Frederick Banting and Charles Best Canada Graduate Scholarships (CIHR); Toronto Rehabilitation Institute Chair (Supervisor); Heart & Stroke Foundation Grant (Supervisor).
Rehabilitation Technology Sciences

The integration of multidisciplinary knowledge and expertise in the design, development and evaluation of assistive technology to enhance the function and well-being of people with disabilities and their caregivers and to enable people to participate fully in day to day living.
Poster #21

The Association between Knee Pain and Perfusion Kinetics at the Knee Joint in Non-Overweight Postmenopausal Women

Vahid Anwari, Rehabilitation Sciences Institute, University Health Network, Joint Department of Medical Imaging; Siwen Liu, University Health Network, Toronto General Hospital Research Institute; Nima Yazdankhah, University Health Network, Osteoporosis Clinic; Emily Ha, University of Toronto; Rachel Whyte, Rehabilitation Sciences Institute, University of Toronto; Andy Kin On Wong, University Health Network, Joint Department of Medical Imaging.

Background: Cartilage loss is a hallmark of weight bearing knee osteoarthritis (OA). However, non-overweight individuals with knee pain have been poorly studied. It is known that bone marrow lesions (BMLs) are associated with pain regardless of a weight-bearing component. BMLs have been shown to have higher perfusion. Knee pain has also been associated with pro-inflammatory cytokines, originating within fat. At the knee, the infrapatellar fat pad (IPFP) represents a source of fat, and therefore potential contributor to inflammation and pain. While studies have shown the relationship between pain and synovitis on MRI, little is known about how perfusion properties of BMLs, synovium and IPFP each contribute to knee pain.

Purpose: To study perfusion properties of the subchondral bone, the synovium, and infrapatellar fat pad as correlates of knee OA pain among non-overweight postmenopausal women. It is hypothesized that higher blood flow within these regions is associated with worse knee-specific pain.

Methods: Women 50 to 85 years of age, with BMI ≤25 kg/m², with varying degrees of knee pain (as assessed by the Knee OA Outcome Score) were recruited as a convenience sample. Those with rheumatoid arthritis, existent joint replacements, or contraindications to MR imaging were excluded. T1-weighted, sagittal dynamic contrast enhanced (DCE)-MR images were obtained with Gadolinium injection. BMLs were identified and manually segmented. The synovium was manually segmented into suprapatellar, intercondylar (notch), and infrapatellar (fat pad) regions. Pharmacokinetics of Gadolinium arrival was calculated using the Toft’s model, yielding a fluid transfer constant, Ktrans which reflects the permeability of blood to the region. Statistical analysis: Ktrans measured at each region was related to KOOS pain (dichotomized as ≥ 3) using a binary logistic regression model, reporting odds ratios (OR) and 95% confidence intervals per standard deviation in Ktrans. All models accounted for age.

Results: Among 41 participants, mean age was 61.5±8.8 years and BMI 22.69±3.29 kg/m². Intercondylar (OR: 2.39(1.08,5.31)) and IPFP (OR: 7.11(1.49,33.91)) Ktrans were each associated with an increased odd for having knee pain. Suprapatellar Ktrans showed only a marginally significant association with knee pain (OR: 2.39(0.96,6.01)). Among two participants with BMLs, the Ktrans signal (~0.308) was larger than the mean IPFP (0.013±0.018) or intercondylar (0.013±0.013) values.

Funding: CIHR CGS-M, UofT Fellowship - RSI, and Supervisor’s Research Grant (University Health Network, Toronto General Hospital Research Institute, TGHRI), Canadian Institutes of Health Research (Supervisor).
Poster #22

Validation of Engineered Facial Kinematic Features with Respect to the Perceptual Clinical Scores Provided by Trained Clinicians for Individuals with Oro-Facial Impairments due to Neurological Disorders

Deniz Jafari, Rehabilitation Sciences Institute, University of Toronto; Diego Guarin, Florida Institute of Technology; Andrea Bandini, University Health Network; Babak Taati, University of Toronto; Yana Yunusova, Department of Speech-Language Pathology, University of Toronto.

Background/Purpose: Accurate assessment of oro-facial movements is important for the diagnosis and treatment of various neurological disorders. However, existing oro-facial assessment methods rely on either subjective clinical evaluations performed by experts, such as cranial nerve examination, or on the use of complex and expensive sensor-based techniques, such as electromagnetic articulography, that are not suitable for integration into current clinical settings. An objective and continuous assessment of facial function is important for evaluating the severity of the disease at onset as well as tracking its progression. In this study, we aim to clinically validate the efficacy of an automatic tool for assessing speech and orofacial impairments by determining the correlation between objective features and clinical assessments conducted by expert clinicians.

Methods: 3D video recordings of the participants (individuals with amyotrophic lateral sclerosis, post-stroke individuals, and aged-matched healthy control adults) performing selected oro-facial tasks typical of the clinical assessment are processed and 146 engineering features are extracted and analyzed. Univariate regression is used to identify features that are significantly correlated to the clinical scores. Multivariable regression model is then used to predict the severity of clinical measures.

Results: Thus far, the video recordings for the ALS and healthy participants were pre-processed for the analysis. The post-stroke individuals data is currently undergoing preprocessing. Once all the data is pre-processed, the features will be extracted and analyzed. The most significant features correlated to the corresponding perceptual scores will be identified and used for predicting the severity of the clinical measure.

Research to Practice Implications: It is expected that the engineered features extracted from 3D video recording to be correlated to their corresponding perceptual clinical scores indicating the severity of oro-facial impairments. Video-based systems have the potential to be used as facial analysis tools in determining the severity of oro-facial deficits as judged by experts.

