



The Royal's
Institute of Mental Health Research
affiliated with the University of Ottawa

RESEARCH TO ACTION: From Neuron to Neighbourhood



2018-2019 Impact Report

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As the stigma around mental illness slowly dissipates, more and more people are reaching out and asking for help.

Unfortunately, more than half of those who seek treatment may not get well.

That's because there is still so much we don't understand about the brain, its connections to the mind, and how things go awry to cause mental illness. This, combined with diagnostic challenges and limited treatment options, makes it difficult to provide patients with personalized and effective care.

That's where research comes in.

Innovative mental health research is bringing us closer to finding answers to some of the biggest questions that currently exist within the mental health care landscape.

Together with clinical collaborators and community partners, researchers at The Royal's Institute of Mental Health Research are moving innovation from the *Neuron to the Neighbourhood*, transforming mental health outcomes for people today, and into the future.





01

Breaking Down Barriers to Care Begins With Research Breakthroughs

Message from our President & CEO and Board Chair

When we hear that a friend or family member has been diagnosed with cancer, the same kinds of questions typically get asked: *"What kind of cancer?" "How serious is it?" "What's the treatment plan?"*

Although these questions can be tough to discuss with loved ones, the answers are generally clear-cut. When it comes to a cancer diagnosis, we can, at the very least, take solace in the fact that we now have a greater understanding of the types, causes and effects of this disease, and the science is advancing rapidly towards new and personalized treatments.

The situation is not the same when it comes to mental illness.

What would you say to someone who had been diagnosed with depression, for example?

"What kind of depression?" "How serious is it?" "What's the treatment plan?" These are typically not the questions we hear being asked.

Part of the reason for this is that science doesn't quite have the answers yet—and as such, our

mental health treatments currently stand where cancer or heart disease treatments did decades ago.

We know that mental illness develops when there are 'malfunctioning' circuits in the brain, but we still need to understand why, when and how this happens, in order to offer more effective treatments.

This is where innovative research comes in.

How we're doing things differently

At The Royal's Institute of Mental Health Research (IMHR), affiliated with the University of Ottawa, we are focused on making important breakthroughs through innovative thinking and approaches that will help to improve current diagnoses, treatment, intervention and prevention strategies and ultimately alleviate unnecessary suffering.

Our scientists are carrying out innovation in a number of ways. They are harnessing new technologies, exploring the biological, social and environmental contributors to mental illness, and

collaborating with primary care providers and people with lived experience to ensure that the value of research is maximized.

In line with The Royal's vision of a 'hospital without walls', our research objectives involve innovation *beyond* the lab, and integration of research into the broader community through a number of alternative channels: via people's smartphones (e.g. harnessing wearable devices and apps to help predict and manage depression risk); home and work computers (e.g. e-health intervention programs); fitness routines (e.g. exercise interventions for depression); doctor's offices (e.g. clinical blood tests for depression risk), and more.

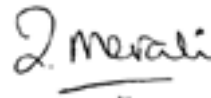
While we have much ground left to cover, we have already achieved some major milestones. We have successfully established Canada's first Brain Imaging Centre dedicated solely to neuroscience and mental health research. We have also been successful in nurturing the next generation of scientists, and have launched the Emerging Research Innovators in Mental Health (eRIM^h) incubator program to help foster a strong environment of innovation going forward.

We are continuing to make strides through the planning and development of a First Episode Depression Research Intervention Centre (FEDRIC), which will harness ground-breaking brain imaging research on depression biotypes to get people on personalized and effective treatment paths quickly—and ultimately avoid the traditional trial-and-error approach.

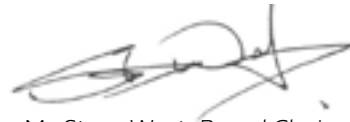
We have built an extremely strong team of researchers who are curious, engaged, and passionate about changing the current status quo.

Thanks to their hard work and dedication, we have been able to foster strong partnerships and collaborations, and drive our knowledge exchange regionally, nationally and internationally.

The path to mental health care transformation may still not be entirely clear, but through research innovation we can continue to break down barriers and make important breakthroughs that will help people in our communities—and beyond—to get better, faster.



Dr. Zul Merali, *President & CEO*



Mr. Steve West, *Board Chair*

Bold leaders driving breakthroughs: Thank you to Dr. Zul Merali & Lynn Pratt

Transformative mental health research and care requires bold and forward-thinking leadership. At The Royal's IMHR, we have been fortunate to have Dr. Zul Merali at the helm as President & CEO for over 16 years. It is largely thanks to his visionary leadership that we have become the world-class mental health research institute that we are today.

We extend our sincerest gratitude to Dr. Merali for the monumental strides he has made for mental health research and care, and wish him all the best as he now prepares to "rewire" and embark on a new journey, to help improve mental health beyond Canada's borders.

