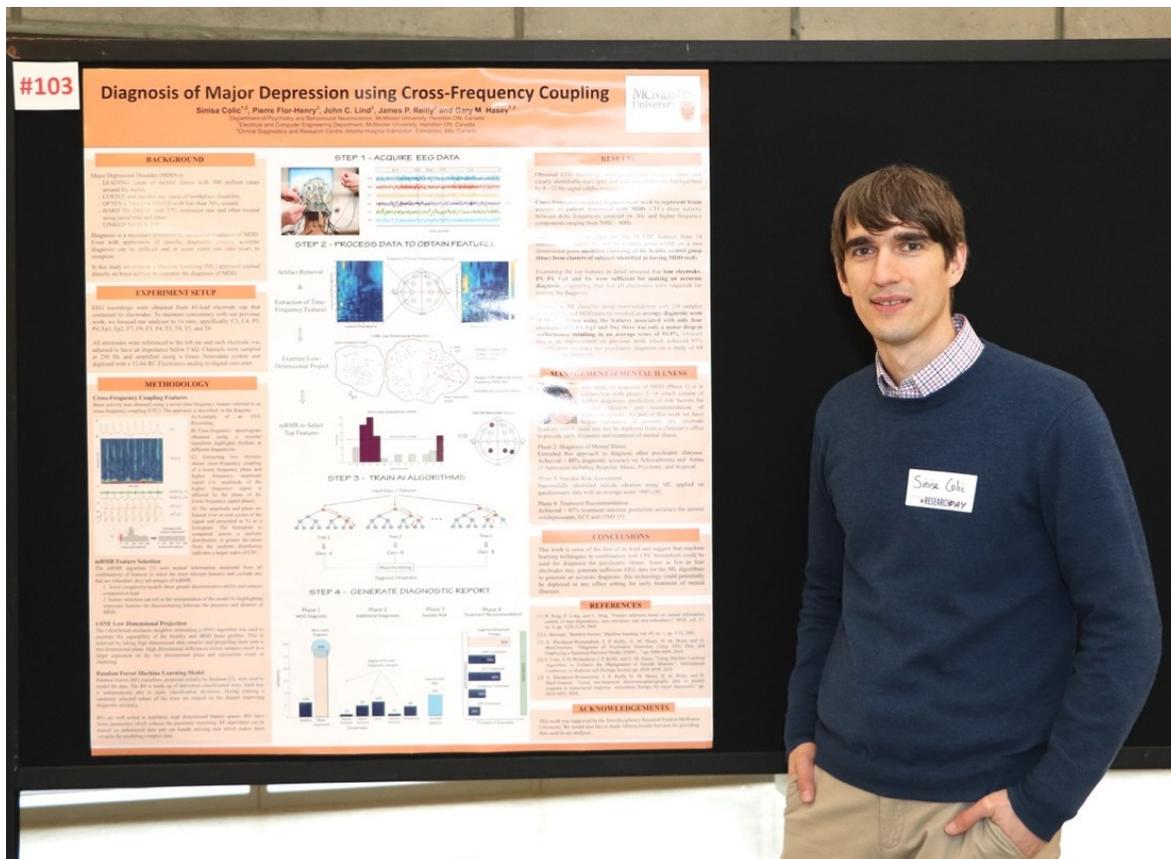


# SPOTLIGHT ON RESEARCH

## Research Day 2019 Top 3 Posters: Postdoctoral Fellow Category



**1<sup>st</sup> Place**

**Name:** Siniša Colic

**Supervisors:** Drs. Gary Hasey and Jim Reilly

**Education Program and Level:** Postdoctoral Fellow in the Department of Psychiatry and Behavioural Neurosciences, and PhD – Electrical and Computer Engineering.

**About Siniša:**

Sinisa Colic is currently a Postdoctoral Fellow at the Department of Psychiatry and Behavioural Neurosciences. He received his PhD from the Department of Electrical and Computer Engineering, University of Toronto in 2017 on the topic of Machine Learning for Prediction of Anticonvulsive Drug Treatment Outcomes in a model of epilepsy. His research interests and career goals include the analysis of medical imaging data, in particular electroencephalogram (EEG) data, to provide solutions for prediction and treatment of brain related disorders and illnesses.

**Siniša's Project:**

Diagnosis is a necessary precursor to successful treatment of MDD. Even with application of specific diagnostic criteria, accurate diagnosis can be difficult and in some cases can take years to complete. In this study we propose a Machine Learning (ML) approach trained directly on brain activity (obtained using EEGs and features of cross-frequency coupling) to expedite the diagnosis of MDD.

