2022 Owerko Centre Conference

June 7, 2022

ABSTRACT BOOKLET

Alberta Children's Hospital Research Institute

University of Calgary

Supported by generous donations through the Alberta Children's Hospital Foundation.

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2022 Owerko Centre Conference Program

9:00 – 9:10 **Opening Remarks**: Dr. Susan Graham, PhD, Director, Owerko Centre
Welcome: Dr. Susa Benseler, MD, PhD, Director, Alberta Children's Hospital Research Institute

9:10 – 10:10 **Keynote Speaker:** Dr. Stelios Georgiades, PhD McMaster Children's Hospital Chair in Autism and Neurodevelopment, Associate Professor, Department of Psychiatry & Behavioural Neurosciences
Autism Chronogeneity: What does it mean for Research, Policy, and Practice?

10:10 – 10:40 **Internal Speakers:** Dr. Carolyn Emery, PhD Professor, Faculty of Kinesiology, Chair Sport Injury Prevention Research Centre; Professor, Pediatrics and Community Health Sciences at the Cumming School of Medicine and Dr. Brianne Redquest, Postdoctoral Associate, Werklund School of Education

Evidence-informed Adapted Physical Activity Programs for Youth with Disabilities: Calgary Adapted Hub Research Opportunities

10:40 – 11:00 **Break**

11:00 – 11:45 **Community Panel:** Moderated by Dr. Suzanne Tough, PhD, Owerko Centre

- Karen Orser, CEO, Luna Child and Youth Advocacy Centre
- Tanya McLeod, President, The Sinneave Family Foundation
- Nicki Wilson, Associate E.D, Renfrew Educational Services

11:45 – 1:15 **Lunch and Trainee Poster Presentations**

1:15 – 2:00 **Trainee Collaborative Translational Research Presentation:**
Anything you can do, I can do better! Comparing and contrasting questions asked by model organism research and human neuroimaging studies to better understand the developing brain

- Dr. Kathyrn Manning, PhD**,** Human imaging researcher
- Dr. Gillian England-Mason, PhD**,** Child neurodevelopmental researcher
- Dr. Deepika Dogra, PhD, Zebrafish/human organoid researcher
- Dr. Jing Zheng, PhD**,** Mouse/human imaging researcher

2:00 – 2:30 **3-minute Trainee Flash Talks**

- Kaylan Burns**,** Supervisor: Dr. Guang Yang, Dept. of Biochemistry and Molecular Biology
  Solving the mystery of a rare neurodevelopmental disorder
- Dr. Parisa Moazen, Supervisor: Dr. Deborah Kurrasch, Dept. of Medical Genetics
  Battle of the sexes for vasopressin development
- Christiane Roth, Supervisor: Dr. Jennifer Zwicker, School of Public Policy
  Measure what matters - identifying key indicators to align policy and service delivery with child health and well-being
- Sarah Williams, Supervisor: Dr. Kelly Schwartz, Werklund School of Education
  Changes in student mental health and adaptive functioning during the COVID-19 pandemic: does age matter?
- Dr. Elnaz Vaghef Mehrabani, Supervisor: Dr. Gerry Giesbrecht, Dept. of Paediatrics
  The association between maternal pre-pregnancy obesity and child behavior: The role of inflammation
- Rayyan Zuberi, Supervisor: Dr. Chad Bousman, Dept. of Medical Genetics
  Impact of cannabinoid use on selective serotonin reuptake inhibitor efficacy and tolerability in adolescents

2:30 – 3:30 **Keynote Speakers:**

Dr. Lucy Lach, PhD, Associate Professor, School of Social Work, Faculty of Arts; Associate Member, Departments of Paediatrics, Neurology and Neurosurgery, Faculty of Medicine, McGill University
Dr. David Nicholas, PhD, Professor, Associate Dean, Research and Partnerships, Faculty of Social Work, University of Calgary
Considering Social Determinants of Health When Navigating Access to Services and Supports: Implications for ALL Stakeholders

3:30 – 4:30 **Closing Remarks, Awards, Reception**

Sorted by Supervisor's Faculty or Department

Biochemistry and Molecular Biology

Kaylan Burns
Masters Student, Supervisor: Dr. Guang Yang
Authors: K.M.L. Burns, P.Y.B. Au an G. Yang.

Solving the mystery of a rare neurodevelopmental disorder

Rare diseases affect 1 in 12 Canadians, over half of which are children, and yet most people with these rare conditions do not have diagnoses or treatments. Our multi-lab, collaborative research team has identified a group of patients with a rare neurological disorder which has not yet been reported. The patients present with severe neurological phenotypes such as cognitive and motor impairments, absent olfactory bulbs, and cerebral atrophy. Genetic studies identified de novo heterozygous missense mutations in the USP15 gene amongst our cohort of patients. This gene encodes a deubiquitinase which has not been studied in brain development, therefore its role in neuronal development is not known. We hypothesize that the USP15 variants may be contributory to the phenotypes as a novel disease-associated gene.
We have found that USP15 is expressed in neurons in the cerebral cortex of the developing mouse embryo. Additionally, we found that wildtype USP15 localizes predominantly to the nucleus, but the patient variants result in mostly cytoplasmic USP15. These results suggest that altered nucleocytoplasmic localization of USP15 may underlie the pathological changes in this disorder. Moving forward, we will further characterize USP15's role in brain development to understand the patients' phenotypes. This research will uncover the uncharacterized mechanism behind this disorder and advance our understanding of the gene's role in brain development. Through understanding this rare disease, we hope to develop treatments that can improve quality of life for these individuals.

Medical Genetics

Rayyan Zuberi
Undergraduate Student, Supervisor: Dr. Chad Bousman
Authors: Rayyan Zuberi, Abdullah Al Maruf, S-M Shaheen, Ryden McCloud, Madison Heintz, Nusrat Shommu, Laina McAusland, Paul D. Arnold, Chad A. Bousman

Impact of cannabinoid use on selective serotonin reuptake inhibitor efficacy and tolerability in adolescents

Introduction: Selective serotonin reuptake inhibitors (SSRIs) are frequently prescribed to adolescents. Likewise, cannabidiol (CBD) and cannabis use among adolescents is widespread, but little is known about how these drugs interact with SSRIs. Previous work has suggested that CBD/cannabis may inhibit SSRI metabolizing enzymes, CYP2C19 and CYP2D6. However, clinical implications of this inhibition are unclear and have not been explored in adolescents. Moreover, it is not known whether an adolescent's innate SSRI metabolism activity modifies the magnitude this inhibition has on clinical outcomes. In this study, we examined whether CBD/cannabis use was associated with ADRs or symptom improvement among adolescents using SSRIs, with and without adjustments for innate CYP2C19 and CYP2D6 metabolism activity.
Methods: The study included 150 adolescents aged 11-17 enrolled in the Pharmacogenetic-Supported Prescribing in Kids (PGx-SParK) study who reported current use of one of six SSRIs (sertraline, citalopram, escitalopram, fluoxetine, fluvoxamine, paroxetine) for more than 10 days. Participants self-reported CBD/cannabis use, degree of symptom improvement, and ADRs. CYP2C19 and CYP2D6 genotype data was used to estimate innate SSRI metabolism activity.
Results: Adolescents who reported use of CBD/cannabis were 6.3 times more likely to report no symptom improvement from their SSRI treatment relative to non-CBD/cannabis users (p=0.028). CBD/cannabis users were not more likely to report ADRs. Innate CYP2C19 and CYP2D6 metabolism activity did not significantly impact observed results.
Conclusion: CBD/cannabis use may reduce the efficacy of SSRI treatment in adolescents but does not appear to increase the risk of ADRs.

Parisa Moazen
Post-doctoral Student, Supervisor: Dr. Deborah Kurrasch
Authors: Parisa Moazen, Deborah Kurrasch

Battle of the sexes for vasopressin development

Arginine vasopressin (AVP) is a neuropeptide that acts centrally to modulate numerous social behaviors. AVP and the AVP projections

are sexually dimorphic in many brain regions, with higher levels of expression found in males. Sex differentiation of the AVP system was thought to occur around birth, but recent data from our lab suggests that it initiates much earlier â€“ from neurogenesis and the earliest stages of brain development. Here, I study the timing and molecular events that initiate sex differentiation of AVP in the

embryonic hypothalamus. To determine the timing of the sex differences in the AVP system in early brain development, we examined the brains of male and female CD1 mice between embryonic day (E) 8.5 and E16.5 to examine the neurogenic patterning of the hypothalamic AVP neurons as well as quantify the number of AVP positive neurons in males versus females. The AVP protein was detectable in males and females as early as E14.5, with males displaying higher levels of expression than females. Moreover, we observed sexual differences in rate of the neurogenesis in male vs females but no significant differences in the timing of the neurogenesis, with peak neurogenesis in either sex observed by E11.5. Furthermore, our data showed that neurogenesis in the paraventricular nucleus of the hypothalamus commenced earlier than the other parts of the hypothalamus and across the brain, confirming the role of this hypothalamic nucleus in leading sex differentiation in the other parts of the brain. These data are significant as they show that embryonic sexual dimorphism occurs before gonads start secreting testosterone in E16.5 in one of the most important systems leading social behaviors. Therefore, these data can shed light into the origins of the sexual dimorphism in those behaviors and diseases like Autism Spectrum Disorders.

Pediatrics

Dr. Elnaz Vaghef Mehrabani
Post-doctoral Student, Supervisor: Dr. Gerry F. Giesbrecht
Authors: Elnaz Vaghef-Mehrabani, Rhonda C. Bell, Catherine J. Field, Nicole Letourneau, Deborah Dewey, Megan Jarman, Gerald F. Giesbrecht

The association between maternal pre-pregnancy obesity and child behavior: The role of inflammation

Introduction: Maternal obesity might predispose children to mental health problems, probably through increasing prenatal inflammation. We aimed to study the association between maternal pre-pregnancy body mass index (BMI) and the offspring behavior in pre-school children, and the role of systemic inflammation in this association.
Methods: We used data (n=989) from the Alberta Pregnancy Outcomes and Nutrition (APrON) cohort study on maternal pre-pregnancy BMI, serum C-reactive protein (CRP; biomarker of inflammation) measured in 3rd trimester, and Child Behavior Checklist (CBCL) completed by parents to report internalizing and externalizing behaviors of children at the age of 3. We applied multivariate regression analysis and Process Macro to analyze data (covariates: sex, exclusive breastfeeding for 3 months, maternal socioeconomic status).
Results: Pre-pregnancy BMI ($\hat{I}^2$ = 0.307; 95% CI 0.153, 0.231) significantly predicted 3rd trimester CRP (R2 = 10.1%). CRP marginally (P-value=0.056) predicted aggressive behavior ($\hat{I}^2$ = 0.064; 95% CI -0.003, 0.263; R2=0.014) and significantly associated with somatic complaints ($\hat{I}^2$ = 0.080; 95% CI 0.009, 0.090; R2=0.020) and other problems ($\hat{I}^2$ = 0.080; 95% CI 0.025, 0.237; R2=0.038). Pre-pregnancy BMI was associated with other problems ($\hat{I}^2$ = 0.084; 95% CI 0.019, 0.152; R2=0.039). CRP mediated the association between pre-pregnancy BMI and somatic complaints (Indirect effect = 0.0095; 95% CI 0.0005, 0.0199).
Conclusions: Higher pre-pregnancy BMI is associated with higher inflammation in the 3rd trimester and other behavioral problems in the offspring. We found limited evidence that 3rd trimester CRP mediated the association between maternal BMI and child behavior. Other factors may be more important mediators.

School of Public Policy

Christiane Roth
Masters Student, Supervisor: Dr. Jennifer Zwicker
Authors: Christiane Roth, Brent Hagel, Jennifer Zwicker, Heather M. Boynton, Lynden F.J. Crowshoe, Gina Dimitropoulos, Deinera Exner-Cortens, Amy Metcalfe, Shelly Russell-Mayhew, Kelly Schwartz, Karen Thomas, Suzanne Tough

Measure What Matters - Identifying Key Indicators to Align Policy and Service Delivery with Child Health and Well-being

Canada lags behind other high-income countries in relation to their child health and wellbeing outcomes. The current Alberta child and youth services sector lacks coordinated strategy, and links between development trajectories, environmental factors, and child health and well-being. Indicators are one approach to simplify the complex information concerning child wellness, environmental factors, and policy nexus by identifying modifiable factors.
The study aims to identify child health and wellness indicators to turn population data into relevant information for decision-makers and identify policy gaps.
The study uses a co-designed multi-methods approach with comprehensive stakeholder engagement to identify indicators through an environmental scan, review, and stakeholder consensus process to subsequently map the indicators against policies. The study is centered on vulnerable children (racialized, immigrant, Indigenous children, children with disabilities or mental health concerns).
An environmental scan gathered relevant existing institutional/organizational, provincial, federal, and international frameworks, as well as most commonly used domains to measure child health and well-being. The analysis revealed various approaches to measuring child health and well-being that serve varying purposes depending on their context (e.g. measuring rights achievement in the international human rights sector, quality of services through output reporting in grant-funded projects or development and behavior outcomes in the education sector).
The project recognizes the importance of developing a measurement framework that has practical impact and directly supports the work of stakeholders in their efforts to improve child wellness. Next steps include a rapid scoping review guided by the PRISMA statement and a DELPHI stakeholder consensus process.