We would also like to welcome the new Chair of the IMHR Board of Directors, Mr. Steve West, and thank Ms. Lynn Pratt for her tenure as chair since 2016.

Ms. Pratt's strong focus on the practical needs of clients and their families has helped to significantly drive patient-oriented research, and provide hope to those suffering.



Left to Right: IMHR Board Chair Steve West and Dr. Zul Merali



People are the purpose that drives our innovation

At The Royal, we care for people with severe mental illness. Some have been sick for a long time, having encountered treatment after treatment that just doesn't seem to work.

In many instances, we see clients and family members motivated with hope that recovery from illness is within their grasp. But we also see others in their darkest moments.

We know the devastating impact of mental illness and we are driven to change it. The engine of that change is research.

Our strategic vision of The Royal as a hospital without walls includes groundbreaking research that connects with care both in our hospitals, and out in the community.

We are exploring and pushing the boundaries of our knowledge in a way that is integrated with care and driven by the needs and experiences of our clients. We have a state of the art research facility and some of the brightest research minds in the world. Together, we can create better futures for all people living with mental illness.

I would like to thank Dr. Zul Merali for his vision that through research, we can transform the way mental illness is diagnosed and treated. Under his leadership, The Royal's IMHR has become a force for innovation.

We will continue blazing this trail of mental health research and client-centred care.

Dr. Joanne Bezzubetz
President & CEO, The Royal

Inspiring research investment through innovation

The Royal Ottawa Foundation congratulates The Royal's IMHR on another incredible year of achievements.

The Foundation takes great pride in sharing the latest research discoveries and inspiring our donors, and over the past year we have witnessed many cutting-edge advancements and innovations which will help shape the future of mental health care.

The PET-MRI machine at The Royal's Brain Imaging Centre, for instance, is now helping to shift our understanding of mental illness and improve treatment and diagnosis. Acquiring this cutting-edge technology has allowed us to attract world-renowned researchers, and support ground-breaking studies. The opportunity to look inside the brain in this capacity has become a game changer for The Royal, and was only made possible thanks to our generous donors.

It's no secret that mental health care does not receive adequate financial support compared to other illnesses. However, the results from recent Foundation events share an encouraging story: Our annual Leaders for Mental Health Breakfast is the largest in the city, with over 125 incredible community leaders as table captains. Our latest Inspiration Awards also broke new fundraising records.

On behalf of the Foundation Board and my team, I want to extend our heartfelt congratulations and thank you to Dr. Zul Merali for his incredible accomplishments in terms of the continued growth and success of The Royal's IMHR.

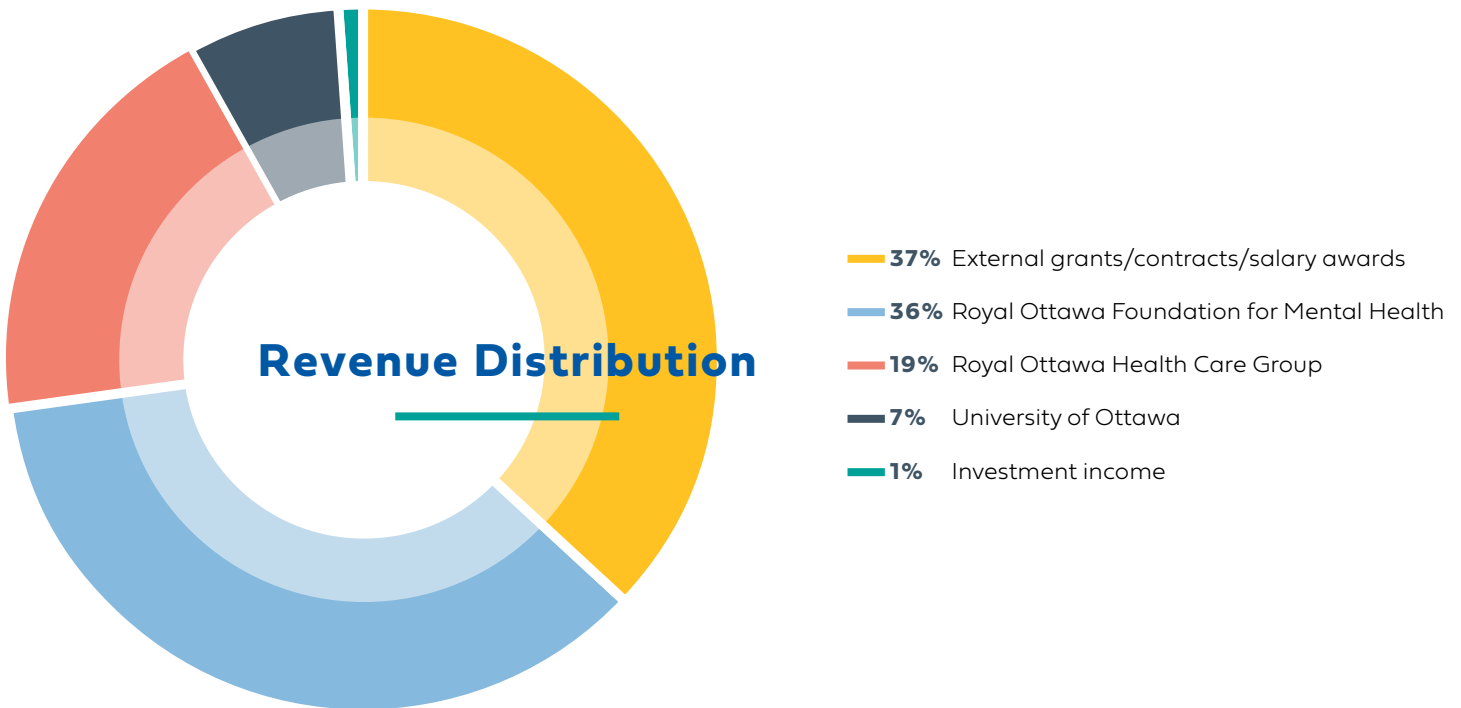
We look forward to ongoing collaboration.

