



Seventh Annual Dr. Benjamin Goldberg Developmental Disabilities Research Day

Program and Abstracts

https://zoom.us/webinar/register/WN_2PJ3jJD2SXG8da2DRxkO1A

1pm – 4:30pm

Presentation Schedule

1:00pm Welcome.
Dr. Rob Nicolson and Dr. Julio Martinez-Trujillo.

Presentations

1:05pm **Keynote Presentation.**
Professor David Wright.

2:05pm Break.

2:10pm **Inclusion of Children with Intellectual and Developmental
Disabilities in Informal Education Settings.**
*Julia Ranieri & Nicole Neil.

2:25pm **Modeling from Single Cell Electrophysiology to Neuronal
Network Interactions in Human Stem Cell Derived Rett
Syndrome.**
*Kartik Pradeepan, Gabriel Benigno, Wenbo Zhang, Rebecca
Mok, Mike Salter, James Ellis, Julio Martinez-Trujillo, & Lyle
Muller.

2:40pm **Using the Phenomenology of Self-Injurious Behaviour in
Neurodevelopmentally Disabled Individuals to Guide
Treatment.**
Ashan Veerakumar.

2:55pm **Influence of Language Skills and Family Environment on
Theory of Mind Ability in Neurodevelopmental Disorders.**
*Kara Hannah, Ken McRae, Evdokia Anagnostou, Robert
Nicolson, Elizabeth Kelley, Stelios Georgiades, Jennifer Crosbie,
Russell Schachar, Muhammad Ayub, & Ryan A. Stevenson.

- 3:10pm **Gene-Environment Interactions Alter Postnatal Vocal Communication and Juvenile Play Behavior in a Rat Model for Autism**
*Dorit Moehrle, Ella Doornaert, Pui Man Megan Yuen, Alice Zheng, Brian L. Allman, & Susanne Schmid.
- 3:25 Break.
- 3:30 **Teaching Behaviour Analysts' Statistical Approaches to Analyse Extended Clinical Data**
*Nazurah Khokhar, Marie-Chanel Morgan, & Alison Cox.
- 3:45 **Joint Attention in 4 and 6-month-old Infants at High Familial Risk for Autism Spectrum Disorder: association with brain development**
*Julia Montenegro, Diane Seguin, & Emma Duerden.
- 4:00 **An Examination of the Concurrent Validity of the interRAITM Child and Youth Mental Health – Developmental Disability Instrument**
*Kim Arbeau, Dilini Kekulawala, Serena Atallah, Shannon L. Stewart, Jeff St. Pierre.
- 4:15 **Bridging the Gap: Building Collaborative Psychoeducational Assessment Practice**
*Sarah E. Prezeau & Donald H. Saklofske.
- 4:30 Final remarks and award presentation – Dr. Rob Nicolson and Dr. Julio Martinez-Trujillo.

Keynote Speaker

Prof. David Wright.



Above is a photo of Professor David Wright. He is a Caucasian male with brown hair. He is facing the camera, wearing a white dress shirt.

David Wright received his BA and MA in History from McGill University and his DPhil (in History) from the University of Oxford.

As a post-doctoral fellow at Oxford he specialized in the history of health and medicine before being appointed Wellcome Trust Lecturer in the History of Medicine at the University of Nottingham (1996-1999).

In 1999, David returned to Canada to become the Hannah Chair in the History of Medicine at McMaster University, a cross-appointment between the medical school and the History department.

During his eleven years at McMaster, Professor Wright was Chair of the International Society for the Social History of Medicine, Associate Dean (Vice-Dean) of the Faculty of Humanities, and Chair of McMaster's University Curriculum Committee.

For most of the past twenty years, he has researched and published on the history of mental disorders (with a particular expertise in the history of mental hospitals), resulting in several books and edited volumes.

He is currently a Professor of History and Canada Research Chair in the History of Health Policy at McGill University.

Professor Wright's 2011 book, *DOWNS: the history of a disability* (Oxford University Press), won the biennial Dingle Prize for best book in the history of science and medicine. He has also co-authored (with Sasha Mullally) *Foreign Practices: Immigrant Doctors and the History of Canadian Medicare* (McGill Queen's University Press, 2020). He was also recently elected Fellow of the Royal Society of Canada.

JUNE 2, 2022

Abstracts – Oral Presentations

Inclusion of Children with Intellectual and Developmental Disabilities in Informal Education Settings.

Julia Ranieri & Nicole Neil.

Objectives: Informal education settings include museums, camps, or aquariums, and can provide powerful learning opportunities for children. This series of studies explored facilitators and barriers toward inclusion and participation for children with intellectual and developmental disabilities (IDD) at informal education settings.