Werklund School of Education

Sarah Williams
PhD Student, Supervisor: Dr. Kelly Schwartz
Authors: Sarah Williams, Kelly Schwartz, Deinera Exner-Cortens, Carly McMorris, Erica Makarenko, Paul Arnold, Marisa Van Bavel

Changes in Student Mental Health and Adaptive Functioning During the COVID-19 Pandemic: Does Age Matter

The impact of the COVID-19 pandemic on individuals across the globe has been significant. One segment of the population that may be particularly vulnerable to the impact of the pandemic are adolescents. Due to the developmental tasks and formational experiences that characterize the adolescent period, a number of studies have sought to investigate the potential effect that the pandemic may be having on youth, particularly their mental health. The current study sought to better understand adolescent mental health and adaptive functioning during this time and to determine whether there are age differences both cross-sectionally and across time. The current study followed adolescents from four school divisions at two time points: September 2020 and December 2020. Participants completed the BIMAS-2 and a COVID-concern scale. Results indicated that, although mental health and COVID-concerns increased and adaptive functioning decreased across time, adolescents' experience differed depending on their age. Older adolescents reported higher negative affect and cognition/attention difficulties while younger adolescents reported higher conduct and academic functioning. Moving forward, these results can help to inform development of programs and strategies for adolescents as they continue to navigate new experiences within the context of COVID-19.

Poster Trainee Presentation Abstracts

Sorted by Supervisor's Faculty or Department

Clinical Neurosciences

Dion Kelly
PhD Student, Supervisor: Dr. Adam Kirton
Authors: Dion Kelly, Erica Floreani, Danette Rowley, Eli Kinney-Lang, Joanna Keough, Zeanna Jadavji, Ephrem Zewdie, Ion Robu & Adam Kirton

BCI@Home: A home-based brain-computer interface program for children with quadriplegic cerebral palsy and their families

OBJECTIVES: Many children with quadriplegic cerebral palsy (CP) are locked-in. Brain-computer interfaces (BCIs) offer a means of control using only brain signals. However, most BCI studies have been conducted in adults in a lab, presenting a crucial translational gap. We aimed to evaluate the feasibility of a home-based BCI program for children with severe quadriplegia and their families.
METHODS: Participants were recruited through neurology and neuromotor/physiatry clinics. Inclusion criteria were: (1) severe quadriplegic CP (GMFCS level V), (2) estimated cognitive/intellectual skill at grade 1 level or higher, (3) age 6-18 years, (4) informed consent/assent. Children with unstable epilepsy were excluded. Participants received a BCI@Home package containing an EEG headset, tablet with pre-loaded software, user-specific activities, and setup guide. Participants and their parent/caregiver participated in weekly BCI sessions with online support. Parents completed a survey about their experience.
RESULTS: Eight participants (mean age=11.6 years, 38% female) have enrolled in the BCI@Home Program, with durations from 7-86 weeks. Children participated in 170 BCI sessions totaling over 205 hours. Home BCI use was mainly supported by the mother or caregiver. Family-perceived benefits included new opportunities for play, improved accessibility/flexibility, and enhanced safety during COVID-19. Challenges included technical issues, setup, and scheduling. Most parents (88%) reported BCI@Home as useful for interacting with family and self-expression. Parent BCI setup confidence increased by 120% and correlated with the number of sessions (r=0.62).
CONCLUSION: Home-based BCI programs are feasible, accessible, and beneficial. Home-based BCI can advance life participation in a patient-centred manner for severely disabled children.

Sarrah Husain
Undergraduate Student, Supervisor: Dr. Elizabeth Condliffe
Authors: Sarrah Husain, James Wrightson, Laura Brunton, Elizabeth Condliffe

Walking and Fatigue in People with Cerebral Palsy

The objective of this research was to examine the relationship between perceived fatigue and perceived walking abilities and difficulty in people with cerebral palsy (CP). Twenty people with CP (range 10â€“21y; mean age 14.8y) who usually walk in the community were recruited. The Functional Mobility Scale (FMS) was used to assess community mobility. Participants were asked about their walking ability and frequency, perceptions of effort during walking (using the Children's Effort Rating Table), as well as perceived fatigue (using the Fatigue Impact and Severity Self-Assessment). We found that community mobility, walking frequency, and perceived effort during walking were significantly related to fatigue. No relationship was found between the amount of time spent walking (maximum walking

time) and fatigue. In this study, we show that perceived fatigue is related to walking in people with CP.

Tammy Wong
Undergraduate Student, Supervisor: Dr. Elizabeth Condliffe
Authors: Tammy Wong, Christa Diot, Benjamin Norman, Jessica Youngblood, Dr. Elizabeth Condliffe

Evaluating the Impact of 1-Month Trexo-Home Use on Bowel Function

The majority of individuals with cerebral palsy (CP) will experience constipation and related symptoms affecting their quality of life. Trexo Home (Trexo) is a robot-assisted gait trainer for individuals with mobility limitations. Trexo users are able to stretch their muscles and improve their gait pattern without excessive strain. However, there remains minimal research and disputed understanding on the topic of bowel movement (BM) in CP. Thus, this study aims to examine 1-month of Trexo usage on BM frequency and constipation-related medication/procedure use in individuals with CP. Data was collected through a voluntary questionnaire (n=27). Participants were asked to participate in the study if they own or decided to lease a Trexo. The mean BM frequency score at baseline and 1-month of Trexo use was 3.43 (SD=Â±0.76) and 3.62 (SD=Â±0.820), respectively. The BM frequency of 3 represents every other day, whereas 4 represents daily. A Wilcoxon rank-sum test revealed no significant difference between baseline and 1-month of Trexo use in BM frequency. Further analysis using a Chi-squared test of proportions revealed that Trexo use significantly increased bowel function in participants who are constipated. The results suggest that there are benefits in Trexo use in improving bowel function for individuals with constipation. The current study is part of a larger study examining multiple outcomes of Trexo use. This research explores and adds to current knowledge surrounding the benefits of assisted-walking devices, and BM issues in individuals with CP.

Jessica Youngblood
PhD Student, Supervisor: Dr. Elizabeth Condliffe
Authors: Jessica L. Youngblood, Christa M. Diot, Anya H. Friesen, Kelly A. Larkin-Kaiser, Elizabeth G. Condliffe

Do robotic gait trainers influence self-reported physical activity and related measure for children living with a significant mobility impairment

Background and Objectives: Robotic gait trainers are a promising new technology to enhance physical activity for children who may struggle to find accessible physical activity otherwise. The Trexo Home robotic assisted gait trainer (Trexo) allows children with significant mobility impairments to ambulate. The purpose of this study was to evaluate if the initial month of Trexo use impacted patient reported outcomes related to physical activity.
Methods: An international prospective observational cohort study was conducted. Patient-Reported Outcomes Measurement Information System (PROMISÂ®) was used to assess Physical Activity, Sleep Disturbances, and Positive Affect. Parents also reported their child's bowel habits. All measures were collected before training and 4-8 weeks after starting training. Median scores (25th â€“ 75th percentiles) are reported and change over time was assessed using a Wilcoxon Signed-Rank Test (â=0.05, p<0.0125 with Bonferonni correction).
Results: Twenty-seven participants were included between the ages of 3-18 years of age (median age 7). No significant change in Physical Activity was reported, with a median change of 2.1 (-3.8 â€“ 6), p=0.18. Participants experienced a reduction in Sleep Disturbances with a median change of -3.0 (-7.6 â€“ 0), p=0.0015. Positive Affect scores were unchanged with Trexo use (p=0.21). Of the 12 participants who were constipated at baseline, bowel habits improved in 7 and none had a worsening of constipation.
Conclusions: Improvements in sleep disturbances and bowel habits occurred after ~1month of training. Changes in these outcomes may be linked to less inactivity. Future research is needed to directly measure levels of physical activity achieved with Trexo use.

Kelsey Harkness
PhD Student, Supervisors: Drs. Kara Murias & Signe Bray
Authors: Harkness, K., Bray, S., and Murias K.

The predictive power of the Childhood Behavioural Checklist (CBCL) on diagnosis of Autism Spectrum Disorder (ASD) and Attention-Deficit/Hyperactivity Disorder (ADHD) in a large community sample

Attention-deficit/hyperactivity disorder (ADHD), and autism spectrum disorder (ASD) are prevalent in the population. Diagnosis of ASD and ADHD is complex and often takes many visits using considerable time and resources. Streamlining assessment would decrease the resources required and allow for earlier intervention, which has been shown to decrease lifelong disability. The childhood behavioural checklist (CBCL) is a broadband assessment of problem behaviours in children that is widely used within the literature to assess behavioural problems in school aged children.
Participants were retrieved from the Adolescent Brain Cognitive Development (ABCD) database. Baseline CBCL scores were obtained and participants (10-11 years) were sorted into 3 groups: ASD (n=119), ADHD (n=982), no ASD or ADHD (n=9828). Participants were excluded if they had a co-diagnosis of ASD and ADHD (n=71). Two ridge regressions were performed to assess contribution of CBCL scores on diagnostic status for ASD and ADHD separately. Terms within the ridge regression included: ADHD, thought problems, attention problems, internalizing problems, externalizing problems, and total problems from the CBCL and additional terms for sex, site, and age.
Both regression models indicated that the CBCL scores accounted for limited variability (ASD(1.73%);ADHD(11.86%)), suggesting limited

ability of CBCL to explain variability between individuals with and without ASD or ADHD.
By determining which assessments are most predicative of diagnostic status, the time spent waiting for a diagnosis can be decreased. This increased efficiency has the potential to relieve burden on the health care system and allow children to receive intervention more quickly.

James Wrightson
Supervisor: Dr. Elizabeth Condliffe
Authors: Wrightson J.G, Husain S, Brunton L, and Condliffe E.G.

Perceived fatigue is associated with 6-minute walking distance, but not fatigability, in youth with cerebral palsy and youth with typical development

Fatigue is a frequently reported distressing symptom for people with cerebral palsy (CP), with no recommended treatment. Qualitative evidence suggests that people with CP experience fatigue during and following walking. We examined whether perceptions of chronic fatigue were associated with walking performance and fatigability in 14 youth with CP (mean age=15 years, 8 males, 10 GMFCS level I, 4 GMFCS level II) and eight youth with typical development (TD, age=12 years, 3 males). Participants performed the 6-min walking test and perceptions of chronic and state fatigue were measured using the Fatigue Impact and Severity Self-Assessment (FISSA) and the Rating of Fatigue scale (RoF). Walking performance was measured using the total distance walked (m) and the relative change in distance covered in the last minute of walking compared to the first (%, walking fatigability). FISSA was greater in participants with CP (median [IQR] 87 [44]) compared to TD (41[33], p=0.027). Participants with CP's walk distance was shorter (475 [82] m) compared to TD (563 [145] m, p=0.021). However, walking fatigability was not different between groups (CP=6.8 [10.7] %, TD=7.1 [4.7] %). Both FISSA (β=-1.5) and RoF (β=-35) were significantly associated with walking distance, but not with walking fatiguability. Fatigue is associated with 6-min walk distance in both people with CP and TD, despite the higher levels of fatigue reported in individuals with CP. These results suggest that 6-min walking distance may be in part mediated by how fatigued youth are on the days leading up to the test.

Christa Diot
Supervisor: Dr. Elizabeth Condliffe
Authors: Christa M. Diot, Anya H. Friesen, Benjamin Norman, Kelly A. Larkin-Kaiser, Elizabeth G. Condliffe

Robot Assisted Gait Training for Children with Impaired Mobility: Who is using it and how much?

Background and Objective: The Trexo Home (Trexo) robotic gait trainer aims to provide children intensive rehabilitation in their home and community. However, who may benefit and training feasibility is unknown. We aimed to characterize who is using the Trexo and the volume of training achieved.
Study Participants & Setting: This prospective observational study recruited participants who purchased or leased a Trexo and tracked usage over the initial month of training.
Materials/Methods: Parents reported their child's demographics, diagnosis and functional abilities. Use was based on what was meaningful and feasible for their family. The Trexo device records usage and training time, number of training sessions and steps each week were calculated.
Results: Twenty-seven Trexo users participated, age 3-18 years (median 7 (4.5-9)), 48% males. Twenty-two (81%) participants had cerebral palsy. Participants Gross Motor Functional Classification System levels were III (11%), IV (26%) or V (63%). In 26 participants with available usage data, they trained for 74.6 (30.8-125.3) minutes/week, over 3.8 (2.6-5.8) sessions involving 1089 (539-2325) steps/week.
Conclusions/Significance: Users are mostly elementary-school-age children with cerebral palsy who don't routinely walk. Most participants trained over 3 times/week, taking over 1000 assisted steps each week that they would have been unlikely to take otherwise. For children with significant mobility limitations the Trexo is being used regularly as a unique option for assisted ambulation in the community.