Naaz Kapadia-Desai, KITE–Toronto Rehabilitation Institute, University Health Network; Kristin Musselman, Department of Physical Therapy, University of Toronto; Rosalie Wang, Department of Occupational Science and Therapy, University of Toronto; Milos R. Popovic, KITE–Toronto Rehabilitation Institute, University Health Network.

Background/Purpose: In the current study we assessed the feasibility of 3D printing the Toronto Rehabilitation Institute-Hand Function Test (TRI-HFT). TRI-HFT is an upper extremity outcome assessment tool that can measure change following newer rehabilitation therapies and has been validated in the spinal cord injury population. However, accessibility of the test has posed challenges with its uptake in research and clinical settings. The objective of the study was to assess the feasibility of designing and constructing a 3D printed version of TRI-HFT objects (3D TRI-HFT). The secondary objective was to assess the psychometric properties of the test in Stroke and Spinal cord injury (SCI).

Methods: To 3D print the TRI-HFT, the dimensions of the original test objects were measured using calipers (precision level 0.01mm) and the weight of the objects were measured using a kitchen scale (precision level 0.1 gm). These dimensions were used to create 3D printing design files. Reliability and validity of the 3D printed objects was assessed in 9 individuals with chronic stroke, 4 individuals with sub-acute SCI and 3 individuals with chronic SCI. Criterion validity was assessed in SCI with the Graded Re-defined Assessment of Strength, Sensibility and Prehension (GRASSP) and Concurrent validity of the 3D TRI-HFT was assessed with the Chedoke McMaster Stroke Assessment Arm (CMSA-Arm) and Hand (CMSA-Hand) in Stroke.

Results: The TRI-HFT objects were successfully 3D printed except the paper and sponge which were redesigned to overcome the technological limitations. We found the 3D TRI-HFT to have very high inter and intra rater reliability in all of the assessed patient populations. The 3D TRI-HFT showed a strong co-relation with the GRASSP and a moderately strong co-relations with the CMSA-Arm in SCI and stroke populations, respectively.

Research to Practice Implications: Our findings indicate that TRI-HFT is a 3D printable, simple, reliable, open source, and valid measure that can be accessed from virtually anywhere in the world. The 3D printing of the test guarantees high repeatability in object manufacturing and makes the test available to all users with a 3D printer, which are now becoming ubiquitous.

Funding: Canadian Institutes of Health Research, Ontario Graduate Scholarship, Toronto Rehabilitation Institute Scholarship.
Poster #24

The Feasibility of Transcranial Direct Current Stimulation as an Adjunct to Inpatient Physiotherapy in Pediatric Acquired Brain Injury: Year 1 Eligibility and Recruitment

Jennifer L. Ryan, Holland Bloorview Kids Rehabilitation Hospital; Deryk S. Beal, Holland Bloorview Kids Rehabilitation Hospital; Darcy L. Fehlings, Holland Bloorview Kids Rehabilitation Hospital; Danielle E Levac, Northeastern University, Boston, MA; F. Virginia Wright, Holland Bloorview Kids Rehabilitation Hospital.

Background/Purpose: Children with moderate to severe acquired brain injury (ABI) require intensive physiotherapy (physio) early in recovery to address gross motor deficits. Despite considerable improvement with inpatient physio, motor recovery typically plateaus and deficits persist. As such, adjuncts to traditional therapy, such as transcranial direct current stimulation (tDCS), are frequently explored to enhance motor recovery. tDCS modulates brain activity and enhances motor learning when coupled with motor skill practice but has not been studied in subacute pediatric ABI. The primary objective of this study is to evaluate the feasibility of a ‘tDCS+physio’ protocol in an existing pediatric inpatient ABI rehabilitation program and determine if a randomized control trial (RCT) to evaluate its effectiveness is warranted.

Methods: This feasibility RCT will randomize 30 children (5-18 years) with moderate to severe ABI to receive active or sham tDCS paired with their existing inpatient physio at Holland Bloorview Kids Rehabilitation Hospital (i.e. tDCS+physio). Participants receive 20 minutes of either active or sham tDCS immediately prior to 4 physio sessions each week for 4 weeks (16 sessions). Feasibility is evaluated by tracking process, recruitment, and treatment indicators. Participants, therapists, assessors, and primary investigators are blinded to treatment allocation.

Results: Since January 2020, 152 were children admitted for inpatient ABI rehabilitation at Holland Bloorview and screened for study eligibility. Six children were eligible and 3 enrolled. Recurrent reasons for exclusion include: age, tDCS contraindications, short admission, behaviour. Screening data and control charts outlining recruitment to date indicate that recruiting 30 children in a reasonable time frame is unlikely. Mitigating actions include expanding eligibility criteria and adapting analysis plans based on projected enrollment rates.

Research to Practice Implications: Results will inform whether tDCS is a practical adjunct to inpatient physio in pediatric ABI from tolerability and eligibility/recruitment perspectives. Gross motor outcomes will provide a basis for sample size calculations for a future effectiveness RCT if warranted. If effective, tDCS+physio could enhance motor outcomes in pediatric ABI.

Funding: Frederick Banting and Charles Best Canada Graduate Scholarships (CIHR); Holland Bloorview Centre for Leadership; Canada Child Health Clinician Scientist Program (Supervisor).
Social and Cognitive Rehabilitation Sciences

Cognitive science concerns the study of the mind: its capacities and the brain structures/processes that underlie those capacities. Social science addresses human systems, namely the relationship between individuals and larger groups, such as family, community and work. The cognitive and social sciences in rehabilitation are concerned with lost or altered cognitive functioning and social functioning with the aim of enhancing functional competence in real-world situations.
**Poster #25**

**Multi-Domain Assessment of Concussion Recovery: A Scoping Review**

Danielle DuPlessis, Rehabilitation Sciences Institute, University of Toronto; Emily Lam, Institute of Biomaterials and Biomedical Engineering (IBBME), University of Toronto; Lucy Xie, Bloorview Research Institute; Elaine Biddiss, Bloorview Research Institute; Shannon Scratch, Bloorview Research Institute.