Mitchell Bellman
President & CEO, The Royal Ottawa Foundation



Left to Right:
Dr. Zul Merali,
Dr. Joanne Bezzubetz
and Mitchell Bellman

2018–2019: The Year in Numbers



NO. OF VOLUNTEERS

105

NO. OF RESEARCHERS

77

NO. OF PUBLICATIONS

178

NO. OF ADJUNCT SCIENTISTS AND VISITING SCHOLARS

35

NO. OF ACTIVE RESEARCH GRANTS AND CONTRACTS

148

NO. OF RESEARCH PROJECTS (CLINICAL AND BASIC)

117

NO. OF RESEARCH TRAINEES

62

NO. OF RESEARCH SUPPORT STAFF

90

RESEARCH SPACE (SQ. FT)

27,400

02

Research in the Digital Age

Artificial intelligence on the frontlines of suicide prevention

What if we knew who was at high risk for suicide long before they were actually in danger?

If it sounds like the premise of a sci-fi novel, you're not far off—but neither is the technology.

In fact, Dr. Zachary Kaminsky says it's here now. Using artificial intelligence, he has built an algorithm that identifies Twitter users at high risk of suicide.

Through use of the algorithm, public posts on the popular social media platform can hold clues about who might be at risk for suicide before they reach a crisis point.

That's because it doesn't just use word recognition or identify suicidal ideas—it analyzes speech patterns and pinpoints the actual psychological concepts related to suicide. It then scores and matches these patterns alongside all the public data linked to a Twitter user.

"This isn't identifying only people saying 'I'm going to kill myself.' It's identifying a risk pattern for people who are moving towards that point," says Dr. Kaminsky, DIFD Mach-Gaensslen Chair in Suicide Prevention Research.

He says he built the algorithm using Twitter data because it's completely public. It's also a social media platform used by more than a third of Canadians between the ages of 18 and 34—a

population amongst whom suicide is the second leading cause of death.

"This tool takes tweets, and it turns what people say into a number," says Dr. Kaminsky. "It asks, 'How lonely is this tweet? What's the hopelessness score? What's the risk score?'"

The algorithm can effectively comb through years' worth of tweets in minutes, and through machine learning—part of artificial intelligence—somehow puts all the data together to identify at-risk people early.

So far, Dr. Kaminsky's pilot study has successfully identified 89 per cent of people who would begin to express explicit suicidal ideas weeks—even months—before an attempt happened. His precision rate continues to rise as he works to further refine and test the algorithm.

He is now seeking input from the wider community to identify where this tool could be most valuable.

And while the tool still needs larger studies and further validation in the future—as well as a clear determination of the best way to use it—its potential is very promising.

"If these tools work as well as we think they're working, they're going to help save lives," says Dr. Kaminsky.



Left to Right: Ben Leikin and Dr. Zachary Kaminsky

Community & clinical applications

One key stakeholder that Dr. Kaminsky has been working closely with is Ben Leikin, supervisor of mental health programming at Ottawa Public Health, co-chair of Suicide Prevention Ottawa, and member of the Canadian Association for Suicide Prevention's Board of Directors.

Leikin says that down the road, he could see many potential community-based applications for a suicide prevention tool like this, providing friends and family with an intuitive resource at their fingertips to better check in with their loved ones—and help connect them to support, when necessary.

He also envisions this tool being used by physicians, psychiatrists and other service providers to help inform them about how their patients are doing. A physician, for instance, could get approval from a patient to use this tool to track their moods, and be automatically alerted when an individual might not be doing so well.

"Since [clinicians] are not currently seeing how their patients are feeling or interacting outside of their office or a treatment session, this tool could help support people in a way that isn't currently possible," says Leikin.