Our findings on a dataset of 220 subjects consisting of 110 with MDD and 110 healthy controls resulted in an average AUC diagnosis score of 95% determined using a 5-fold cross-validation approach. Closer examination of the selected features showed that not all electrodes were necessary for making an accurate diagnosis, with 4 of 14 electrodes providing the majority of the discernment.

These results suggest that machine learning techniques could be used as a clinical tool for the early diagnosis of psychiatric illnesses directly from EEG data and accurate diagnosis can be achieved with on only 4 electrodes thus reducing the cost of the medical imaging. This work on diagnosis of MDD is the first phase of several that will lead to improvements in brain state profiling to improve diagnosis of mental illnesses and identification of patient-specific treatment options.

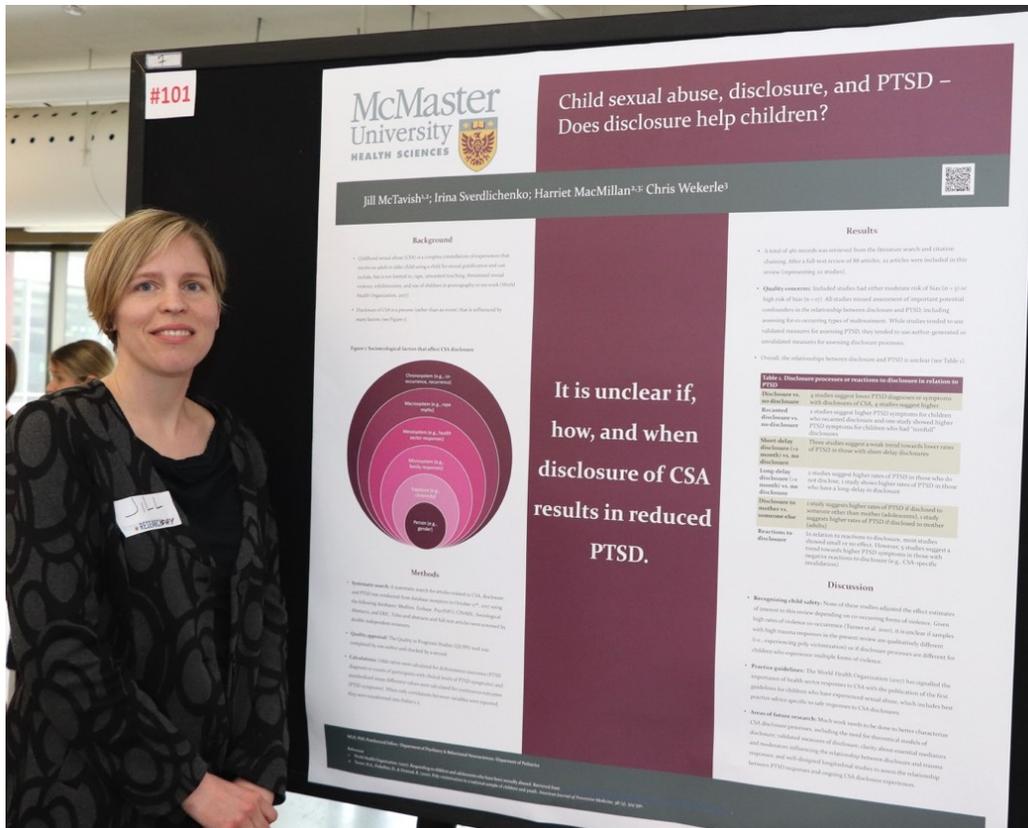


affected. One factor believed to predict alcohol use disorder is binge drinking. Binge drinking is especially a concern for emerging adults (ages 18-25 years) as it is the most prevalent in this age group. While many individuals “mature” or “age out” of drinking, a considerable minority will continue heavy use and be at risk for clinically significant problems. The predictors of failing to age out have not been well characterized.

In the current study, various dispositional characteristics, environmental variables, along with the presence of other substance use were employed to examine whether distinct classes of binge drinkers would emerge. Then using novel behavioral economic measures, we investigated whether these subgroups of individuals differed in measures of alcohol reinforcement.