**Background/Purpose:** The current scoping review aims to explore the scholarly literature on multitask paradigms used in concussion recovery, with an ultimate goal of informing evidence-based and ecologically valid return-to-play assessment. As such, the current review asks: What simultaneous multi-domain measures are used to assess recovery following concussion?

**Methods:** A comprehensive search was conducted across five databases from the inception of the review until June 17, 2020. To increase the rigour of our search, we also performed reference tracking of included articles: screening their references for relevant papers. Lastly, additional references were collected from colleagues with expertise in the field.

**Results:** Records collected were limited to those published in peer-reviewed journals, in English, between 2002 and 2020. Included studies were required to describe the assessment of concussion recovery using paradigms that were dynamic and that spanned multiple domains simultaneously. Of the 5401 unique articles identified through database searching, 51 were included in the analysis. Once identified, articles were charted according to study characteristics (authors, year, purpose, hypothesis), population characteristics (for concussed groups: time since injury, age, gender, sample size; for control groups: exclusion criteria, age, gender, sample size), and assessment characteristics (task name, author’s description, scoring, elements of the task mapped onto the physical, cognitive, and socio-emotional domains). The 51 included articles described 34 unique assessments. These assessments were deconstructed into their constituent parts: 13 physical tasks, 16 cognitive tasks, and one socio-emotional task. Different combinations of these “building blocks” formed the basis of the multi-domain assessments. Of the included studies, 38 implemented a level walking task with a concurrent cognitive task to construct their multi-domain assessment. The most frequently implemented cognitive tasks were ‘Q&A’ paradigms, which required participants to respond to a question continuously aloud while completing a simultaneous physical task.

**Research to Practice Implications:** Our results highlight a breadth of assessments, but among studies a preference emerged for combinations of level walking and Q&A tasks. Future research should strive to strike a balance between ecological validity and clinical feasibility in multi-domain assessments, and work to validate these assessments for use in practice.

**Funding:** Ontario Graduate Scholarship; Natural Sciences and Engineering Research Council of Canada Discovery Grant (Supervisor).
**Poster #26**

**Effects of High-Intensity Interval Training on Blood Lactate Levels in Healthy Adults: Systematic Review and Network Meta-Analyses**

Nithin Jacob, Rehabilitation Sciences Institute, University of Toronto; Robin Green, Toronto Rehabilitation Institute, University Health Network.

**Background/Purpose:** High-intensity interval training (HIIT) involves periods of vigorous exercise interspersed with recovery intervals. HIIT can have cognitive benefits in healthy adults through a pathway involving lactate – an exercise metabolite. However, our understanding of the HIIT parameters that evoke a maximal blood lactate response in healthy adults is limited. Moreover, evidence relating HIIT-induced blood lactate and cognitive performance has yet to be collated. The primary objective of this systematic review is to use network meta-analyses to compare the relative impact of different HIIT parameters such as work interval durations, session volumes, and work-to-rest ratios on post-HIIT blood lactate response in healthy adults. The secondary objective is to determine the relationship between HIIT-induced blood lactate and acute post-HIIT cognitive performance.

**Methods:** A systematic review is being conducted to identify studies measuring blood lactate response following one HIIT session in healthy adults (>18 years). Electronic searches will be performed in (1) MEDLINE, (2) EMBASE, (3) Cochrane Central Register of Controlled Trials, (4) Sport Discus, and (5) Cumulative Index to Nursing and Allied Health Literature Plus with Full Text. Complying with Cochrane Review guidelines, two reviewers will independently screen abstracts and full-texts, extract data on key outcomes variables, and complete risk of bias assessments using the Cochrane Risk of Bias Tool and the Risk of Bias in Non-Randomized Studies of Interventions Tool. Disagreements will be discussed with and resolved by a third reviewer. The primary outcome is blood lactate concentrations (mmol/L). Pairwise comparisons will be conducted to estimate the comparative effectiveness of each work interval, session volume, and work-to-rest category, on average blood lactate levels. To interpret the comparative effectiveness of all categories, the data will be summarized using treatment rankings and surface under the cumulative ranking curve. Meta-regression analyses will be performed to test the relationship between blood lactate changes and cognitive performance.

**Results:** Data collection in progress.

**Research to Practice Implications:** This network meta-analysis will provide evidence on how to structure a HIIT protocol that elicits maximal blood lactate response in healthy adults. This review will increase our understanding of the relationship between HIIT-induced blood lactate response and the associated cognitive benefits.

**Funding:** SCACE Graduate Fellowship in Alzheimer’s Research, Toronto Rehabilitation Institute Student Scholarship; Canada Research Chairs Program (Supervisor).
Poster #27

**Evaluation of Rowan’s Law Concussion Awareness Resources for Athletes of all Abilities: a Caregiver Perspective**

Matthew Metcalfe, Rehabilitation Sciences Institute, University of Toronto; Alexandra Cogliano, Department of Occupational Science and Therapy, University of Toronto; Emily Bremer, Faculty of Kinesiology and Physical Education, University of Toronto; Roxy O'Rourke, Faculty of Kinesiology and Physical Education, University of Toronto; Kelly Arbour, Faculty of Kinesiology and Physical Education, University of Toronto; Nick Reed, Department of Occupational Science and Therapy, University of Toronto.