Methods: The first study was a scoping review examining practices for supporting participation at IES for children with neurodevelopmental disorders. Study characteristics, practices used to promote inclusion, and outcome measures were extracted from the literature. The second study was a qualitative descriptive study of the facilitators and barriers to inclusion for children with IDD at museums, aquariums, zoos, and science centers (MAZSC) across Canada. Ten participants, each from 10 different MAZSC across Canada, participated in semi-structured interviews examining the facilitators and barriers and staff training in support of inclusion for children with IDD and their families within their organizations.

Results: Thirty-two studies were included in the scoping review. Limited high-quality research on inclusion in informal education settings exists. Interviews with MAZSC staff members show staff members committed to engaging and supporting visiting children with IDD and their families as well opportunities and gaps in staff and volunteer training in support of children with IDD.

Conclusions: Overall, the findings of these studies suggest that, while progress has been made to improve opportunities for inclusion and participation for children with IDD, barriers continue to prevent participation and inclusion. Further work is needed to continue to reduce and eliminate barriers toward inclusion for children with IDD in informal education settings.

Funding: SSHRC Insight Development Grant and SSHRC Partnership Engage Grant

Modeling from Single Cell Electrophysiology to Neuronal Network Interactions in Human Stem Cell Derived Rett Syndrome

Kartik Pradeepan, Gabriel Benigno, Wenbo Zhang, Rebecca Mok, Mike Salter, James Ellis, Julio Martinez-Trujillo, & Lyle Muller.

Rett syndrome (RTT) is a rare neurodevelopmental disorder that is caused by a single heterozygous loss-of-function mutation in the gene methyl-CpG-binding protein 2 (MECP2) found on the X-chromosome – affecting almost exclusively females. Previous human cell work for RTT has shown that MECP2-mutant neurons exhibit decreased excitatory neuronal activity and synaptic connectivity. While these effects have been extensively studied at the level of single neurons, how these changes translate to network-level activity patterns remains unknown. Here we combine single-cell and population electrophysiological analysis, and computational modeling to understand the network-level mechanism of RTT. By developing a tightly constrained computational modeling framework, we find that an interplay between fast excitatory currents at the network level and slow adaptation currents at the single-neuron level can underlie changes in population spiking activity in hiPSC RTT networks.

hiPSC-derived networks exhibited bursting patterns that went from sparse firing to synchronous bursting across 6 weeks of development. RTT networks exhibited significantly slower frequencies of network bursts compared to isogenic controls. Using data from intracellular recordings in vitro, we developed a single-neuron model to capture the subthreshold membrane potential and spiking dynamics following standard current injection protocols. We next implemented our single neuron models into a spiking network model of the excitatory hiPSC populations. The spiking network model revealed that increased adaptation currents at the single-neuron level can explain the changes in network burst frequency at the network level. These preliminary computational results implicate channels, like BK and KCC2 channels that are involved in adaptation as downstream targets of MECP2.

Using the Phenomenology of Self-Injurious Behaviour in Neurodevelopmentally Disabled Individuals to Guide Treatment.

Ashan Veerakumar

Self-injurious behaviour has increased incidence in individuals with developmental disabilities, including autism, intellectual disabilities, and various chromosomal abnormalities. These behaviours can cause impairment in social functioning, school progression, and at worst lead to serious physical injuries or disabilities. Evidence from several well-controlled studies have established the role of applied behavioural analysis (ABA) in characterizing and reducing the burden of self-injurious behaviour, and randomized clinical trials for aggression in autism have established antipsychotic agents, notably risperidone, as first-line psychopharmacological interventions to utilize as an adjunct to ABA. Despite the undeniable progress in the study and treatment of self-injury in developmentally disabled individuals, a subset of individuals have persistent self-injury that seems resistant to standard treatments such as ABA and psychopharmacological agents. For these cases of treatment-resistant self-injury, “last-line” agents, with some controversy, have been proposed, including naltrexone and electroconvulsive therapy.

In the following presentation, developed following a search and synthesis of available literature, the phenomenology of self-injury in the neurodevelopmental disorders population will be presented from 4 perspectives (spatial distribution of self-injury, antecedents and consequences of self-injury, timing of self-injury, associated symptoms with self-injury). If successful, these 4 perspectives may provide guidance in choosing the appropriate intervention to decrease the burden of treatment-resistant self-injurious behaviour. Appropriate interventions could range from optimizing first-line interventions, optimizing treatment for a new or ongoing separate medical illness that may present with self-injury, or considering evidence-informed “last-resort” treatments. Among the “last-resort” interventions studied for self-injury in the neurodevelopmental disorders population, the presentation offers potential scenarios in which a trial naltrexone or electroconvulsive therapy could be considered.