Kinesiology

Robyn Madden
PhD Student, Supervisor: Dr. Jane Shearer
Authors: Robyn F. Madden, Sophie Lalonde-Bester, Jill A. Parnell, Melanie M.S. Trudeau, Julia M. Martin, Aneal Khan, Jane Shearer

Assessment of Dietary Patterns and Supplement Use in Mitochondrial Disease

Background and Objective: Mitochondrial diseases (MITO) are a large group of rare genetic conditions that manifest in high-energy organ systems and impair mitochondrial oxidative phosphorylation. Therapeutic management often involves the use of dietary supplements and special dietary patterns.
Methods: A questionnaire assessing dietary patterns and supplement use was administered to diagnosed patients or their surrogate caregivers through various MITO-related patient and advocacy organizations and social media. Secondary outcomes assessed information available to participants regarding supplements, and factors influencing use, knowledge, and adherence to dietary supplements. Supplements were classified using standard criteria. A total of 236 responses were used for the analysis.

Results: The average number of supplements taken among patients was 7.0 (Â± 5.0 SD) with over 70% reporting taking more than 4 supplements. Sixty percent of respondents reported dietary restrictions, while 14% were tube fed or parenterally fed. Uncertainty regarding supplement cost, use, and availability were a significant source of stress for most participants with 61% of patients reporting no financial coverage for supplementation and 45% reporting no coverage for special dietary needs.
Conclusion: Adequate scientific evidence for the widespread use of dietary supplements in MITO is lacking. As a result, there is excessive supplementation in MITO that imposes significant stress on patients. Future studies are needed to evaluate the efficacy of specific supplements as well as special dietary patterns to enable physicians to provide evidence-based recommendations to patients to reduce symptoms, as well as the emotional and financial strain associated with supplement use.

Dr. Chunlong Mu
Post-doctoral Student, Supervisor: Dr. Jane Shearer
Authors: Chunlong Mu, Thomas A. Tompkins, Jong M. Rho, Morris H. Scantlebury, Jane Shearer

Gut-based manipulations spur hippocampal mitochondrial bioenergetics in a model of pediatric epilepsy

A growing body of evidence supports a role of the gut microbiota in regulating diverse physiological processes, including neural function and metabolism via the gut-brain axis. Infantile spasms syndrome is an early-onset epileptic encephalopathy associated with perturbed brain mitochondrial bioenergetics. Employing a neonatal rat model of infantile spasms, mitochondria respirometry and biochemical analyses, the present study reveals that gut microbiota manipulations by diet, antibiotics and probiotics have the potential to enhance hippocampal mitochondrial bioenergetics. Although preliminary in nature, our data reveal that microbial manipulation that regulates brain mitochondrial function may be a novel strategy for the treatment of epileptic disorders.

Katarina Laketic
Masters Student, Supervisor: Dr. Jane Shearer
Authors: Katarina Laketic, Sophie Lalonde-Bester, Kimberly Smith, Donna Slater, Suzanne C. Tough, Hans J. Vogel, Matthias S. Klein, Jane Shearer

Maternal Metabolites Indicative of Mental Health Status during Pregnancy

Approximately 25% of women report poor mental health during their pregnancy or the postpartum period. Compared to healthy controls, poor mental health throughout pregnancy can impact fetal neurodevelopment, birth outcomes, and maternal behaviors. Given this, identifying metabolites associated with these conditions may provide insight into both the identification and pathophysiology of poor mental health during pregnancy. In the present study, maternal serum samples were collected from 465 pregnancies at 28-32 weeks of gestation from the All Our Families (Alberta, Canada) cohort and assessed using nuclear magnetic resonance spectroscopy (1H-NMR) and inductively coupled plasma mass spectrometry (ICP-MS). Metabolites were examined in relation to validated self-reported mental health questionnaires for associations with stress (Perceived Stress Scale), depression (Edinburgh Postnatal Depression Scale), and anxiety (Spielberger State Anxiety Inventory) completed in the same period. Significant 1H-NMR metabolites were identified for stress (O-acetylcarnitine), depression (glutamine), and anxiety (acetone, alanine, creatine phosphate, formate, glutamine, glycerol, methanol, succinate, taurine, and pyruvate). For ICP-MS, only zinc was found to be associated with depression. Although these results warrant further validation, they may serve as a predictive tool for mental health during pregnancy. Earlier identification has the potential to aid early mental health identification, intervention, and management to avoid harmful consequences to both mother and child.

Angela Pochakom
Masters Student, Supervisor: Dr. Jane Shearer
Authors: Angela Pochakom, Chunlong Mu, Thomas A. Tompkins, and Jane Shearer

Selective Probiotic Treatment Positively Modulates the Microbiota-Gut-Brain Axis in a BTBR Mouse Model of Autism

Historically, the purpose of probiotic use in autism spectrum disorder (ASD) has been associated with alleviating co-morbid gastrointestinal symptoms. Recent studies have shown promise for the use of probiotics in modulating brain function to improve the behavioural symptoms of ASD through the microbiome-gut-brain axis. In the present study, we assessed the impact of two probiotic strains in mitigating autism-related symptomology in the BTBR T+ Itpr3tf/J mouse model of ASD. Male juvenile BTBR mice were randomized into: 1) control, 2) Lr probiotic (1 x 109 CFU/mL Lacticaseibacillus rhamnosus HA-114), and 3) Ls probiotic groups (1 x 109 CFU/mL Ligilactobacillus salivarius HA-118) (n=18-21/group), receiving treatments in drinking water for 4-weeks. Gut microbiota profiling by 16S rRNA showed Lr, but not Ls supplementation, to increase microbial richness and phylogenetic diversity, with a rise in potential anti-inflammatory and butyrate-producing taxa. Assessing serum and brain metabolites, Lr and Ls supplementation produced distinct metabolic profiles, with Lr treatment elevating concentrations of potentially beneficial neuroactive compounds, such as 5-aminovaleric acid and choline. As mitochondrial dysfunction is often observed in ASD, we assessed mitochondrial oxygen consumption rates in the prefrontal cortex and hippocampus. No differences were observed for either treatment. Both Lr and Ls treatment reduced behavioural deficits in social novelty preference, however no changes in hyperactivity, repetitive behaviour, and sociability were observed. Results show Lr to impart positive changes along the microbiome-gut-brain axis, exhibiting beneficial effects on behaviour, gut microbial diversity, and metabolism in BTBR mice.

Spencer Epp
Masters Student, Supervisor: Dr. Jillian Vinall Miller
Authors: Spencer Epp, Elodie Boudes, Andrew Walker, Signe Bray, Melanie Noel, Laura Rayner, Nivez Rasic, Jillian Vinall Miller

Functional brain changes and less pain interference following intensive pain rehabilitation in youth.

Introduction: The Intensive Pain Rehabilitation Program (IPRP) at the Alberta Children's Hospital is a multidisciplinary, three-week, day-treatment program, which aims to improve function in youth with severe chronic pain. Little is known about how rehabilitation influences brain activity. Previous studies have demonstrated decreases in brain functional connectivity following IPRP. Therefore, we hypothesized that IPRP would be associated with a decrease in brain activity in response to emotional stimuli, pre- to post-IPRP.
Background/Goals: We investigated whether IPRP was associated with a decrease in brain activity in response to emotional versus neutral stimuli, pre- to post-IPRP, and whether these changes were associated with improvements in functioning and mental health in youth with severe chronic pain.
Summary of Methods: Twenty youth aged 14-18 years were scanned using fMRI, pre- and post-IPRP. During the fMRI, patients were presented with emotional stimuli (i.e., faces expressing happiness and fear) and neutral (i.e., scrambled) images. Patients also filled out questionnaires pre- and post-IPRP regarding their pain type, intensity, interference, catastrophizing, and post-traumatic stress symptoms (PTSS). Paired t-test were used to examine mean differences in brain activity in response to emotional versus neutral stimuli, pre- and post-IPRP. Data from significant brain regions were entered into linear mixed models to examine the relationships between brain activity and behavior pre- and post-IPRP, accounting for age, gender, pain type, pain intensity and time between scans.
Results: Patients demonstrated a decrease in middle frontal gyrus activity (MFG) in response to emotional versus neutral stimuli, between pre- and post-IPRP ($P<0.05$). Lower MFG activity was associated with lower pain interference and PTSS pre- and-post IPRP ($P<0.05$).
Conclusions: IPRP was associated with decreases in MFG hyperactivation in response to emotional stimuli. Decreases in MFG activity, a key area involved in attentional selection, were associated with improvements in functioning and mental health in youth with severe chronic pain.

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Increases in white matter microstructure with the chronification of pain in youth at risk for internalizing mental health conditions

Introduction: Chronic pain (> 3 months) is a prevalent childhood health issue. Internalizing symptoms (anxiety/depression) are highly comorbid with chronic pain. We examined whether white matter microstructure differences across tracts involved in pain and emotional processing were associated with pain occurrence in youth at familial risk for internalizing symptoms.
Methods: Youth (11-18 years) at familial risk for anxiety and depression underwent a 3T MRI scan. Diffusion tensor images were obtained. Mean fractional anisotropy (FA) and mean diffusivity (MD), white matter microstructure measures, were extracted from the corpus callosum (genu, body, and splenium), cingulum, inferior fronto-occipital, superior longitudinal and uncinate fasciculi. Youth reported pain frequency, and were categorized into chronic pain (N = 30), acute pain (N = 22), or no pain groups (N = 60). Pain interference and anxious/depressive symptoms were reported using validated measures. Univariate analyses compared characteristics across groups. Regression analyses examined relationships between brain microstructure and pain interference, controlling for anxiety symptoms.
Results: MD was significantly higher ($P=0.02$) and FA was significantly lower ($P=0.05$) in the acute pain group, compared to the chronic pain group. Higher MD (ÃŸ=0.16, $P=0.03$), lower FA (ÃŸ =-0.17, $P=0.02$) and higher internalizing symptoms (ÃŸ=0.35, $P <0.001$) were associated with greater pain interference (total $R2=0.51$).
Conclusions: Lower FA and higher MD in youth reporting acute pain may indicate temporary impacts to their white matter microstructure. Weaker white matter connectivity and greater internalizing symptoms were associated with greater pain interference. Acute pain in combination with higher internalizing symptoms may therefore enhance the neurobiological risk for developing chronic pain.

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Changes in brain GABA levels and improvements in physical functioning following intensive pain rehabilitation in youth with chronic pain

A 3-to-6-week multidisciplinary, day-treatment, Intensive Pain Rehabilitation Program (IPRP) was developed at the Alberta Children's Hospital to help youth with unmanaged chronic pain (pain >3 months) and functional disability. Dysregulation of GABA is thought to

play a role in the chronification of pain due to over-excitation of inhibitory brain pathways. We investigated the effect of IPRP on levels of GABA in pain-related brain regions: the anterior cingulate cortex (ACC) and left posterior insula (LPI). We hypothesized that GABA would decrease across IPRP in the ACC and LPI, and this decrease would correlate with improved functioning.
3T MRI scans were obtained on 23 youth (mean age=16.09Â±1.40, female=82.6%) at baseline and discharge from IPRP. GABA concentrations were measured using GABA-edited MEGA-PRESS and analyzed using Gannet. At baseline and discharge objective physical measures including the 6-minute walk test were recorded, and patients completed the PROMISÂ® pain interference questionnaire.
Repeated MANOVA revealed a significant decrease in LPI GABA (F=5.374, p=.031), but not ACC GABA (n.s.) after controlling for time between scans. Applying GEE, the decrease in LPI GABA accounted for increased distance in the 6-minute walk test (B=-149.378, p<.001) and decreased pain interference (B=5.744, p=.014).
LPI is involved in intensity encoding, localization, learning, and memory of painful events. IPRP may have contributed to the normalization of inhibitory tone within this region. Appropriate functioning of the LPI could have contributed to the improvements in physical outcomes pre- to post-IPRP. This research provides objective evidence for IPRP's role in inhibitory control of pain pathways in youth.

Medical Genetics

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Investigating the mechanism by which concomitant clozapine and valproate increase risk for myocarditis: a pharmacoepigenomic approach.

Clozapine is the most effective antipsychotic medication for the management of treatment-resistant schizophrenia. However, the use of clozapine is limited due to severe and often fatal adverse events, including myocarditis. It is known that clozapine and valproate induce epigenetic modifications and that their concomitant use increases the risk of myocarditis by >2.5-fold. The aim of my study is to investigate the potential epigenetic mechanism underlying this increased risk of myocarditis using genome-wide profiling of DNA methylation, histone modification and gene expression in a novel cellular model. We hypothesize that valproate inhibits histone deacetylase enzymes and maintains histone acetylation thus making the genome more accessible to clozapine-induced DNA methylation loss. This combination of epigenetic changes affects cellular gene expression, which promotes the development of myocarditis in a susceptible individual. To address my hypothesis, I will differentiate induced pluripotent stem cells derived from patients with and without a history of clozapine-induced myocarditis into beating cardiomyocytes. I will expose these cells to clozapine with and without valproate at physiologically-relevant concentrations. DNA methylation will be interrogated with a methylation array and chromatin immunoprecipitation assays with sequencing will assess histone changes at H3K4me3 and H3K27ac. Epigenetic changes will then be correlated with gene expression changes assessed through RNA-Seq. In particular, we will assess changes in pathways associated with inflammation and metabolism. This novel study combines several genome-wide analyses in unique patient-derived cells and leverages ongoing efforts being conducted to identify novel risk markers and elucidate the mechanism by which clozapine induces myocardial inflammation and damage.