**Background:** Concussions pose a significant health concern amongst youth involved in sport. To address this, Ontario passed the Rowan’s Law legislation in 2018 to improve concussion safety and awareness. One of the fundamental components of the law is mandating that sports organizations have their athletes, coaches, and caregivers review the newly established Ontario Concussion Awareness Educational Resources. Following feedback from Special Olympics Ontario (SOO) end-users of the initial Rowan’s Law resources, it became evident that athletes with intellectual disabilities (ID) were not fully considered in the design process. In order to address this concern, our research team worked with SOO and the Government of Ontario to update the existing athlete’s resource in order to increase accessibility and design a new supplementary caregiver-specific resource.

**Purpose:**

1. To explore and describe the suitability, accessibility, and utility of the newly created Rowan’s Law Concussion Awareness Educational Resources within the SOO community from a caregiver’s perspective.
2. To explore concussion knowledge of caregivers before and after reviewing the resources.

**Methods:** This study will utilize a pre-post survey design to collect data from SOO caregivers immediately before and immediately after the review of the newly created Rowan’s Law Resources. SOO caregivers will respond to a purposively developed survey package through the SOO virtual training platform in order to evaluate the accessibility, feasibility, and utility of the resources. Caregivers will also provide demographic information and complete a concussion knowledge assessment. Descriptive statistics and regression analysis will be used to analyze demographics and closed-ended questions. Participant responses to the open-ended questions will be analyzed using thematic analysis.

**Research to Practice Implications:** This study will help to ensure that athletes with ID are fully considered under Rowan’s Law. Inserting athletes with ID into the overarching narrative surrounding concussion safety, prevention, and education is an important step towards promoting safe sport participation for all amateur athletes in Ontario. Additionally, our analysis hopes to highlight areas of improvement for the Rowan’s Law resources in order to facilitate implementation in the SOO community.

**Funding:** Ontario Graduate Scholarship; Tom Pashby Sport Safety Fund (Supervisor).
Poster #28

Occupational Therapist’s Role in Maintaining the Presence of Populations with Early Onset Dementia and Mild Cognitive Impairment in the Workforce

Nirusa Nadesar, KITE–Toronto Rehabilitation Institute, University Health Network; Arlene Astell, Toronto Rehabilitation Institute, University Health Network; Behdin Nowrouzi-Kia, Department of Occupational Therapy and Occupational Science, University of Toronto; Emile Tompa, Institute for Work & Health.

Background: Early-Onset Dementia (EOD) commonly presents as a progressive, irreversible disorder in individuals aged 30 to 65. Mild-cognitive impairment (MCI) is a diagnosis that can increase the risk of developing EOD. These individuals must navigate the effects their symptoms may have in their daily lives and employment. The majority will need support to stay in the workforce, allowing them to receive income to provide for themselves and their families. Occupational Therapists (OTs) work with these populations to figure out methods and interventions that make living with their diagnoses easier. OTs in this context will assess the capabilities, circumstances, and goals of their unique clients and use targeted interventions to allow them to engage back into their lives after their diagnoses. There is currently no formal Canadian guideline to address these individuals’ needs in the workplace and there is also minimal knowledge and no Canadian guide related to the work done by OTs while working with these populations.

Purpose: To investigate and identify OTs’ role in maintaining the presence of individuals living with EOD and MCI in the workplace. The study will provide insight into the unique challenges these populations face related to continuing their employment after being diagnosed. Furthermore, explaining how OTs navigate these challenges and provide support through their role as a health care professional.

Methods: This project will use (i) interviews conducted with 8-14 licensed OT’s from the public and private sector of Canada and other commonwealth countries to inform the development of a survey (ii) a survey from a larger sample of those OT’s. Both qualitative and quantitative data will be obtained. Descriptive non-parametric statistics and thematic analysis will be completed.

Results: These methods will provide information regarding best practices for successful accommodations and interventions by OTs, that maintained the presence of their EOD and MCI clients at work, and barriers and challenges that arose.

Research to Practice Implications: This research will provide OTs and employers with a reference when working with EOD and MCI patients in the workplace. This research can further inform the creation of future guidelines involving these populations and their places of work; This can include how OTs can help these groups in the context of their employment and how workplaces can better accommodate these individual’s needs.

Funding: Canadian Institutes of Health Research, University of Toronto Fellowship, Canadian Institutes of Health Research (Supervisor).
Curating the Self: Exploring the Impact of Camp on the Illness Identity of Children and Youth Living with Cancer

Stephanie Posa, Rehabilitation Sciences Institute, University of Toronto; Fiona Moola, Dalla Lana School of Public Health, University of Toronto; Ryerson University, Holland Bloorview Kids Rehabilitation Hospital.

Background: Two thirds of paediatric cancer survivors experience physical, and/or psychological effects later in life. Of the psychological effects, children and youth with cancer may experience difficulty forming an illness identity, that is, a self-concept that exists in relation to one’s illness. Research has suggested that recreational oncology camps improve the psychosocial wellbeing of children living with cancer. Despite this, researchers have not examined the effects of camp participation upon the illness identities of children and youth.

Objectives: To explore: 1) How children and youth with cancer define their illness identity 2) How Camp Quality might influence the conceptions of illness identity among children and youth with cancer.

Methods: Participants were 12 children and youth between the ages of 12-20, diagnosed with cancer. Participants were recruited in conjunction with our community partner, Camp Quality. Methodologically, this study is be grounded in an arts-based narrative tradition. Information about children’s illness identity experiences were collected using two methodological tools — an arts-based portrait exercise and qualitative interviews. For data analysis, I will draw on Braun and Clarke’s Reflexive Thematic Analysis.

Results: Data analysis is in progress.

