women in neuro CONFERENCE

03.21.2026

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DUNIN-DESHPANDE INNOVATION CENTRE at Queen's University

Morning coffee break & lunch catered by:

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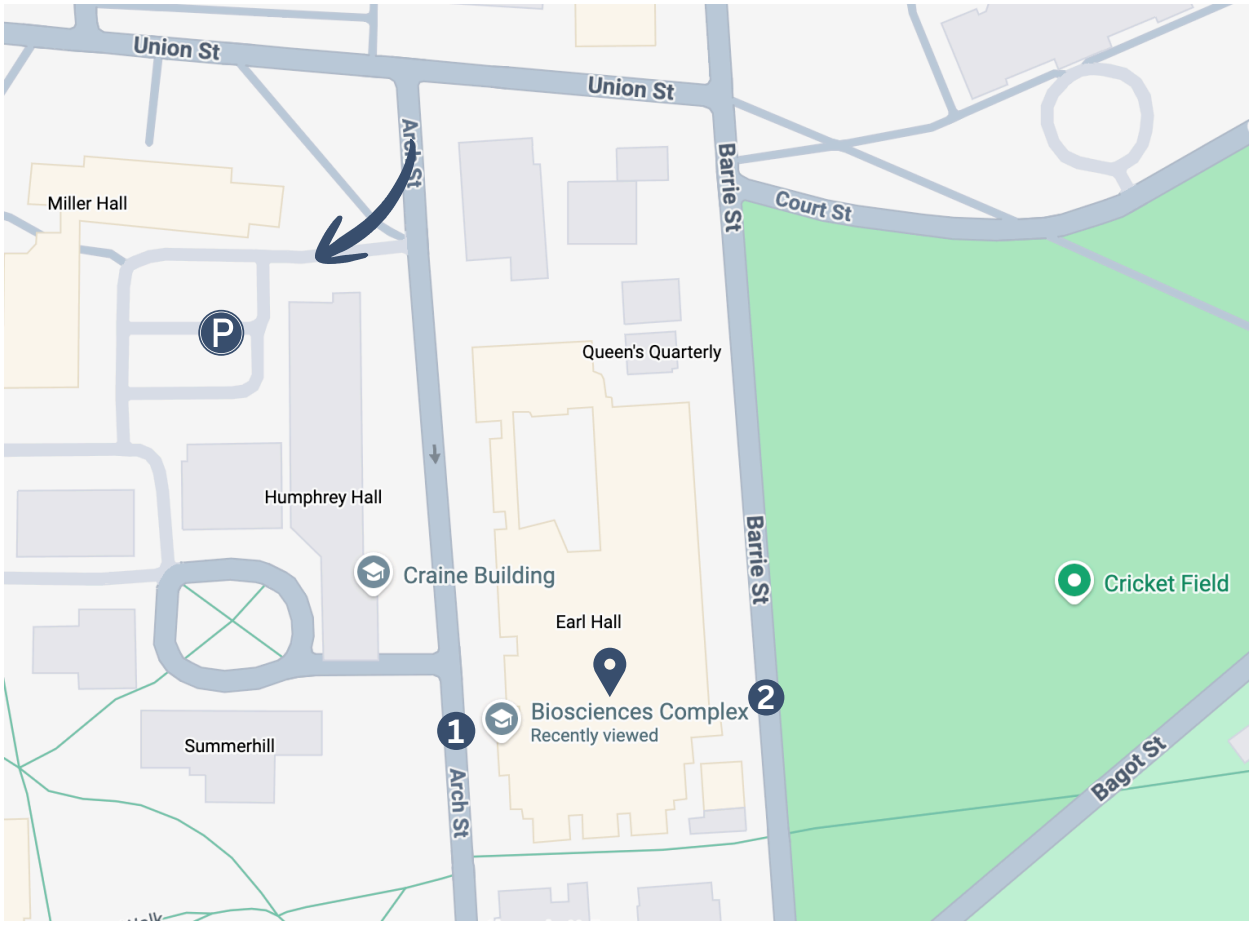
TABLE OF CONTENTS

LOCATION

The conference is located at the Queen's University Biosciences Complex in Kingston, Ontario.



The Biosciences Complex can be accessed from Arch St (Entrance 1) or Barrie St (Entrance 2). You can use either entrance, but the registration desk will be set up by Entrance 1. Please be sure to stop by to get your lanyard, which gives you access to the conference events (and food)!

Those driving can find free weekend parking as indicated on the map. Spots are limited, but some should be available if arriving on time!

CONFERENCE SCHEDULE

Time	Session	Location
9:15am-10:00am	Attendee Check-In & Coffee Break	Biosciences Atrium
10:00am-10:10am	Opening Remarks	Biosciences 1102
10:10am-11:00am	Keynote Speaker: Dr. Natalia Lyra e Silva	Biosciences 1102
11:00am-12:00pm	Student Oral Presentations 1	Biosciences 1102
12:00pm-12:45pm	Lunch	Biosciences Atrium
12:45pm-1:45pm	Headshots & Poster Session 1 (Odd Numbered Posters)	Biosciences Atrium
1:45pm-2:45pm	Invited Speakers: Dr. Emily Oby & Dr. Michele Morningstar	Biosciences 1102
2:45pm-3:45pm	Headhots & Poster Session 2 (Even Numbered Posters)	Biosciences Atrium
3:45pm-4:45pm	Student Oral Presentations 2	Biosciences 1102
4:45pm-5:00pm	Closing Remarks & Awards	Biosciences 1102

KEYNOTE & INVITED SPEAKERS

Keynote Speaker: Dr. Natalia Lyra e Silva

Dr. Natalia M. Lyra e Silva is a Research Associate at De Felice lab in the Centre for Neurosciences Studies and the Department of Biomedical and Molecular Sciences at Queen's University. Her research is focused on understanding the molecular mechanisms underlying the beneficial effects of exercise on Alzheimer's disease.

More details on Dr. Lyra e Silva's talk coming soon!

Invited Speaker: Dr. Emily Oby

My research takes place at the intersection of motor neurophysiology, bioengineering, and machine learning. We apply dimensionality reduction methods to chronic multi-electrode neural recordings in a brain-computer interface paradigm to offer a neural population view of the brain. One branch of my research program uses brain-computer interfaces to answer basic science questions about the structure and flexibility of neural population activity. A second branch of my research program focuses on developing brain-computer interfaces that have the potential to restore movement to people with spinal cord injury or provide rehabilitation to people after strokes.

Talk Title: Precise, transient perturbations of working memory using a brain-computer interface

Goal-directed movements must be planned and executed despite uncertainty and delays in sensory feedback. In such conditions, motor working memory is thought to stabilize upcoming actions when sensory information is unavailable or unreliable. During motor planning, activity in motor cortex reflects the upcoming movement, yet it remains unclear whether motor cortex actively maintains motor working memory or instead reflects a memory maintained elsewhere in the sensorimotor network. We tested these alternatives by causally perturbing neural population activity during the memory period of a memory-guided reaching task, a regime in which sensory uncertainty is high. Using a brain–computer interface (BCI), we trained rhesus monkeys to volitionally modulate their neural activity along task-relevant population dimensions that encode the instructed arm reach. We then examined how these perturbations affected the subsequent evolution of neural activity and behavior. If motor cortex maintains motor working memory, perturbations toward a particular memory state should bias recovery of neural trajectories and the ensuing reach. Instead, we found that the direction of the BCI-induced manipulation did not bias the recovery of neural population activity or the eventual reach direction. These results suggest that the remembered reach plan is reinstated by inputs external to the recorded motor cortical population, rather than being autonomously maintained within it.

Invited Speaker: Dr. Michele Morningstar

Dr. Michele Morningstar is an Assistant Professor in the Department of Psychology at Queen's University. Previously, she completed a post-doctoral fellowship in the Research Institute at Nationwide Children's Hospital and Department of Pediatrics at The Ohio State University, in Columbus, OH. She obtained her Ph.D. in Clinical Psychology from McGill University in 2017. Dr. Morningstar's research focuses on the development of emotional processing and social cognition from childhood to adulthood. She is particularly interested in the ways in which we learn to express and perceive emotional states through nonverbal cues, such as our tone of voice. She uses a variety of methods, including speech analysis and functional neuroimaging, to determine how these basic emotional skills contribute to our social functioning and psychological well-being across development.

Talk Title: Neural response to peers' social cues in adolescents with and without depression

Adolescent-onset depression is thought to be particularly detrimental to socio-emotional development due to its potential impact on social learning processes. How does risk for depression impact how youth process and learn from social cues from peers? Dr. Morningstar will present evidence of altered neural response to socio-evaluative feedback and to socio-emotional signals from peers in adolescent depression.

STUDENT PRESENTATION SCHEDULE

Time	Session 1
11:00am-11:15am	**Tracking Cerebral Oxygenation in ICU Delirium: Early Insights from the ICU-DOTS Feasibility Study** Cassidy Bretney, *Queen's University*
11:15am-11:30am	***The Overlooked Mental Health Burden of Polycystic Ovary Syndrome: Neurobiological Insights Into PCOS Related Depression*** Eleni Dubé-Zinatelli, *University of Ottawa*
11:30am-11:45am	**Real-World Performance of Automated MRI Lesion Detection Tools in Drug-Resistant Focal Epilepsy** Michelle Li, *Western University*
11:45am-12:00pm	**System offline: understanding how spinal cord injury impacts tissues and gut microbiome at baseline and under infectious challenge** Lauren Coulson, *Queen's University*
Time	**Session 2**
3:45pm-4:00pm	**Using Combined TMS-EEG to Investigate Cortical Changes in Response to Acute Pain** Thu Pham, *Western University*
4:00pm-4:15pm	**Focused Ultrasound Induced Phenotypic Alterations to Breast Cancer Cells** Dure Khan, *Queen's University*
4:15pm-4:30pm	**Investigating the role of Physical Activity in Default Mode Network Connectivity and Cognitive Function in Mild Cognitive Impairment** Ayesha Hammad, *Western University*
4:30pm-4:45pm	**Quantitative Assessment of White Matter Myelin Alterations After Ischemic Stroke in Non-Human Primates** Wenxin Yin, *Queen's University*

SESSION 1 STUDENT PRESENTATION ABSTRACTS

1. Tracking Cerebral Oxygenation in ICU Delirium: Early Insights from the ICU-DOTS Feasibility Study presented by Cassidy Bretney, MSc student at Queen's University

Delirium is an acute disturbance in consciousness affecting one's perception, cognition, and memory. Delirium is a common issue in clinical settings, occurring in around 15 to 20% of hospital cases. However, in the Intensive Care Unit (ICU), the prevalence of delirium jumps to 80% of all ICU cases. Despite being such a pressing issue in the ICU, the pathophysiology of delirium is complex and not well understood. This severely impacts the development of targeted, evidence-based therapies and prevention strategies. Previous research using Near Infrared Spectroscopy (NIRS) has identified an overall reduction in cerebral oxygenation amongst delirious patients when compared to non-delirious patients. Additionally, functional NIRS (fNIRS) studies in children demonstrated widespread frontal lobe suppression during postoperative delirium. However, fNIRS has not yet been used to investigate delirium in critically ill adults. This study aims to address this gap by employing fNIRS alongside the standard CAM-ICU delirium screening tool in ICU patients. The objective is to advance understanding of delirium pathophysiology by exploring cerebral oxygenation patterns. Specifically, this feasibility study has three aims: (1) to determine the practicality of using fNIRS in critically ill patients, (2) to examine changes in cerebral oxygenation patterns and their association with delirium, and (3) to assess whether fNIRS can provide early insights into delirium duration and severity. While recruitment and data collection are ongoing, preliminary analysis has demonstrated reduced activity in the prefrontal cortex (PFC) of patients experiencing delirium. Meanwhile, functional connectivity analysis shows an increase in PFC connectivity among these same patients, likely relating to some compensatory mechanism. Further analysis will aim to establish group effects within a study population of 25 critically ill adult patients. Overall, this work seeks to establish fNIRS as a novel tool to investigate delirium in the ICU and to inform future development of targeted management and prevention strategies.

2. The Overlooked Mental Health Burden of Polycystic Ovary Syndrome: Neurobiological Insights Into PCOS-Related Depression presented by Eleni Dubé-Zinatelli, PhD student at the University of Ottawa

Systemic neglect of women's health in research has produced persistent gaps in knowledge and clinical care, particularly for conditions unique to women. Polycystic ovary syndrome (PCOS) is one of the most prevalent endocrine disorders, affecting approximately 6-13% of women of reproductive age worldwide. It is characterized by ovarian dysfunction, hyperandrogenism, and metabolic disturbances. While research has traditionally focused on its gynecological, reproductive, and metabolic consequences, PCOS also carries a substantial mental health burden. Women with PCOS experience significantly higher rates of depression, anxiety, bipolar disorder, and sleep disturbances compared to women without the condition. Among these psychiatric comorbidities, depression is the most prominent, with women with PCOS being more than 2.5 times more likely to develop depression than those without the condition. Despite this well- documented association, the mental health dimensions of PCOS remain underrecognized in both research and clinical care, contributing to insufficient psychological support and reduced quality of life for affected individuals. This presentation will highlight how PCOS contributes to mental health outcomes through both biological pathways, including endocrine dysregulation, chronic inflammation, and altered gut-brain signalling, as well as psychological pathways, such as distress associated with common physical symptoms of the condition, including hirsutism, weight-related changes, and infertility. It will examine how distinct PCOS phenotypes shape both physiological and psychological outcomes, explore the biological mechanisms underlying these differences, and evaluate the effects of existing treatments on PCOS symptoms and depression. The presentation will also identify key gaps in the current literature

and introduce ongoing projects and emerging data from this research. Overall, this work aims to advance understanding of PCOS-related mental health dysfunction by examining the neurobiological drivers of mood disturbances and addressing a critical gap in women's health research.

3. Real-World Performance of Automated MRI Lesion Detection Tools in Drug-Resistant Focal Epilepsy presented by Michelle Li, undergraduate student at Western University

Epilepsy is a common brain disorder that affects about 50 million people worldwide, and many individuals continue to have seizures despite adequate trials of anti-seizure medications. For people with drug-resistant focal epilepsy, surgery can be highly effective when a lesion is identified and removed, yet many candidates are MRI negative or show only subtle abnormalities on routine scans. Automated MRI lesion detection tools have been developed to assist lesion identification, but most models are trained and validated on carefully curated research datasets, and their performance on routine clinical scans remains uncertain. The present study retrospectively analyses structural MRI scans from 250 patients with drug-resistant focal epilepsy, obtained from the MRI2EEG project, EpLink, and an FCD project. Three automated programs are applied: the Multicentre Epilepsy Lesion Detection (MELD), the deep-learning focal cortical dysplasia (deepFCD), and the Morphometric Analysis Program (MAP18). For each patient, we quantify whether each tool identifies at least one candidate cluster, along with cluster size and location, and spatial overlap across tools. Program outputs are compared with original neuroradiology reports and, where available, stereoelectroencephalography (SEEG) seizure-onset locations and surgical resection cavities. We anticipate that individual programs behave as high-sensitivity, low-specificity screens for both MRI-positive and MRI-negative patients. Consensus clusters identified by multiple programs are less frequent than clusters from a single program, but show greater spatial alignment with clinically defined epileptic regions.

4. System offline: understanding how spinal cord injury impacts tissues and gut microbiome at baseline and under infectious challenge presented by Lauren Coulson, MSc student at Queen's University

Traumatic spinal cord injury (SCI) disrupts motor, sensory, and autonomic communication between the central nervous system and periphery, resulting in widespread autonomic and immune dysfunction (Sekhon & Fehlings, 2001; Thompson et al., 2015). Loss of autonomic regulation contributes to impaired host defense, referred to as SCI-immune depression syndrome (SCI-IDS; Riegger et al., 2007; Kopp et al., 2023). Gastrointestinal function is likewise disrupted, leading to gut dysbiosis that exacerbates immune dysfunction (Kigerl et al., 2020; Holmes & Blanke, 2019; Kigerl et al., 2016). Together, SCI-IDS and gut dysbiosis cause people with SCI to be at high risk and poorly recover from infection.5 Serious infections, such as sepsis, remain the leading cause of morbidity and mortality in people with SCI (Thietje et al., 2011; Savic et al., 2017; Center NSCIS, 2022). Despite this clinical significance, how SCI, the gut microbiome, and infection influence spinal cord and systemic pathology are poorly understood. Elucidating how infection following SCI disrupts immunity, the gut microbiome, and spinal cord pathology may reveal novel targets that improve infection resolution and ultimately reduce intraspinal and peripheral morbidities in SCI. Injury model: Male and female C57BL6/J mice received a 70 kDyne T9 contusion SCI or control laminectomy, and a cecal ligation and puncture (CLP) to induce sepsis or control laparotomy (Toscano et al., 2011). Aim 1: Investigate how systemic infection alters spinal cord pathology and transcriptional landscape after SCI. Spinal cord tissue will be analyzed using both immunohistochemistry (IHC) and single-cell RNA sequencing to assess changes in lesion pathology, cellular composition, and injury-associated inflammatory and neurodegenerative responses. Aim 2: Investigate how systemic infection alters immune and metabolic responses in peripheral organs after SCI. Immune (bone marrow, spleen) and metabolic (liver, kidney) tissues will be analyzed using bulk RNA sequencing to identify alterations in inflammatory and metabolic responses affecting tissue function. Aim 3: Investigate how systemic

infection alters gut microbial composition and pathology after SCI. Longitudinal microbiome profiling will be combined with IHC of intestinal tissues to evaluate changes in microbial populations, intestinal barrier integrity, and immunological disturbances.