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Characterizing developing behaviours in chd8 and shank3b autism-risk allele mutant zebrafish lines

Autism Spectrum Disorder (ASD) is amongst the most prevalent neurodevelopment disorders in the world, approximated to affect 1 in 58 people. The etiological basis of ASD has a genetic bias, with 50-80% of the disorder being attributed to genetic factors. Using animal models to study ASD is key to unraveling etiological genetic influences, allowing structured study of ASD risk genes and their consequences on neurodevelopment and behaviour, an area of study that is complicated in human subjects due to homogeneity of the disorder. In this study, we aim to characterize autism-like behaviours in shank3 and chd8 mutant zebrafish lines. Here, we hypothesize that zebrafish with mutations in chd8 or shank3b will display differential behaviours from wild-type zebrafish. To examine behaviour, at 5-, 7- and 10-days post-fertilization and 8+ months post-fertilization the ZebraBox® and ZebraCube® recording chambers were used to track larval and adult behaviours respectively, of wild-type, chd8, or shank3b mutant fish. We observed that in light, adult shank3b+/- zebrafish travel higher distances at a low speed and lower distances at a moderate speed, suggesting they are less active. In the light, distance travelled of adult chd8+/- fish is not significantly different than wild-type fish. In adult novel-tank assays, chd8+/- fish spent more time than wild-type fish in the upper half of the tank, indicating they are exhibiting more exploratory behaviours. In an operant conditioning assay, we observed that shank3b+/- adult fish could not associate food with an unconditioned stimulus. Our findings suggest that fish with mutations in autism-risk genes have abnormal locomotive and cognitive behaviours in adulthood, and we aim to characterize these behaviours at earlier timepoints to understand behavioural changes over a life-span.

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Gestational Low Dose Bisphenol A Exposure Disrupts The Sexually Dimorphic Development of Vasopressin System in Mice

Arginine vasopressin (AVP) system is one of the most consistently sexually dimorphic system across species that regulates social behaviors. Bisphenol A (BPA) is a well-recognized estrogenic endocrine disruptor that has been linked to adverse outcomes in humans including pregnant women. Epidemiological and animal studies showed associations between prenatal BPA exposure and social behavioral issues later in life, with some of them displaying sex-biased deficits. However, the underlying mechanisms remains unknow. Our previous studies suggested that gestational exposure to BPA altered AVP development in the mouse hypothalamus, herein, we evaluated the effects of maternal BPA exposure on AVP system using birth dating and immunohistochemistry experiments, as well as iDISCO+ whole-brain imaging and whole-cell patch-clamp.
Our results showed that maternal BPA exposure caused a remarkable effect on the sexually dimorphic development of the AVP system. Specifically, we observed disruption in the sexually dimorphic neurogenesis of the AVP neurons in the PVN (AVPPVN), the number of AVPPVN neuron across developmental stages (E15.5, P0, P7, P15, P30 and 4 month). Additionally, with the iDISCO+ we confirmed/identified the sexually dimorphic projections of AVP fibers in intra- and extra-hypothalamic regions, which was disrupted by BPA exposure. In addition, our whole-cell patch-clamp data showed that maternal BPA exposure perturbed the electrophysiological properties of AVPPVN in a sex-specific manner.
Collectively, our results suggest that low dose maternal BPA exposure perturbs the sexually dimorphic development of AVP system, suggesting a potential mechanistic link for epidemiological studies showing association between maternal BPA exposure and sex-biased social behavioral defects.

Dr. Sisu Han
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The influence of psilocybin on adult neurogenesis in human brain organoids

By age 40, ~50% of the Canadian population will have or have had a mental illness. Although mental illness can affect people of all income and cultures, systemic inequalities such as homelessness and racism can worsen symptoms. Unfortunately, our children are not spared this disease, with ~20% of Canadian youth affected by a mental health disorder. Behavioural therapy is still a mainstream treatment for mental health, but with relapses common new, scientifically supported, treatment approaches is needed. As a result, psilocybin, an established psychedelic compound, is gaining attention due to its therapeutic potential for mental diseases. However, little is known about the neurophysiological effects that underlie psilocybin's action, which hinders the implementation of psychedelics for therapeutic purposes. Serotonin receptors are the main target of psilocybin and they are expressed in human neural stem cells where they play a key role in neurogenesis during embryonic brain development. Given that psilocybin can lead to an improvement of mental health over 25 years after administration, we hypothesized that psilocybin induces neurogenesis in the mature human brain by activating quiescent pools of stem cells, leading to long-term integration of new neurons into nearby neural circuits. To test our hypothesis, we employ human cerebral organoids as a model system that shares features to human brains. Our preliminary studies found that psilocybin acts as a strong neurotropic factor, inducing neurite outgrowth and expanding progenitor pools at high doses. Now we are studying the effect of lower doses of psilocybin and its active metabolite, psilocin, to find the optimal dose for the neurotropic effects, while also assaying for integration of newly born adult neurons. This research will provide neurobiological knowledge regarding the long-term effects of psilocybin on neurogenic programs to support the application of psychedelic compounds as a viable treatment for adults and perhaps even children suffering from PTSD-related symptoms.

Dr. Reza Aghanoori
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Celf2 patient mutation results in increased neuronal activity and aberrant dendrite development in mouse cortex

About 1000 genes in eukaryotes encode for multifunctional RNA-binding proteins (RBPs) that can regulate splicing, transport, localization, and translation of RNAs. More than 50% of these RBPs are expressed in the brain, dysfunction of which can exert global effects on their targetomes that underlie neurodevelopmental disorders and other diseases. Recently, we and others have reported germline mutations in the nuclear localization signal (NLS) of CELF2, an RNA-binding protein causes a previously uncharacterized rare neurodevelopmental disorder. The affected children show intellectual disabilities and seizure. We thus hypothesized that the genetic mutations perturb CELF2 subcellular localization in neurons, resulting in altered gene expression and abnormal neuronal development and activity. Using the mouse as the model system, we found Celf2 subcellular localization in neurons of the cerebral cortex is dynamically regulated throughout brain development and is under the control of neuronal activity. Interestingly, in mice harbouring a patient-derived mutation, we found that cortical neurons show an aberrant increase in their activity. Moreover, abnormal dendritic branching and disrupted dendritic spines were also observed in Celf2 mutant mice. Our data suggests that dynamic regulation of Celf2

localization during development is critical for neuronal development and function. This finding can shed light on the mechanism of this rare neurodevelopmental disorder.

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Development of personalized medicine for patients with a rare neurodevelopmental disorder

Approximately 1 in 12 Canadians are affected by a rare disease, two thirds of which are children. The low rate of occurrenceand lack of awareness often results in inaccurate diagnoses and difficulties in accessing proper healthcare. Consequently, thesediseases are typically severely debilitating or life-threatening as limited or no treatment options are available. Our collaborative team has identified a group of children with a rare neurodevelopmental disorder associated withdevelopmental delays and perturbed folding of the cerebral cortex. Further studies revealed that mutations in the CELF2 genecause this disease by disrupting the normal localization of CELF2 proteins within brain cells. Importantly, the discovery of theunderlying disease mechanism gives us the opportunity to develop potential therapeutic strategies. A preliminary drug screenidentified several FDA-approved drugs that may effectively correct mis-localized CELF2 proteins within diseased cells. Thesepromising initial results set the basis for my thesis project to investigate the therapeutic potential of the identified drugs in patientderived induced pluripotent stem (iPS) cells, a cell model that has been recognized and widely used as a patient-specific modelfor drug discovery. sing CRISPR-Cas9 technology I will generate an isogenic patient iPS control cell line using patient cells. This cell line will becritical when examining the effects of FDA-approved drugs on the localization of the CELF2 protein and thus the identification ofpotential treatment options. Ultimately, our objective is to develop personalized medicine for young patients with rareneurodevelopmental disorders caused by a variant in the CELF2 gene.

Nursing

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The Effects of Parental Technoference on Parent-Child Relationships and Children's Health and Development: Results from a Scoping Review

Background: Parental technological immersion has been shown to alter parent-child interactions. This concept, referred to as parental technoference, has the potential to affect parent-child relationships and children's health and development.
Research Aim: To identify, describe, and summarize: (1) evidence on parental technoference and parent-child relationships, and children's health and development; (2) definitions and measurements of parental technoference; (3) research designs and methodologies used to investigate parental technoference; and (4) literature gaps.
Methods: We utilized the Joanna Briggs Institute methodology for scoping reviews and searched eight electronic databases for research (e.g., quantitative, qualitative) published before November 2020 with three main concepts: parents, children, and technoference. Two authors independently reviewed titles and abstracts (attaining 97% inter-rater reliability) and conducted reference mining of included articles.
Results: Sixty-four studies, within 61 publications, met the review criteria. Findings demonstrated that parents recognized, and researchers observed, changes in parents' and children's behaviors during parental technoference. Adolescent mental health concerns and maladaptive technological behaviors, children's safety, and aspects of children's development were negatively impacted by parental technoference. No significant associations were found between parental technoference and children's medical (e.g., neurodiverse diagnoses) and physiological health; however, these associations were least studied.
Conclusion: Parental technoference can negatively affect parent-child relationships and aspects of children's health and development; however, this research is novel and additional evaluations are needed to understand its effects on children's physiological health and development. Effective parenting interventions are needed to support parent-child relationships and children's health and development by mitigating parental technoference harms.

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Maternal Mental Health, Child Distress and Family Strain During the COVID-19 Pandemic

Objective: To understand impact of the COVID-19 pandemic on families by examining the relationship between maternal mental distress (MD), child distress (CD) and family strain (FS) trends over time.
Approach: Three waves of COVID-19 Impact Survey (March 2020-July 2021), collected from APrON longitudinal cohort in Alberta, Canada, were used. Mothers' depression, anxiety, and/or stress scores were standardized separately, averaged at each wave, and combined as one maternal MD variable (low/medium/high). CD was measured across emotional, conduct, hyperactivity, and peer

problem scales (low/high). FS was defined as COVID-19 straining family relationships (yes/no). Latent class analyses were performed to identify and categorize membership across variables. Multiple logistic regression models were conducted.
Results: The sample consisted of 157 participants were included in the study; 19.1% reported FS. Three latent classes were formed for maternal MD: consistently low (36.9%), medium (44.0%), and high (19.1%). Two latent classes were formed for CD: consistently low (79.6%) and high (20.4%). When adjusted for COVID-19 related and sociodemographic covariates, mothers with medium/high levels of MD were at increased odds of experiencing FS compared to those with a low level of distress (medium aOR=3.90[1.08, 14.03]; high aOR=4.57[1.03, 20.25]). Adjusted association between CD and FS was not statistically significant (aOR=1.75[0.59, 5.20]).
Conclusion: Understanding how MD could affect family strain is important as families recover from the pandemic. More distressed individuals experience greater FS over time, suggesting this association as a chronic problem. Stakeholders should tailor support systems to longer-term, family-level interventions improving family relationships and maternal-child MD impacted by COVID-19.

Paediatrics

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Investigating Uremic Toxins as a Risk Factor for Cardiac Dysfunction in Pediatric Chronic Kidney Disease

Chronic kidney disease (CKD) involves the progressive loss of renal function, resulting in the accumulation of toxic substances in the blood. End-stage CKD patients can develop cardiac dysfunction that partially improves with dialysis and medications and completely normalizes after kidney transplantation. This suggests that accumulated toxins that are inadequately cleared by the kidneys and dialysis negatively impact the heart. However, the identity and levels of these circulating toxins, particularly in children, are poorly characterized. We hypothesize that blood samples from children with CKD and cardiac dysfunction will contain elevated uremic toxins levels that adversely affect cardiomyocyte function in vitro. Using human-induced pluripotent stem cells differentiated into cardiomyocytes (iPSC-CMs), this project aims to optimize an in vitro assay to study uremic toxin effects on cardiomyocyte function. This project has three aims: (1) optimize an in vitro iPSC-CM platform to evaluate the effect of four known uremic toxins (indoxyl sulfate, p-cresyl sulfate, trimethylamine N-oxide and fibroblast growth factor-23) on cardiomyocyte beating rate and contractility, calcium handling, oxidative stress and inflammation. (2) collect serial blood samples from end-stage CKD children with or without cardiac dysfunction and evaluate the cardiac toxicity of these samples in our cellular model. Correlate patient clinical information with measures of in vitro toxicity. (3) Measure indoxyl sulfate, p-cresyl sulfate, trimethylamine N-oxide and fibroblast growth factor-23 levels in patient blood using mass spectrometry. Correlate patient clinical information with toxin levels. Findings from this study will begin to provide insight into the causes of cardiac dysfunction in children with CKD.