Participants were emerging adults ( $n = 728$ ) recruited from the Hamilton region. They were included in the study if they engaged in heavy episodic drinking ( $>5/4$  standard drinks for males/females) at least weekly over the last six months. These individuals were examined on their responses to baseline measurements on a variety of standardized instruments that focus on mental health and addiction. These instruments measured: consequences of alcohol and cannabis misuse, drug related problems, symptoms of nicotine dependence, anxiety, depression, post-traumatic stress disorder, attention deficit hyperactivity disorder, and binge drinking. Using these variables, it was found that individuals could be classified into three distinct groups: (1) *Smoking +*, characterized by individuals that endorsed moderate levels of substance use with high rates of smoking and moderate levels of psychopathology; (2) *Low severity*, characterized by individuals that endorsed low levels of substance use and low markers of psychopathology; (3) *High psychopathology*, characterized by moderate levels of substance use and high levels of psychopathology.

These three groups were then compared on indices of alcohol reinforcement using proportionate alcohol-related reinforcement and the alcohol purchase task. Results indicate that those belonging to the *Smoking +* and *High psychopathology* groups displayed greater alcohol-related pathology than those in the *Low severity* group. Thus far, results suggest that meaningful distinct subgroups exist within this cohort of binge drinkers and may do so in the general population also. These characteristics may ultimately inform the understanding of longitudinal trajectories of binge drinking.



**3<sup>rd</sup> Place**

**Name:** Jill McTavish

**Supervisors:** Dr. Harriet MacMillan

**Education Program and Level:** Postdoctoral Fellow, Department of Psychiatry & Behavioral Neurosciences

**About Jill:**

Jill received her Ph.D. from the Faculty of Information & Media Studies at Western University in 2013. In the past she worked as an information professional in a hospital setting, where she conducted mediated searches (including systematic reviews) for allied health professionals. Currently Jill is supporting VEGA (Violence Evidence Guidance Action), an initiative co-led by Harriet MacMillan, which involves creating curriculum for healthcare and social service providers to recognize and respond safely to family violence. During her postdoctoral fellowship, Jill served as Technical Advisor to the World Health Organization in supporting the development of guidelines on responding to children and adolescents who have experienced child sexual abuse and guidelines on the health sector response to child maltreatment. Jill is also completing her Masters of Social Work and is interested in supporting children who experience PTSD.

**Jill's Project:**

Child sexual abuse (CSA) has significant, potential negative consequences for children extending across their lifespan. There is a considerable amount of research that speculates about the relationship between CSA and posttraumatic stress disorder (PTSD): is PTSD a necessary response following CSA? And how do some children resolve PTSD “naturally” following CSA experiences? There is also a significant amount of literature that discusses barriers to and facilitators of CSA disclosure. While influential work of James Pennebaker suggests that writing about traumatic experiences reduces distress and improves well-being, it is unclear if verbal disclosure of CSA results in the reduction of trauma responses, such as PTSD.

In this poster, we present the findings of a systematic and critical review that investigated the relationship between CSA, disclosure, and PTSD. Our findings suggest that it is unclear if, when, and how disclosure benefits people with CSA experiences (in their childhood or adulthood). This lack of clarity is in part related to problems with the data, especially the lack of assessment of child safety. While research consistently shows that children who experience multiple forms of violence or other adverse childhood experiences (e.g., caregiver addiction) have more significant trauma responses (e.g., depression, anxiety, PTSD), studies included in our review unfortunately did not consistently assess for these confounding variables. It is therefore not surprising to find that the results of this review are unclear.

In spite of the limitations of the data, the results of the review raise a key ethical question: beyond reasons for safety (i.e., ending the child’s exposure to sexual abuse), is disclosure of CSA necessary to improve children’s well-being? In addition, if and when people with experiences of sexual abuse want to disclose these experiences, what factors are important for them to consider (e.g., who to disclose to, when, etc.)? Is disclosure of CSA necessary in health and social service settings, in order to receive safe and evidence-based care? What is the safest way that informal and formal sources of support can respond to disclosures of CSA?

The publication of the World Health Organization’s recent clinical guidelines for responding to CSA offers key guidance for safe responses to CSA, such as offering a non-judgmental and validating response and taking steps to enhance the child’s safety and minimize harms. In Canada, the VEGA project (<https://vegaproject.mcmaster.ca/>) is developing educational resources on recognizing and responding to family violence with one of the goals being to increase healthcare and social service providers’ ability to provide safe responses to children experiencing any form of maltreatment. These initiatives signal an ongoing commitment to safe responses to disclosures of violence and, ultimately, a movement towards reducing/eliminating violence experienced by children.