SESSION 2 STUDENT PRESENTATION ABSTRACTS

5. Using combined TMS-EEG to investigate cortical changes in response to acute pain

presented by Thu Pham, MSc student at Western University

Pain is a distressing experience caused by intense stimuli exerting damage to the body tissue. During acute pain, motor control and performance is reduced, presumably to prevent movements that could provoke further injury (Chowdhury et al., 2022). To evaluate the neural mechanism underlying these motor changes, we measure cortical excitability using combined transcranial magnetic stimulation (TMS) and electroencephalography (EEG) during acute experimental muscle pain. We recruit thirty healthy participants and randomize them into control or pain group. The pain group receive a 0.2 mL bolus injection of hypersonic saline (5% NaCL) into the right first dorsal interosseous (FDI) muscle, while the control group receive 0.9% isotonic saline which produces no pain. Pain intensity and quality are assessed every minute after the injection. Single-pulse TMS is delivered over the left motor cortex, targeting the left FDI hotspot as identified using a neuronavigation system, and EEG (64 channels) is concurrently recorded. TMS-evoked potentials (TEPs), used to index brain activity, are collected before, during, and after pain resolution. The amplitude of the TEP peaks is compared across time (pre-pain, during pain, post-pain) and between groups (hypertonic, isotonic). We hypothesize that the amplitude of the TEP peaks at 45 ms (indexing GABAergic neurotransmission) will increase in response to pain, conjectured based on previous literature reporting reduced corticomotor excitability (measured using electromyography [EMG]) during experiment pain (Chowdhury et al., 2022). This is the first study to apply simultaneous TMS-EEG in acute muscle pain, providing new insight into the mechanisms of pain for new treatment targets.

6. Focused Ultrasound Induced Phenotypic Alterations to Breast Cancer Cells

presented by Dure Khan, PhD student at Queen's University

Up to 10-15% of patients with breast cancer (BC), particularly those with triple negative (TNBC) and human epidermal growth factor receptor 2 overexpressing (HER2+) subtypes, have increased risk of developing brain metastases. Despite aggressive treatments, including chemotherapy and radiotherapy, the median survival for these patients is ~15 months. Focused Ultrasound (FUS) is a non-invasive, image-guided therapeutic technology used in cancer treatment for ablation and drug delivery, however, the direct biological effects of FUS on tumour cells at sublethal intensities are not well understood. Therefore, this study aims to characterize the response of representative human TNBC (MDA-MB-231) and HER2+ (SKBR3) BC cell lines to FUS for in vitro, specifically assessing changes in viability (Flow cytometry), migration (Scratch Wound Assay), invasion (Modified Boyden Chamber Assay), and proliferation (MTT assay). Cells were treated with FUS (frequency=479.5kHz, 1% duty cycle) at peak pressures ranging from 0.6-1.2 MPa and seeded in triplicate for each condition across three independent experiments. FUS-treated MDA-MB-231 cells showed a significant decrease in viability, migration and proliferation (p<0.005) when compared to controls. Assays to assess viability, migration, invasion and proliferation are currently being conducted with SKBr3 cells. Results from these studies will guide future in-vivo studies assessing novel applications of FUS in the treatment of BC metastases in the brain.

7. Investigating the role of Physical Activity in Default Mode Network Connectivity and Cognitive Function in Mild Cognitive Impairment presented by Ayesha Hammad, MSc student at Western University

Mild Cognitive Impairment (MCI) is a transitional stage between healthy aging and dementia, where individuals experience cognitive decline beyond what is expected of their age. MCI is characterized by disruptions in one of the key functional brain networks called the Default Mode Network (DMN) that contributes to cognitive functions, such as memory and executive function. Physical activity (PA) is protective against cognitive decline. However, the neural mechanisms through which PA supports cognitive function remain unclear. Therefore, this study will examine the relationship between everyday PA levels and connectivity within the DMN in individuals with MCI, a population at a higher risk for dementia. Addressing this gap can clarify how lifestyle behaviors support cognitive resilience during aging. This study will use baseline data from a randomized controlled trial. Forty community-dwelling lder adults aged 60+ who meet the clinical criteria for MCI will be included. Real-time PA will be tracked using wearable accelerometers to capture objective measures of movement. Cognitive performance will be evaluated using validated assessments for both memory and executive function including measures for verbal and visuospatial memory, working memory, inhibitory control, and mental flexibility. Functional connectivity within the DMN will be measured using resting-state functional Magnetic Resonance Imaging. Cross-sectional analysis will examine the associations between PA levels, DMN functional connectivity, and cognitive performance. By examining relationships between PA, DMN and cognitive performance, this study aims to advance understanding of the neural mechanisms through which PA supports brain health in aging. Findings may help explain individual differences in cognitive resilience during aging and inform the development of more personalized strategies.

8. Quantitative Assessment of White Matter Myelin Alterations After Ischemic Stroke in Non-Human Primates presented by Wenxin Yin, undergraduate student at Queen's University

Stroke is a cause of disability and mortality worldwide, with ischemic stroke representing the most prevalent form (Kuriakose & Xiao, 2020). Although ischemic injury is traditionally associated with gray matter damage, substantial effects on white matter (WM) are increasingly recognized (Wang et al., 2016). WM integrity depends on myelinated axons, and demyelination represents a key pathological feature following ischemic injury (Zhang et al., 2024; Shi, et al., 2015). Non-human primates (NHPs) provide a valuable model for studying post- stroke pathology due to their close anatomical and functional similarity to humans (Li et al., 2022; Lin et al., 2022). However, previous studies have often relied on qualitative or semi-quantitative assessments of demyelination, reflecting the absence of a standardized quantification tool for myelin quantification (Huitema et al., 2021). This independent research project aimed to optimize myelin staining and develop a quantitative workflow that aligns histological myelin measurements with structural magnetic resonance imaging (MRI) to improve the assessment of WM myelin changes after stroke. Brain tissue from NHPs subjected to middle cerebral artery occlusion was processed using Luxol Fast Blue staining to visualize myelin. High-resolution brightfield microscopy was performed, followed by deformable image registration of histological sections to structural MRI using the BigWarp plugin in ImageJ to ensure anatomical correspondence. A standardized image analysis pipeline was applied, with regions of interest (ROI) selected within major WM tracts, including the corticospinal tract and internal capsule, which are highly myelinated and well-suited for myelin intensity assessment. Myelin intensity was quantified as a percentage of signal relative to the maximum gray value and compared between contralateral and ipsilateral hemispheres. Across all examined regions, myelin intensity showed a consistent overall trend toward lower values in the ipsilateral hemisphere, although these differences did not reach statistical significance. Overall, this project establishes a reproducible and scalable framework for integrating histological and imaging data to enhance the precision of myelin assessment in translational stroke research.

SESSION 1 POSTER ABSTRACTS

1. Determining the functional role of Sept9 phosphorylated isoforms in Medulloblastoma presented by Olivia Prince, undergraduate student at Queen's University

BPost-translational modifications, such as phosphorylation, play a critical role in the regulation of developmental and cancer signaling pathways. While phosphorylation can be regulated at the kinase level, the promiscuity of kinases can limit their ability to selectively regulate individual phosphorylation events. Co-transcriptional mechanisms, such as alternative transcriptional start sites (ATSS), can offer a potential mechanism for removing phosphorylation sites at the transcript level. ATSS events are observed across different cancer types and can be used to generate isoforms which include or exclude exons harboring critical phosphorylation sites, termed phosphosites. Preliminary work from our lab explored such mechanisms in cancer by integrating phosphoproteomics, whole-cell proteomics, and RNA sequencing datasets between medulloblastoma (MB) cells, the most common malignant pediatric brain cancer, compared to their developmental cell of origin, granule neuron precursors (GNPs). We discovered a subset of proteins that had phosphorylation sites enriched in MB compared to GNPs. One such protein is Septin-9 (Sept9), a guanosine-5'-triphosphate (GTP)-binding protein which interacts with actin and microtubules and plays a role in cell division. Preliminary work from our lab revealed the *Sept9* isoforms including the phosphosite localizes along the boundary of MB cells, suggesting a potential isoform-specific role in the spatial organization of tumor cells. To investigate the role that the different isoforms of *Sept9* plays in MB, we have generated *Sept9* knockdown (KD) cell lines. The *Sept9* phosphorylated KD cell lines were found to exhibit a distinct morphological phenotype. While wildtype MB cell lines grow adherently, KD cells have formed spheroid structures, a phenotype exhibited by mesenchymal-like cells in culture which are prone to invasion.These findings provide insight into how cancers use co-transcriptional regulation as a means of altering which isoforms are present and ongoing work will further determine how *Sept9* impacts MB pathogenesis.

3. Safety and associated assessment methods of low-intensity transcranial focused ultrasound neuromodulation: A systematic review of preclinical and clinical studies presented by Bo Fei Yu, undergraduate student at Queen's University

Transcranial low-intensity focused ultrasound (LIFU) is a rapidly emerging non-invasive neuromodulation modality that has generated increasing clinical interest across neurological and psychiatric indications. However, broader clinical translation requires robust evidence addressing safety risks such as thermal injury, hemorrhage, edema, inflammation, and neuropsychiatric adverse effects. This systematic review will characterize the safety profile of transcranial LIFU neuromodulation across preclinical and clinical studies to advance clinical translation. MEDLINE (Ovid), Embase (Ovid), Cochrane CENTRAL, PsycINFO (Ovid), and PubMed were searched from inception to July 2025 using focused ultrasound, neuromodulation, and safety-related terms. Studies were included if they reported original in vivo data, used transcranial LIFU to modulate brain function, and assessed outcomes relevant to safety. Due to the invasive nature of safety assessments, safety data from preclinical studies was included, but reported separately from clinical safety outcomes. Data were extracted on model or participant characteristics, target sonication region, sonication parameters, safety assessment timing and modality, and clinical outcomes. The search identified 361 unique records, 50 of which met inclusion criteria (31 animal, 19 human). Across studies, thermal effects were minimal and most preclinical investigations reported preserved tissue architecture, no necrosis, no apoptosis, and no major behavioural abnormalities including after repeated sonication. Three minor hemorrhage or suspected hemorrhage events were reported in animal models, generally under elevated sonication intensity or highly repetitive

stimulation conditions, suggesting parameter dependence. Clinically, LIFU neuromodulation was generally well tolerated with few transient adverse structural and behavioural abnormalities that were predominantly mild, though isolated psychiatric events highlight the need for careful monitoring. Available evidence supports a favourable safety profile for LIFU neuromodulation, with rare adverse histological findings occurring under high-intensity exposure conditions. Future work should prioritize standardized safety reporting and longitudinal neuropsychiatric follow-up to support safe clinical translation.

5. Microglial Phenotype in Chronic Ischemic Stroke and the Potential Impact of AAV-NeuroD1 Gene Therapy presented by Naomi Hawreluk, undergraduate student at Queen's University

Ischemic stroke remains a leading contributor to mortality and long-term neurological disability worldwide. While improvements in emergency care have increased survival rates, most effective clinical interventions are largely restricted to the acute phase of injury. As a result, increasing attention has shifted toward understanding cellular processes that influence tissue remodelling and recovery during the chronic stage. Microglia, the resident immune cells of the central nervous system, play a critical role in shaping recovery outcomes, yet their behaviour during the chronic stage of stroke remains poorly defined. An increasingly compelling area of research has investigated regenerative gene therapies. One such therapy involves adeno-associated virus (AAV) mediated delivery of the transcription factor NeuroD1, which has demonstrated robust neuroregenerative effects in both rodent and non-human primate models of ischemic stroke, including increased neuronal density and reduced gliosis. Despite these promising outcomes, the impact of NeuroD1 treatment on microglial populations during the chronic stage of stroke is not well understood. The present study investigates microglial distribution and phenotype in chronic-stage ischemic stroke tissue following AAV-NeuroD1 gene therapy in non-human primates. Brain tissue collected nine months after transient middle cerebral artery occlusion was immunolabeled for Iba1 to identify microglia and counterstained with DAPI to label nuclei. Quantitative image analysis was performed to assess microglial density and spatial distribution in ipsilateral, stroke-affected regions compared to contralateral control regions, as well as across control, low-titer, and high-titer NeuroD1 treatment groups. By examining microglial patterns in chronically injured tissue, this study provides foundational insight into how regenerative gene therapy may influence the long-term neuroimmune environment after stroke.

7. Electroencephalographic Biomarkers of Deep Transcranial Magnetic Stimulation Treatment Response for Major Depressive Disorder in Older Adults: A Preliminary Study presented by Shelby Prokop-Millar, PhD student at McMaster University

Major depressive disorder (MDD) in older adults can result in detrimental health consequences and often presents with resistance to antidepressant treatment. While Hesed-coil 4 (H4) and 7 have shown great promise in the treatment of MDD in older adults, not all participants will respond. Establishing biomarkers to predict individual treatment responses and to better understand how these coils work to treat MDD in older adults is essential. Resting-state electroencephalography (rsEEG), a cost-effective technique, has been previously used to identify response biomarkers to psychiatric treatments. This study therefore aims to identify rsEEG biomarkers of response to the H4 and H7 coils in older adults with MDD. Twenty-one older adults with treatment-resistant MDD were randomly assigned to undergo 20 sessions of either H4 or H7 coils. rsEEG recordings were ascertained at baseline and posttreatment, along with the 24-item Hamilton Depression Scale (HDRS-24). Although none of the effects remained significant after correction, several preliminary biomarker patterns emerged. Higher baseline gamma power at Fp1 and F4 predicted a lower likelihood of treatment response. Similarly, an increase in F4 and P3 alpha power was associated with smaller improvements in the HDRS-24. However, increased theta power at F7

and across multiple cortical regions were associated with greater reductions in the HDRS-24. This study identified preliminary rsEEG biomarkers of H4 and H7 coil response in older adults with MDD, providing initial proof-of-concept. Therefore, these findings can help guide hypothesis generation in future research. With larger sham-controlled trials needed for definitive characterization and validation.

9. Sex and Dose-Dependent Disruptions Produced by Adolescent Edible Tetrahydrocannabinol (THC) Consumption presented by Marieka DeVuono, postdoctoral fellow at Western University

Adolescent cannabis use may increase the risk of psychiatric illness later in life, yet usage rates remain high in this age group. Previous studies indicate that Δ9-tetrahydrocannabinol (THC) exposure during adolescence disrupts prefrontal cortex (PFC), ventral tegmental area (VTA), and nucleus accumbens (NAc) pathways, potentially causing long-lasting behavioural changes. Prior research has focused on systemic THC injections, which do not reflect typical human consumption methods. Therefore, we investigated the long-term effects of adolescent edible THC consumption, a popular method of human cannabis use, in male and female rats, comparing low and high-dose exposures. Male and female Sprague Dawley rats received THC edibles (1-5mg/kg, mixed with Nutella®) either once (low-dose) or twice daily (high-dose) during adolescence (postnatal day 35-45). Adult behaviour was evaluated through a battery of cognitive and affective tasks, and in vivo electrophysiology assessed glutamatergic PFC activity and dopaminergic VTA activity. Low-dose adolescent THC consumption produced an anxiolytic effect in males; however, the high-dose THC edible caused sex-specific outcomes, resulting in anxiety behavioural in males and cognitive deficits in both sexes. Correspondingly, the high-dose edible also produced PFC glutamatergic hyperactivity in both sexes and elevated VTA dopamine activity in males. Distribution to glutamate, GABA, monoamine neurotransmitters and related metabolic enzymes was also found in the PFC, NAc, and VTA following high-dose adolescent edible THC. Alterations in excitatory/inhibitory balances and monoamine metabolism within these pathways may mediate the behavioural consequences of adolescent THC consumption and contribute to future psychiatric risk.