He adds that Ottawa Public Health is eager to play a role in helping to roll out this tool when it is ready, including holding focus groups with people with lived experience and clinicians, to look at the tool's most valuable, immediate and effective applicability.

Can virtual reality help improve real-world cognitive impairments?

While many people may still associate virtual reality (VR) technology primarily with video games—as a way to escape into another universe for a while—mental health researchers are increasingly exploring this novel technology as an effective tool to improve the lives of individuals in the real world.

VR is the most immersive type of reality technology to date, and can convince the human brain that it is somewhere it is really not, once the wearer straps on the headset.

VR's ability to “trick” our minds and make it possible for us to experience almost anything, anywhere, has captured the interest of some mental health researchers including Dr. Synthia Guimond, who is

currently exploring this technology's efficacy as a novel tool for cognitive remediation therapy.

While the majority of therapies and medications currently available are used to treat certain symptoms of mental illness (e.g. depression, anxiety, hallucinations), there is actually very little that exists to help improve the associated cognitive deficits that are common in many psychiatric disorders (e.g. decreased attention, memory, executive function, and social cognition).

Cognitive deficits can be extremely disruptive, and may continue to negatively affect one's quality of life, even when other symptoms are effectively treated. These deficits can also, in some cases, contribute to an individual's relapse.



Dr. Synthia Guimond (left) leads a participant through a virtual reality exercise

// We need to push for more research-informed care in this area, so that our treatments also ensure that people have a good quality of life."

"In schizophrenia in particular, the majority of people struggle with their attention or memory troubles, which can negatively impact their ability to function in society," says Dr. Guimond.

Rather than using VR to take people out of the real world, she is more interested in putting individuals with cognitive impairments *back in* to everyday situations, where they may be experiencing difficulties with memory or social interactions.

In a new pilot study supported by the New Frontiers in Research Fund Exploration Program, Dr. Guimond is working to understand whether navigating a particular VR environment can serve as an effective therapy in helping schizophrenia patients improve their memory.

In the study, participants are taught memory strategies, and are then transported to a virtual restaurant environment, in the role of a server.

Once in the VR environment, they will be able to test out the strategies they have learned in a practical way, by taking food and drink orders from customers, and relaying those orders to the virtual kitchen.

Dr. Guimond says it is possible that the ability to practice cognitive strategies and skills through VR will help to better translate learnings to individuals' real lives.

Traditional computer cognitive training exercises, for example, might simply ask people to memorize lists of words or pictures. With cognitive treatment delivered through VR, however, individuals can apply teachings to simulated, real-life situations and receive feedback in real-time.



This would allow clinicians to better evaluate how cognitive strategies are working, and adjust treatment if necessary. It could also help improve individuals' confidence levels and lower anxiety about translating the skills they learned into their daily routines.

Additionally, Dr. Guimond believes that the novelty of VR may help to better engage individuals in cognitive rehabilitation, and effectively lower some of the societal stigma that still exists around seeking treatment.

"People are generally excited about using VR—so while a young person living with schizophrenia may be reluctant to talk to others about visiting their psychiatrist, they may be more open to share that they are using VR technology for treatment," she says.

And while her ongoing VR pilot study is focusing on treating just one specific measure of verbal memory, in one particular group of psychiatric patients, Dr. Guimond says her long-term goal is to harness this innovative technology to help treat the variety of cognitive deficits that persist in other groups (e.g. individuals with depression, bipolar or post-traumatic stress disorder).

Overall, she believes that innovative strategies and evidence-based treatments for cognitive rehabilitation need to become a larger, more integral focus within the greater mental health research and care landscape.

"Treating the symptoms of mental illness through medication and more traditional therapies is critical to help patients achieve remission—but cognitive deficits still persist once individuals get better", says Dr. Guimond.

"We need to push for more research-informed care in this area, so that our treatments also ensure that people have a good quality of life."



Keeping 'watch' on mental health with wearable technologies

Every day, millions of people strap on smart watches, fitness trackers, head-mounted displays and other wearable devices to perform anything from basic, hands-free computing tasks to complex tracking of their vital signs or health/fitness levels.

Given their ability to comprehensively gather physiological data through small, non-invasive electronic devices, wearable technologies are increasingly being explored within health research and care as potentially valuable tools to better understand patients and personalize treatments.