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The Tuning in to Kids (TIKÂ®) intervention for parents experiencing mental health difficulties: Preliminary results from a feasibility and acceptability study

Background: There has been a dramatic surge in the prevalence of mental health difficulties experienced by Calgary parents during the COVID-19 pandemic, with approximately 1/3 of parents reporting clinically significant symptoms of depression and/or anxiety. Pre-COVID-19 evidence indicates that emotion-focused parenting interventions are effective for improving parent mental health and related difficulties with parenting and child behaviour problems; however, few existing interventions have been evaluated via virtual delivery methods.
Objective: This study examines the feasibility and acceptability of implementing and evaluating the virtual Tuning in to Kids (TIKÂ®) parenting intervention among a sample of 20 parents of young children who are experiencing mental health difficulties.
Methods: Parent-child pairs are being recruited from Families Matter parenting centres in Calgary. Parents with clinically significant levels of depression and/or anxiety are invited to participate. Parents are asked to complete questionnaires, which assess relevant outcomes (e.g., parenting, child behaviour) before and after participating in the TIKÂ® intervention, as well as a qualitative interview after the intervention. TIKÂ® is an emotion-focused parenting intervention and is being delivered by certified facilitators from Families Matter.
Analysis Plan: To date, one cohort of parents (n = 6) has completed the study protocol and recruitment is ongoing. Analyses will involve generating quantitative metrics of study feasibility (e.g., recruitment rates), qualitative analysis of parents' experiences from interview transcriptions, and estimates of intervention effects on outcomes assessed by the questionnaires. The findings from this study will provide the foundational evidence necessary to design and implement a larger-scale trial.

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Prenatal exposure to Endocrine Disrupting Chemicals and Gestational Diabetes Mellitus

Background: The incidence of gestational diabetes mellitus (GDM) has tripled over the past two decades and now occurs in 13.6% (range 3-24%) of all pregnancies worldwide. This increasing prevalence is a public health concern and could be associated with the widespread use of endocrine disrupting chemicals (EDCs) such as phthalates, phenols, heavy metals, and perfluoroalkyl acids (PFAA), which have been associated with an increased risk of excessive weight gain and impaired glucose tolerance during pregnancy, risk factors for gestational diabetes. In the present study, we examined the associations between maternal exposure to EDCs during pregnancy and GDM.
Methods: 423 pregnant women without pre-existing diabetes from the Canadian APrON study with available data on GDM and EDCs were included. The metabolites of the EDCs were quantified in spot maternal urine and serum blood samples collected during second trimester (mean gestational weeks: 17Â±2.1) of pregnancy. Adjusted multiple logistic regressions examined the associations between EDC metabolites and GDM.
Results: The bisphenol-A (BPA) was found to be positively associated with GDM in the adjusted model, aOR:1.81 CI:1.09-3.01, p-value= 0.02. Mercury (Hg) was also positively associated in the adjusted model, aOR:1.51, CI:1.01-2.27, p-value= 0.04. In contrast, zinc (Zn), OR :0.006, CI:0.00006-0.71, p-value=0.03, and manganese (Mn), OR :0.12, CI:0.01-1.23, p-value=0.07, were negatively associated with GDM. No associations were observed between GDM and phthalate metabolites, bisphenol-S, or PFAAs.
Conclusion: Prenatal exposure to EDCs could have differential effects on the risk of developing GDM. Further research on the effects of EDC mixtures on risk factors for GDM is needed.

Dr. Marcel van de Wouw
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Associations Between the Gut Microbiota and Sleep in Preschool-Aged Children

Introduction: Sleep plays a crucial role in the development of mental and physical health of children. The relationship between sleep and the gut microbiota is becoming increasingly clear in animals and human adults, even though this relationship remains unexplored during preschool - a key developmental period. This study aims to investigate the link between the gut microbiota and sleep in preschool-aged children
Methods: The stool microbiota and metabolite levels were assessed from a community sample of typically developing children (4.37Â±0.48 years, n=143). Sleep measures included total nighttime sleep (TST), sleep efficiency (SE), and wake-time after sleep onset (WASO) assessed using actigraphy.
Results: Differences in beta-diversity between low and high TST (p=0.048) suggest gut microbiota community alterations. Specifically, the relative abundance of Bifidobacterium was higher in the high TST group, while Bacteroides was higher in children who had higher SE and low WASO (LDA>2). In contrast, some Lachnospiraceae members were associated with shorter night-time sleep duration and less efficiency, respectively. Tryptophan and its metabolizing products were higher in children who had higher SE or lower WASO (LDA>2); concentration of propionate was higher in children with lower WASO (p=0.036).
Conclusions: These data provide novel insights into the relationship between the gut microbiota and sleep during preschool. Longer night-time sleep and greater sleep efficiency correlated with selective commensal bacteria that may regulate sleep through modulating the metabolism of neuroactives.

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The Relationship Between Internalizing Behaviors and the Gut Microbiota in Preschool Children

Introduction: The connection between the brain and the gut microbiota, including its metabolites like short-chain fatty acids, is becoming increasingly clear. However, the relationship between the gut microbiota and mental health problems (e.g., internalizing behaviors) in preschool-aged children remains largely unknown. This study investigates the associations between the gut microbiota and internalizing and externalizing behaviors in preschool children.
Methods: The stool microbiota and SCFA levels were assessed from a community sample of typically developing children (3-5 years, n=248). The parent-reported Child Behavior Checklist was used to assess child internalizing and externalizing behaviors. Spearman correlations followed by an adjustment for multiple testing were used to investigate associations between the gut microbiota and child behaviors, with subanalysis conducted in children clinically "at risk" for behavioral problems compared to those who were not.
Results: There was an association between Shannon alpha diversity with internalizing behaviors (rs=-0.134) and its subscale somatic complaints (rs=-0.144). Children clinically "at risk" for internalizing problems had decreased alpha diversity (U=551, p=0.017). Internalizing behaviors correlated with valerate and isobutyrate (rs=-0.147; rs=-0.140, respectively). In addition, the somatic complaints subscale also correlated with acetate and butyrate (rs=-0.219; rs=-0.241, respectively). These findings were additionally present in children "at risk" for internalizing problems (U = 569, p=0.026; U=571, p=0.028) and somatic complaints (U=164, p=0.004; U=145, p=0.001).
Conclusions: These results provide novel insights into the relationship between internalizing behaviors and the gut microbiota in

preschool children. Furthermore, the relationship between somatic complaints and acetate and butyrate warrants future investigation into interventions that increase SCFA production.

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Can Probiotic Use Improve Sleep Patterns and Reduce Crying Episodes in Infants?

Sleep is important throughout an individual's lifetime but especially necessary in the first few years of life for cognitive and physical development. Probiotic administration significantly improves colicky crying and fussing in infants. This project aimed to investigate whether probiotic use could improve sleep patterns and crying in infant children.
Methods: Data was collected from the Pregnancy During Pandemic (PdP) cohort and compared infants who were given probiotic with those who had not. Infant (n = 310) sleep was assessed using Brief Inventory Sleep Questionnaire â€“ Revised (BISQ-R) at 3 months of age. Fussing or crying was measured as total number of crying episodes. Mothers self-reported the number of episodes of crying or fussing per week.
Results: There were no significant effects of probiotic supplementation on the number of episodes of crying or fussing, or on the total sleep time at 3 months.
Discussion: These results are part of a growing body of research wherein some studies report an improvement in both temperament and sleep quality as a result of probiotic use, and others do not. This study was limited by unequal distribution of participants across experimental groups, limiting the ability to determine an effect of probiotics, which future studies would correct. As the sample consisted of typically developing children, the benefits of probiotics seen in colicky infants does not seem to extend to this demographic. However, future studies might focus on probiotic strains targeting specific behavioural outcomes not related to fussing and crying.

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Investigating the Association Between Prenatal Stress and Neurodevelopment: The Contribution of the Gut Microbiota

Prenatal stress is associated with adverse neurodevelopmental outcomes in children. The child's gut microorganisms (e.g., gut microbiota) may mediate the relationship between prenatal stress and neurodevelopmental outcomes.
This study aims to investigate the relationship between (1) prenatal stress and Full-Scale Intelligence Quotient (FSIQ) and (2) features of the child's gut microbiota and FSIQ in children aged 3-4 years from the Alberta Pregnancy Outcomes Nutrition study.
Both objective and subjective measures of stress were used to operationalize prenatal stress during each trimester. Maternal salivary cortisol levels were used for the objective measures. For the subjective measures, a psychological distress score was generated using the average score of the Edinburgh Postnatal Depression Scale and the Anxiety scale of the Symptom Checklist-90-Revised. Child stool samples collected at 3-4 years of age were assessed for the gut microbiota using 16s rRNA sequencing and metabolomics. The Wechsler Preschool and Primary Scale of Intelligence-IV was used for the neurocognitive assessments.
There was a significant negative association between psychological distress in trimester 3 and FSIQ ($r = -.17$). However, the multivariate model was not significant when controlling for relevant covariates (e.g., socioeconomic status), $F(6,147) = 1.638$, $p = .141$. Finally, greater Shannon alpha diversity (i.e., different bacteria types) was associated with a lower score on the Verbal Comprehension Index ($r = -.14$) but not with FSIQ.
These findings suggest that the child's gut microbiota does not mediate the relationship between prenatal stress and FSIQ at 3-4 years of age. Although there is strong evidence connecting the brain and gut microbiota, the current findings do not link them.

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Opioid Related Healthcare Utilization Among Alberta Youth

Background: The morbidity and mortality associated with the opioid epidemic continues to exert a devastating economic and psychosocial burden. In response to the significant increase in opioid-related deaths over the past five years, Alberta officially declared an opioid crisis in 2016. More recently, Health Canada revealed that Canadians ages 15 to 24 years are the fastest growing population with opioid overdoses requiring hospital services. To date, opioid overdose research has primarily focused on adults ages 18 years or older and currently there are no studies examining the prevalence of opioid overdoses among Canadian adolescents and young adults (i.e., youth). Given that approximately 10% of individuals presenting to hospital with an opioid overdose die within one year, youth are a high-risk population that demand further evaluation and appropriate and timely intervention for opioid use and overdose.
Objectives/Methods: Our cross-sectional exploratory study explores the number, percentage, and characteristics of Alberta youth (ages 13 to 24) presenting to healthcare services across Alberta for opioid-related conditions over five years (April 2014 to March 2019). Data

was collected from the National Ambulatory Care Reporting System, Discharge Abstract Database, Emergency Medical Services, and Practitioner Claims databases.
Results: Our data demonstrates an increasing trend of opioid related healthcare utilization among Alberta youth, especially among younger age groups (ages 13 to 17).
Conclusions: Our research findings highlight a high-risk adolescent and young adult population in Alberta that has not yet been described and demonstrates an urgent need for further research and developmentally appropriate resources for this unique population.

Physiology and Pharmacology

Kylie Hornaday
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Mid-pregnancy maternal inflammatory cytokines are associated with adverse neonatal outcomes in preterm births, and with medically indicated preterm, but not spontaneous preterm births.

Background: Inflammatory cytokines are associated with adverse outcomes including preterm birth (PTB, <37 weeks), but which and at what time points, is unclear. We sought to investigate cytokine profiles in the second and third trimesters with respect to neonatal and pregnancy outcomes (preterm birth with spontaneous labour (sPTB) or medical indication (MI-PTB), with and without hypertension).
Methods: Plasmas and serums were collected at two time points (TP) 17-23 (TP1, plasma) and 28-32 (TP2, serum) weeks gestation as part of the All Our Families study. Cytokines were measured at TP1 and TP2 in n=140 women (n=58 sPTB, n=19 MI-PTB hypertensive, n=14 MI-PTB non-hypertensive, n=48 term) using a bead-based assay. One-way analysis of variance (ANOVA), Pearson's correlation and linear regression was performed.
Results: IL-10 levels at T2 were positively correlated with birthweight in sPTB ($p=0.0249$, $r=0.3080$). TNFa at T1 ($p=0.0351$, $r=0.6104$) positively correlated, while IL1B T2/T1 ratio negatively correlated with birthweight ($p=0.0157$, $r=-0.7336$), in MI-PTB without hypertension (gestational diabetes or fetal indication). The ratio of T2/T1 in G-CSF was higher in MI-PTB with and without hypertension ($p=0.001$). High T2/T1 ratio of G-CSF was associated with elevated odds of MI-PTB (OR 1.33 95% CI 1.04-1.69).
Conclusion: Inflammatory cytokines are associated with adverse neonatal outcomes in preterm, but not term births. Preterm birth following medical indication, but not sPTB, is weakly associated with elevated levels of G-CSF in maternal circulation. Further, the change in cytokine levels, rather than levels at a single time point, may be more indicative of PTB and adverse neonatal outcomes.

Psychiatry

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Genome-Wide Association Study of Obsessive-Compulsive Behaviors and Imaging Endophenotypes

Obsessive-compulsive (OC) behaviors (OCB), characterized by intrusive thoughts and repetitive intentional behaviors are common in youth [DSM-5, 2013]. They are the core features of obsessive-compulsive disorder (OCD) and are often associated in youth with tic and grooming disorders. In this project we will examine the genetic basis of OCB, as well as their association with neuroimaging endophenotypes (intermediate phenotype) in child psychiatric outpatients with a broad range of psychopathology.
The overall goal is to determine the relationship between brain activity and childhood OCB, and identify genetic variants associated with OC symptom severity and imaging endophenotypes. To assess OC symptom severity, we utilized a quantitative symptom measure: the Obsessive-Compulsive Scale of the Child Behavior Checklist Scale (CBCL-OCS) [Achenbach et al., 1983, Hudziak et al., 2004]. Magnetic resonance imaging measures will be considered for neuroimaging endophenotypes.