Research to Practice Implications: Findings might lead to further developments in the area of theory and methodology. Specifically, it may lead to the formulation of a theoretical canon on identity that includes the perspectives and experiences of young people with cancer. Methodologically, it may generate new insights on how to engage children with cancer in arts-based research online. This study will also contribute to understandings of how creative inquiry can be used within social scientific research to explore the nuances and complexities inherent in psychosocial phenomena. Specifically, findings will illustrate how qualitative methods can be used to supplement the standardized batteries that are typically used to explore psychosocial identity. The results of this research can be translated into the practical realm as they will advocate for the integration of art-based methods into recreational environments, such as camp, to facilitate the communication of illness experiences and self-concept among children and youth.

Funding: Social Sciences and Humanities Research Council (SSHRC).
Poster #30

Can you cope? Exploring Young Athletes’ Cognitive Coping Response to a Hypothetical Concussion

Tian Renton, Rehabilitation Sciences Institute, University of Toronto; Sidney Kennedy, Department of Psychiatry, University of Toronto; Robin Green, Rehabilitation Sciences Institute, University of Toronto; Sakina Rizvi, Department of Psychiatry, University of Toronto; Kevin Thorpe, Dalla School of Public Health, University of Toronto.

**Background:** Coping strategies utilized by athletes following concussion have been associated with recovery outcomes (i.e., symptom severity and duration). Investigation of an athlete’s pre-injury cognitive coping approach (i.e., what and how they think), an unexplored area of coping, may help to identify individuals at risk for persisting symptoms following injury.

**Purpose:** Our primary objective was to investigate the cognitive coping strategies utilized by healthy young athletes in response to a hypothetical concussion scenario (HCS), and if coping response differed by age or a history of concussion. Our secondary objective was to examine the relationship between cognitive coping response, athletic identity (AI), and return-to-play (RTP) behaviours and perceptions reported by athletes.

**Methods:** Healthy athletes between the ages of 13 and 25 years old were invited to participate in this cross-sectional investigation. Athletes provided self-reports pertaining to their AI, resiliency and mental health status (i.e., presence and severity of depressive and anxiety symptoms). Questionnaires measuring cognitive coping and RTP behaviours and perceptions were used to assess athlete response to the HCS.

**Results:** A total of 158 athletes with a mean age of 17.4 years old, representing 28 different primary sports and various levels of competition were captured. Although age was a significant independent predictor of total cognitive coping response, the top five coping strategies used did not differ by age or a history of concussion. A small but significant association was identified between ‘self-blame’ and ‘less safe’ RTP behavioural intentions (i.e., willing to RTP despite experiencing ongoing hypothetical concussion symptoms). Resiliency was identified as a positive and significant independent predictor of total cognitive coping response and each adaptative coping strategy assessed.

**Research to Practice Implications:** Clinicians treating athletes in the acute phase following concussion could assess resiliency to understand how the individual may cope with their injury as time progresses. Subsequent research should investigate the feasibility and utility of pre-season resiliency booster sessions designed for athletes. Thereafter, exploration into the effect that resiliency booster sessions have on concussion recovery outcomes (e.g., functional, psychological, etc.) should be examined.

**Funding:** Frederick Banting and Charles Best Canada Graduate Scholarships (CIHR), Peterborough K.M Hunter Charitable Foundation Award, Ontario Graduate Scholarship, Ontario Graduate Scholarship, Dalton Whitebread Award, Judy Willcocks Award, Unilever/Lipton Neuroscience Fellowship, University Hospital Network.
Poster #32

A Critical Interpretive Synthesis of How Human-Animal Interactions are Discussed in the Prevailing Autism Literature

Pia Vollmers, Rehabilitation Sciences Institute, University of Toronto; Bloorview Research Institute; Yani Hamdani, Department of Occupational Therapy and Occupational Science, University of Toronto; Barbara Gibson, Department of Physical Therapy, University of Toronto.

Background: Autism Spectrum Disorder (ASD) is a diagnosis in the Diagnostic Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013) characterized by restrictive, repetitive patterns of behaviour, activities or interests and persistent deficits in social interaction and communication across multiple contexts. Almost all research studies that have explored the relationship between animals and children with ASD have sought to analyze the therapeutic and functional benefits of these interactions. Although this is important work, it tends to narrowly construct the outcomes of interest. Emphasis is placed on increased social engagement, verbal communication, breaks in repetitive behaviour and eye contact. These outcomes of interest are taken for granted and sought out in biomedical approaches. The perspectives of children with ASD and their families are often left out by researchers in human-animal interactions (HAI) literature. The objective of this research is to explore how ASD and HAI are represented in the literature and compare these findings to the experiences of families and children on interacting with an animal in their homes.

Methods: I used Dixon-Woods et al.’s (2006) methods to synthesize the literature regarding ASD-HAI. These methods helped me develop analytic questions to interrogate the key ideas about ASD and HAI to identify and reveal assumptions and the presumed effects of HAI.

Results: Deficits in social functioning were represented as a major concern across the reviewed literature. Studies suggested that HAI improve the communication skills of children with ASD. I examined how social functioning was defined and understood. Social functioning in children with ASD was seen to be lacking and compared to non-disabled children that met ‘typical’ developmental milestones. Emphasis is placed on observing and collecting data on autistic characteristics that are typically labeled as problematic. Improvements in these problematic behaviours is the outcome that majority of studies are hoping for as a result of the HAI. Animals have therefore been reduced to one purpose, to act as therapeutic tools.

Research to Practice Implications: This research is being used to guide a study that explores the relationships of children with ASD and the animals in their lives. The results of this study will help us understand the effects of HAI and how it can change perceptions of ASD and what it means to be social.
Speech-Language Pathology (SLP)

SLP is a multidisciplinary field of research concerned with the study of the normal processes of speech, language and swallowing function as well as research into the etiology, symptomatology, and prognosis of various disorders and efficacious methods for evaluation and treatment of such disorders. Specific populations of interest include individuals affected by disorders of developmental language, neurogenic speech and language, fluency, voice, articulation/phonology, and swallowing across a wide age range.
Early Predictors of Future Literacy Development in Urdu-English Bilingual Children

Insiya Bhalloo, Rehabilitation Sciences Institute, University of Toronto; Monika Molnar, Department of Speech-Language Pathology; Rehabilitation Sciences Institute, University of Toronto.