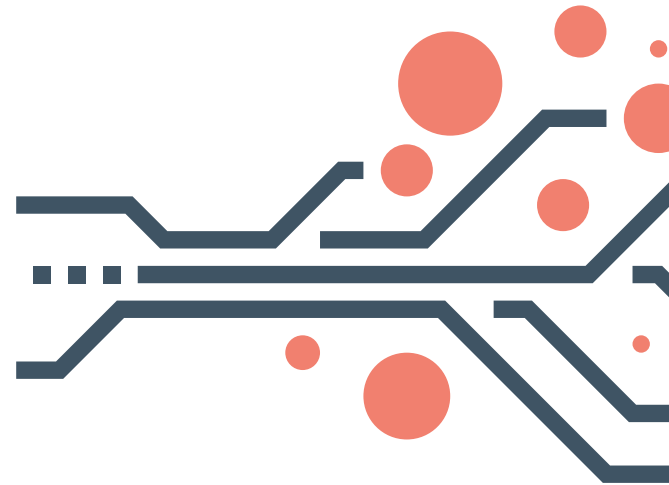
While these devices are already being used in some clinical settings to track vitals such as heart rate, blood pressure and sleep, Dr. Rébecca Robillard says the untapped value of these technologies lies in their potential to not only monitor and record information to help inform diagnosis and treatment, but to also help *predict* patterns of mental illness—and, in some cases, prevent depressive or other psychiatric episodes from occurring.

// These tools could really help empower individuals to better take control of their own mental health and avoid undue suffering."

In short, what if your smart watch could quietly collect your data in the background, but then alert you when your mental health was at risk—before you even realized it?

Dr. Robillard, Clinical Research Director of the Sleep Research Platform at The Royal's IMHR, has long been monitoring biological data in her lab, tracking signals in patients with mental health disorders who have also been referred to The Royal's Sleep Clinic.

While her research has helped to better understand how physiological monitoring can help to diagnose and treat mental illness, she believes



harnessing wearable technologies to conduct monitoring outside the lab could open up a whole new realm of possibilities.

"We know that sleep and physiological markers of people with mental disorders vary day by day, so it is hard to capture a full picture based solely on short sleep recordings in the lab for just one night," says Dr. Robillard.

That's why her latest study will converge behavioural, psychosocial and multi-systemic biological signals recorded through wearable devices and smartphone technologies to better capture the complexity of mental illness.

Biological, social and behavioral markers are all altered in people with mood disorders, says Dr. Robillard, but it has previously been a major research challenge to link objective measures to subtle, subjective moods. Through wearable and smartphone technologies, however, there exists the opportunity to track objective and subjective measures together, and monitor a more holistic model of mental health.

In Dr. Robillard's study, participants will wear various monitors (e.g. heart rate monitor, respiration monitor, temperature monitor) for 24 hours a day, which will gather data on markers such as physical activity, social interactions, sleep, heart rate, respiration and body temperature.



Dr. Rébecca Robillard (left) measures behavioural, psychosocial and biological signals through wearable devices

Mood fluctuations will also be monitored via an application installed on participants' smartphones, which will document outgoing messages and engagement with social media platforms and look for patterns. Twice a day, automated messages will pop up on screen, asking participants to rate their mood on an analog scale.

All of this data will then be used to retrospectively assess how daily variations in mental health states could have been predicted by integrated behavioural, social and biological features recorded in the preceding days.

The ultimate goal of all of this is to eventually help inform the development of a singular, research-validated wearable technology that can process data from various markers in real

time, and alert patients who may be at risk of a depressive or manic episode.

Dr. Robillard believes that developing an accessible tool to rapidly identify onset mood changes could help to significantly ease daily self-management of mood disorders and enhance patient self-empowerment.

"When you're dealing with mental illness, sometimes you don't necessarily see a difficult episode coming on, and it can be difficult to recognize," says Dr. Robillard.

"This tool could really help empower individuals to better take control of their own mental health and avoid undue suffering."

03

Overcoming Mental Health Inequities Through Research

Healing intergenerational trauma

Across Canada, Indigenous populations face a unique, complex and historical set of mental health challenges.

From the oppressive conditions set by the Indian Act, to the Residential Schools and Sixties Scoop, to persistent disparities and inequities within Indigenous health and child welfare systems today, there are a number of intersecting determinants that have played a role in shaping the mental health and wellness of Indigenous peoples.

We know, for instance, that intergenerational impacts of the Residential Schools continue to affect First Nations communities, as trauma can be passed down to later generations through processes such as altered parenting behaviors, socio-economic disadvantages, and stress proliferation.

This means that youth and adults who did not attend Residential Schools—but have immediate family members that did—experience higher rates of distress, depression, suicidal ideation, and problematic substance use.

While understanding the negative outcomes of historical marginalization and intergenerational trauma are important in contextualizing mental health disparities in First Nations communities,

researchers at The Royal's IMHR say the path towards more equitable services, better outcomes, and continued healing *must* involve a shifting focus towards the strengths and resiliency of these communities.



“When approaching Indigenous mental health research, sometimes all we can see are all of the problems,” says Dr. Kimberly Matheson, IMHR and Carleton University’s joint Culture and Gender Mental Health Research Chair.

“When you start to dig a little deeper though, and ask a different set of questions, you can see there is actually a lot of strength in these communities.”