Although progress has been made in identifying genetic variants associated with OC traits, little of the genetic variance is explained and neurobiological consequences of those variants are poorly understood. This study will provide a better understanding of the pathogenesis of pediatric OCB which will inform the development of new prevention and treatment strategies.
Hypothesis: The effect of genetic variants on psychiatric score will be mediated by imaging endophenotypes.
Aim1: Perform quantitative genome-wide association study to identify genetic variants associated with OCB in a large sample of children. Aim2: Perform an analysis of the relationship between OCB genetic biomarkers and imaging endophenotypes and OCB.

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The Oxytocin Receptor Gene (OXTR) and Mental Health Disorders in Children and Youth: A Systematic Review

Genetic factors play an essential role in the etiology of mental-health disorders. The oxytocin-receptor-gene(OXTR) has recently been a focus of genetic studies on several child-onset disorders. The current study aims to systematically review the literature assessing the

association of OXTR and its polymorphisms with mental-health disorders and their symptoms in children and youth.
Systematic searches of the peer-reviewed literature were conducted in the following online databases: Scopus, Pubmed, Medline, Embase, Cochrane Central and PsychInfo, from January2000-August2021.
Forty-eight studies met the inclusion-criteria, including 16841 individuals. Three studies on the association of OXTR-SNPs with Attention-Deficit-Hyperactivity-Disorder(ADHD) found that rs13316193, rs53576 and rs237902 were associated with ADHD symptom-severity. One study reported the association of three OXTR-SNPs(rs1042778,rs2254298,rs53576) with an increased risk of chronic and more severe post-traumatic-stress-disorder(PTSD). One study found that the cumulative genetic risk of three OXTR-SNP(rs2254298,rs53576,rs1042778) was associated with more severe generalized-anxiety-disorder. One study found that OXTR-rs53576 was associated with alcohol-use-disorder. Five studies on the association of OXTR-SNPs with depression found that rs53576, rs237911 and rs2254298 were associated with increased depressive-symptoms. Twenty-five studies reported twenty-two OXTR-SNPs(rs35062132, rs2254298,rs4686302,rs2268493,rs1042778,rs53576,rs2301261,rs2268494,rs2228485,rs237902, rs7632287,rs2268491,rs2254298,rs237893,rs237894,rs237911,rs237901,rs810568,rs237887, rs13316193,rs237884) had no association or increased risk of autism-spectrum-disorder(ASD) diagnosis or symptom severity. Two studies reported that rs53576 was positively associated with pathology of borderline-personality-disorder. Seven studies on the association of OXTR-SNPs with conduct-disorder found that rs1042778, rs2268493 and rs53576 were associated with severity of the symptoms.
In conclusion, there is some evidence that common variants in the OXTR-gene may play a role in the pathology and symptom severity of mental-health disorders in children and youth. These findings have been most consistent for seven SNPs(rs13316193,rs53576,rs237902,rs1042778,rs2254298,rs237911 and rs2268493). Further studies are needed to replicate these preliminary associations in larger samples.

Min Jae Kim
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Gene by environment interaction study of major depressive disorder and peer victimization in a pediatric population

Childhood adversity such as peer victimization (i.e., bullying) is a common phenomenon, where the experience can consist of physical, verbal, indirect and cyber-related violence. Children who have experienced peer victimization have an increased susceptibility to various psychiatric disorders including major depressive disorder, and therefore it has been identified to be a risk factor for depression. However, the effect of peer victimization varies between individuals, and therefore further research is required to understand how genetic predisposition in conjunction with other environmental factors interacts with peer victimization to confer risk for depression. The objective of the study is to identify whether polygenic risk will be associated with the development of depression in conjunction with childhood peer victimization. Data from a longitudinal McMaster Teen Study have been obtained, where students were initially assessed in Grade 5 (n=875) and have been followed to age 22. Peer victimization data have been measured using the Indirect Aggression Scale Target Version and depression symptoms were measured using the Behavioral Assessment System for Children-2. We will use genome-wide single nucleotide polymorphism (SNP) data to identify the genetic variants associated with depression as a quantitative trait. History of childhood peer victimization will be included as a covariate to investigate gene-by environment interactions associated with depressive symptoms. Lastly, polygenic risk scores for depression from previously published data will be obtained to test whether they predict susceptibility to depression in children faced with childhood peer victimization.

Psychology

Chelsey Pastershank
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Investigating COVID-related Maternal Social Relationship Changes and Maternal and Child Distress

COVID-19 social distancing negatively affected close relationships and mental health. Within families, parental mental health may â€œspilloverâ€ to child mental health. Purpose: To test links between pandemic-related changes in maternal relationship quality and child depressive symptoms, as mediated by maternal anxiety. Methods: A sample of 194 mother-child dyads were recruited from the Alberta Pregnancy Outcomes and Nutrition cohort. Mothers reported pandemic-related changes in relationship quality (partner, child, partner-child, friends/family) and anxiety symptoms three months after the pandemic start. Children (8-11 yr) reported depressive symptoms five weeks later. Covariates were sociodemographics, number of children in the home, time between assessments, and pandemic-related change in household income. Separate mediation models (SPSS PROCESS) were run for each relationship assessed. Results: For each relationship, changes in quality were indirectly related to child depressive symptoms via maternal anxiety, bootstrapped CI's<-.025. Decreases in relationship quality were related to higher maternal anxiety, b's=-1.91 - -1.05, SE's=.464-.773, p's<.02; which in turn predicted higher child depressive symptoms, b's=.261-.285, SE's=.095-.643, p's<.014. Conclusions: Pandemic-related change in maternal relationship quality could indirectly affect child distress via maternal distress.

Won Kyu Jung
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Authors: Elisabeth Bailin Xie, James WonKyu Jung, Jasleen Kaur, Lianne Tomfohr-Madsen, Karen Benzies, Elizabeth Keys

Digital parenting interventions for fathers of infants from conception to 12 months of age: A systematic review

Background: Digital interventions help address barriers to traditional healthcare services. Father involvement plays critical roles in maternal and early child mental health. Although digital interventions are a promising avenue to facilitate father involvement during the postpartum period, most are oriented to maternal needs and do not address the unique needs of fathers. This systematic review describes digital interventions that are being developed and tested for new and expecting fathers. Methods: A systematic search across four databases identified a total of 1614 studies, of which 48 met inclusion criteria. Data from studies were extracted and themed using a narrative synthesis approach. Preliminary results: Most studies described interventions that were exclusively digital (73%) and mostly delivered by website. Most interventions described were designed to be delivered in the postpartum period (46%) or both pregnancy and the postpartum (43%). In all, 36% and 33% of interventions included fathers or couples, respectively. The most common outcomes of interest focused on acceptability and usability of the interventions (56%). Impact: New and expecting fathers frequently use digital technologies, which could be used to promote father involvement. This review indicates the growing interest, and need to test effectiveness, of digital interventions for fathers.

Jasleen Kaur
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Partners in the Pandemic: Exploring Prenatal Anxiety and Depression

Paternal perinatal anxiety and depression has been previously associated with poor developmental outcomes for children. Prior to the COVID-19 pandemic, the rates for paternal perinatal anxiety and depression were 10.7% and 8.4%, respectively; rates may have increased during the pandemic. In this study, we investigated symptoms of prenatal anxiety and depression among partners of pregnant individuals during COVID-19 and potential protective factors. From September 2020 to March 2021, partners of participants from the Pregnancy During the Pandemic cohort (N = 342) responded to self-report questionnaires assessing anxiety, depression, educational attainment, household income, general social support, partner social support, and physical activity. SPSS 26 was used for data analysis. Approximately one in four partners reported symptoms of clinically significant depression [25.7% (n = 88)] and/or anxiety [24.0% (n = 82)]. Hierarchical linear regression revealed that prenatal anxiety was significantly predicted by household income ($p = .026$) and partner social support ($p = .001$), with higher levels being protective. Prenatal depression was significantly predicted by household income ($p = .005$), general social support ($p = .012$), and partner social support ($p < .001$), with higher levels being protective. Compared to pre-pandemic samples, partners of pregnant individuals showed a two-and-a-half-fold increase in anxiety and a three-fold increase in depression. To protect child development from the impact of these findings, early intervention becomes increasingly important. Higher partner social support and household income were protective factors, and thus should be used to inform interventions.

Selena Fu
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Vesicular zinc modulates cell proliferation and survival in the developing hippocampus

In the brain, vesicular zinc, which refers to a subset of zinc that is sequestered into synaptic vesicles by zinc transporter 3 (ZnT3), has extensive effects in neuronal signaling and modulation. To date, vesicular zinc-focused research has mainly been directed to its role in the hippocampus, particularly its role in adult neurogenesis. However, whether vesicular zinc is involved in modulating neurogenesis during the early postnatal period has been less extensively studied. To provide insight into vesicular zinc's role in early developmental hippocampal neurogenesis, we used the ZnT3 knockout (KO) mouse model that lack vesicular zinc to evaluate cell proliferation and survival. Male and female ZnT3 KO and wildtype (WT) mice received bromodeoxyuridine (BrdU) injections at either postnatal day (P) 6, 14, or 28. Half of the pups from each group were killed 24 hours after the last injection to assess cell proliferation, as assessed by BrdU+ cells, and the other half were left to survive until P60 to assess cell survival. Our results show that male ZnT3 KO mice have impaired cell proliferation at P14, but the survival of these cells are sustained until P60, suggesting loss of vesicular zinc may impair normal cell proliferation and cell pruning at this age. At P28, we found sex-dependent differences whereby male mice, regardless of genotype, showed higher levels of cell proliferation. In conclusion, our findings offer novel insight into how vesicular zinc may modulate hippocampal neurogenesis during early postnatal development that may differ from its role in adult neurogenesis.

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Demographic and home media environment factors and bedtime screen use in 9-12-year-olds.

Background: Youth revealed 62% keep smartphones with them at bedtime, and 36% check their device during the night. Previous research has investigated the associations between bedtime screen habits and adolescent sleep and mental health, yet little is known

about who is at risk for bedtime screen use.
Objective: This study investigated demographic characteristics and home media environment factors associated with bedtime screen use in 9-12-year-olds.
Methods: Participants (n = 996) included child/mother dyads from the All Our Families cohort who completed two self-report surveys when children were 9-12 years old. Mothers reported on demographic characteristics (e.g., age, income, ethnicity/race, and gender) and their practices relating to their child's screen use (e.g., screen use rules and awareness). Both mothers and tweens self-reported overall screen use duration. Tweens self-reported the outcome variable, bedtime screen use.
Results: Correlational analyses and t tests were performed on demographic characteristics. Age, income, and ethnicity were significantly associated with higher levels of bedtime screen use. After controlling for these covariates, linear regressions revealed a significant relationship between maternal screen use rules, awareness of screen use, tween overall screen use duration, and bedtime screen use, respectively. Longitudinal results revealed that maternal rules of tween screen use and tween overall screen use durations were significantly associated with bedtime screen use, respectively.
Conclusion: Cross-sectional and longitudinal results suggest that along with demographic characteristics, the home media environment is associated with bedtime screen use in tweens; this knowledge can help provide information to youth at risk for bedtime screen use.

Dr. Samantha Noyek
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Pain assessment in studies of youth with brain-based developmental disabilities: A systematic review and future directions

Pain experiences of youth with brain-based developmental disabilities are more likely to be overlooked and/or misinterpreted. Ample measures exist to assess acute and chronic pain, yet their utility and frequency of use in youth with brain-based developmental disabilities is unclear, and the measures available are not validated for all diagnostic groups. This systematic review identifies and maps the scope of self and observer-reported pain assessment measures of youth with brain-based developmental disabilities. A comprehensive search was conducted through: CINAHL, Medline, Web of Science, CENTRAL, PsycINFO, and EMBASE. Eligible studies were English peer-reviewed articles assessing pain in youth (ages 3-24) with any brain-based developmental disability. This review is registered on PROSPERO (CRD42021237444). 9,117 non-duplicate records were screened; 644 articles met inclusion criteria. Most prevalent patient populations included cerebral palsy (n=307;47.6%), intellectual disability (n=64;9.9%), Autism Spectrum Disorders (n=57,8.8%), and ADHD (n=25;3.9%). Studies included youth in early childhood (n=251;39%), middle childhood (n=406;63%), early adolescence (n=404;62.7%), and young adulthood (n=148;23%). Studies assessed chronic pain (n=217;33.7%), acute pain (n=145;22.5%), or both (n=141;21.9%). Observer-report was more often applied (n=158;24.5%) than self-report (n=67;10.4%). Eighteen self-report measures and 30 observer-report measures were used. Most studies were quantitative (n=411;63.8%). Pain outcomes included prevalence (n=269;41.8%) and/or pain intensity (n=304;47.2%). This review adds to existing pain assessment knowledge by capturing a broader range of youth with brain-based developmental disabilities. Future research will develop recommendations for pain assessment in practice; and explore the holistic understanding of pain experiences for this group of youth in the context of their daily life.

