2020-2021 Talent Development Successful Candidates Abstracts

Applicant Name: Amy Boyle
Supervisor Name: Dr. Neil Vasdev
Title: Development of positron emission tomography radiopharmaceuticals for Neuroimaging of glycogen synthase kinase-3
Amount Awarded: $65,000
Abstract:

Positron emission tomography (PET) is a medical imaging technique that visualizes biochemical processes in the living body, where radioactive molecules are injected, and the distribution of those molecules are measured on a PET camera. As the burden of neurological illnesses worldwide is high, new PET radiopharmaceuticals are needed to diagnose and monitor illness-related processes in the brain. The proposed research will develop tools designed to advance scientific understanding of the brain enzyme glycogen synthase kinase- 3 (GSK-3), an important player in Alzheimer's disease (AD) and depressive disorders. GSK-3 is involved in brain signaling pathways and is highly abundant in brain tissues. Elevated GSK-3 levels occur with AD, and inhibition of GSK-3 lowers levels of the tau protein, thus preventing subsequent events associated with AD. Despite ample progress in AD biomarker development, PET imaging agents for AD only show weak correlation with cognitive impairment so new approaches are needed. Two major obstacles for molecular imaging of GSK-3 in the central nervous system are the discovery of potent, highly selective GSK-3 inhibitors and achieving reasonable brain penetration. Through collaboration with Pfizer, my proposed supervisor developed the most advanced PET imaging agent targeting GSK-3, yet a novel radiotracer is needed with higher brain penetration and optimized kinetic profiles prior to human PET imaging studies. My proposed project will advance our understanding of GSK-3 by developing and evaluating a series of novel GSK-3 inhibitors radiolabeled with 11C or 18F through in vitro studies, in vivo PET imaging in rodent models, and for first-inhuman translation.

Applicant Name: Alexander Daros
Supervisor Name: Dr. Lena Quilty
Title: Using smartphone technology to examine emotion regulation as a treatment Mechanism in cognitive-behavioral therapy for outpatients with depression.
Amount Awarded: $65,000
Abstract:

People with depression often have difficulties implementing effective emotion regulation (ER) strategies to dampen negative emotions and increase positive ones. Although cognitive-behavioral therapy (CBT) is an effective treatment for depression, researchers have yet to examine whether ER skill acquisition serves as a mechanism of treatment outcomes, even though CBT involves teaching effective ER strategies to deal with emotional stressors. Symptoms of depression and ER strategy selection often fluctuate over time. Therefore, innovative methods that go beyond traditional paper-and-pencil measures are needed to fully understand how ER skill acquisition yields improved depression and quality of life during treatment. With smartphone technology, researchers can gather brief, repeated evaluations of these variables while participants go about their daily routines, overcoming many of the methodological shortcomings of retrospective research. Using intensive longitudinal assessment, this project seeks to examine the role of ER skill acquisition during CBT for depression by following 150 outpatients completing 14 weeks of treatment. CBT has three phases which may differentially impact ER skill acquisition: behavioral activation, cognitive restructuring, and relapse prevention. Therefore, the study will examine both daily-level changes in ER during CBT and real-time sampling during each CBT phase. Results will serve to increase our understanding of how ER skill acquisition is causally linked to treatment outcomes, and whether changes in specific strategies are linked to phases of CBT. The study will expand theoretical models of depression and CBT and may aid in the development of novel smartphone-based interventions for depression and other disorders that target ER skills.

Applicant Name: Nick Kerman
Supervisor Name: Dr. Sean Kidd
Title: Helping the Helpers: Examining the Mental Health and Support Needs of Direct Service Providers Working with People Experiencing Homelessness
Amount Awarded: $20,000

Abstract:

The health of service providers is instrumental to the delivery of high quality and effective health and social care. Healthy service providers are especially important in the homeless sector, as the homeless population commonly has negative service experiences, which can contribute to service disengagement and prolonged homelessness. However, direct service work is demanding and stressful, with frequent exposure to traumatic events. The rates of common mental health problems and support needs among the homeless sector workforce are also largely unknown. Accordingly, the aim of this study is to better understand the scope of common mental health problems (i.e., depression, anxiety, burnout, and trauma) among direct service providers in the homeless sector. This mixed-methods study will explore the mental health and support needs of providers who work with homeless populations in three service settings (emergency shelters, supportive housing, and harm reduction programs) in Canada. An online survey will be distributed to national and regional homelessness networks to collect data from 430 direct service providers on trauma symptoms; depression, stress, and anxiety symptoms; substance use; occupational satisfaction and burnout; perceived social support; modes of supervision; and mental health support needs. Data analysis will involve descriptive statistics and multiple regression models. In-depth interviews will be conducted with 15 organizational directors to achieve a richer understanding of service providers' support needs and organizational approaches to promoting positive mental health. The results will be used to inform the development of workplace interventions to promote positive mental health and well-being in the homeless sector.