This inherent cultural vitality is why, through the Indigenous Youth Futures Partnership, Dr. Matheson is working closely with First Nations communities in Northwestern Ontario to foster Indigenous youth resilience and build on each community’s strengths.

Together with a multi-disciplinary team of Indigenous researchers and partners including the Sioux Lookout First Nations Health Authority, Dr. Matheson is seeking to identify and implement community-led strategies to promote youth and maternal mental health, and help to diminish self-harm, substance use and deaths by suicide.

Dr. Robyn McQuaid, a scientist at The Royal’s IMHR who collaborates closely with Dr. Matheson is also involved in a number of ongoing research studies that are helping to identify

culturally-relevant risk and resiliency factors that can hopefully be the targets for effective interventions.

Through one of her latest studies, together with Dr. Matheson and Dr. Amy Bombay (Dalhousie University), Dr. McQuaid is looking at national population data gathered from the First Nations Information Governance Centre to examine the relationship between intergenerational trauma, community stressors and resiliency factors with mental health outcomes, among First Nations children and youth.

While the study is still ongoing, the research team has already made some key findings. For example, their data has found that youth with a parent who attended Residential Schools appear to be *more* connected to their culture.

“We think they’re actually turning to their culture for healing,” says Dr. McQuaid.

This knowledge, she says, can help inform community-based interventions, as well as make a strong policy case for the need for increased resources within communities.

Before moving forward with any intervention or prevention strategies, however, reciprocity will be key.

Drs. McQuaid and Matheson both emphasize the importance of working with their community partners to ensure the work they are doing is community-led, culturally sensitive, and of benefit to those involved.

“Indigenous-based research needs to be approached by ensuring that the questions being asked are informed by the people who want—and would benefit from—the answers,” says Dr. McQuaid.

And while prevention and resiliency strategies are the primary focus of the majority of Indigenous-led efforts moving forward, continuing to understand how historical trauma has influenced current disparities and states of mental health and wellness has also been identified by First Nations partners as a critical part of the healing process.

“Understanding that the current health disparities they might be experiencing today can be attributed to this cycle and history of trauma can help to remove self-blame or shame,” says Dr. McQuaid.



Dr. Kim Matheson (right) with Indigenous Youth Futures Partnership project manager Allan Turtle (left) in Fort Severn First Nation; one of the communities in Northwestern Ontario where research is being conducted



Sex differences and the brain

When it comes to women's mental health, it's still largely a "man's world".

Historically, females have been left out of many research and clinical trials, and, in particular, specific populations of women (e.g. fertile, pregnant and breastfeeding women) have been excluded from mental health research altogether.

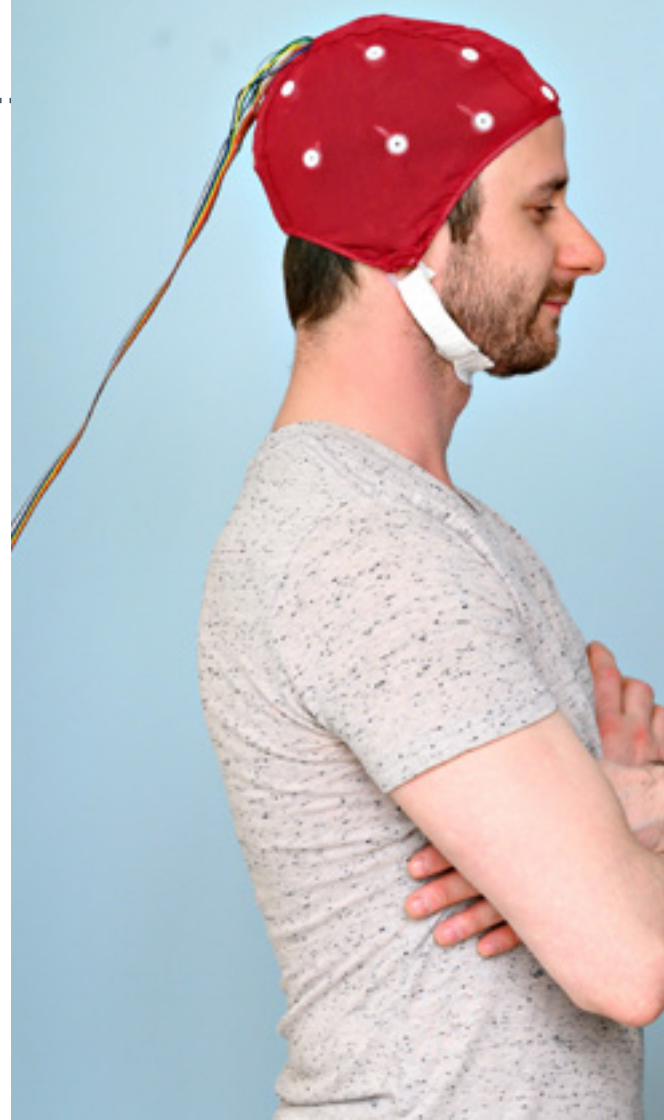
This means that most of the older drugs being used to treat psychiatric disorders in *both* males and females haven't actually been tested as extensively in women.