Background: Reading difficulties are common in young children, internationally and in Canada. Childhood literacy is a major contributor to future academic and socio-economic success; it is therefore crucial to provide early reading intervention. A major component of effective early intervention is literacy screening tools that can detect potential reading difficulties prior to their manifestation. Current standardized tools have been predominantly developed for monolingual English-speaking children, despite 50% of the world’s population being bilingual. One screening tool is assessing phonological awareness skills (i.e., recognition and manipulation of language-specific sound structures), a cognitive-linguistic skill that predicts early reading abilities.

Purpose: During my MSc thesis, I (i.) developed an age-appropriate and language-specific (i.e., based on linguistic and cultural properties) Urdu phonological awareness test for Grade 1-2 (i.e., aged 6-8 years) Urdu-English bilingual children across Canada and Pakistan; and (ii.) determined the validity of the in-progress developed Urdu phonological awareness test, by examining within-language correlations between Urdu phonological awareness and word/non-word reading skills.

Methods: We consulted Urdu linguists and primary-level Urdu language teachers in Karachi, Pakistan to develop an age- and linguistically-appropriate Urdu phonological awareness test. Along with parental reports of language background and socio-economic status (Language Experience and Proficiency Questionnaire [LEAP-Q]), we assessed Urdu and English expressive vocabulary (i.e., Expressive Vocabulary Test), phonological awareness (i.e., Comprehensive Test of Phonological Processing) and word/non-word reading (i.e., Woodcock Reading Mastery Test) skills of 95 typically-developing Grade 1-2 Urdu-English simultaneous bilinguals in Canada and Pakistan.

Results: Simple and multiple regression analyses demonstrate significant within-language correlations between Urdu phonological awareness and word/non-word reading.

Research to Practice Implications: The Urdu phonological awareness assessment tool will enable clinicians to assess Urdu-English bilingual children in both languages, and facilitate development of evidence-based early literacy intervention programs for less studied heritage languages. In the long-term, we will create an open access database where educators can contribute to the developed tools, thereby promoting Canadian-global collaborations.

Funding: Social Sciences and Humanities Research Council of Canada (SSHRC), Ontario Graduate Scholarship, Natural Sciences and Engineering Research Council of Canada (Supervisor).
Profiles of swallowing physiology in individuals with mild Parkinson’s disease compared to healthy older adults.

Pooja Gandhi, Rehabilitation Sciences Institute, University of Toronto; Renata Mancopes, Swallowing Rehabilitation Research Laboratory, Toronto Rehabilitation Institute, University Health Network; Danielle Sutton, Swallowing Rehabilitation Research Laboratory, Toronto Rehabilitation Institute, University Health Network; Emily K. Plowman, Aerodigestive Research Core – University of Florida, USA; Catriona M. Steele, Swallowing Rehabilitation Research Laboratory, Toronto Rehabilitation Institute, University Health Network.

Background/Purpose: Dysphagia is a common sequela of Parkinson Disease (PD) and is significantly associated with malnutrition, aspiration pneumonia and mortality, yet the nature of abnormal swallowing physiology in PD is yet to be clearly established. The aim of this study was to compare videofluoroscopic measures of swallowing physiology to recently published healthy adult reference data: (1) in adults with PD; and (2) in a control group of healthy age- and sex-matched adults.

Methods: A standard videofluoroscopy (VF) protocol was performed in 17 adults with mild PD and 17 age- and sex-matched healthy adults using 20% w/v liquid barium ranging from thin to extremely thick consistency. Blinded VF analysis was performed according to the ASPEKT Method. Frequencies for atypical values were tabulated by cohort and compared using odds ratios. Atypical values were defined as values falling outside the interquartile range (below the 25% tail and above the 75% tail) of the reference range for healthy adults under age 60.

Results: Elevated frequencies (i.e. > 25%) of atypical values were seen in the PwPD for several parameters, including prolonged swallow reaction time, prolonged time-to-laryngeal-vestibule-closure (LVC), poor pharyngeal constriction and residue. However, these findings were also observed in the healthy older control group. The only parameters for which significantly higher frequencies of atypical values were isolated to the PwPD were the prolonged durations of LVC and upper esophageal sphincter opening.

Research to Practice Implications: This study helped to delineate swallowing impairments that were due to Parkinson’s disease related physiological changes from those that occur due to healthy aging. Significantly atypical values unique to Parkinson’s disease: prolonged LVC and UES opening duration were in the direction of compensation rather than impairment. Identification of these physiological differences can aid clinicians in determining which parameters they might treat versus not.

Funding: National Institute on Deafness and Other Communication Disorders (Supervisor).
Poster #35

Implicit and Explicit Motor Learning in Adults who do and do not Stutter

Fiona Höbler, Rehabilitation Sciences Institute, University of Toronto; Tali Bitan, Department of Psychology and IIPDM, University of Haifa; Luc Tremblay, Faculty of Kinesiology and Physical Education, University of Toronto; Luc De Nil, Department of Speech-Language Pathology, University of Toronto.

Background/Purpose: Fluent speech production requires smooth and efficient coordination, integration and automaticity of several neural and sensorimotor processes. During speech and language development, we unintentionally adapt to our linguistic environment by means of implicit learning. In adulthood, we still rely on these mechanisms to update and integrate complex motor skill and maintain fluency of performance. Research has found that the speed and accuracy of explicitly learned speech and non-speech movements, along with their retention, transference, and automaticity, differ between individuals who do and do no stutter. We therefore sought to answer the fundamental questions concerning motor learning in developmental stuttering by investigating domain-general implicit and explicit processes that we rely upon at different stages of motor skill acquisition.