Influence of Language Skills and Family Environment on Theory of Mind Ability in Neurodevelopmental Disorders.

Kara Hannah Ken McRae, Evdokia Anagnostou, Robert Nicolson, Elizabeth Kelley, Stelios Georgiades, Jennifer Crosbie, Russell Schachar, Muhammad Ayub, & Ryan Stevenson

Research suggests that autistic individuals exhibit differences in social communication skills, including theory of mind (the understanding of mental states), compared to typically-developing (TD) peers. However, differences in theory of mind are not exclusive to autism spectrum disorder (ASD), and have been seen in attention-deficit/hyperactivity disorder (ADHD) and obsessive-compulsive disorder (OCD). To understand theory of mind within and across disorders, it may be beneficial to look at the effects of the communicative context in which it is developed, such as language skills and family environment, in addition to symptom severity. The current study's objectives are to:

1. Assess the influence of language skills, family environment, and symptom severity on theory of mind ability.
2. Explore whether the above relationships are transdiagnostic or diagnosis-specific.

Methods

1761 youth (600 ASD; 668 ADHD; 235 OCD; 258 TD) from the POND Network completed the Reading the Mind in the Eyes Test. Family demographics (including household income, equal care from caregivers, and number of siblings) were collected. Language skills were also assessed (e.g., by the CELF-5, OWLS-II, or PLS-5). Symptom severity was evaluated using established measures of ASD, ADHD, and OCD traits.

Results and Conclusions

Preliminary results suggest higher language skills are predictive of higher theory of mind ability transdiagnostically. Additionally, compared to an upper-class income, having a low-middle class income predicted lower theory of mind ability. Other family variables, including equal care and number siblings, and symptom severity were not predictive of theory of mind across disorders. Further transdiagnostic and diagnosis-specific relationships will be investigated.

Gene-Environment Interactions Alter Postnatal Vocal Communication and Juvenile Play Behavior in a Rat Model for Autism.

Dorit Moehrlé, Ella Doornaert, Pui Man, Megan Yuen, Alice Zheng, Brian L. Allman, & Susanne Schmid.

Study Objectives: Deficits in social communication and language development belong to the earliest diagnostic criteria of autism spectrum disorders (ASDs). Of the many risk factors for ASD, the contactin-associated protein-like 2 gene, CNTNAP2, is known to be crucial for language and social skills. The present study aimed to investigate potential compounding effects of ASD risk gene mutation and environmental challenges, i.e. rearing conditions, on early vocal communication and reciprocal social behavior in the offspring.

Methods: Maternal isolation-induced ultrasonic vocalizations (USVs) from *Cntnap2* wildtype (WT) and KO rats at selected postnatal days were analyzed for their acoustic, temporal, and syntax characteristics. Social behavior was scored in juvenile play dyads including KO rats crossfostered from homozygously to heterozygously bred litters.

Results: *Cntnap2* KO pups from heterozygous breeding showed similar numbers and temporal structures of USVs compared to WT controls, whereas both parameters were affected in homozygously bred KOs. Homozygous breeding further exacerbated altered call pitch and transitioning between call types found in *Cntnap2* KO pups from heterozygous breedings. Certain agonistic play fighting behaviors were increased in juvenile *Cntnap2* KO pairs from both breeding backgrounds compared with WT controls.

Teaching Behaviour Analysts' Statistical Approaches to Analyse Extended Clinical Data.

Nazurah Khokar, Marie-Chanel Morgan, & Alison Cox.

Study Objectives: In behaviour analysis, researchers have begun to explore the efficacy of using video modeling to train behaviour analytic students and certified behaviour analysts (i.e., Board Certified Behaviour Analysts; BCBA) on graphing skills. However, evaluating the efficacy of using this strategy to teach more complex skill sets (e.g., statistics) is relatively understudied. Furthermore, with the arrival of COVID-19 most continuing education activities shifted to virtual delivery; increasing the need for research evaluating the efficacy of different teaching approaches delivered virtually (e.g., asynchronous versus synchronous). The proposed study explores the efficacy of a training package to teach BCBAs to conduct and interpret statistical methods that may be directly relevant in practice. The training package includes written instructions, a statistical analysis tool developed in the Shiny app, and a video model.

Method: We recruited several masters-level BCBAs as participants. The training group completed one dataset in the baseline condition (no-training), a second dataset in the training condition, and two datasets in the post-training condition. The delayed training group completed two datasets in the baseline condition (no-training) and one dataset in the training condition before proceeding to one post-training dataset.