Catherine Lowe
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Pregnancy-Specific Anxiety, Epigenetic Age, and Offspring ADHD Symptoms

Background: Attention-deficit/hyperactivity disorder (ADHD), a neurodevelopmental condition that affects up to 10% of children, is characterized by inattention, impulsivity, and hyperactivity. Maternal distress affects 10-25% of pregnant women and is related to worse executive function (EF) and attention in children. Pregnancy-specific anxiety (PSA) is also associated with poorer EF. The fetal programming hypothesis posits that in utero experiences get â€œunder the skinâ€ to affect genetic expression by fine-tuning offspring phenotype to anticipate the postnatal environment. The current understanding of how PSA programs the fetal phenotype and subsequently increases the risk for poor EF, attention, and ADHD is unknown. One pathway may be through changes in offspring DNA methylation (DNAm). Evidence indicates that maternal anxiety predicts infant epigenetic biological age acceleration through DNAm, but whether this is associated with child attention or EF, or if PSA predicts epigenetic age is unknown.
Objective: To examine associations between maternal PSA, infant epigenetic age, and child attention and EF.
Methods: Pregnant women in APrON reported PSA two times during pregnancy. Blood samples collected from infants at 3-months of age were profiled for DNAm using the Infinium HumanMethylation450 (450k) BeadChip. Children were followed at 5- and 8-years and reports of attention and EF were obtained.
Analysis Plan: Mediation regression analysis will be used to test all hypotheses.
Outcomes: Maternal distress, such as PSA, threatens offspring EF and attention, which could lead to ADHD. Identifying relationships between PSA and offspring DNAm patterns that predict long-term EF and attention deficits has implications for prevention and intervention.

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Pregnancy-Specific Anxiety, Cortisol Awakening Response Variability and Gestational Length

Background: Pregnancy-specific anxiety (PSA) is associated with risk for shorter gestation. Hypothalamic-pituitary-adrenal (HPA) axis indices, such as the cortisol awakening response (CAR), could link PSA with shorter gestation. In non-pregnant adults, cortisol index variability is linked with adverse outcomes; this has not been explored in pregnancy. The objective of this study is to explore associations between PSA, CAR variability and gestational length in pregnant women. It is hypothesized that there is an association between PSA and gestational length, as mediated by cortisol index variability. Methods: A sample of 149 women from the Healthy Babies Before Birth study reported PSA in early pregnancy. Saliva samples were taken at three pregnancy intervals for two days at awakening and 30 minutes later. To calculate CAR, 30-min values were subtracted from wake-values and averaged across two assessment days. CAR variability was quantified using standard deviations of pregnancy assessments. Gestational length was derived from medical charts. Covariates were mean CAR, sociodemographics, parity and obstetric risk. Mediation models were tested using SPSS PROCESS. Results: There was a significant indirect effect of PSA on gestational length via CAR variability, b(SE)=-.083(.051), .95CI [-.197,-.003]. Higher PSA predicted lower CAR variability, b(SE)=-.018(.008), p=.034, and lower CAR variability predicted shorter gestation, b(SE)=4.67(2.57), p=.07. Conclusion: Cortisol index variability, demonstrated through CAR variability, does mediate the association between higher PSA and shorter gestational length. PSA could dysregulate HPA axis activity, as indicated by lower CAR variability, increasing risk for poor pregnancy outcomes.

Radiology

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Changes in neurochemistry across the migraine cycle in children and adolescents

Migraine is one of the five most prevalent childhood diseases, leading to disability at home, in school, and in social relationships. This disorder follows a cyclical pattern which may be linked to changes in the brain's neurochemistry due to an excitation-inhibition imbalance. The brain chemicals responsible for excitation and inhibition are glutamate and gamma-aminobutyric acid (GABA), respectively. To date, few studies have measured glutamate and GABA in adults with migraine, and only one has done so in a pediatric sample with migraine. This study reported that lower GABA levels were associated with less time until the next attack. Moreover, children and adolescents with migraine demonstrated different neurochemical changes than adults with migraine. These findings highlight the importance of exploring the underlying biology specific to the migraine cycle in children and adolescents.
My study will determine how glutamate and GABA change across the migraine cycle in a pediatric population. Using magnetic resonance spectroscopy (MRS), glutamate and GABA concentrations in the brain will be measured. Children and adolescents with migraine will be scanned four times over â‰¤2 weeks and will complete concurrent headache diaries. It is hypothesized that as a migraine attack approaches, glutamate will increase, while GABA will decrease. During and after an attack, it is expected that glutamate will decrease and GABA will increase as levels return to baseline. The information from this project will provide knowledge about migraine that can then be used to identify potential treatment targets focused on the unique biology of migraine in children and adolescents.

Kirk Graff
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Evaluating trade-offs in censoring and scan length in early childhood fMRI

Introduction: Head motion continues to challenge fMRI studies in brain development. One strategy to mitigate motion damage is temporal censoring, where motion-contaminated volumes are removed from the time series. Naturally, this reduces the number of time points available; however, other evidence shows that longer scans improve data reliability. The present study thus considered trade-offs between scan length and censoring threshold.
Methods: fMRI data were collected from 72 children aged 4-7, at baseline and 12-month follow-up. This is a high motion sample that may be particularly impacted by censoring decisions. Data reliability was assessed as the correlation between connectome values from baseline and follow-up scans in each participant. Each scan was truncated to progressively longer lengths, originally only keeping the first two minutes of the scan, then the first four minutes, and so on, in increments of two minutes. At each scan length, we tested reliability with progressively stricter censoring thresholds, from 0.90 mm to 0.15 mm of motion. We then determined the threshold that maximized average reliability.
Results: The optimal threshold dropped from 0.6 mm at two minutes, to 0.3 mm at eight minutes, and to 0.22 mm at 10 minutes or longer. As scan length increased, the effect on reliability of optimal censoring compared to no censoring increased from a negligible to

a medium effect size.
On the other hand, we found an asymptotic benefit of increasing scan length, but up to 18 minutes, the reliability improvement of a longer scan was larger than the improvement with optimal censoring.

Claire Donnici
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Links between prenatal depressive symptoms, infant brain network structure and infant sleep.

Prenatal depressive symptoms have been associated with negative outcomes for developing infants including behavioural difficulties, sleep problems, and altered brain development. In the first 10 months of the COVID-19 pandemic, the pooled prevalence of prenatal depressive symptoms was 31%, which is substantially elevated compared to pre-pandemic prevalences of 10-20%. The objective of this work was to study relationships between prenatal depressive symptoms during the pandemic, infant sleep, and the structural organization of two infant brain networks involved in emotion regulation. Pregnant mothers and their infant children (n = 66; 25 females; 3 months old) were recruited from the Pregnancy during the Pandemic study. Depressive symptoms were measured during pregnancy and 3 months postpartum. Infants underwent diffusion magnetic resonance imaging and infant sleep information was collected. Local and global network structure of the limbic and default mode networks (DMN) were calculated using graph theory. Infant sleep was tested as a moderator and evaluated in relation to brain network properties. There was a negative relationship between measures of local DMN connections in infants and prenatal maternal depressive symptoms. Infant sleep duration was positively related to DMN global efficiency and moderated the relationship between prenatal depressive symptoms and local limbic connections, such that infants exposed to more symptoms that slept more hours had more local connectivity. Lower density of connections within this network have been related to depression in previous research, suggesting that alterations in network structure may have consequences for mental health later in development; however, infant sleep may be protective.

Kathryn Manning
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Prenatal maternal distress during the COVID-19 pandemic and the infant brain

BACKGROUND AND AIM: The pandemic has elevated anxiety and depression symptoms in pregnant individuals. This could impact infant brain development with potential long-term effects on child mental health. Here, we aimed to understand the association between prenatal distress and the infant brain at 3-months of age, including the potential protective role of social support.
METHODS: Patient Reported Outcomes Measurement Information System, Edinburgh Depression Scale and Social Support Effectiveness Questionnaire measures were collected from a population-based sample through the Pregnancy during the COVID-19 Pandemic Study. In a sub-sample of participants, we acquired MRI data from their infants during natural sleep. We examined the association between prenatal maternal distress and functional and diffusion (fractional anisotropy (FA), mean diffusivity (MD)) measures.
RESULTS: 58 participants (38M/20F, 92+/-14 days old) were included and we observed a significant relationship between prenatal maternal distress and FA in the uncinate fasciculus, and MD in the amygdala-prefrontal white matter tract. Prenatal maternal distress was significantly related to amygdala-orbitofrontal and amygdala-inferior frontal gyrus functional connectivity. Importantly, this involved an interaction with social support, where only pregnant individuals who reported lower quality social support had a negative correlation between prenatal distress and functional connectivity.
CONCLUSIONS: In this study we found a relationship between prenatal maternal distress and infant brain structural and functional architecture. We observed that social support may moderate the influence of prenatal distress and infant brain development. These findings provide timely evidence to inform clinical policy surrounding the care of families and children born during the pandemic.

Mohammad Ghasoub
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The Brain's Structural Connectome Correlates of Pre-reading Abilities in Pre-school Aged Children.

Background: Pre-reading abilities such as phonological awareness (i.e., recognizing and manipulating sound units of words) and naming speed (i.e., rapidly identifying objects) are strong indicators of future reading skills. Prior studies examining the association between structural neural connectivity and pre-reading/reading abilities have mainly focused on older children. Little research has been done with pre-school aged children, despite this being a critical learning period. Studying the brain's structural connectivity from an early age can provide insight into the roots of reading abilities in the developing brain.
Methods: 64 children aged 2-4 years (35 males/29 females) participated in the study. All participants were born full-term and spoke English as their primary language. Pre-reading skills were assessed using the Phonological Processing and Speeded Naming subtests from the NEPSY-II. Participants underwent diffusion tensor MRI to assess white matter connectivity. 16 brain regions associated with primary and secondary language networks were extracted, and the structural connections between them were assessed using graph

theory, a mathematical technique to study brain networks. Measures of network connectivity at the local (i.e., between neighboring regions) and global (i.e., between all network regions) levels were calculated.
Results: Global network efficiency, as well as average nodal degree (I.e., number of directly connected regions), were significantly positively associated with Phonological Processing scores. No significant relationships with Speeded naming scores were observed.
Conclusions: Our findings complement previous studies done with older children and suggest that phonological awareness is linked to integrative processing of information at the global level of reading networks.

School of Public Policy

Ash Seth
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Policy Considerations for Infants, Toddlers and Pre-schoolers during COVID-19

The COVID-19 had profound impacts on the health and well-being of young children and their families. There were already mental health concerns for the children before the pandemic. COVID-19 and resulting service disruptions exacerbated existing mental health disparities. This study determined experiences of Canadian families with children under six-years to understand the pandemic's impact. A mixed-methods approach was used to analyze data collected through an online survey including quantitative and open-ended questions. It asked families about their experiences accessing services during COVID-19's first wave.
This study describes the results of a secondary analysis performed on open-ended questions. The data was transcribed verbatim and analyzed by the lead researcher. The analysis included code generation and validation resulting in key themes. Rigor was established by evaluating the themes and findings by the principal investigator and co-investigators. 1186 participants completed the survey. Participants varied according to various demographic factors. Qualitative analysis led to following findings. * Access to Services: Participants reported challenges in accessing services, like childcare and early intervention for their children. * Families' Well-being: Work from home, increased caregiving and limited supports adversely impacted parents' and families' well-being * New Mother's Health: New mothers experienced negative impacts on postpartum care and respite due to service disruptions * Virtual Access: Participants reported longer wait times for seeking virtual healthcare services. Findings will be used to design policy recommendations that integrate the unique needs of the families and children during COVID-19 and post-recovery. The recommendations are based on population-specific approaches and developed for different levels of decision-makers.

Kalpana Thapa Bajgain
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Engaging youth in mental health research: A systematic review

Background and objectives: Youth engagement (YE) in paediatric mental health (MH) research has the potential to enhance the quality of research and benefit for the patient. However, there is limited evidence to guide MH researchers on YE approaches that foster a positive engagement experience for patients and optimize YE impact. This systematic review aims to describe YE in MH research and it's impacts on research and youth and academic researchers.
Approach: We searched the following databases: MEDLINE, EMBASE, and PsycINFO, using a combination of subject headings, keywords, and synonyms for the concepts "patient engagement", "youth" and "mental health". Articles that describe engaging youth within a MH research process were included. Two reviewers performed study selection and quality appraisal. We extracted study characteristics, stage(s) of research where patients were involved, strategies used to engage patients, impacts of PE and barriers/facilitators to PE. Quality appraisal will be according to the four guiding principles in the CIHR Patient Engagement Framework.
Results: The review is in progress. The database search returned 2836 citations, 151 full text articles were screened and 16 were selected for inclusion. If sufficient data is available, we hope to examine the relationships between YE approaches and the impacts of YE.
Conclusions: This study will provide an understanding of the different approaches to YE in mental health research and their impact on research. Researchers may use these findings to inform their YE approaches in MH research.