11. Different Sensory Worlds, Different Outcomes: Sensory Processing's Impact on Mental Health and Quality of Life presented by Natalia Van Esch, MSc student at Wilfird Laurier University

Sensory processing differences, especially sensory sensitivities, have shown relationships with various mental health traits in neurodiverse and neurotypical populations. Additionally, these sensory processing differences have been clustered or grouped in youth and neurodiverse populations, with more sensitive clusters often showing greater difficulties. Our study seeks to understand how sensory processing clusters in a general sample, and how these clusters relate to mental health and executive functioning traits as well as quality of life within students. Five-hundred-fifty-six students (M_{age}=19.93, SD_{age}=3.72; 85 men, 461 women, 7 non-binary, 3 prefer not to answer) are included in our study. We conducted a k-means cluster analysis on 7 sensory processing domains of the modified Adult/Adolescent Sensory Processing scale, resulting in 5 clusters; Sensory Sensitive (SN; n = 63), Sensory Adaptive (SA; n=78), Sensory Seeking (SE; n=158), Sensory/Social Avoiding (SSA; n=124), and Mild Sensory Differences (MSD; n=133). Follow-up ANOVAs with Bonferroni corrections comparing clusters on levels of depression (F(4,211.71) = 23.14, p<0.001, η_p^2 = 0.171), anxiety (F(4,551) = 28.97, p<0.001, η_p^2 = 0.174), intolerance of uncertainty (F(4,500) = 30.62, p<0.001, η_p^2 = 0.197), obsessive-compulsive (F(4,210.83) = 33.143, p<0.001, η_p^2 = 0.217), quality of life (F(4,207.73) = 17.09, p<0.001, η_p^2 = 0.124), alexithymia (F(4,517) = 15.97, p<0.001, η_p^2 = 0.106), and executive functioning (F(4,438) = 25.81, p<0.001, η_p^2 = 0.191) showed that generally, the SA cluster showed the least difficulties across mental health and executive functions, as well as the highest quality of life. The SN cluster generally scored the highest for mental health and executive functioning difficulties, and the lowest for quality of life, followed by MSD. These findings align with and

extend prior research in youth and neurodiverse samples, showing that greater sensory sensitivities and processing differences are linked to poorer mental health and executive functioning, as well as lower quality of life.

13. Prevalence of Comorbid Postpartum Depression and Anxiety in Community-Based Birthing Parents Seeking Treatment for Postpartum Depression presented by Karley George, PhD student at McMaster University

To estimate the prevalence of comorbid postpartum depression (PPD) and anxiety in a community-based sample of birthing parents seeking treatment for PPD in Ontario, Canada and who were enrolled in one of nine randomized controlled trials (RCTs) of cognitive behavioral therapies (CBT) for PPD. Data from nine RCTs containing 1920 birthing parents and conducted between 2017 and 2025 were meta-analyzed. All participants were living in Ontario, Canada with Edinburgh Postnatal Depression Scale (EPDS) Scores ≥10 and infants < 12 months old. Comorbid anxiety was assessed using the Generalized Anxiety Disorder-7 (GAD-7) scale, the Penn State Worry Questionnaire (PSWQ) and/or the Mini International Neuropsychiatric Interview (MINI). Sixty-six percent of participants with PPD (i.e., with EPDS scores ≥10) had moderate to severe anxiety (GAD-7 scale score ≥10; 95% confidence interval (CI) 63%-68%, seven studies, *n*=1654), and 69% of participants with PPD met the cutoff for probable GAD (PSWQ scale score ≥61; 95% CI, 63%-74%, two studies, *n*=254). Seventy percent of participants with MINI-defined current major depressive disorder (MDD) met Diagnostic and Statistical Manual of Mental Disorders – 4th Edition-based criteria for any anxiety disorder (95% CI 64-76%, six studies, *n*=448). Nearly 60% of participants with MDD met criteria for current GAD on the MINI (95% CI, 52-61%, *n*=448). More than two-thirds of individuals with PPD and seeking treatment have clinically significant anxiety. Those with PPD, their families, and healthcare professionals should be aware of the high prevalence of anxiety in these individuals so that treatment plans can be optimized to meet their clinical needs.

15. Dissociable effects of adolescent systemic aromatase inhibition and estrogen receptor blockade on sociosexual development in male rats presented by Francine Burke, PhD student at Brock University

In rats, aromatization of testosterone to estradiol during the perinatal period drives sexual differentiation of the brain. Similarly, adolescence may represent a second window in which gonadal hormones organize and refine neural circuits underlying sexspecific behaviours as sexual maturity is reached. Systemic blockade of aromatization in male rats during adolescence using the aromatase inhibitor fadrozole (FAD) from postnatal day (P) 38 to 48 (pubertal onset ~P40) led to deficits in adult reproductive behaviours, including reduced copulatory performance and a failure to show abovechance preference for odours from sexually receptive females relative to control rats, which suggests that estradiol synthesis during adolescence supports the organization of male reproductive behaviours. In the present study, male rats were treated systemically with the estrogen receptor (ER) antagonist ICI182,780 (ICI) during the same adolescent period to determine whether these effects are mediated through a lack of ER signalling. ICI treatment delayed balanopreputial separation (p < 0.001) and reduced seminal vesicle weight compared to controls (p = 0.064). Despite these somatic effects, ICI-treated males did not differ from controls in copulatory performance with a receptive female (mounts, intromission, ejaculations) and both groups demonstrated a significant preference for female odours over male or clean bedding. Thus, systemic blockade of classical ER (i.e., ERα, ERβ during adolescence via ICI does not recapitulate the behavioural phenotype observed after aromatase inhibition via FAD. These divergent outcomes may reflect insufficient ER blockade by systemic ICI at neural circuits underlying sociosexual behaviour. Further, aromatase inhibition may alter circuitry through mechanisms not captured by classical ER antagonism, such as engagement of non-genomic ERs or disruption of local circuit development during

adolescence (e.g., synaptic pruning, dendritic spine remodeling). As such, estradiol synthesis during adolescence likely organizes male reproductive behaviour through pathways that extend beyond classical ER signalling.

17. Making Connections: The Relationship Between Synaptogenesis and Cognitive Decline presented by Hannah Curryer, undergraduate student at Carleton University

Synaptogenesis, the formation and refinement of synaptic connections between neurons, is essential for proper development and plasticity of the brain, meaning subtle disruptions to this process can have long-term effects on both cognitive function and mental health. Synaptic dysfunction often occurs prior to extensive neuronal loss, highlighting synaptogenesis as a potential early biomarker for mild cognitive impairment (MCI), commonly a precursor to Alzheimer's disease. Understanding this is of great importance to the healthcare field as it targets early cognitive decline, rather than late-stage neurodegeneration where treatment options are limited. This study aims to examine how shortages of brain-derived neurotrophic factor (BDNF), a prominent synaptic regulator, in hippocampal synaptogenesis during the early adulthood stage is associated with MCI. The proposed study will synthesize findings from neuroimaging and animal models exposed to lessened BDNF signaling, and examine changes in both synaptic density and synaptic regeneration. Synaptic alterations in the hippocampus of individuals diagnosed with MCI compared to age-matched cognitively healthy controls would be assessed, and experimental studies examining how reduced or enhanced BDNF signaling affects hippocampal synapse formation, synaptic plasticity, and memory performance would be performed. By comparing this data across healthy and cognitively impaired populations, this research seeks to identify consistent patterns of synaptic deficiencies that may serve as early indicators of cognitive decline. Overall, this research aims to contribute a clearer understanding of the relationship between synaptogenesis and early neurodegenerative diseases, with the final goal of developing early diagnostic strategies and preventative measures for cognitive disorders within clinical settings.

19. The effects of simultaneous alcohol use on problem gambling: a systematic review presented by Emily Dye, MSc student at McMaster University

Given Canada's rapidly growing gambling industry, addressing potential risks and harms is crucial to public health and safety. Despite common simultaneous use and comorbidity between problematic alcohol use and problem gambling (PG), limited research has assessed the acute impacts of alcohol intoxication within PG populations. The present systematic review aims to examine current experimental literature exploring acute alcohol consumption effects on gambling behaviours within PG populations. The literature search was conducted using OVID on Embase, MEDLINE, and PsycINFO databases. Inclusion criteria comprised an acute alcohol administration protocol, PG assessment, analysis specifically examining PG pathology, and peer-reviewed, primary research. *n*=3027 studies were retrieved. *n*=2996 were excluded during initial title/abstract screening and *n*=17 were excluded during full-text screening, mostly lacking alcohol administration or PG assessment. *n*=7 were excluded during extraction due to absent analysis of PG pathology. N = 7 studies met all inclusion criteria. Most studies took place within a bar-lab with target Blood Alcohol Curves of 0.05%-0.08%. The South Oaks Gambling Screen was primarily used to assess pathological gambling, with Video Lottery Terminals and neurocognitive tasks used to examine gambling-related behaviours. Uniquely within PG participants, alcohol increased time spent gambling, risky betting, and loss frequency. However, alcohol did not influence average bets, number of trials, or gambling-related biases within PG participants. Regarding neurocognitive task performance, some research found effects of alcohol unique to PG populations, while others found no such effect in variables like response inhibition and punishment sensitivity. Very few studies to date examine acute alcohol effects in those with PG. Current literature suggests that those

with PG may represent a unique population with an increased risk of negative outcomes from simultaneous gambling and alcohol use. Further research is needed to understand the complexities underlying this relationship and can inform policy decisions mitigating simultaneous use particularly within at-risk populations.

21. How the Social Brain Changes: A Brain-Based Marker of Mentalizing Captures Age-Related and Neurodiverse Variation presented by Natalia Castro Gonzale, PhD student at Queen's University

Just as a fingerprint uniquely identifies a person—or a map represents landmarks—stable whole-brain activity patterns observed across individuals and contexts can serve as objective hallmarks of specific mental processes. Known as *brain signatures*, these patterns have translational value, predicting subjective experiences (e.g., pain intensity or craving) and tracking neural changes related to treatment. Despite advances in neural biomarkers, the reliability, generalizability, and applicability of brain signatures targeting socio-cognitive processes such as *mentalizing*—the ability to understand others' inner mental states, including their thoughts, beliefs, or feelings—remain largely unexplored. Here, we leverage a recently developed brain signature of mentalizing to test whether it captures mentalizing-related activity across tasks, examine how its expression relates to individual differences in mentalizing ability, and assess variability in groups at risk for impairments (older adults and individuals diagnosed with Autism Spectrum Disorder, ASD). Data were pooled from multiple datasets (total N = 337) spanning two mentalizing tasks: the EmpaToM task (N = 84; young and older adults) and two versions of the Level of Inference Task (N = 255), including a high-functioning ASD group. In both tasks, participants made social inferences about another person's mental states or factual judgments (control) while brain responses were collected using fMRI. Results show that the mentalizing signature reliably emerges across tasks and robustly distinguishes mentalizing from non-mentalizing neural activity. Moreover, signature expression tracked individual differences in mentalizing performance. Age-related reductions in pattern expression were observed in older adults, mirroring behavioral declines in mentalizing later in life and indicating sensitivity to developmental changes across adulthood. Individuals with ASD likewise showed reduced signature expression relative to neurotypical participants, highlighting the marker's translational relevance. Together, these findings establish the mentalizing signature as a reliable and generalizable neurobiomarker with applications for assessing social-brain resilience, identifying socio-cognitive vulnerabilities, and tracking intervention-related change.

23. Examining binding properties of invertebrate retinoid receptors presented by Irdina Thajuddin, MSc student at Brock University

The vitamin A metabolite, retinoic acid (RA), canonically acts through nuclear hormone receptors (RARs and RXRs) to regulate gene expression (Aranda & Pascual, 2001). These receptors mediate essential functions of RA, including CNS development, regeneration and learning and memory (Rothwell & Spencer, 2014). Though well characterized in mammalian CNS, less is known of the functional significance of these receptors in invertebrate CNS. Our studies in the mollusc Lymnaea stagnalis have shown that the RXR (LymRXR) plays an important role in mediating RA signaling during CNS regeneration, by inducing neurite outgrowth and mediating axon guidance (Dmetrichuk, Carlone & Spencer, 2006). Whereas mammalian RXRs have largely been studied in the context of gene regulation, LymRXR is located in the neurites and growth cones and is implicated in mediating rapid, non-genomic effects of RA (Carter et al., 2010). In order to further examine these non-genomic actions of RXR, we are now studying its retinoid binding capabilities. Ligand-responsive RXR sensor constructs have been generated and expressed in Drosophila melanogaster and the activation of RXR examined using a GAL4–UAS reporter system (de Hoog et al., 2022). Larval Drosophila CNS (which have no endogenous RXR) were extracted and treated with varying concentrations of retinoid isomers as well as synthetic ligands, including an RXR-selective

agonist and an RAR selective agonist. Our results indicate that LymRXR responds to low concentrations of natural retinoids (similar to those found in vivo) and only responds to RXR-selective agonists. Unlike the mammalian RXRs which do not bind the all-trans RA isomer, we show here that LymRXR does, thus exhibiting divergent properties (Heyman et al., 1992). These findings will support future studies on how RXR mediates effects of various endogenous retinoids to induce neuronal outgrowth and growth cone turning in a CNS regeneration-competent species.

25. Immediate Effects of Parent-Child Cuddling on Preschoolers' Resting-State EEG

presented by Angelica Doctolero, undergraduate student at Queen's University

Social touch is an important contributor to healthy mental, physical, and social functioning. For example, various forms of touch have been associated with improved positive affect, pain reduction, and facilitating social bonds between individuals. Despite substantial research on the long-term health and social benefits that touch has for adults and children, less is known about the immediate effects that social touch may have on everyday social functioning. Previous studies have established that, for adults, touch that stimulates C-tactile afferents leads to activity in neural regions collectively known as the social brain (e.g., medial prefrontal cortex, dorsolateral prefrontal cortex, and dorsomedial prefrontal cortex). The goal of this study is to investigate whether there may also be effects of touch on social-brain activity in preschool-aged children. To address this goal, preschoolers' resting-state EEG will be recorded at two time points, once during a baseline period and once after children either cuddle or do not cuddle with a parent during a storybook task. I hypothesize that preschoolers will experience increased activity in social brain regions after cuddling when compared to their own activity at baseline. Furthermore, this increase is expected to be significantly greater than preschoolers' activity in the no-cuddle condition. Findings from this study will contribute to understanding the mechanisms that influence social cognition, supporting the notion that touch is an important component for early sociocognitive functioning.

27. Neuroanatomical and Vascular Determinants of Memory Performance in Episodic Memory

presented by Hunter Nicholls, undergraduate student at Queen's University

While the hippocampus's central role as the brain's hub for learning and memory has been well established (Lisman et al., 2017; Lazarov & Hollands, 2015), less is known about how individual variability in its anatomical features influences cognitive performance. Differences in connectivity within and between the hippocampus and cortical regions, as well as variations in cortical thickness and hippocampal subfield volume, play a critical role in successful memory outcomes, which may depend on how information is learned (Walhovd et al., 2006; King et al., 2015). This project will investigate how hippocampal inter-connectivity and anatomy support learning via active visual encoding tasks, such as drawing, that use a combination of multimodal cognitive pathways (e.g., visual, motor) to strengthen memory (Fernandes et al., 2018; Wammes et al., 2019). We will analyze structural and functional MRI and angiography data collected during the completion of an episodic encoding-based memory task, to answer the following questions: How do individual differences in connectivity, cortical thickness, and hippocampal subfield volume contribute to multiple measures of episodic memory performance during drawing-based encoding, and to what extent are these effects mediated by the nature of hippocampal vascularization (i.e. fed by a single artery or multiple)? By linking neuroanatomy, blood flow, and behaviour, this project aims to provide insights into the variability within the brain's memory center and its effects on cognition.