Results and Conclusions: Our preliminary results suggest improved performance across all participants. We will discuss clinical implications of supporting behaviour analytic professionals in enhancing their analytic skillset, as well as next steps regarding approaches to training professionals to further address existing research gaps in the training literature.

Joint Attention in 4 and 6-month-old Infants at High Familial Risk for Autism Spectrum Disorder: Association with brain development.

Julia Montenegro, Diane Seguin, & Emma Duerden.

Joint Attention (JA) is the ability to follow the gaze of others, and it allows infants to share a common focus on other individuals or objects. Children diagnosed with Autism Spectrum Disorder (ASD) show impairments in JA. The ability to initiate JA (IJA) can be more impaired than the ability to respond to JA (RJA). In a longitudinal study, 101 high-risk infants for ASD (62% males) completed MRI scans at 4 or 6 months of age. Subcortical brain volumes were extracted. JA behaviours were assessed using standardized measures. The majority of infants were IJA non-responders (n=93, 92%), and over half were RJA non-responders (n=50, 52%). In the non-responder groups, models testing the association of subcortical volumes with later ASD diagnosis accounted for age, sex, and cerebral volumes. It was found that hippocampal and thalamic volumes predicted later ASD diagnosis. Findings suggest that these brain regions may present increased vulnerability early in life and the absence of IJA might be a key predictor of ASD development.

An Examination of the Concurrent Validity of the interRAI™ Child and Youth Mental Health-Developmental Disability Instrument.

Kim Arbeau, Dilni Kekulawala, Serena Atallah, Shannon L. Stewart, & Jeff St. Pierre.

Study Objectives

It has been reported that 39% of children with a developmental disability also have a mental health disorder. It is important that services treating children/youth with developmental disabilities provide the appropriate assessments and treatments for both mental health and developmental disability needs. The interRAI™ Child and Youth Mental Health – Developmental Disability (ChYMH-DD) instrument is a promising comprehensive measure of needs for both mental health and developmental disabilities for children/youth 4-20 years. This study investigates the concurrent validity of selected scales from this instrument.

Methods

The ChYMH-DD was completed on 24 children/youth at a tertiary service agency as standard of care. In addition to the ChYMH-DD families consented to completing the Vineland™-3 Domain-Level Assessment and either the Parent Stress Index, Fourth Edition (PSI-4) or the Stress Index for Parents of Adolescents (SIPPA).

Results

Results from correlational analyses indicated moderate to strong relations between the following interRAI scales and related constructs on the Vineland: Communication ($r=0.44$), Sleep ($r=0.39$), Internalizing ($r=0.65$), and Externalizing ($r=0.40$). The interRAI Depressive Severity Index was related to measures of child/youth mood on the PSI-4/SIPPA ($r=0.50$). The interRAI Activities of Daily Living scale was not related to the Daily Living Skills scale on the Vineland but results highlight where the scale may be improved.

Conclusion

The results demonstrate that the ChYMH-DD is a promising tool to understand the needs of children/youth with developmental disabilities. A limitation of the study is the small sample size. Further research with a larger sample size is needed to replicate these results.

Bridging the Gap: Building collaborative psychoeducational assessment practice.

Sarah E. Prezeau & Donald Saklofske

Objectives: The identification of learning challenges in children typically involves standardized evaluation with a psychologist. And while cognitive ability assessment is an informative part of the process, a major concern is that teacher and parent observations are not integrated into psychoeducational evaluation and intervention processes, leaving gaps in understanding. The purpose of this research was to identify specific, observable behaviours that conceptually aligned with primary five-factors of the WISC-V to develop home and classroom behavioural screening measures that can be used collectively to streamline the assessment process. **Methods:** Development of the measures involved both qualitative and quantitative approaches. Focus groups, panel reviews, and item rating surveys allowed items to be generated, appraised, and modified to develop the pilot measures. The final study collected WISC-V and screener data to assess conceptual alignment between measures and included a qualitative examination of parent experiences supporting complex learners during the COVID-19 pandemic. **Results:** Based on feedback data, the pilot Home and Classroom Cognitive Ability Screeners were developed. Preliminary evaluation demonstrates a relation between screener scores and corresponding WISC-V scales, and qualitative data showed a significant number of distinctive challenges supporting children with unique learning needs. **Conclusion:** Given the daily demands of psychologists and teachers to support diverse learners, it is imperative that research focuses on improving practices and enabling collaboration. These measures facilitate a more effective, informed assessment process by creating the opportunity for a common language for diagnosis, support, and progress monitoring. Study supported by funding from the C. Kingsley Allison Research Grant.

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Big Kahuna Burger