Given that sex can be a critical determinant of diagnosis, symptoms and outcomes when it comes to mental illness, a new study that seeks to better understand the connections between sex hormones and the respective brains of males and females* could help to bridge some of the existing sex-based gaps in treatment.

"There are major swaths of females who were essentially excluded during really seminal developments of some of the anti-depressant drugs that we continue to use today," says Dr. Natalia Jaworska, Director of the Clinical Electrophysiology Laboratory at The Royal's IMHR.

"We're in this place where we've been prescribing the same forms of anti-depressant medications for males and females without really thinking about whether it's the right approach for both sexes. The impact of this continues to reverberate, as we might be under- or overdosing females—or are perhaps not looking at the best combinations of drugs."

Given the greater prevalence rate of certain mental illnesses among women—and the fact that females have a higher possibility of adverse reactions to certain kinds of drugs—Dr. Jaworska's latest research is taking important



first steps towards addressing the mental health gender gap.

Armed with the understanding that sex-brain differences do exist, Dr. Jaworska is currently investigating the role of sex hormones, and the structural and functional similarities and differences between the male and female brain.

She is recruiting 40 healthy males and 40 healthy females to her study, which will use brain electrical activity measures and advanced neuro-imaging techniques to characterize distinct and overlapping brain profiles of men and women.

Specifically, she is exploring the relationship between brain structure and function with sex/stress hormones. This will be done through assessing brain activity at rest, as well as when participants complete two distinct tasks (a visual-spatial identification task which males are known to do better at, and an emotional identification task, which has better success rates among women).



"By looking at brain activity in various ways, we can capture subtleties and get a better idea of how much influence sex and stress hormones actually have on performance and activity," says Dr. Jaworska.

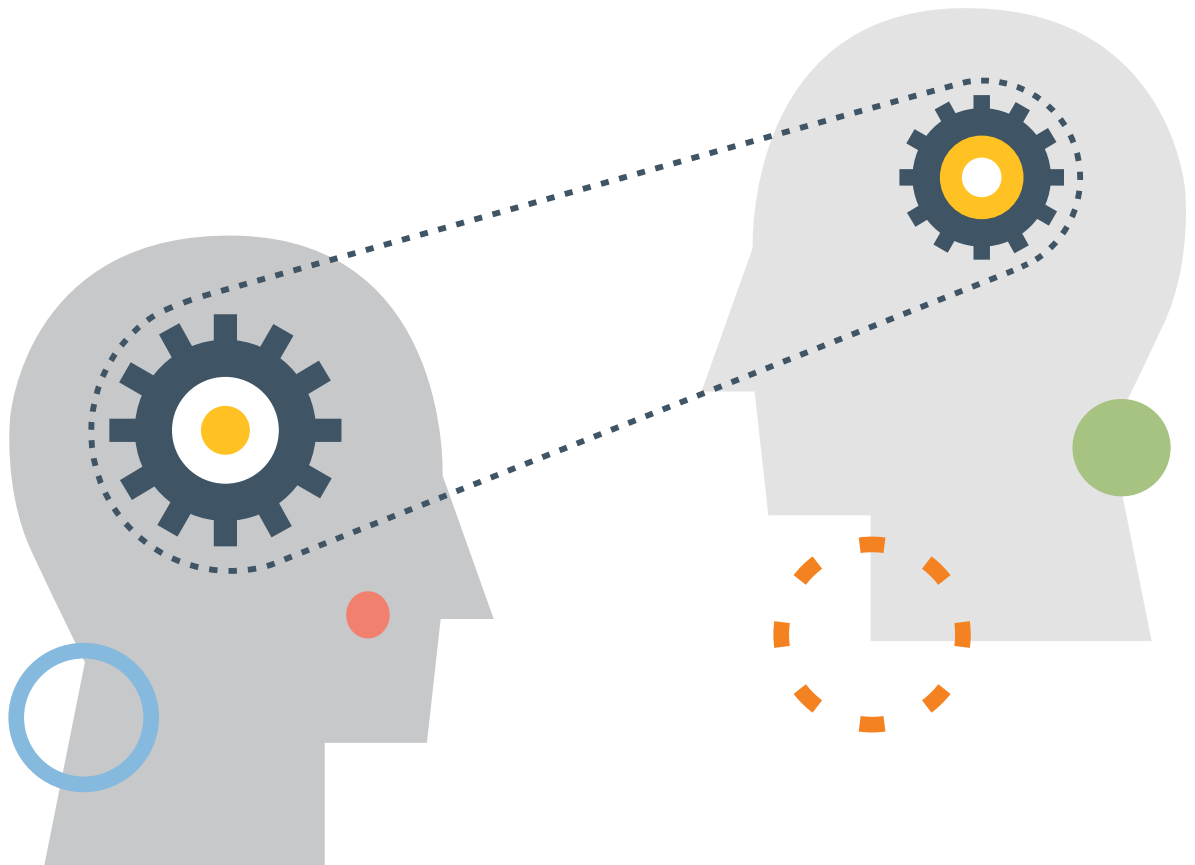
"If we can better understand the nuances of the female versus male brain—including how certain treatments affect particular brain circuits, or how particular areas of the brain interact with certain hormones—we can consider treatment options in a much more personalized way."