29. Investigating the Relationship Between Glioblastoma Growth Kinetics, Stemness, and Patient Outcomes presented by Katelyn Wu, undergraduate student at Queen's University

Glioblastoma (GB) is the most common and aggressive primary brain tumour in adults, accounting for 48.6% of all central nervous system malignancies. The current standard of care includes maximal safe surgical resection of the tumour, followed by concomitant radiation and chemotherapy with temozolomide. However, prognosis remains poor even with treatment, characterized by an overall five-year relative survival rate of approximately 4-5%. Despite decades of research and medical advances, improvements in GB outcomes have been limited. The biological complexity and heterogeneity of GB contribute to pronounced variability in patient outcomes, presenting a major challenge in establishing prognostic frameworks capable of effectively guiding personalized treatment strategies. Currently, MGMT promoter methylation is the only widely accepted prognostic biomarker, highlighting the need to identify additional factors capable of more comprehensively stratifying patients and predicting clinical outcomes. Underexplored factors, including the growth kinetics and stemness of patient-derived GB cell lines, warrant further investigation as potential prognostic predictors. This project investigates the relationship between the in vitro growth dynamics and stemness of patient-derived primary GB cell lines and corresponding patient outcomes. In vitro growth is quantitatively characterized using specific growth rate and spheroid doubling time. Meanwhile, stemness and proliferative capacity are assessed through the expression of SOX2, OLIG2, Ki-67, and Nestin, which are markers reflecting GB stem cell maintenance, lineage plasticity, and tumour proliferation. Patient outcomes are evaluated primarily using progression-free survival, defined as the time from diagnosis to tumour progression or death. Overall, the purpose of the study is to determine whether in vitro GB growth kinetics and stemness are associated with clinical outcomes. Identifying such prognostic markers could not only advance understanding of GB biology, but also improve patient stratification, predict therapeutic response, inform clinical decision-making, and support the development of personalized treatment approaches for GB patients.

31. The Behavioural Effects of Lipopolysaccharide Treatment During Puberty and Chronic Fluoxetine Treatment in Adult Male and Female Mice presented by Abby Hinterberger, PhD student at University of Ottawa

Puberty is a critical period of maturation, during which, exposure to systemic immune stressors such as lipopolysaccharide (LPS) may induce enduring depression- and anxiety-like behaviours. While fluoxetine (FLX) treatment has been shown to mitigate depression- and anxiety-like behaviors and reduce proinflammatory responses in other models, its efficacy in reducing sex-dependent behavioural symptoms following pubertal LPS treatment remains unclear. Thus, we investigated whether chronic FLX administration in adulthood can attenuate anxiety-like behaviour in CD1 mice. Male and female mice (n = 40) received either LPS (1.5 mg/kg, *i.p.*) or saline at 6 weeks of age, a stress-sensitive period during pubertal development. At 10 weeks of age, mice received either FLX (~18 mg/kg/day) or regular water *ad libitum* in their water bottles. After four weeks of FLX treatment, mice were exposed to the elevated plus maze, open field test, and novelty suppressed feeding test to assess anxiety-like behaviours. Preliminary results showed that pubertal LPS treatment increased anxiety-like behaviour in males, but not in females. In both sexes, fluoxetine-treated mice consumed more chow following food deprivation in the novelty-suppressed feeding test in the home cage, suggesting potential effects of FLX on hunger. These findings suggest that pubertal immune activation can lead to persistent, sex-dependent behavioural changes, and that chronic fluoxetine treatment may modulate these effects. Further research is required to clarify the underlying neuroinflammatory mechanisms and sex-specific treatment responses.

33. Assessing the Impact of Early-Life Stress on Social Alcohol Drinking presented by Hannah Nicholson, MSc student at Western University

Early-life stress (ELS), or adverse childhood experiences, is a significant risk factor for the development of Alcohol Use Disorder (AUD; Zhen-Duan et al., 2023). Studies show a relationship between ELS and earlier initiation of alcohol use, heavier drinking, and increased AUD risk that persists even after accounting for genetic and socioeconomic factors (Ystrom et al., 2014). Beyond behavioural outcomes, ELS alters neurodevelopmental trajectories in brain regions involved in stress regulation and reward processing, which can impact stress-reward interactions and increase reliance on alcohol as a coping strategy (Tottenham & Galván, 2016). Despite strong clinical and preclinical evidence linking ELS to alcohol misuse, critical gaps remain regarding the developmental timing at which vulnerability emerges and whether ELS promotes compulsive, aversion-resistant drinking, which is a core feature of AUD (Garrison et al., 2025). Preclinical models provide a powerful framework for addressing these questions. A previously well-known method called maternal separation has yielded important insights, but it represents a less translationally relevant form of adversity (Meng et al., 2023). However, the Limited Bedding and Nesting (LBN) model induces fragmented and unpredictable maternal care while maintaining continuous dam-pup contact, more closely representing common forms of human early adversity such as neglect or unstable caregiving (O'Neill et al., 2025). LBN reliably alters offspring stress physiology, reward circuitry, and emotional behaviour, and has been associated with increased alcohol consumption in adulthood, particularly in social contexts (O'Neill et al., 2025). This study will evaluate the LBN paradigm as a translationally relevant model of ELS-induced vulnerability to compulsive alcohol consumption across development. Using socially housed rats, ethanol self-administration will be assessed during adolescence and adulthood using the Fluid Acquisition Recording in Socially Housed Animal Research (FARESHARE) system, which enables high-resolution measurement of alcohol drinking without the confound of social isolation (Frie & Khokhar, 2024). Compulsive-like drinking will be assessed via resistance to quinine-adulterated ethanol. Both male and female rats will be included to examine sex differences. We hypothesize that LBN-exposed rats will consume more ethanol than controls, with effects emerging during adolescence and persisting into adulthood in a sex-dependent manner. We further predict that ELS will increase resistance to aversive stimuli, reflecting compulsive-like drinking, and that adolescent alcohol exposure will exacerbate this phenotype in adulthood. By integrating a developmentally relevant stress model with social drinking paradigms and measures of compulsivity, this work advances the translational validity of preclinical AUD models and provides insight into how early adversity and developmental timing interact to shape long-term addiction vulnerability.

35. Aging Minds and Social Ties: Neural Signatures of Mentalizing Predict Social Network Size, But Not Loneliness or Perceived Social Support, in Older Adults presented by Sarah Saju, PhD student at Queen's University

Social disconnection in later life is an increasing public health concern, with both structural (e.g., reduced social network size) and experiential (e.g., loneliness) dimensions linked to poorer health and well-being. Prior research in young adults has shown that multivariate neural signatures associated with mentalizing —the ability to infer others' beliefs, intentions, and mental states—predict social network size. However, it remains unclear whether similar neural markers operate in older adulthood and whether they differentially relate to structural versus experiential aspects of social connectedness. To address this gap, we applied multivoxel pattern analysis (MVPA) to fMRI data collected from 41 older adults (aged 65–77 years) while they completed the EmpaToM task, a validated paradigm probing mentalizing and empathy. Using a leave-one-participant-out cross-participant support vector regression (SVR) decoding approach, we tested whether mentalizing-related neural activation patterns predicted individual differences in social network size, perceived loneliness, and perceived social support. Mentalizing-related neural activation patterns in the right temporoparietal junction (rTPJ) significantly predicted two

indicators of structural social connectedness, support and sympathy clique sizes, despite age-related declines in behavioral mentalizing performance. In contrast, these patterns did not predict experiential measures such as perceived loneliness or social support. Supplemental analyses revealed no reliable associations between empathy-related activation patterns and social network size, indicating specificity of mentalizing processes. However, empathy-related neural signatures in a cluster spanning the inferior frontal gyrus and right anterior insula (rIFG/AI) marginally predicted variance in loneliness. Together, these findings demonstrate that mentalizing-related neural representations retain predictive relevance for real-world social structure in older adulthood, while experiential aspects of social connectedness may rely more strongly on socio-affective neural systems. This dissociation highlights distinct cognitive and affective mechanisms underlying social connectedness in later life.

37. Examining Cortical DMN Functional Connectivity During Interlimb Transfer: An fNIRS Study presented by Katrina Stanfield, Camille Cheeseman, KaiLi Enhorning, Jayden Jeong, and Zarah Kiley, undergraduate students at Queen's University

Interlimb transfer refers to the phenomenon whereby unilateral motor practice leads to improved performance in the contralateral, untrained limb. Although interlimb transfer is well-established, the neural mechanisms underlying it remain unclear. Rezaei et al. (2025) used fMRI to show that interlimb adaptation during a visuomotor rotation (VMR) task produces distinct changes in functional connectivity across the Default Mode Network (DMN). The objective of the present study is to replicate these findings using functional near-infrared spectroscopy (fNIRS), a portable, inexpensive and movement-compatible neuroimaging technique, to determine whether fNIRS can reliably capture similar functional connectivity patterns. Our participants will perform a VMR task in the Kinarm Exoskeleton, enabling precise measurement of movement across limbs. Concurrent fNIRS recording will target cortical regions in the DMN, especially the medial prefrontal cortex (mPFC), inferior frontal gyrus (IFG), and angular gyrus (AG). By integrating neural and behavioural data, this study tests whether interlimb transfer could rely on the re-expression of DMN activity patterns that support learning. In doing so, it also evaluates fNIRS as an accessible tool for studying motor learning.

39. Motor Evoked Potentials as Biomarkers of Upper Extremity Impairment in Non-Human Primate Models of Chronic Stroke presented by Madison Wilson, PhD student at Queen's University

Ischemic stroke, caused by cerebral blood flow occlusion, disrupts corticospinal tract (CST) integrity and often results in long-term motor impairments. Transcranial magnetic stimulation (TMS) motor mapping is a non-invasive technique used to assess CST integrity by measuring motor evoked potentials (MEPs). MEP amplitude reflects residual CST integrity and may serve as a biomarker of motor recovery. Non-human primate (NHP) models closely resemble humans in neuroanatomy and motor deficits, making them ideal for translational stroke research. This study investigated whether MEP amplitudes correlate with upper extremity motor impairment severity in NHPs with chronic stroke. We hypothesized thst higher MEPs would be correlated with lower impairment scores on the NHP Upper Extremity Motor Dysfunction Scale.Three NHPs with chronic stroke (eight months post-transient right middle cerebral artery occlusion) underwent high-resolution T1-weighted magnetic resonance imaging to guide stimulation using Brainsight neuronavigation. TMS motor mapping was performed under ketamine anesthesia using single pulses of TMS (50-70% of maximum stimulator output) applied to the affected and contralesional primary motor cortices to elicit MEPs. Intramuscular electromyography recorded muscle responses from the biceps, brachioradialis, and abductor pollicis brevis, with TMS pulses synchronized to EMG recordings. MEP amplitudes were measured peak-to-peak and averaged per muscle. Upper extremity function was evaluated daily for two weeks using the NHP Upper Extremity Motor Dysfunction Scale. Three NHPs with chronic stroke (eight months post-transient right middle

cerebral artery occlusion) underwent high-resolution T1-weighted magnetic resonance imaging to guide stimulation using Brainsight neuronavigation. TMS motor mapping was performed under ketamine anesthesia using single pulses of TMS (50-70% of maximum stimulator output) applied to the affected and contralesional primary motor cortices to elicit MEPs. Intramuscular electromyography recorded muscle responses from the biceps, brachioradialis, and abductor pollicis brevis, with TMS pulses synchronized to EMG recordings. MEP amplitudes were measured peak-to-peak and averaged per muscle. Upper extremity function was evaluated daily for two weeks using the NHP Upper Extremity Motor Dysfunction Scale. Relationships between MEP amplitude and impairment severity were muscle specific. Distal (abductor pollicis brevis) and mid-forearm (brachioradialis) muscles supported the hypothesis, with stronger MEPs correlating with lower impairment scores. However, proximal (biceps) muscle responses showed an inverse relationship, which may reflect compensatory neuroplastic mechanisms or methodological factors.These findings demonstrate the translational potential of TMS-derived MEPs as biomarkers of residual motor pathway function after stroke. However, muscle-specific patterns require further investigation, and larger NHP cohorts are needed to validate these findings.

41. Short term benefits of an AAV9-mediated gene replacement therapy in a mouse model of X-Linked Intellectual Developmental Disorder-98 presented by Eve Racette, PhD student at Queen's University

Many cases of intellectual disability (ID) are linked to mutations of genes located on the X chromosome, one of which is the Neurite Extension and Migration Factor gene (NEXMIF). Loss of NEXMIF causes X-Linked Intellectual Developmental Disorder-98 (XLID98), a syndrome characterised by intellectual disability, autism spectrum disorders, drug-resistant epilepsy, and other neurological and non-neurological symptoms. Interestingly, while both men and women are affected by XLID98 and typically present with the abovementioned cardinal features, some symptoms are sex specific, both with respect to prevalence and severity. Studies on the role of NEXMIF in loss-of-function animal models have suggested that sexual dimorphism can be modelled in other mammalian species. Our previous studies on the role of NEXMIF in mice have suggested that, like in humans, XLID98 is associated with a variety of sex-specific phenotypes, such as alterations in their behavioural and electrophysiological parameters. Given the lack of effective treatments for symptom management and the absence of curative therapies for XLID98, our lab is focusing on developing a gene replacement therapy for XLID98. Our hypothesis is that the symptoms associated with the loss of NEXMIF in mice can be rescued in a dose dependant fashion, using an AAV9-mediated gene replacement therapy. To verify this hypothesis and validate our gene replacement therapy, we designed a study where our proposed therapeutic was first assessed in cellular models at different doses. Following this confirmation of gene replacement, we administered different doses of our proposed therapeutic at birth and assessed a) the rescue of cognitive impairments via behavioural assays and, b) the biodistribution of the NEXMIF transgene in the central nervous system of treated mice. Considering the lack of a curative therapy for XLID98, these results may serve as a preclinical validation of our gene replacement therapy and pave the way to future preclinical developments using our proposed gene therapy.

43. Comparison of Oculomotor Abnormalities Between Two Subtypes of Frontotemporal Dementia presented by Daria Hinton, MSc student at Queen's University

Frontotemporal dementia (FTD) is a heterogenous neurodegenerative disorder comprising one of the most common causes of early onset dementia (Grossman et al., 2023). However, the lack of standardized diagnostic criteria and symptom overlap with other neurodegenerative and psychiatric disorders often leads to misdiagnosis. The subtypes of FTD are characterized by clinical presentation and include behavioural variant FTD (bvFTD) and nonfluent variant primary progressive aphasia (nfvPPA). While FTD

generally affects the frontal and temporal lobes, bvFTD predominately involves right-lateralized atrophy and nfvPPA involves left-lateralized atrophy (Ljubenkov & Miller, 2016). The anterior cingulate cortex (ACC) and insula are the disease epicentres in FTD, but also anchor the salience network (SN), which is responsible for detecting and integrating multimodal stimuli with autonomic, visceral and hedonic signals (Seeley, 2019). The SN is disrupted in FTD, but has important implications in eye movements due to autonomic, arousal, and cognitive control. Since the right SN controls sympathetic activity and the left SN controls parasympathetic activity, differential disruption of the SN may lead to differences in saccade, pupil and blink behaviour between bvFTD and nfvPPA (Guo et al., 2016). Eye-tracking has a rich potential for enhancing the diagnostic accuracy of eurodegenerative diseases; thus, this study aims to compare oculomotor abnormalities between bvFTD and nfvPPA. 19 individuals with bvFTD, 7 individuals with nfvPPA, and 31 healthy age-and sex-matched controls were recruited through the Ontario Neurodegenerative Research Initiative. Participants completed an unstructured free-viewing task, which involved watching sequences of video clips (3-4 seconds in duration) containing scenes of nature, people, buildings, etc. Saccade, pupil and blink measures were recorded from a video-based eye-tracker and neuropsychiatric assessments were collected. Preliminary data reveals differences in saccade behaviour, pupil size, dilation and constriction, and blink probability between bvFTD and nfvPPA. These results demonstrate how affected oculomotor pathways can perpetuate differences in eye behaviour between bvFTD and nfvPPA, enabling eye-tracking to aid in detection and diagnosis.

45.Energy Drinks Versus Coffee: A Meta-Analysis on The Association Between Caffeine Source and Alzheimer's Disease Risk presented by Emily Cohen and Eva Roth, undergraduate students at Queen's University

Alzheimer's disease (AD) is a neurodegenerative disorder characterized by β-amyloid accumulation and tau hyperphosphorylation that induce progressive synaptic failure. Epidemiological evidence associated caffeine consumption with reduced AD risk, with findings derived from studies focused on coffee consumption. However, energy drinks have emerged as a major alternative source of caffeine and differ substantially from coffee in both their chemical composition and physiological effects. These differences raise the possibility that caffeine source, rather than caffeine alone, may differentially influence AD-related mechanisms, a question that has received little direct investigation. To address this gap, this study examines how caffeine consumed through coffee versus energy drinks influences AD-relevant pathology. Adenosine A2A receptors (A2ARs) are G protein–coupled receptors involved in regulating synaptic plasticity, neuroinflammatory signaling, and cardiovascular function. In the central nervous system, A2ARs are highly expressed in hippocampal and cortical regions, critical for learning and memory. In AD, A2AR expression is upregulated in neuronal and glial cells, contributing to synaptic vulnerability and neuroinflammation. Caffeine inhibits A2AR-mediated signaling, limiting adenosine-driven pathology. When consumed as coffee, this antagonism favours neuroprotection against AD risk.
In contrast, energy drinks deliver caffeine alongside compounds such as taurine and D-glucuronolactone and are often consumed rapidly at higher doses. This intake pattern is linked to oxidative stress, sleep disturbance, and vascular dysfunction, which promote neuroinflammatory signaling. These stress signals activate microglia, the brain's primary immune cells. Chronic microglial activation drives pro-inflammatory cytokine release which contributes to synaptic dysfunction and neuronal loss. As a result, energy drink consumption may offset the neuroprotective effects of A2AR antagonism and instead promote AD-related pathology. These findings suggest that identical caffeine–A2AR interactions yield divergent downstream effects depending on beverage source. The different regulation of oxidative, inflammatory, and vascular pathways demonstrates how coffee and energy drinks exert opposing influences on AD risk.