Applicant Name: John Krzeczkowski
Supervisor Name: Dr. Brendan Andrade
Title: Behaviour parent training for the parents of children with emotional and behavioural disorders.
Amount Awarded: $65,000

Abstract:

Background: Emotional and behavioural disorders (EBD) affect 15% of children. While behavioural Parent Training (BPI) is the first-line treatment children with EBD, half of all dyads receiving BPI fail to improve. Since EBD and parental depression are highly comorbid, standard BPI may not meet the needs of these dyads. However, exclusive reliance on self-reports has significantly limited our ability to identify these dyads at risk for poor treatment outcomes. Greater behavioural and physiological synchrony between parents and their children are known to underly adaptive parent-child relations; however, no studies have examined if dyads at risk for poor treatment outcomes can be identified using objective assessments of synchrony. Identifying at-risk dyads using more sensitive, objective dyadic measures would be a critical step forward towards improving the efficacy of BPI for these vulnerable families. Objective: To determine whether parent-child dyads lead by a depressed parent vs. a non-depressed parent can be accurately differentiated using objective assessments of behaviour and neurophysiological synchrony. Methods: 50 parents and their 8-12-year-old children with EBD will be recruited from three treatment hospitals. Parental depression will be assessed via structured clinical interviews. Synchronous parent-child interactions will be assessed using the gold standard parent-child interaction task. Physiological synchrony will be assessed using simultaneously acquired heart rate variability. Impact: This study aligns with Discovery Fund's strategic priorities 2b that of decreasing disability associated with depression. As result, this study has the potential to optimize the health and success of some of our most at-risk families.

Applicant Name: Sandra Pereira
Supervisor Name: Dr. Margaret Hahn
Title: Antipsychotics: effects on brain nutrient sensing in relation to metabolic adverse effects
Amount Awarded: $65,000

Abstract:

Antipsychotics used to treat schizophrenia greatly increase the risk of developing type 2 diabetes, and this can occur independently of changes in adiposity. This may occur through the central nervous system (CNS). Nutrient sensing (i.e. glucose, lipids) in the CNS, especially the hypothalamus, is critical in maintaining glucose homeostasis by suppressing glucose production in the liver. Our current objective is to determine if olanzapine (OLA), one of the most effective antipsychotics, impairs the central effects of nutrients on whole body glucose metabolism. We will investigate two nutrients: long chain fatty acids (LCFA) and lactate. Circulating levels of LCFA change throughout the fasting-feeding cycle and lactate is metabolized in the CNS from glucose as well as amino acids. Gold-standard, pancreatic-euglycemic clamps will be performed to assess glucose kinetics in response to a primed, continuous intracerebroventricular infusion of LCFA, lactate, or vehicle solutions. Sprague Dawley rats will be co-treated with an acute injection of OLA or vehicle solution. Alterations in nutrient sensing in the CNS are expected to impair glucose homeostasis, resulting in type 2 diabetes, increased cardiovascular morbidity, and possibly other nutrient-dependent functions such as cognition. Our study may contribute to the design of lifestyle, nutritional, and/or pharmaceutical interventions to minimize the metabolic impact of antipsychotics.

Applicant Name: Martin Rotenberg
Supervisor Name: Dr. Paul Kurdyak
Amount Awarded: $65,000
Title: Geographic and social factors and the risk of readmission following initial hospital admission for schizophrenia in Ontario: A retrospective population based cohort study

Abstract:

Introduction: Geographic and social factors are associated with the incidence of schizophrenia and health service use, however, there is a dearth of data on how these factors impact outcomes. There is only one prior study from Taiwan that examined geographical factors and readmission rates for schizophrenia, however, confounders including the level of outpatient care, severity, marginalization and other social factors were not considered. Objective: To examine the relationship between geography, social factors, and care outcomes in people with schizophrenia. We hypothesize that people who are admitted to hospitals further away from their homes and areas with greater levels of marginalization are more likely to be readmitted. Methods: A retrospective cohort identifying all index hospitalizations for schizophrenia in Ontario (2009-2019) will be constructed from administrative health data. The primary exposure of interest— distance—will be calculated using drive time analysis between hospitals and residential addresses. Covariates including medical comorbidity, immigration status, severity, length of stay, outpatient care, injectable medication, rurality and marginalization will be obtained. Cox proportional hazard models will estimate hazard ratios of readmission within 30 and 180 days of discharge. Outcomes: The findings of this study may inform clinical practice and be used by policymakers to improve service planning and outcomes. This cohort will also be used to assess outcomes associated with Health Quality Ontario care standards, and as a baseline 'population at risk' to further analyze spatial accessibility of specialized mental health services including Early Psychosis Intervention programs and Assertive Community Treatment Teams across Ontario.