Methods: In study one, participants performed an explicit Finger-to-thumb Opposition Sequencing (FOS) task. Accuracy was measured by number of incorrect sequences and speed by number of correct sequences performed across 20 x 30-second blocks on day one and 5 blocks the next day. In study two, participants completed the implicit Alternating Serial Reaction Time (ASRT) task, allowing for sequence-specific learning to be evaluated on measures of reaction time and number of correct responses per sequence type. Participants completed 20 blocks during practice and 5 blocks on day two.

Results: 18 adults who stutter (AWS) and 18 adults who do not stutter (ANS) completed the FOS task. Multivariate analyses of variance revealed significant within-session performance gains across participants (p<.001). There was no effect of group on within- (p<0.60) or between-session (p<0.72) performance.

16 AWS and 16 ANS completed the ASRT task. Analyses of variance revealed significant sequence-specific learning across participants (p<.001), as well as a significant effect of group on implicit measures of within- (p<0.04) and between-session (p<0.05) learning.

Research to Practice Implications: These results highlight the importance of considering performance differences in adults who stutter based on the nature of the motor task. As many treatment approaches rely on a combination of implicit and explicit learning strategies, their potential differential influence on treatment outcomes and relapse needs to be considered. This will better inform individualized assessment and treatment approaches, and support long-term outcomes.

Funding: Doctoral Completion Award, Hayden Hantho Award, Natural Sciences and Engineering Research Council of Canada Discovery Grant (Supervisor)
The Effect of Bilingual Exposure on Language and Cognitive Recovery in Children Following Ischemic Stroke

Kai Ian Leung, Department of Speech-Language Pathology, Rehabilitation Sciences Institute, University of Toronto; Nomazulu Dlamini, Division of Neurology, The Hospital for Sick Children; Robyn Westmacott, Department of Psychology, The Hospital for Sick Children; Monika Molnar, Department of Speech-Language Pathology, University of Toronto.

Background/Purpose: Pediatric stroke occurs during a sensitive period in development and often affects higher-level cognitive and linguistic processes. In typically developing bilingual children, certain theories of linguistic and cognitive advantages have been confirmed in behavioural studies. Protective effects of bilingualism has also been demonstrated in bilingual Alzheimer’s Disease patients. Whether atypically developing bilingual children may be able to benefit similarly in their recovery of language and cognition is unknown. The current project evaluates the effect of bilingual exposure post-stroke on the cognitive and linguistic recovery of pediatric ischemic stroke patients. We hypothesise that bilingual children will benefit from protective factors, due to their bilingual environment.

Methods: The Sick Kids Pediatric Ischemic Stroke Registry and medical charts were used to gather variable and performance data, including the patient (e.g., age, sex, socio-economic status), linguistic (e.g., language exposure), and neural (e.g., stroke characteristics) variables that affect children’s cognition and linguistic processing. The Pediatric Stroke Outcome Measure (PSOM) was administered at several timepoints post-stroke and used to evaluate 237 children with arterial ischemic stroke across 3 age groups (0-28 days, 1-12 months and 13 months-18 years at stroke onset). Children with presumed stroke, death and/or prior developmental diseases were excluded to avoid confounds.

Results: Using growth curve analyses, we compared PSOM performance over time based on language exposure and its interactions with other variables. No differences were found between monolingual and bilingual performance on the composite and cognitive PSOM measures; however, on language PSOM subscales, an interaction revealed that among children with a stroke onset between 1-12 months of age, bilingual children had a better post-stroke performance compared to monolinguals.

Research to Practice Implications: Gaining a better understanding bilingual neural and cognitive processing and brain-behaviour relationships in children is crucial to clinical practice and theoretical research, as about half of children around the globe are bilinguals. Overall, our findings demonstrate that a bilingual learning environment has no negative consequences on pediatric stroke recovery; further, it is a possibility that a bilingual learning environment facilitates linguistic recovery post-stroke in very young children.

Funding: Canadian Graduate Scholarship-Master’s (NSERC); Natural Sciences and Engineering Research Council of Canada Discovery Grant (Supervisor).
The Role of Oral and Pharyngeal Motor Exercises in Post-stroke Recovery: A Scoping Review

Reeman Marzouqah, Rehabilitation Sciences Institute, University of Toronto; Anna Huynh, Rehabilitation Sciences Institute, University of Toronto; Joyce Chen, Sunnybrook Research Institute; Rehabilitation Sciences Institute, University of Toronto; Mark Boulos, University of Toronto; Yana Yunusova, Department of Speech-Language Pathology, University of Toronto.

Background/Purpose: Motor deficits after stroke are prevalent and have a significant impact on the health of stroke survivors. Muscular dysfunction in the oral cavity and pharynx can cause difficulties with swallowing, communication and breathing. These adverse effects led to the uptake of oral and pharyngeal motor exercise (OME/OPE) protocols, which attempt to improve muscular function after stroke. Despite the widespread use of these exercises, their impact on post-stroke recovery remains unclear. This review aims to synthesize goals, protocols, and outcomes used for OME/OPE interventions in post-stroke rehabilitation.

Methods: A scoping review was conducted on peer-reviewed studies published between 1980 and 2020. Our literature search involved five databases and used keywords and MeSH terms for post-stroke, oral motor function and exercise training. Screening criteria included language of publication (English), study design (randomized controlled trials), population (post-stroke subjects ≥18 years), intervention (OME/OPE), and outcomes (at least baseline and post-training outcome measures). We extracted data on (1) targeted functions and muscles, (2) protocol designs, (3) outcome measures classified by the International Classification of Functioning, Disability and Health (ICF). The full-text screening and data extraction were completed by two reviewers, with discrepancies resolved by consensus.