47. Cannabinoid type 1 receptor (CB1R) blockade in adolescence alleviates the effects of adolescent social instability stress (SS) on social reward motivation in female rats

presented by Amanda M. Leonetti, PhD student at Brock University

The endocannabinoid system influences the development of social behavior in adolescence; repeated cannabinoid type-1 receptor (CB1R) blockade in adolescence increased social interaction and neuronal activity in regions that regulate social motivation in adolescent female rats. We previously showed that adolescent social instability stress (SS; daily 1 hr isolation and pairing with new cage partner from post-natal days (P) 30-45) reduced social interaction during adolescence and social motivation in adulthood in female rats. Here, we investigate the hypothesis that repeated CB1R blockade in adolescence would attenuate SS-induced reductions in social behaviour. Female rats were treated with an antagonist of the CB1R (AM251) or a vehicle control (VEH) from P30-45 to block CB1R activity in adolescence in SS or CTL (control; no SS) rats. In contrast to our previous reports, neither SS nor AM251 treatment affected social interaction during adolescence. In a social operant conditioning test in which rats would “nose-poke” at a gate to access a stimulus peer, there was no effect of either SS or AM251 on training days. Consistent with our prior work, SS reduced social motivation in a progressive ratio test relative to CTLs. AM251, however, increased social motivation in SS rats and had no effects in CTL rats. To explore mechanisms underlying SS-induced reductions in social motivation, we measured dopamine receptor abundance in the medial prefrontal cortex (mPFC) and nucleus accumbens (nAcc) using immunoblotting. Despite prior evidence of increased dopamine receptor 2 mRNA in the mPFC and nAcc following SS, we found no changes in dopamine receptor protein abundance. Together, these findings suggest that disruptions in adolescent CB1R signaling underlie reduced social motivation in SS female rats, independent of changes in dopamine receptor abundance, and that CB1R blockade during adolescence buffers against stress-induced impairments in social reward motivation in females.

49.Correction of Arginine:Glycine Amidinotransferase (AGAT) Deficiency through a Novel AAV9 Constructk

presented by Tesla Peretti, PhD student at Queen’s University

Creatine is a small molecule that plays an important role in energy metabolism and is required for overall health and neurodevelopment as seen from creatine deficiency syndromes (CDS). CDS are inborn errors of metabolism which result in neurodevelopmental disorders presenting with developmental delay, speech impairment, intellectual disability and seizures emphasising the importance of creatine in brain function. Endogenous production of creatine begins through the enzymatic function of arginine:glycine amidinotransferase (AGAT) to form the intermediate, guanidinoacetate (GAA), which is then converted to creatine by guanidinoacetate methyltransferase (GAMT) enzyme. Accumulation of GAA as seen in GAMT deficiency is neurotoxic. AGAT-deficiency (AGAT-D) is an autosomal recessive disorder caused by loss of function mutations in the GATM gene encoding the AGAT protein preventing endogenous creatine production. We have performed an *in vivo* proof-of-concept study with a novel *sc.AAV9hGATM* construct administered intravenously to an AGAT-D murine model. Mice entered the study at 5 weeks of age and underwent baseline serum collection and began oral immunosuppression administration that continued throughout the study. At 6 weeks of age, mice were intravenously injected with either a control substance or the *sc.AAV9hGATM* vector via the tail vein. The mice performed a strength test (force test) and were weighed with serum collected every 2 weeks. At the 13-week endpoint, serum, gross organs and the central nervous system (CNS) was collected for biochemical analysis. The results demonstrate restoration of AGAT protein through a western blot of the liver and restoration of creatine production through mass spectrometry analysis in the CNS and all gross organs. Visualization of the increase in creatine production overtime is represented through the various serum collection timepoints. Additionally, there was no concerning level of GAA accumulation in any of the organ systems of the treated mice. Biodistribution of the vector was also investigated; the brain contained appreciable copies of the vector while the liver maintained a relatively low number of copies. This proves that when the

novel sc.AAV9hGATM construct is administered intravenously, it can efficiently cross the blood brain barrier to correct the biochemical aspects of AGAT-D in mice. The myopathy and weight phenotypes were also improved in the treated mice, closer resembling the untreated heterozygotes than the untreated mutant mice. Further studies will aid in determining optimal efficacy and safety of the vector for translation into clinical use for AGAT-D.

51. Mapping SOX2-Positive Cell Dispersal in Glioblastoma to Inform Surgical Margins

presented by Leila White, undergraduate student at Queen's University

Glioblastoma (GB) is the most prevalent and aggressive primary malignant brain tumour in adults, with a median overall survival of 15 months and 5-year survival rate of around 5% (Delgado-López, & Corrales-García, 2016). Despite multimodal therapy consisting of surgical resection, chemotherapy, and radiotherapy, approximately 70% of patients demonstrate tumour progression within one year of initial diagnosis (Davis, 2016). Surgical resection is a critical prognostic factor, however, the optimal extent of resection (EOR) remains controversial due to the highly infiltrative nature of GB cells, including GB stem cells, which demonstrate diffuse invasion beyond radiographically enhancing margins, making resection boundaries unclear (Guerrini et al., 2022; Wach et al., 2023). Delineating resection boundaries based on cellular phenotype and molecular features would facilitate maximization of EOR while preserving normal functioning brain and minimizing neurological deficits. Tumour samples from patients undergoing supramarginal resection for GB were collected, encompassing both tumour bulk and surrounding brain. Specimens underwent formalin fixation, paraffin embedding, and sectioning at 5 μm. Immunofluorescence staining was performed using DAPI for nuclear visualization and anti-SOX2 antibody to identify stem-like cells. Imaging was conducted at 20x magnification, with quantitative analysis of SOX2- positivity performed via computational image analysis.SOX2 positivity was compared between tumour bulk (n=14 areas) and distal regions (n=21 areas) across three specimens. Mean SOX2 expression in the bulk was 14.75% compared to 14.48% in distal regions, with no significant difference detected by linear mixed-effects modeling (p=0.78). While both regions exhibited spatial heterogeneity, the variance between regions was not significantly different (Levene’s test, p=0.82). The abundance of SOX2-positive cells in regions distal to the tumour core that may be left unresected suggests that substantial populations of cancer stem cells remain after surgery, potentially with the capacity for driving early recurrence. Removing these cells via supramarginal resection may extend progression-free survival for GB patients.

53. Assessing Selective Conversion of Reactive Astrocytes by NeuroD1 Gene Therapy in a Non-Human Primate Stroke Model

presented by Ashley Wilson, undergraduate student at Queen's University

Stroke is a leading cause of long-term disability, and effective strategies to promote neural repair remain limited (Cook & Tymianski, 2012). Following stroke, neuronal loss is accompanied by astrogliosis and glial scar formation, which can restrict neural plasticity during later stages of recovery (Chen et al., 2025). NeuroD1-mediated gene therapy has emerged as a promising approach to promote post-stroke neuroregeneration by inducing astrocyte-to-neuron conversion (Huang et al., 2024). While this strategy has shown success in rodent models, recent studies in non-human primates (NHPs) report apparent astrocyte depletion within treated cortical regions (He et al., 2025; Chen et al., 2020; Zhang et al., 2021). This raises concerns given the essential neuroprotective roles of astrocytes (7). Emerging evidence suggests that this reduction may instead reflect selective conversion of reactive astrocytes associated with glial scar formation, rather than loss of supportive astrocyte populations (4). This targeted cellular shift may reduce glial scarring while restoring neuronal populations (Huang et al., 2024; Zhang et al., 2021; Becerra-Calixto & Cardona-Gómez, 2017). This study aims to determine whether NeuroD1-mediated transdifferentiation selectively targets reactive astrocytes involved in glial scarring for neuronal

conversion. Archived brain tissue slides from 12 NHPs were analyzed to quantify astrocyte populations using glial fibrillary acidic protein (GFAP) immunohistochemistry. Microscopic imaging was performed to generate high-resolution mosaics for ipsilateral and contralateral hemispheres relative to the stroke site. Regions exhibiting elevated GFAP expression and hypertrophic astrocytic morphology, characteristic of reactive astrocytes, were identified. Image analysis was conducted to quantify GFAP-positive cells across mosaic hemispheres and generate spatial heat maps. This approach enables quantitative comparison of astrocyte cell counts between hemispheres and assessment of glial scarring in control and experimental NHP tissue. Identified glial scar regions in experimental tissue will be further evaluated for neuronal nuclei (NeuN+) expression to assess evidence consistent with the conversion of reactive astrocytes into neurons. This study will determine whether astrocyte-to-neuron conversion contributes to neuroprotection, which is essential for evaluating the therapeutic potential of post-stroke cellular reprogramming strategies.

55. The Acute Effects of Aerobic and Resistance Exercise on Executive Function in Young Adults with Attention Deficit Hyperactivity Disorder (ADHD) or ADHD-Like Symptoms presented by Michaela Nikpal, MSc student at Western University

Attention-Deficit Hyperactivity Disorder (ADHD) is a prevalent neurodevelopmental disorder characterized by impairments in executive function, often accompanied by inattention, impulsivity, and emotional dysregulation. Executive dysfunction, which encompasses deficits in working and verbal memory, cognitive flexibility, and inhibitory control, contributes to academic and functional challenges in young adulthood. Despite pharmacological treatment remaining as the standard approach, exercise is emerging as a non-pharmacological strategy that modulates neural systems underlying executive control. Acute aerobic exercise has been shown to transiently enhance executive function in young adults with ADHD; however, the cognitive effects of acute resistance exercise remain underexplored. Given that aerobic and resistance exercise engage partially distinct neurophysiological mechanisms, it is important to determine whether these modalities differentially influence executive function. Therefore, this within-subjects study aims to compare the effects of a single bout of aerobic versus resistance exercise on core domains of executive function in young adults with ADHD or ADHD-like symptoms. An expected sample of 28 participants, aged 18-30 with self-reported ADHD or ADHD-like symptoms, will be recruited from Western University. Each participant will complete three counterbalanced experimental sessions including: (1) moderate-intensity aerobic cycling, (2) moderate-intensity resistance training, and (3) a seated control condition. Standardized cognitive tasks assessing working memory, verbal memory, cognitive flexibility and inhibitory control will be administered before and after each session.Both aerobic and resistance exercise are expected to improve executive function relative to the control condition. Aerobic exercise may preferentially enhance working and verbal memory and cognitive flexibility, whereas resistance exercise may show stronger effects on inhibitory control. This study will provide novel insight into how different acute exercise modalities influence executive function in individuals with ADHD symptoms and may inform personalized, non-pharmacological strategies for managing cognitive challenges associated with ADHD.

57. Auditory Sensitivity in Development: Behavioural and Perceptual Experiences of Decreased Sound Tolerance in Children presented by Lily Wortley, MSc student at Wilfrid Laurier University

Decreased Sound Tolerance (DST) is a type of heightened auditory sensitivity, often characterized by strong negative reactions to everyday sounds that do not occur in most people. Individuals exhibiting these sensory differences have indicated downstream effects on a multitude of neural processes, including motor, social, and cognitive functioning. DST encompasses multiple subtypes; this includes

misophonia (severe and disproportionate emotional reactions to a specific sounds), and hyperacusis (sounds are perceived as unusually loud or painful). DST can exist in individuals with standard hearing test results and can result from both peripheral and central mechanisms. Subtypes of DST have been observed to change across the lifespan, with variation often influenced by environmental factors such as life stressors and individual traits associated with DST. A large gap in current DST research is the paucity of research on child-specific DST, including how it develops and early prevalence rates. Here, fifty-one children (M_{age} =7.8, SD_{Age} =1.9) participated in a two–part study. In the first part, parents assessed their sensory characteristics with a set of questionnaires, and the children completed a self-report pediatric misophonia and hyperacusis scale alongside a researcher. The children then completed a psychoacoustic task, in which they were exposed to validated potential misophonia and hyperacusis trigger sounds (Core Discriminant Sounds - CDS, such as throat clearing, chewing, and everyday environmental noise). As the children listened to each sound, they were asked to rate the subjective pleasantness and loudness. Analyses are currently ongoing, with results of this study providing insight into sensory sensitivities and experiences of children with DST. This study will also allow further understanding of the development of DST throughout the lifespan.

59. Dissecting the shared origins of schizophrenia and cannabis use: A genomic investigation presented by Hayley Thorpe, Post Doc at Western University

Cannabis use and schizophrenia are often comorbid. Their overlapping genetic architectures support shared biological mechanisms. Here, I present preliminary data showing that cannabis use disorder polygenic scores (PGS; a quantitative measure of genetic liability) predict schizophrenia diagnosis, even in the absence of cannabis use, and schizophrenia PGS predict cannabis use regardless of schizophrenia diagnosis. However, genome-wide association studies (GWAS) used to calculate PGS do not account for comorbidity, which confounds downstream analyses. Accounting for their phenotypic and genetic overlap can reveal new disorder biology and therapeutics, and improve PGS disorder prediction. Genomic Structural Equation Modelling, an innovative technique that generates new GWAS from existing datasets, can be used to dissect cannabis use and schizophrenia genetics.Aim 1 uses partitioned GWAS to identify shared and trait-specific biology; explore the overlapping genetics between cannabis use, schizophrenia, and hundreds of other heritable traits; pinpoint genetic regions implicated in schizophrenia-cannabis overlap; and conduct drug repurposing, which proposes candidate drugs targetting schizophrenia and pathological cannabis use. These analyses will illuminate the biology of schizophrenia and/or cannabis use risk, and guide therapeutic developments. Aim 2 leverages partitioned GWAS and external cohorts with genotypic and deep phenotypic data to probe how accounting for trait confounding refines PGS prediction. Expanding upon our preliminary data, participants are grouped by schizophrenia and cannabis use histories to evaluate how refining PGS affects their prediction of cannabis and schizophrenia phenotypes. Using electronic health records, phenome-wide association study will uncover associations between refined PGS and thousands of health diagnoses to inform health profiles associated with genetic vulnerabilities. Refining PGS with partitioned GWAS will theoretically improve PGS prediction and enable effective clinical interventions. This project interrogates the schizophrenia-cannabis biological relationship and develops biomarkers using cutting-edge genetic techniques. This work will direct future studies exploring schizophrenia and cannabis use etiology and innovative interventions.

61. The Effects of Cannabis-Related Olfactory Cues on Craving and Working Memory in Users vs. Non-Users presented by Ava Small, Shira Reznik, Julia Fishman, Rohin Gudka, Crystal Wang, undergraduate students at Queen's University

Cannabis use is prevalent among young adults, yet little is known about how cannabis-related odors influence craving and cognitive functioning. Most cue-reactivity research relies on visual stimuli, even

though cannabis is typically encountered alongside its distinctive odor, which is strongly linked to emotional memory and reward processing. This study aims to address the lack of research on olfactory cannabis cues and the limited understanding of how cue-induced craving affects cognitive performance. To do so, participants who are either frequent cannabis users or non-users will be exposed to cannabis-related, peppermint (positive control), and neutral (negative control) odor cues delivered through an olfactometer. Immediately following cue presentation, participants will complete an 2-back working memory task through the Galea VR headset, which simultaneously collects EEG and eye-tracking data. Subjective craving will be measured using the Marijuana Craving Questionnaire Short Form (MCQ-SF), and physiological arousal will be indexed through pupillometry. Electroencephalogram (EEG) recordings will capture relevant power bands. Data analysis will be conducted in R using repeated-measures ANOVA and regression models to evaluate relationships among craving, physiological responses, working memory performance, and neural activity. Together, these methods will provide an integrated assessment of how odor-based cannabis cues affect both craving and cognition.