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EXPLORING THE MENTAL HEALTH BENEFITS OF PARTICIPATING IN SPECIAL OLYMPICS: PRELIMINARY RESULTS

Objectives: Anxiety and depression are common among youth and adults with neurodevelopmental disabilities (NDD) and, if left untreated, can lead to crises and economic burden on the healthcare system1,2. However, effective and accessible mental health interventions for individuals with NDD are limited.

Special Olympics (SO) Canada reaches over 49,600 athletes with NDD and promotes and supports the physical and mental health of participants through sport. Despite limited research in this area, there is some evidence that athletes benefit from positive changes in self-perception and emotions and reductions in maladaptive behaviour3. However, factors that contribute to the mental health benefits of SO participation remain largely unknown. As such, this study is essential to identify the individual and contextual factors that contribute to the mental health benefits of SO participation.
Method: Special Olympics athletes, coaches, and caregivers participated in one-on-one semi-structured interviews and completed an online survey. Thematic analysis of the interview transcripts was completed to elucidate factors.
Results: Preliminary analyses show that both internal (e.g., skill development, sense of belonging) and external factors (e.g., skill transfer, community engagement) contribute to the mental health benefits associated with SO participation, as perceived by SO athletes.
Discussion: Findings will provide valuable insight into how sport participation for youth and adults with NDD can impact both physical and mental health. Information gained from this project will be used to guide SO sport development and programming and, in turn, continue to promote sport participation among individuals with NDD and enhance the mental health of SO athletes.

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Describing The Experience of Suicidal Thoughts and Behaviours in Autistic Youth

Background: Suicidal thoughts and behaviours (STBs) are exceptionally common in autistic youth, with suicidal thoughts being about 3-5 times higher than in non-autistic youth. Existing research has focused on prevalence, with comparably little research into the lived experience of STBs in autistic youth and their families.
Objectives: Although it is well established that STBs are common among autistic youth, the unique characteristics of STBs in this population is largely unknown. These knowledge gaps are significant barriers for effective risk assessment and prevention. This project aimed: 1) describe past and present experiences of STBs in autistic youth, and 2) describe caregiver experiences of providing care and obtaining support for the family.
Methods: Seven semi-structured exploratory interviews were conducted between February and August 2021 with caregivers of autistic youth (12-20 years of age, M = 15.4 years) who experienced STBs. Purposive sampling was used to recruit caregivers through social media advertisements and autism-specific community agencies. Themes were generated using Interpretative Phenomenological Analysis.
Results: Four core themes emerged each with related subthemes. Core themes reflected that: (1) reasons for wanting to die are diverse and varied among autistic youth, (2) youth benefit from external support to manage suicidal thoughts (e.g., caregiver intervention to distract, electronics) (3) caregivers experience hesitation around emergency services where they are concerned emergency medical care might escalate their youth further or not offer added support, (4) available support lacked accessibility and was incomplete.
Conclusions: Caregivers offered rich insight and attributed a wide range of reasons for their autistic youths wish to die, suggesting that a highly individualized approach to assessment and intervention is required. Further investigation of how mental health crisis intervention and prevention strategies can be tailored to meet the needs of autistic youth and their caregivers is needed.

Non-presenting Trainee Abstracts Submitted

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Bridging the Gap: Exploring the Role of Cortisol in the Effects of Prenatal Depression on Child Neurocognition

Background: Many people consider pregnancy to be a time of joy and excitement. However, for individuals with prenatal depression, pregnancy can be accompanied by hopelessness and overwhelm. As prenatal depression can adversely affect child health outcomes, it is paramount that we uncover its mechanism of action. Here, we investigate the role of cortisol, a commonly speculated mechanism, in the prenatal depression-child neurocognition relationship.
Methods: Via the Alberta Pregnancy Outcomes and Nutrition study, data was collected from 52 mother-child dyads, including prenatal depression symptoms, prenatal diurnal cortisol, child executive function (4y), and child cortical thickness (MRI) measures (3-7y). All data has been collected and processed. Analyses are ongoing. We will use multiple regression mediation analysis to determine if cortisol mediates the association between prenatal depression and child executive function or cortical thickness.
Results: In preliminary analyses, second-trimester prenatal depression was associated with poorer performance on the Dimensional Change Card Sorting Task (DCCS) (R2=[0.09],F=[5.25], p<.03) â€“ a measure of mental flexibility, and on the NEuroPSYchological Assessment II Statue Subtest (R2=[0.08], F=[4.92], p<.03) â€“ a measure of inhibitory control. Early pregnancy prenatal depression symptoms were also associated with worse DCCS outcomes (R2=[0.08], F=[5.08], p<.03).

Discussion: Preliminary results suggest that prenatal depression is associated with executive function outcomes, which is promising for future analyses. Next steps involve examining the role of cortisol in explaining associations between prenatal depression and childrenâ€™s brain and cognitive outcomes, thus filling an important gap in the literature. Understanding the mechanism of prenatal depression emphasizes the importance of prenatal mental health intervention.

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Mental Health Challenges During COVID-19: Perspectives from Parents with Children with Neurodevelopmental Disorders

Background: The global pandemic and subsequent denials, delays, and disruptions in essential daily activities created significant challenges for children and youth with neurodevelopmental disorders (NDDs) and their parents. Children and youth with NDDs require basic structures, services and supports to ensure their participation in everyday life. This was particularly challenging when public health restrictions during the COVID-19 pandemic limited access to supports and services required by children with NDDs to maintain their health and well-being. Objective: This study sought to understand the impacts of these public health measures and restrictions on mental health from the perspective of parents with children with NDDs. These insights will inform pathways for public health policies that are responsive to the needs of this population. Method: Interpretive descriptive design was used to guide data collection and data analysis. Forty caregivers from across Canada were interviewed about their experience with pandemic restrictions. Findings: Four themes emerged: 1) lack of social networks and activities, 2) lack of access to health and social supports, 3) tension in the family unit, and 4) impact on mental health for children and their parents. Generic policy measures contributed to many gaps in families' social support systems and contributed to new or worsening mental health challenges for children and their parents. Recommendations: Emergency preparedness planning requires a disability inclusive approach allocating resources for family supports in the home and community. Families also identified disability inclusive supports to minimize further pandemic disruptions and enhance recovery.

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Wandering mind, How do you spend your time? The association between mind-wandering and executive function in 8- to 12-year-olds

Mind-wandering often refers to the shifting of attention from a current task to thoughts unrelated to the task. According to the executive failure theory of mind-wandering, mind-wandering reflects a failure of the executive function system. Executive function is commonly conceptualized as three core facets: working memory, inhibition, and task switching. Most prior studies examined the link between mind-wandering and executive function in adults. Thus, given that executive function skills develop throughout childhood, we studied whether executive function skills are linked to mind-wandering frequency in children. To address this aim, 8- to 12-year-olds (n = 98) completed three tasks targeting three core facets of executive function. During each task, they were prompted to report their attention state as on-task or mind-wandering. Analyses indicated that only task switching, and mind-wandering frequency are negatively related, whereas mind-wandering did not correlate with inhibition, or working memory. These results suggest that not all executive function facets are equally linked to mind-wandering frequency in children, proposing a more nuanced relation than expected. Overall, the relation between children's mind-wandering and executive function is a new field that requires further investigation for regulating mind-wandering in children.

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Canadian Health Psychology contribution to Child & Youth Research

Summary: Health psychology is a fast growing but under-characterized field in Canada. We conducted a thematic analysis of faculty profile research descriptions to characterize the expertise of Canadian university affiliated researchers in health psychology and their contributions to Child & Youth research.
Methods: University-affiliated health psychology researchers were identified through an environmental scan of faculty profiles in health- and psychology-related departments at Canadian universities. Inclusion criteria were: affiliation with a Canadian university, psychology-related background, and a research program involving the interplay of physical health with psychosocial factors.
Results: A total of 285 faculty were identified. Approximately 5% of journal article keywords were related to child and youth-specific topics, which is more than other key topic areas such as cancer, sleep and pain research (~2% each). Specific topics included child, youth, pregnancy/postpartum, and family.
Conclusion: Canadian health psychology research addresses critical topics around children and youth. Identified areas of research expertise present future research opportunities.

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Impacts of COVID-19 On Family Violence: A Rapid Review

Background: After the World Health Organization declared COVID-19 a pandemic, public health restrictions were introduced to slow COVID-19 transmission and prevent health systems overload globally. Restrictions included work-from-home requirements, online schooling, and social isolation measures that may have exposed parents and children to family violence, including intimate partner violence and child abuse and neglect. Therefore, as a consequence of COVID-19, we sought to: (1) examine the occurrence of family violence; (2) identify factors associated with family violence; and (3) identify relevant recommendations.
Methods: This review was registered on PROSPERO (CRD42021241622), employed rapid review methods, and extracted data from peer-reviewed publications between 2019 and 2021 in MEDLINE, PsycINFO, CINAHL, and Embase.
Findings: While studies of community households revealed a sharp rise of family violence incidence, justice, police, and emergency department records noted an overall decline during the pandemic. Parental stress, burnout, mental distress (i.e. depression), difficulty managing COVID-19 measures, social isolation, and financial and occupational losses were related to increases in family violence. Health services should adopt approaches to prevent family violence, treat victims in the context of public health restrictions, and increase training for digital service usage by health and educational professionals.
Interpretation: Globally, restrictions aimed to limit the spread of COVID-19 increased the risk factors and incidence of family violence in communities. Official records of family violence may be biased toward under-reporting in the context of pandemics and should be interpreted with caution.
Funding: RESOLVE Alberta, Canada and the Emerging Leaders in the Americas Program (ELAP), Global Affairs Canada.

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A systematic review and meta-analysis of DNA methylation sites associated with Autism Spectrum Disorder.

Autism spectrum disorder (ASD) is a prevalent neurodevelopmental disorder affecting 1% of Canadian children. Clinical symptoms for ASD range from mild to severe. The underlying mechanisms that have been associated with ASD appear to be both genetic and environmental. Epigenetics is the study of how the environment can change gene expression. It refers to various types of DNA changes, with DNA methylation (DNAm) being the most studied epigenetic modification in humans. Evidence suggests that changes in DNAm could play a significant role in the development of ASD. Therefore, identifying DNAm changes linked to ASD could contribute to our understanding of the alterations in gene expression predisposing individuals to ASD. As ASD is a heterogeneous disorder, no single epigenetic change will likely be responsible for all ASD presentations; however, the magnitude of association of a specific change in DNAm with ASD could help to identify key biomarkers that may assist in identifying specific mechanisms that underlie ASD. As of yet, no systematic review and meta-analysis has been carried out that includes data from studies that have investigated DNAm changes in individuals with ASD or in animal models. The proposed project will undertake a systematic review and meta-analysis to investigate the DNAm changes that have been associated with ASD. This study will assist in determining if alterations in DNAm are associated with ASD and could assist in clarifying if specific genes or gene pathways are associated with ASD. Such information could help in guiding the development of biomedical interventions for this disorder.

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Understanding The Mechanisms That Control The Specification Of Neuronal Subtype Identity

The cerebral cortex is one of the most important parts of the mammalian brain, responsible for higher cognitive. The proper function of

the cortex relies on the presence of distinct subtypes of neuronal cells that form complex circuits. Perturbations in the generation and function of neuronal subtypes can lead to neurodevelopmental disorders such as autism spectrum disorders. However, our understanding of how different neuronal subtypes are differentially regulated remains limited. Here, we show that an RNA binding protein called Rbms1 is robustly expressed in only a specific group of neurons in the developing mouse cortex. Furthermore, in this subtype of neurons, we find that Rbms1 can directly bind the mRNA encoded by a gene called Csde1 whose genetic mutations and abnormal expression have been linked to autism spectrum disorders. Interestingly, ectopic induction of Rbms1 alters Csde1 expression by shifting the translational status of Csde1 mRNA. Our findings indicate that Rbms1 plays an important role in regulating gene expression in a neuronal subtype-specific manner and provides a potential link to understand the gene regulatory mechanisms underlying autism spectrum disorders.

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Shared Mental Models to Facilitate Inter-professional Collaboration

Growing complexity of social needs, aligned with pressures for efficient and effective public services, has been met with calls for cross-sectoral, integrated approaches to societal problems (Henderson et al., 2020; Careau et al., 2018). Much is known about the essential ingredients, facilitators, and barriers to integrated service delivery. Despite all that is known, such approaches often fail. Simply put, integrated care is difficult to implement, operate and sustain.

Organizational capabilities are widely recognized as influencing success or failure of integrated initiatives but there is a significant lack of specificity about when and how these factors matter (Evans et al., 2016; Li et al., 2018; Seaton et al., 2018). Recent evidence has confirmed a positive relationship between shared mental models and team/organizational performance (Evans & Baker, 2012). Mental models are an individual's deeply held beliefs about the environment. They facilitate an individual's ability to â€˜make sense' of their environment by providing a frame to interpret and ascribe meaning to events (Senge, 1990). Applied at an organizational level shared mental models can be used to explain and understand dynamics. Shared mental models allow individuals to behave in ways that are consistent and coordinated with each other in the completion interdependent tasks (Evans et al., 2014).

What is not known, is how/if the concept of shared mental models specifically facilitates integrated or inter-professional service delivery.