Results: A total of 22 studies were included for the final review. Intervention goals aimed to improve swallowing (n=17), facial expression (n=2), speech (n=2), and sleep-disordered breathing (n=1). Large variation was found in the training protocols. The protocol durations ranged from 1 to 13 weeks. Exercises were repeated on average 5.5(SD 1.3) days per week and 2.1(SD 1.2) times per day. Many studies (n=13) applied motor learning principles to enhance exercise training, such as structured feedback and distributed practice. Studies commonly used more than one outcome measure (mean 3.1, SD 2.5). The majority of outcome measures were linked to the body functions and body structures component of the ICF. Outcomes related to muscle structure revealed consistent improvement post-exercises. Changes in muscle structures did not always translate to improvement in oral and pharyngeal functions.

Research to Practice Implications: Our findings will inform future clinical trials and facilitate choice of protocols and outcome measures for OME/OPE interventions in the post-stroke setting.

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Determiring the relationship between hyoid bone kinematics and airway protection in swallowing.

Sana Smaoui, Rehabilitation Sciences Institute, University of Toronto; Melanie Peladeau-Pigeon, KITE–Toronto Rehabilitation Institute, University Health Network; Catriona M. Steele, KITE–Toronto Rehabilitation Institute, University Health Network.

Background/Purpose: Hyoid bone movement is commonly evaluated in videofluoroscopic swallowing studies (VFSS), yet research remains equivocal regarding links between hyoid movement and swallowing safety. The aim of this secondary analysis was to explore the associations between atypical hyoid peak position, hyoid XY speed, laryngeal vestibule closure (LVC) parameters, and swallowing safety. We hypothesized that hyoid parameters would reveal associations with swallowing safety. Determining which of these parameters are the strongest predictors of penetration-aspiration was a secondary objective of this analysis.

Methods: This study involved secondary analysis of an existing VFSS database, previously collected in 305 participants (152 males) who were considered at-risk for non-congenital, nonsurgical, and non-oncological oropharyngeal dysphagia. We extracted data for thin liquid swallows from the dataset. Blinded duplicate ratings were completed using the ASPEKT Method, including frame-by-frame tracking of hyoid position. Values were classified as typical or atypical based on recently published reference values. Chi-Square tests, odds ratios, and regression analyses were computed to determine the associations and relationships between atypical values.

Results: Univariate analyses identified significant associations between penetration-aspiration and the following parameters: incomplete LVC, prolonged time-to-most-complete-LVC, short LVC duration, reduced anterior hyoid excursion and reduced hyoid XY speed. Reductions in superior or hypotenuse-axis measures of peak hyoid excursion showed no significant associations with penetration-aspiration, but all hyoid kinematic parameters were significantly associated with LVC integrity, timing and duration. When all parameters were combined in the regression model, only incomplete LVC and prolonged time-to-LVC remained significant as predictors of penetration-aspiration.

Research to Practice Implications: These results corroborate previous studies suggesting links between hyoid XY speed and anterior excursion with swallowing safety, when relationships are examined in isolation. However, when hyoid parameters are considered in conjunction with parameters measuring the integrity, timing and duration of LVC (with which they are significantly associated), they do not independently account for variations in penetration-aspiration. When identifying mechanisms explaining penetration-aspiration, clinicians should focus on LVC integrity and timeliness.

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Concurrent validity of automatic DDK analysis methods against varying levels of dysarthria severity in ALS

Chelsea Tanchip, Rehabilitation Sciences Institute, University of Toronto; Diego L. Guarín, Florida Institute of Technology; Scotia McKinlay, University of Toronto; Carolina Barnett, University Health Network; Yana Yunusova, Department of Speech-Language Pathology, University of Toronto.

**Background/Purpose:** Oral dysdiadochokinesis (DDK) is a standard dysarthria assessment task in ALS. Numerous DDK analysis algorithms based on acoustic signal processing are available, including amplitude-based, spectral-based, and hybrid. However, these algorithms were predominantly validated against patients with no perceptible to mild dysarthria. The behavior of these algorithms across dysarthria severity is largely unknown, which may put more severely dysarthric patients at risk for erroneous assessment. We aimed to fill this gap by studying the performance of five DDK algorithms used in clinical dysarthria assessment as a function of dysarthria severity.

**Methods:** We analyzed 282 DDK recordings of /ba/, /pa/, and /ta/ from 145 participants with ALS. Recordings were stratified into mild, moderate, or severe dysarthria groups based on performance on the Speech Intelligibility Test. Analysis included manual and automatic estimation of the number of syllables, DDK rate, and cycle-to-cycle temporal variability (cTV). Validation metrics included Kendall’s tau-b correlations between manual and algorithm-detected DDK rate and cTV, Bland-Altman mixed effects limits of agreement between manual and automatic syllable counts, and recall and precision between manual and automatic syllable boundary detection.

**Results:** The amplitude-based algorithm (absolute energy) yielded the strongest correlations with manual analysis across all severity groups for DDK rate ($\tau_b = 0.84$) and cTV ($\tau_b = 0.84$) and the narrowest limits of agreement (-7.34 to 8.40 syllables). Moreover, the amplitude-based algorithm provided the highest mean recall and precision across severity groups for /ba/ and /pa/.

**Research to Practice Implications:** Based on these observations, we concluded that a simple, absolute energy-based algorithm is the most robust tool for DDK analysis across dysarthria severity. My investigation establishes measures for improving automatic acoustic analysis for bulbar assessment and provides guidelines for efficient technology use in clinical practice.

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Thank you

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Beatrice Manduchi
PhD Student

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