SESSION 2 POSTER ABSTRACTS

2. Stress and Psychosocial Correlates in Young Women with Depression and Problematic Substance Use: Cognitive Behavioral Therapy versus Groups 4 Health

presented by Kate Lui, MSc student at Carleton University

Transitional-aged youth (TAY) women experience disproportionately high rates of depression, loneliness, and problematic substance use, alongside elevated perceived stress. This period represents a unique period of time that is characterized by significant life changes, during which young women report higher rates of stress, anxiety, and depression compared to peers. Loneliness is the distressing experience that can occur when there is a discrepancy between the quality and/or quantity of social relationships a person has and what they desire. Perceived stress is how an individual interprets the amount of stress they are experiencing. Biological stress processes, particularly dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis and alterations in the cortisol awakening response (CAR), may further contribute to vulnerability; however, no existing work has examined CAR, depression, loneliness, and substance use together in TAY. This study is embedded within a randomized trial comparing two virtually delivered group-based interventions for TAY females with depression, elevated loneliness, and potentially problematic substance use: the Blues Program (CBT) and Groups 4 Health (G4H). Participants complete baseline and post-intervention self-report measures and mail-in saliva kits for CAR assessment. The primary aim is to assess the unique and combined effects of baseline cortisol, depression symptoms, loneliness, and substance use on perceived stress. The secondary aim evaluates whether these predictors forecast changes in perceived stress following intervention, with adherence included as a covariate. Exploratory analyses examine group differences in stress and cortisol change. By integrating psychosocial and biological predictors, this study seeks to clarify mechanisms underlying perceived stress and inform intervention strategies tailored to young women experiencing complex mental health challenges.

4. Investigating Cognitive Differences across Awake and Anesthetized Mice Imaging using rs-fMRI and CPT

presented by Kruti Joshi, MSc student at Western University

Resting-state functional magnetic resonance imaging (rs-fMRI) is used to investigate changes in functional connectivity, defined as the temporal correlation of BOLD signal fluctuations across brain regions (Biswal et al., 1995). Very commonly, studies rely on anesthetized imaging to reduce motion and stress; however, anesthesia can influence synchrony across brain regions and lead to muted or fragmented connectivity patterns (Areshenkoff et al., 2021). Additionally, anesthetized protocols can also influence the subsequent testing of cognitive processes such as attention (Ren et al., 2015). We used the Continuous Performance Test (CPT) to measure attention, alongside rs-fMRI to assess how awake versus anesthetized imaging influences attention and functional connectivity across longitudinal timepoints, with sex considered to relate connectivity patterns to behaviour and identify which imaging protocol best preserves functional connectivity and cognition. 72 C57BL/6J mice (12 males and 12 females per protocol group) were assigned to an awake imaging protocol, anesthetized imaging protocol, or CPT-only control. This longitudinal design included two imaging exposure timepoints (3-month and 12-month using 15.2T) and two behavioural timepoints (6-month and 12-month using Touchscreens). Results show awake imaging preserved synchrony across brain regions and this observation coincided with stronger CPT performance, especially at younger ages. The anesthetized protocol showed less clustering and lower performance under high attentional load, with these effects more noticeable at the 12-month timepoint. Sex differences were also evident. Females showed more consistent synchrony across the medial prefrontal cortex, cingulate cortex, hippocampus, and striatum and maintained a consistent CPT performance across protocol groups compared to males. By contrast, males in the anesthetized

protocol showed steeper declines in CPT performance under high attentional load. Together, these findings underline that protocol group, sex, and imaging exposure timepoints all contribute to differences in connectivity and behaviour in animal models. When combining rs-fMRI with attention tasks, selecting an imaging approach that minimally affects cognition is important, particularly in longitudinal studies.

6. Eye Tracking Reveals Selective Resistance and Vulnerability of Extra-Motor Neural Circuits in Amyotrophic Lateral Sclerosis presented by Emmaley Hunter, MSc student at Queen's University

Amyotrophic lateral sclerosis (ALS), a neurodegenerative disease of both the upper and lower motor neurons, is increasingly recognized as a multisystem disorder with early and frequent impacts to energy homeostasis and autonomic control. Despite profoundly limiting functional capacity and survival, these extra-motor deficits remain poorly understood and difficult to measure. Eye tracking is a non-invasive means to gauge the integrity of dissociable neural circuits and, by transcending physical disability, provides a unique opportunity to assess extra-motor pathology in ALS. In this study, 21 patients with ALS and 34 healthy control participants completed a naturalistic, unstructured eye-tracking task comprised of 10 minute-long movies. Each movie consisted of video clips featuring dynamic scenes of people, nature, and cartoons, with abrupt transitions every 2-5 seconds. Saccade, pupil, and blink responses were quantified, with a particular focus on luminance fluctuations and visual perturbations caused by clip changes. Plasma lipids were also collected from the ALS group for exploratory metabolic associations. Compared to healthy controls, the ALS cohort demonstrated an intact saccadic orienting response to clip changes, but altered pupil and blink dynamics. Specifically, the ALS patients exhibited attenuated pupil constriction and dilation responses to luminance changes and prolonged eyeblink durations. Exploratory analyses revealed moderate correlations between pupil metrics and metabolic biomarkers of ALS, supporting early autonomic impairment and energy imbalance in ALS. The oculomotor profile of ALS is characterized by the resistance of basic saccade-generating circuitry and vulnerability of subcortical brain regions modulating pupil size and eyelid position. Concurrent shifts in metabolism and pupil dynamics suggest that energy balance is affected early in ALS. Video-based eye tracking, as a sensitive and disability-agnostic assessment of extra-motor function, could improve patient stratification and guide targeted therapeutic strategies.

8. Examining Alzheimer's disease markers in ovariectomized muscle-specific glycogen synthase kinase 3 knockdown mice presented by Julia Stante, MSc student at Brock University

Postmenopausal females have an elevated risk of Alzheimer's disease (AD), representing approximately two-thirds of patients with AD. Further, postmenopausal females have a higher risk of sarcopenia. These heightened risks are thought to be partly due to reduced estrogen levels that accompany menopause. Recent evidence suggests a muscle-brain connection in which muscle health can influence brain health. Rodent models of menopause (i.e. ovariectomy; OVX) display higher markers of AD pathology and sarcopenia. Glycogen synthase kinase 3 (GSK3) is a well-known negative regulator of muscle health and overactive GSK3 has been linked to AD and muscle wasting conditions. Muscle-specific GSK3 knockdown ($GSK3^{mKD}$) results in exercise-like benefits including increased muscle size and enhanced oxidative metabolism. $GSK3^{mKD}$ also increases brain-derived neurotrophic factor (BDNF), a vital protein for neuronal survival and cognitive function. This study aims to determine whether $GSK3^{mKD}$ can mitigate AD pathology in estrogen-depleted mice, while providing mechanistic insight into the interplay between muscle health and the brain. It is hypothesized that ovariectomized GSK3mKD mice will display higher BDNF, and reduced markers of amyloidogenic amyloid precursor protein (APP) processing compared to

control OVX mice. Female mice will be assigned to one of four groups: 1) $GSK3^{flox}$ sham, 2) $GSK3^{flox}$ OVX, 3) $GSK3^{mKD}$ sham, and 4) $GSK3^{mKD}$ OVX (n=9-12/group). Mice will undergo OVX or sham surgery at 4-5 months of age. Eight weeks post-surgery, mice will undergo a series of in vivo testing including: body composition (DXA scanning), muscle function (treadmill fatigue, grip strength), cognitive function (spatial and novel object recognition), metabolic caging (energy expenditure, cage activity), and glucose homeostasis (intraperitoneal glucose and insulin tolerance) prior to sample collection. Biochemical analyses of blood, brain, and muscle samples targeting APP processing, BDNF signaling, insulin signaling, and muscle mass homeostasis-related proteins will be completed via ELISA, western blotting, and enzyme activity assays.

10. Levonorgestrel reduces sex differences in tests of anxiety-like behaviour in Long-Evans rats presented by Alison Randell, PhD student at Brock University

Levonorgestrel (LNG) is a common ingredient in many hormonal contraceptive (HC) methods, including pills and intrauterine devices, that acts as an agonist at progesterone and androgen receptors (AR). There is a knowledge gap regarding the effect of LNG use on affective behaviour, especially after adolescent use. Adolescent female and male Long-Evans rats were treated with LNG (20 µg / kg) or a vehicle (sesame oil + 5% ethanol) treatment for 17 days and anxiety-like behaviours were assessed using a behavioural battery including the elevated plus maze (EPM), social interaction test (SIT), and the light/dark box test (LDB). Composite anxiety and femininity scores were created based on z scores generated from raw data. LNG treatment in adolescent rats reduced the sex disparity typically seen in anxiety-like behaviours. Females treated with LNG demonstrated increased anxiety in the EPM and LDB tests, while their anxiety was decreased in the SIT. There was no treatment effect on overall anxiety composite scores, but analysis of composite femininity scores found that LNG masculinized behaviour in females. These results suggest the mechanism involves androgenic actions of LNG; possibly acting as an AR agonist in females and an inverse agonist in males. A follow-up study using flutamide to pharmacologically block LNG from acting at AR is currently in progress to further investigate this possible mechanism.

12. Multimodal Measures of Narrative Engagement in Childhood presented by Rafaela Platkin, PhD student at Western University

In complex listening environments, such as classrooms, successful auditory perception is related to listening effort—the dynamic relationship between the processing demands of auditory stimuli and an individual's cognitive resources (Johnsrude, & Rodd, 2016). Previous research has explored factors influencing listening effort (Gagné et al., 2017), however, much of this work has focused on isolated words or short phrases (Herrmann, & Johnsrude, 2020). As a result, less is known about how listening effort is deployed to perceive naturalistic stimuli that better represent real-world listening conditions. This study examines how children engage with context-rich auditory stimuli that challenge attention and working memory, providing a deeper understanding of how they process and respond within complex listening environments. Children aged 9-12 listened to a series of three short stories while EEG and eye-tracking data were recorded. At the conclusion of each, participants answered comprehension questions and completed an absorption scale that measured how engaged they were by the story. EEG power spectral density analysis was used to assess changes in alpha and theta frequencies linked to attention and cognitive load during story listening, while gaze dispersion was used to capture visual attention patterns. Results showed that engaging, child-directed stories evoked significantly higher parietal alpha power than a mundane control story. These findings suggest that children processed the engaging stories with greater ease, whereas the control story required more cognitive effort to sustain engagement. Self-report ratings further confirmed higher narrative enjoyment and mental imagery during the engaging stories. These findings provide evidence that child-oriented narratives can be used to quantify listening effort under naturalistic listening conditions. This work has implications for classroom education, where an improved understanding of the mechanisms associated with engagement and listening effort can inform strategies to enhance learning outcomes.

14. Beyond the Perceptual Boundaries: The Impact of Visual Manipulations on Biological Motion Perception presented by Inci Eke, PhD student at the University of Ottawa

Biological motion perception, the ability to recognize and interpret human movement from minimal visual cues is a core function of the visual system and is thought to rely critically on the superior temporal sulcus (STS). Although STS involvement is well established, the mechanisms by which visual distortions alter speed perception of biological motion remain understudied. This project examines how four distinct manipulations of point-light walkers affect perceptual judgments of speed: (1) contrast variation through changes in dot luminance across three levels (2) temporal flicker through intermittent disappearance and reappearance, (3) scrambling via distortion of figure structure, and (4) size alteration of individual dots. Stimuli are computer-generated in MATLAB using Psychtoolbox to ensure precise control over timing and visual parameters. Participants will judge the speed of walkers across multiple levels using a magnitude estimation paradigm in a within-subject factorial design. Analyses will focus on how these manipulations affect both the accuracy and consistency of speed judgments, shedding light on the susceptibility of STS-driven motion processing to visual disruptions. Findings are expected to advance understanding of the neural computations underlying biological motion, with implications for theories of hierarchical motion processing as well as applications in virtual reality technologies and clinical contexts where STS function is compromised.

16. Examining Light Sensitivity and Attention Deficit Hyperactivity Disorder presented by Savannah Mancebo Bodden, undergraduate student at York University

Attention Deficit Hyperactivity Disorder (ADHD) has well documented effects on tasks requiring sustained attention and concentration. Treatment efforts for attentional deficits often include pharmacological interventions, or accommodations for time-sensitive tasks such as extra time and accommodated spaces to limit environmental distractors. Despite being prevalent among ADHD populations, certain deficits, namely sensory sensitivity to light, are often not considered in the assessment, treatment efforts or accommodations for those with ADHD, and is a topic vastly underrepresented in the research literature surrounding ADHD. This research aims to address the significant gap in the literature and contribute to developing an understanding of ADHD that incorporates sensory processing differences. Based on the results of the Adult ADHD Self-Report Scale (ASRS), participants will be sorted into either an ADHD group or a control group. Participants will then complete a modified Sustained Attention to Response Task (SART), which consists of four blocks with varying lighting conditions, combining levels of Brightness (Dim, Full), and Temperature (Warm(~3200K), Cool(~6500K)). It is hypothesized that those in the ADHD group will show greater variance in performance scores (measured by reaction time) between the lighting conditions when compared to the control group, whose scores are expected to remain more stable across the conditions. The reaction time data from the SART is to be analyzed with a 2 (ADHD, Control) x 2 (Dim, Full) x 2(Warm, Cool) 3-way mixed-model ANOVA to test for main effects of ADHD status, brightness and light temperature on performance, as well as interaction effects between the conditions. Post-hoc analyses may be conducted where appropriate to determine whether certain subgroups differ significantly from one another using participant variables collected at the beginning of the study (sex, ADHD subtype, self-reported light sensitivity, migraine history).

18. Mapping Dyadic Reorganization After Conflict in Dog-Human Interaction presented by Hannah Burrows, PhD student at Queen's University

Dog–human relationships involve mutual behavioural adjustment, particularly when interests conflict. This project applied a dynamic-systems analytic approach to examine how dyads reorganize after a

behavioural challenge. Dog–guardian pairs participated in two five-minute Free Play sessions separated by a Surprise Self-Control task in which guardians were instructed to prevent their dog from eating a plate of treats. This task introduced a contest of control, ranging from no contention to physical restraint accompanied by canine arousal. The intensity of this contest was quantified using a validated Contest Index (0–4). Free Play segments were coded using structured ethograms of guardian behaviours (Inattentive, Passive, Supportive, Directive) paired with dog behaviours (Inattentive, Monitoring, Engaged, Distressed), enabling State Space Grid (SSG) visualization of dyadic behaviour over time. These grids are used to identify attractor states—stable patterns such as Positive Dyadic Engagement—and examine how states reorganize following conflict. Additionally, guardians completed the Perception of Undesirable Pet Behaviours Survey (PUPS), allowing exploratory analyses of whether pre-existing beliefs about behavioural control predict dyadic flexibility or regulatory style. This study introduces SSG methodology to dog–human interaction research, providing a framework for understanding how conflict, perceptions, and co-regulation jointly shape interspecies interaction.

20. Associations Between Repetitive Subconcussive Head Impact Exposure and Microstructural White Matter Alterations in Female Flag Football Athletes presented by Melissa Lamanna, MSc student at Queen's University

Athletes exposed to repetitive subconcussive head impacts (RSHI) through contact sports may be at an increased risk of developing neurological, mood, and/or cognitive impairments later in life, despite the absence of immediate concussion-like symptoms. Prior studies investigating the potential physiological damage to athletes' brains following RSHI across a season utilize mouthguards with instrumented accelerometers to quantify the total number and severity of impacts sustained and assess maximum principal strain (MPS), correlating these metrics with magnetic resonance imaging (MRI) to identify any resulting micro and macrostructural alterations to white matter. While majority of these studies follow male athletes in sports such as football, hockey, and rugby, few studies have investigated RSHI exposure and quantification in female athlete populations, despite prior findings that indicate biological females are at a greater risk of experiencing sport-related concussions. Nineteen young adult female athletes from the Queen's University Women's Football team wore instrumented Prevent accelerometer mouthguards for every practice and game and underwent MRI before and immediately following their 3-month season. Using an emerging diffusion-analysis software MRtrix3, whole-brain white matter tractography and structural connectivity were assessed, and microstructural alterations to white matter were observed in the right medial and lateral prefrontal cortex, compared to healthy female athlete controls. This study aims to bring attention to RSHI in the understudied yet growing flag football sport, and enhance our understanding of how RSHI may impact female athletes. Further studies into RSHI are required to advance current treatment and prevention strategies aimed at mitigating the risk of impairment and the development of persistent post-concussive symptoms following repetitive head impacts.

22. Analysis of Actigraphy-Derived Indices in Alzheimer's Disease Using UK Biobank Data presented by Haarini Suntharalingam, undergraduate student at Queen's University

Disrupted circadian rhythms are common in Alzheimer's disease (AD), which is associated with sleep fragmentation, behavioural symptoms, and cognitive decline. Despite this, objective characterization of circadian and rest–activity disturbances in AD using real-world wearable sensor data remains limited. Actigraphy, derived from wrist-worn accelerometry, offers a non-invasive method for quantifying habitual activity patterns and circadian organization over extended monitoring periods. Using raw seven-day actigraphy data extracted from the UK Biobank, this study compared rest-activity patterns between

50 participants with AD and 50 healthy controls. Data were processed to extract circadian and activity metrics from Euclidean Norm Minus One (ENMO) acceleration, including mesor (rhythm-adjusted mean activity), amplitude (peak-to-mean rhythmic strength), acrophase (timing of peak activity), and R^2 (goodness-of-fit of the cosinor model). Non-parametric indices included interdaily stability (IS) (day-to-day rhythm regularity), intradaily variability (IV) (rhythm fragmentation), most active 10-hour period (M10) (daytime activity intensity), least active 5-hour period (L5), relative amplitude (RA) (day–night contrast), kRA (probability of rest-to-activity transitions), and sleep time (ST) (estimated nightly sleep duration). Normality of actigraphy indices was assessed using the Shapiro–Wilk test. Group differences were evaluated using independent-samples t-tests for normally distributed variables and Mann–Whitney U tests for non-normal variables, while Watson's two-sample circular test was used to compare acrophase distributions. AD participants exhibited mesor, M10 and L5 compared with controls, while variability in acrophase was greater in the AD group, suggesting disrupted circadian timing. Visual inspection of 24-hour ENMO profiles confirmed attenuated day-night activity contrast in AD participants. These findings indicate that actigraphy can capture measurable differences in activity and circadian patterns in AD, supporting its potential as a non-invasive tool for screening or monitoring disease-related changes.

24. Investigating the relationship between pre-existing anxiety levels and adolescent nicotine vapor-induced behavioural and neural changes presented by Marwa Idrissi, MSc student at Western University

Adolescence is a delicate period particularly vulnerable to disruptions of neurodevelopment caused by neurotoxins such as nicotine. However, nicotine use among adolescents has surged globally, mainly in the form of vaping. Clinical studies show a strong relationship between anxiety- and impulsivity- related traits and nicotine dependence. Pre-clinical studies have investigated the effects of nicotine use on later life anxiety-like behaviours; however, little is known about how pre-existing anxiety levels interact with the effects of nicotine use on behaviour and neurodevelopment. Furthermore, many studies use injection models of nicotine administration that do not reflect human nicotine use. To address these knowledges gaps, adolescent male and female Sprague-Dawley rats' baseline anxiety levels were assessed using multiple anxiety-like behavior assessments, and divided into groups of baseline low- and high-anxiety. Then, from postnatal day (PND) 35-44, rats were exposed to either vehicle (propylene glycol and vegetable glycerin, 0mg/ml nicotine) or nicotine vapor (40mg/ml nicotine) for 10 minutes, 3 times a day, using the OpenVape system. Anxiety- and impulsivity-related behavioural task were performed after a 4-days washout period and again during adulthood (PND>75). In-vivo electrophysiological recordings of the Orbitofrontal Cortex (OFC) and the Mediodorsal Thalamus (MDT), two key regions involved in impulsivity and decision-making, were performed. Preliminary results show an anxiolytic effect of nicotine on adolescent male rats. Nicotine-exposed male and female rats engaged in less risk-assessing behavior. Baseline anxiety levels did not modulate nicotine-induced changes in behavior. In adulthood, nicotine-exposed males show a decrease in OFC cell activity. Interestingly, nicotine induced an increase in MDT cell firing frequency in females only, with the effect being mainly driven by the baseline low-anxiety group. Together, these results suggest that adolescent nicotine vaping has sex-specific effects on anxiety-like behavior, and that pre-existing anxiety has an important role in nicotine-induced neural activity changes in impulsivity-related brain regions.

26. Can Sustained Community Dance Support Cognition in Parkinson's Disease? A Six-Year Longitudinal Study presented by Simran Rooprai, MSc student at York University

Cognitive dysfunction represents a crucial non-motor symptom of Parkinson's disease (PD), a progressive neurological movement disorder. At disease onset, up to 35% of persons with PD (PwPD) have mild cognitive impairment (MCI), a significant risk factor for dementia which is seen in over 80% of PwPD-MCI. Cognitive impairments in PD commonly involve deficits in memory, visuospatial abilities, and executive functioning, including working memory and attention, contributing substantially to functional decline. Because PD remains incurable, with existing treatments largely tailored for motor impairments, there is a growing interest in alternative forms of care. Numerous studies have demonstrated that dance, a social activity integrating music and movement, can alleviate motor and non-motor symptom burden in PD, however, its long-term effects on cognition remain unexplored. To address this gap, we conducted a secondary longitudinal analysis examining global and domain-specific cognition in PwPD (Dance group; n=43) who participated in community dance classes between 2014 and 2019. For an objective comparison, a Reference group of physically inactive PwPD (n=28) was selected from the Parkinson's Progression Markers Initiative. The Mini-Mental State Examination (MMSE) and Montreal Cognitive Assessment (MoCA) were used in the Dance and Reference groups, respectively. In the Dance group, global cognitive performance improved significantly in 2016 ($p=0.008$), 2017 ($p=0.001$), and 2018 ($p=0.0042$). Analyses of cognition at the domain level revealed significant improvements in memory (2016, $p=0.001$; 2017, $p=0.003$) and attention/working memory (2017, $p=0.007$; 2018, $p=0.001$; 2019, $p=0.021$), while visuospatial ability remained relatively stable in the Dance group. The Reference group demonstrated no changes in global and domain-select cognitive performance. In combination with existing literature, the present findings support the role of sustained dance as a beneficial, community-based intervention for cognitive health in PwPD.

28. Impact of Repeated Nonconcussive Hits on Neurophysiological Parameters in Collegiate Football Athletes presented by Kim Huynh, PhD student at Queen's University

A nonconcussive injury occurs from a direct or indirect impact to the head that does not result in overt symptoms.1 However, growing evidence suggests that the accumulation of nonconcussive impacts can result in neurological symptoms, likely due to altered neural functioning.2 Previous magnetic resonance imaging (MRI) studies revealed that athletes who experienced a greater number of nonconcussive impacts exhibited elevated cerebrovascular reactivity (CVR) and decreased cerebral blood flow (CBF) compared to athletes who experienced fewer impacts.1,3 CBF refers to the rate of blood supply to the brain, while CVR is the change in blood flow in response to a change in the demand for blood. The objective of this study is to determine the effects of repeated nonconcussive exposure on neurophysiological parameters in football athletes. This study aims to contribute to the growing body of evidence regarding the impact of nonconcussive injuries on brain health. Twenty Canadian male collegiate football athletes were monitored throughout a season using functional magnetic resonance imaging (fMRI). Participants were scanned at three time points: pre-, mid-, and post-season.

30. Deciding Without Awareness: How the Brain Weighs Reward and Effort Unconsciously presented by Karen Chisica, MSc student at Queen's University

When making value-based decisions people weigh the potential rewards of different options against the effort required, typically choosing the option with the highest overall "action value." However, it remains unclear whether this computation requires conscious awareness or can occur unconsciously and influence everyday choices. To address this question, 35 neurologically and psychologically healthy

adults (18–45 years old), will complete a computerized decision-making task while brain activity is recorded using fMRI. On each trial, participants choose between a low-reward/no-effort option and a higher-reward/effortful option. The effortful option is either visible or rendered invisible using Continuous Flash Suppression, which prevents reward and effort information from reaching conscious awareness. When invisible, participants must rely on intuition to select the better option.In a behavioral pilot (7 of 35 participants), visible trials showed that participants reliably chose the higher-value option, responded faster when doing so, and responded more quickly as the value difference increased. In this preliminary sample, when options were invisible, choices did not exceed chance, and value differences did not influence response times. However, there was a trend toward faster responses when participants chose the higher-value option compared to the lower-value option, suggesting a potential facilitation or inhibition effect when choices aligned or conflicted with the unconsciously represented action value difference. If this pattern is significant in the full sample, it would suggest that action value is computed unconsciously and compared with consciously available options to guide decision-making. We would then expect fMRI results in value-related regions, such as the dorsomedial prefrontal cortex and inferior parietal sulcus, to show engagement during both visible and invisible trials, with weaker signals when information is unconscious. Overall, this study will advance our understanding of unconscious valuation in decision-making and clarify whether and how unconscious information can shape everyday choices.

32. Sex-Specific Behaviour and Neuroinflammatory Effects of Pubertal Chronic Unpredictable Stress and Probiotic Modulation in CD-1 Mice presented by Michaela Dworsky-Fried, PhD student at University of Ottawa

Stress during puberty can disrupt gut microbiota, promote neuroinflammation in stress-sensitive brain regions, and increase vulnerability to anxiety. This study examined the effects of pubertal chronic unpredictable stress (CUS) on anxiety-like behaviour and neuroinflammatory gene expression in the prefrontal cortex (PFC), hippocampus, and amygdala of male and female CD-1 mice and assessed whether the probiotic formulation Cerebiome® could modulate these outcomes. One hundred and twenty CD-1 mice (60 male, 60 female) arrived at three weeks of age and received either water or water supplemented with Cerebiome® (10^9 CFU/day; L. helveticus R0052 and B. longum R0175). The probiotic treatment continued throughout a 28-day CUS or control protocol initiated at four weeks. Anxiety-like behaviour was assessed using the elevated plus maze, open field test, and light/dark box. NLRP3, CASP1, NFκB1, and NFκB2 mRNA expression was quantified in the PFC, hippocampus, and amygdala. Pubertal CUS reduced time spent in the centre of the open field, indicating increased anxiety-like behaviour, whereas other behavioural tests showed no consistent stress effects. In the hippocampus, CUS increased NLRP3 expression in water-treated males, an effect prevented by probiotics, and males exhibited higher hippocampal NLRP3 than females. In the PFC, CUS produced sex- and treatment-specific changes in NFκB signalling, including reductions in NFκB1 and NFκB2 depending on sex and probiotic exposure. In the amygdala, probiotic-treated males showed reduced NLRP3 following CUS, and probiotic-treated females exhibited higher NFκB2 than males. These findings demonstrate region-, sex-, and treatment-specific neuroinflammatory responses to pubertal CUS. Cerebiome® selectively buffered hippocampal NLRP3 but did not normalize CUS-induced anxiety-like behaviour.

34. Evaluating the Effects of a Digital Cognitive Training Program for ADHD: A Randomized, Placebo-controlled Trial presented by Alyssa Swiderski, MSc student at McMaster University

Attention deficit hyperactivity disorder (ADHD) is a neurodevelopmental condition characterized by persistent inattention and/or hyperactivity-impulsivity, often accompanied by a need for immediate gratification (Morita et al., 2021). ADHD can persist into adulthood, affecting nearly 2.8% of adults worldwide, and is associated with adverse outcomes, including emotional dysregulation, anxiety,

depression, and lower quality of life (Pallanti & Salerno, 2020; Cohen et al., 2021). Adults with ADHD are particularly vulnerable to the negative cognitive effects of problematic internet use (PIU; Pallanti & Salerno, 2020). PIU involves excessive engagement with digital media and is more prevalent among individuals with ADHD (Pettorruso et al., 2020). Online activities reinforce ADHD symptoms, addressing immediate reward-seeking behaviours, creating a maladaptive feedback loop (Werling et al., 2022). Evidence supports the use of digital therapeutic methods for ADHD, particularly gamified cognitive training programs that enhance attention, working memory, and inhibitory control (Liu et al., 2024). ReadON is a novel AI-driven digital intervention designed to target cognitive deficits through engaging, adaptive tasks (Orange Neurosciences, 2024). Preliminary evidence supports ReadON in improving working memory and executive functioning (Grover et al., 2024). While early findings are promising, impacts on broader ADHD symptomology and comorbid PIU remain unclear. This study aims to evaluate the feasibility and tolerability of 11 weeks of ReadON digital cognitive training in adults diagnosed with ADHD of moderate-severe severity. Methods: In an 11-week randomized placebo-controlled clinical trial, adults with ADHD will be randomized to receive either ReadON (n = 26) or Cognifit (n = 26). The treatment group will use the ReadON software 3 times weekly for 11 weeks, while the control group will engage in a computer game lacking cognitive training components. Primary outcomes include feasibility and tolerability (number of completers and adverse events); Secondary outcomes include changes in ADHD severity (Barkley Adult ADHD Rating Scale – IV), changes in executive functioning (The ReadON Comprehensive Cognitive Skill Assessment), and PIU (Compulsive Internet Use Scale). Findings may inform larger trials and adult ADHD interventions designed to enhance cognitive and behavioural functioning.

36. Neurofeedback Modulation of Frontal Theta to Improve Decision-Making in a Gambling Context

presented by Madelaine Dewar, Sayin Ding, Angie Ibrahim, Anastasia Kantartzis, and Cole Shannon, undergraduate students at Queen's University

Risk-taking is a major component of everyday decision-making and is dysregulated in many neuropsychiatric conditions. Recreational gambling is associated with impairments in executive control and altered neural markers of decision-making, including reduced P300 amplitude. Neurofeedback is a non-invasive therapy that provides real-time feedback on its electrical activity via brain waves through visual or auditory signals, and it is used to train the brain to function more efficiently. Neurofeedback targeting frontal theta activity has shown promise in enhancing cognitive control, but its effects on risky decision-making remain unclear. This study examines whether training individuals to up-regulate frontal theta activity influences risk-taking behaviour and associated electrophysiological responses during the Balloon Analogue Risk Task (BART). Participants completed baseline BART trials followed by either frontal-theta neurofeedback or sham training across five sessions. Risk-taking behaviour was assessed using established behavioural measures, including the number of pumps participants make before choosing to cash out (reflecting risk-taking) and the frequency of balloon explosions (reflecting risk exposure). EEG was also recorded to measure event-related potentials (P300). P300 amplitude was quantified from frontal and central electrodes, and behavioural and neural outcomes were analyzed using mixed-effects models to assess group differences and changes across sessions. We further examined whether neurofeedback-related changes in P300 amplitude were associated with changes in risk-taking behaviour. This study aims to clarify whether modulation of frontal theta activity through neurofeedback can strengthen neural mechanisms supporting adaptive decision-making in gambling contexts. These findings will determine whether modulating frontal theta activity can strengthen the neural systems supporting adaptive decision-making in gambling contexts, and may inform the development of neurofeedback-based interventions targeting maladaptive gambling behaviour.

38. Can Sustained Community Dance Support Cognition in Parkinson's Disease? A Six-Year Longitudinal Study presented by Cassidy Bretney and Hannah Nicholson, MSc students at Queen's and Western University

The KINARM robotic system and its associated task battery is a gold-standard tool for assessing upper-limb sensorimotor function. Despite its growing use in both research and clinical settings, it has rarely been paired with neuroimaging methods to provide insight into the neural activity supporting sensorimotor performance. Functional near-infrared spectroscopy (fNIRS) provides a non-invasive and movement-tolerant method for measuring cortical activation through task-related changes in the hemodynamic response, making it well suited for integration with robotic motor assessments. Combining these two techniques provides a novel framework for examining cortical activity during KINARM motor tasks, as well as performance metrics such as movement speed, accuracy, and task success. In this study, healthy participants underwent concurrent fNIRS recording while completing four standard KINARM tasks: Visually Guided Reaching (VGR), Reverse Visually Guided Reaching (RVGR), Object Hit (OH), and Object Hit and Avoid (OHA). fNIRS optodes were positioned to primarily capture activity on the prefrontal and primary motor cortices, while also covering supplementary and premotor cortical regions involved in motor planning and executive control. Hemodynamic signals were analyzed to assess both task-evoked activation and functional connectivity between cortical regions. Preliminary functional connectivity analyses reveal stronger functional connectivity between the prefrontal cortex and motor cortex, as well as stronger within-region activation for tasks with a higher cognitive demand (RVGR, OHA) compared to the less cognitive tasks (VGR, OH). These patterns likely reflect increased executive control, response inhibition, and visuomotor transformation requirements during more complex tasks. Overall, these findings demonstrate the feasibility of integrating fNIRS with KINARM robotics and suggest that task complexity systematically modulates cortical network engagement. This work establishes an important healthy baseline for future investigations examining sensorimotor and cognitive-motor dysfunction in neurological and clinical populations.

40. Assessing Loneliness, Depression and Substance Use in Young Women: Cognitive Behavioural Therapy vs Groups 4 Health presented by Lauren Power, MSc student at Carleton University

Young women with depression and concurrent substance use often face gaps in mental health services. Loneliness, a common link between these conditions, is not frequently targeted. Current approaches like cognitive behavioral therapy for depression (CBTd) yield good outcomes for women but lack an emphasis on social connectedness, which is critical for well-being. The 'Groups 4 Health' (G4H) program, a novel group therapy program, targets social belonging and has shown promise in enhancing mental health outcomes. This pilot study evaluates G4H's effectiveness compared to CBTd in reducing loneliness, depression and substance use in young women. We hypothesize G4H will be superior to CBTd in addressing loneliness, while yielding comparable results for depression. Secondary objectives include assessing changes in substance use, anxiety, quality of life, and treatment acceptability. A total of 70 women aged 18-25 experiencing depression, increased loneliness, and concurrent substance use will be randomized into two intervention arms: G4H and CBTd. Both interventions consist of five manualized virtual sessions conducted by psychotherapy trainees. Participants will complete questionnaires assessing mental health outcomes and satisfaction pre-intervention, post-treatment, and at a six-month follow-up. Currently, 41 participants have completed the interventions. We anticipate reductions in depression symptoms across both groups, with greater decreases in loneliness in the G4H group. Improvements in substance use are expected but may vary by intervention. This study aims to advance scalable therapies for TAY women, highlighting G4H's potential to address loneliness, depression, and substance use through social connectedness, while informing future virtual mental health interventions.

42. The Role of Geographic Isolation and Indigeneity on Canadian Neurosurgical Outcomes: A Systematic Review presented by Rose Bilton, undergraduate student at Queen's University

Timely neurosurgical care is critical, yet Canada's specialized services are concentrated in urban centres and rarely designed with Indigenous communities. The magnitude of geographic and colonial inequities in neurosurgical care remain unclear. Therefore, the objective is to synthesise quantitative evidence on how rurality and Indigeneity affect neurosurgical mortality, access and functional recovery in Canada. Following PRISMA guidelines, a systematic literature search of MEDLINE, EMBASE, Cochrane Library, PsycINFO, Web of Sciences and grey-literature sources was conducted (Jan 2000 - Nov 2024). 1697 records were identified. Following, two reviewers independently screened title and abstracts followed by full-texts and risk of bias was appraised with MINORS. Eleven studies (n = 13 337 patients + 310 hospitals) met inclusion criteria: six spinal-cord injury, two traumatic brain injury, one stroke, one paediatric neuro-oncology and one hypoxic-ischaemic brain injury. A rural survival disparity emerged only for acute stroke (30-day mortality 18.3–21.0 % rural vs 14.1–16.8 % urban). Transport distance did not influence TBI or SCI mortality (adjusted OR per hour 0.98, 95 % CI 0.95-1.01). Median injury-to-centre time was ≈3 h, yet 46 % of SCI patients waited ≥24 h for decompression; intermediate transfers doubled this risk (OR 2.48). Rural survivors achieved comparable Functional Independence Measure scores but reported more environmental barriers; Indigenous survivors experienced 70-day longer hospital stays and six-fold higher readmissions and complications in comparison to non-Indigenous patients. Outside hyper-acute stroke, Canadian datasets reveal no rural or Indigenous mortality gap, but substantial in-hospital delays and post-discharge burdens. Policies should prioritise rural CT and telestroke expansion, "direct-to-OR" trauma pathways, and culturally safe discharge programs.

44. Assessment of Non-Invasive Patterned Electromagnetic Field (EMF) Exposure in Human Pain Perception presented by Avery Morrison, undergraduate student at Wilfrid Laurier University

Chronic pain is the global leading cause of disability, presenting significant psychological, economic and healthcare burdens. Existing pain management strategies including non-steroidal anti-inflammatory and opioid pharmacological treatments pose substantial risks due to their potential for long-term organ toxicity, and highly addictive properties, respectively. With existing evidence supporting the analgesic effects of patterned electromagnetic fields (EMFs) in rodent models, this study aims to determine if these analgesic effects will translate to humans. To address this, we assessed whether reductions in pain perception are associated with decreased physiological stress responses using blood draws, saliva samples, heart rate variability (HRV), galvanic skin response (GSR), and electroencephalography (EEG) measurements. Healthy participants without chronic pain and peripheral nerve disorders were recruited for two study sessions. Participants were exposed for 30 minutes to a complex patterned EMF, a simple sine wave, or a sham condition in which no field is delivered. Participants' pain thresholds were quantified using the cold pressor test (CPT), a non-invasive, low-risk method for inducing pain. Data collection is currently underway, and preliminary findings will be presented. The findings from this study may provide evidence for a sustainable, low-risk pain treatment, while promoting further understanding of applied electromagnetic field effects and neurophysiology.

46. Development of a unique CNS organ culture to examine neuronal regeneration presented by Autumn Lif, MSc student at Brock University

Neurite outgrowth is a crucial aspect of nervous system regeneration following injury, but many regeneration-capable vertebrates and invertebrates exhibit declines in functional CNS regeneration with age (Hall et al., 2001). Aging can affect many cellular functions required for regeneration, including

calcium handling, intracellular transport, and the availability of neurotrophic factors (Ureshino et al., 2014; Wang et al., 2021; Enderlin et al., 1997). Here, we developed a novel CNS organ culture to examine how aging and the neuromodulator, retinoic acid (a metabolite of Vitamin A), affect neural regeneration. We have utilized an invertebrate CNS capable of nerve regeneration and developed an organ culture to quantify neurite outgrowth from up to 11 individual cut nerves, which exhibit distinct regenerative capacities. By examining the extent of regenerative neurite outgrowth, we found that aging significantly reduced the CNS's ability to initiate outgrowth and to support continued outgrowth over time; that is, aging reduced the proportion of nerves exhibiting neurites and reduced maximal neurite length. Retinoic acid (RA), known to induce neurite outgrowth during development and regeneration, was found to promote regeneration from the CNS of young animals, but failed to rescue regeneration in aged CNS. Furthermore, the growth-promoting effects of RA were concentration-dependent, and higher levels of RA inhibited regenerative capacity and neurite outgrowth in both young and aged CNS. This study has established parameters to produce optimal regenerative outgrowth from a unique invertebrate CNS organ culture, thereby generating a versatile and reproducible tool for future examination of factors that influence nerve regeneration.

48. Aging with Fragile X Syndrome: Examination of astrocytes and the A2A receptor in the aging brain of Fmr1 knockout mice presented by Mavis Chinn, PhD student at University of Guelph

Individuals with neurodevelopmental disorders, such as Fragile X syndrome (FXS), live a relatively normal lifespan but the pattern of age-related cognitive decline is different when compared to the general population. This project aims to uncover the underlying neurobiology responsible for premature cognitive decline observed in FXS. In the FXS mouse model (Fmr1 KO), aged mice display deficits in cortical neuronal network strength. Neural network function is regulated and supported by glial cells. Astrocytes, a prominent glial cell type, display alterations in FXS and normal aging. Astrocyte-mediated signaling via purinergic compounds is highly dysregulated in FXS. In fact, manipulation of purinergic receptors prevents FXS-dependent network hyperactivity. Inhibition of the A2A receptor, a member of the P1 purinergic receptor family, has been shown to alleviate both FXS and age-related memory impairment. Whether purinergic dysregulation is a factor that leads to early cognitive decline in aging FXS patients in unknown. We hypothesize that elevated A2A expression in aging Fmr1 knockout mice facilitates premature cognitive decline and that inhibition of A2A will ameliorate this effect. This study investigates how the A2A receptor and its function is altered in the Fmr1 KO mouse model and whether A2A expression is dysregulated in aging. This work has significant clinical potential given that therapeutics targeting A2A inhibition are currently available for use in other age-related neuropathies such as Parkinson's disease.

50. Exercise-Induced Enhancement of Working Memory: A Comparison of Active and Passive Exercise presented by Heba Al-Samarai, MSc student at Western University

The working memory component of executive function supports the manipulation of information, driving goal-directed behavior and activities of daily living. A single bout of active exercise improves working memory in healthy young adults, and its benefit is linked to an exercise-based increase in cerebral blood flow (CBF) that enhances neural efficiency. Notably, a paucity of research has examined whether passive exercise (i.e., movement of the limbs via an external force) similarly provides a post-exercise working memory benefit. This represents an interesting question, because passive exercise supports increased CBF – albeit via a mechanism distinct from that of active exercise. Accordingly, the current study will investigate the immediate and delayed effects of active and passive exercise on working memory in healthy young adults. Twenty-two undergraduate students will complete a baseline N-back task followed by one of three interventions: seated rest (control), passive exercise (motorized cycle ergometry), or

active exercise (light intensity volitional cycle ergometry), and subsequent N-back assessments immediately and 30 minutes post-exercise. Additionally, Transcranial Doppler ultrasound will measure middle cerebral artery velocity (MCAv) to provide an estimate of CBF. It is hypothesized that active and passive exercise will provide a post-exercise working memory benefit and that benefit will be linked to exercise-based changes in MCAv.

52. Uncertainly Different: How Intolerance of Uncertainty Differs across Mental Health, Quality of Life, and Neurodiversity presented by Adrianna Molenaar, MSc student at Wilfrid Laurier University

Intolerance of uncertainty (IoU) is a transdiagnostic trait across various neurodivergent conditions that commonly occurs in those with high levels of trait anxiety, autistic traits, depressive symptoms, and panic disorders. Previous work suggests that IoU, combined with other traits, like generalized anxiety, can be categorized into three groups: high, moderate, and low levels. Our study examines if IoU can be clustered within an undergraduate sample independently, and how these clusters relate to mental health, neurodiversity, and executive functioning traits, as well as quality of life. Five-hundred-thirteen students (M_{age}=19.90, SD_{age}=3.89; 77 men, 423 women, 6 non-binary, 3 prefer not to answer), including those with ADHD (n = 82), OCD (n= 22), and autism (n = 6) are included in our study. We conducted a k means cluster analysis on the two factors in the IoU-12 scale (prospective anxiety and inhibitory anxiety), resulting in 3 clusters; Low (n = 180), Moderate (n=219), and High IoU (n=114). Follow-up ANOVAs with Bonferroni corrections comparing clusters on levels of depression *($F(2,480) = 57.3$, $p<0.001$, $\eta p^2 = 0.193$)*, anxiety *($F(2,510) = 72.9$, $p<0.001$, $\eta p^2 = 0.222$)*, autistic traits *($F(2,509) = 53.7$, $p<0.001$, $\eta p^2 = 0.174$)*, ADHD symptoms *($F(2,405) = 42.1$, $p<0.001$, $\eta p^2 = 0.172$)*, obsessive-compulsive *($F(2,480) = 61.30$ $p<0.001$, $\eta p^2 = 0.203$)*, quality of life *($F(2,484) =23.6$, $p<0.001$, $\eta p^2 = 0.089$)*, alexithymia *($F(4,481) = 41.3$, $p<0.001$, $\eta p^2 = 0.147$)*, and executive functioning *($F(2,405) = 69.5$, $p<0.001$, $\eta p^2 = 0.256$)* showed that the Low cluster showed the fewest difficulties in mental health and executive functioning, the least neurodivergent traits, and the highest quality of life. The High cluster showed the opposite pattern, with the most difficulties, most neurodivergent traits, and lowest quality of life. These findings highlight the transdiagnostic nature of IoU and the negative impact of IoU across various populations.

54. The importance of choline transporter Slc44a1 in neural function: insights from a stem cell and mouse model for a novel childhood-onset neurodegenerative disease presented by Sarah Gostlin, PhD student at University of Ottawa

Neurodegenerative diseases represent a growing health crisis, now ranking as the leading cause of disability-adjusted life years worldwide and affecting over 3 billion people (Steinmetz et al., 2021). While the causes of neurodegeneration are multifactorial, mounting evidence highlights the central role of neurometabolic dysfunction in disease onset and progression. Choline is a key nutrient in peripheral and central metabolism. Choline deficiency disrupts fundamental processes, which can lead to impaired cell proliferation, differentiation and apoptosis, and is associated with liver dysfunction, muscle damage and neurodevelopmental disorders (Sanchez-Lopez et al., 2019). Choline requires specialized transporters for cellular uptake and the Slc44a1 transporter is ubiquitously expressed in mammalian tissues, including the brain (Chen et al., 2025; Fujita et al., 2021). The clinical significance of this gene was emphasized with the discovery of a novel neurodegenerative disorder caused by homozygous frameshift mutations in SLC44A1. Patients with this disorder presented with childhood-onset neurodegeneration, progressive ataxia, cognitive impairment and leukoencephalopathy (Fagerberg et al., 2020). Our study will use human patient (and healthy control) fibroblasts containing 3 distinct mutations in the SLC44A1 gene and reprogram them into various neuronal cell lines and evaluate phospholipid synthesis, cell membrane integrity, choline transport and uptake, myelin sheath development and overall neuronal function. Next, we will characterize the newly generated Slc44a1 KO mouse model to assess initial metabolic

characteristics as well as behavioural testing to monitor for signs of neurological decompensation. The proposed study will assess the physiological importance of Slc44a1 in neuronal function, addressing a critical knowledge gap. Importantly, in both human stem cell experiments and loss-of-function mouse model work, we will focus on mechanistic understanding of how mutations lead to phenotype with the hope of identifying and testing novel therapies that might have beneficial impact for patients with these types of mutations.

56. Drosophila CNS as an expression system to examine the activity of a vitamin A metabolite presented by Samantha Berube, MSc student at Brock University

Retinoic acid (RA) is an active metabolite of vitamin A and plays important roles in nervous system development (Rand et al., 2017), regeneration (Dmetrichuk et al., 2006) and learning and memory (Wingrove et al., 2023) in vertebrates and invertebrates. In the mollusc *Lymnaea stagnalis*, RA induces neuronal regeneration and is required for long-term memory formation. The CNS of *L. stagnalis* contains the two classes of retinoid receptors (RXR and RAR), and although RXR can mediate effects of RA (de Hoog et al., 2022), whether molluscan RARs are also capable of doing so is not yet known. The main aim of this study is thus to characterize the ligand-binding activity of the RAR of *L. stagnalis* (LymRAR). To achieve this, we will use the CNS of the fruit fly *Drosophila melanogaster* as an expression system (as it contains no endogenous RXR or RAR). Preliminary experiments using *Drosophila S2* cells using a Gal4-based transcriptional reporter system indicated that *Lym*RAR can be activated by retinoids. We designed a fluorescent transcriptional sensor in which LymRAR is fused to a QF DNA-binding domain. This will be integrated into the *Drosophila* genome, and its successful expression visualized with a red fluorescent marker. When crossed with a QUAS reporter fly line, activation of the receptor by RA is expected to drive transcription of a green fluorescent protein in the CNS. As a positive control, a ligand sensor construct with the *human* RAR LBD has been tested and responds to RA as expected, validating our approach. We are generating and validating stable transgenic fly lines and confirming expression of the sensor within the CNS. If successful, these results will be the first to provide evidence for molluscan RAR-RA binding. These studies will further our understanding of RA signaling conservation across various phyla and further support the role of retinoids in nerve regeneration and memory formation in *L. stagnalis*.

58. The Efficacy and Shortcomings of Spinal Surgery Referral Systems across Canada: A Systematic Review presented by Tharushi Perera, undergraduate student at Queen's University

Canada's publicly funded spine-care pathways are characterized by long waits and high volumes of non-surgical referrals that strain capacity. This systematic review aimed to characterize Canadian spinal surgery referral models and answer whether structured triage pathways improve access and referral quality compared with conventional direct-to-surgeon referral. A PRISMA systematic review was conducted evaluating Canadian spine-surgery referral systems (2005-2024), including MEDLINE, Embase, Web of Science, targeted grey literature, and reference chaining. Eligible studies empirically evaluated referral systems or compared models; descriptive and non-Canadian studies were excluded. Primary outcomes were wait-time intervals, especially Wait-1, referral to surgical consultation. Secondary outcomes included referral appropriateness, surgical yield, imaging utilization, and patient-reported outcomes. Risk of bias was assessed via MINORS. Twenty studies (2008-2024) comprising 17,892 patients were included (median age 47.9 years; 48.4% female) with predominantly lumbar radiculopathy and low back pain cases. Structured pathways like advanced-practice triage, single-entry models, and eConsult produced shorter Wait-1, with comparative evaluations showing a mean Wait-1 reduction of 12.6 weeks (95% CI -4.5 to 29.7), with absolute reductions from 8.6 - 20.6 weeks. Traditional systems had high inappropriateness (e.g., 44% and 80.4%), whereas structured triage increased surgical candidacy (e.g., 59.1% and 37.6%) and reduced MRI use (e.g., 53% and 39%). Structured spinal referral pathways improve

front-end access and referral appropriateness, though downstream operative bottlenecks and heterogenous reporting limit conclusions on total referral-to-surgery time. These findings support scalable investment in standardized, province-wide triage infrastructure alongside equity-stratified evaluation of outcomes.

THANK YOU

Thank you for joining us in celebrating women in neuroscience. We hope to see you next year at WiN 2027!

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