This knowledge, she hopes, could one day help clinicians identify the most optimal way(s) of prescribing specific medications and doses based on one's biology.

**Reference to cisgendered males and females only*



Dr. Natalia Jaworska is exploring male versus female brain biology in a new research study, to help improve women's mental health



Incarceration to hospitalization

For Dr. Michael Seto, Director of the Forensic Research Unit at The Royal's IMHR, working closely with some of society's most stigmatized individuals has given him a valuable perspective that informs his work: individuals with serious mental illness who have come in contact with the law aren't actually that different from other people living with chronic psychiatric disorders requiring care.

"There's a certain stigma associated with the 'forensic' label—people are worried that because an individual broke the law, they're dangerous," says Dr. Seto, referring to the area of mental

health research and care where the legal and mental health systems intersect.

"In a lot of cases, the mental health issues of these individuals are not that different from those of individuals that we see elsewhere at The Royal."

Often, says Dr. Seto, people admitted to The Royal's Forensic Program have been patients of other mental health treatment programs in the past.

The fact that they end up in the Forensic Program, sometimes simply has to do with whether or not the police are called at some point—and what happens in the process.



*Left to right:
Dr. Mathieu Dufour
and Dr. Michael Seto*

"If individuals are brought to the hospital for aggression or causing a disturbance during a manic or psychotic episode, for instance, they might be admitted to the Schizophrenia Program. But if they're arrested and charged, they could end up as a forensic client instead," says Dr. Seto.

"People often think that these individuals are a different kind of patient—a different kind of person—but that's not the case at all."

// The overarching goal...is to help identify best approaches and to inform policies, resources, and community services that can help lead to successful community re-integration."

Contrary to common belief, for example, forensic patients are not inherently violent.

Dr. Seto's research has shown people sometimes end up in the forensic

system not because they exhibit violence, but because they become chronically involved with police due to behaviours related to their mental illness.

"Sometimes these individuals are arrested just because they stand around in public places, or act in ways that might be perceived as 'bizarre' by others. If they do this in or around a coffee house or a store, the owner might frequently call the police," he says.

For those who *do* exhibit violence and end up as forensic patients, dedicated research in the area is particularly critical. Through research, we can understand and develop effective methods to reduce the risk of re-offending, prevent an individual from causing harm to one's self and others, and better re-integrate them into society through evidence-based rehabilitation and recovery strategies.

Dr. Seto is currently working on a national, Canadian Institutes of Health Research-funded study that is looking at opportunities (and obstacles) to successfully bridge individuals found Not Criminally Responsible (NCR) back into their communities, by better understanding their needs and mental health outcomes—and how those needs are being met once they leave the hospital.

To do this, he and his research team are conducting an in-depth analysis of administrative, health and criminal records of a large Canadian

cohort from eight different provinces. It's the first time a project of this scale and scope has ever been conducted in the area of forensic research, in Canada.

The overarching goal, says Dr. Seto, is to help identify best approaches and to inform policies, resources, and community services that can help lead to successful community re-integration.

Beyond its potential to improve outcomes for forensic patients on a national scale, research in this area is also having a direct impact on patients at The Royal—and by proxy, is helping to improve the safety and well-being of local communities.

At The Royal, Dr. Seto and his Forensic Mental Health Research Unit work closely with The Royal's Integrated Forensic Program, where specialized clinical services related to assessment, treatment, rehabilitation and community re-integration are provided to individuals who are deemed NCR—or unfit to stand trial—on account of a mental disorder.

For Dr. Mathieu Dufour, a frontline forensic psychiatrist and Associate Chief of Psychiatry at The Royal (Ottawa Campus), the Forensic Program is an exemplary model of research and clinical care working in tandem to effectively inform practice and improve outcomes.

A recent IMHR research project around risk assessment tools for violence, for instance, helped to inform the use of tools that Dr. Dufour now uses on a daily basis to assess patient risk in a clinical setting when making decisions with his interdisciplinary team around things like patient privileges, medications, etc.

He also cites work that Dr. Seto has conducted through the *National Trajectory Project of Individuals Found Not Criminally Responsible on Account of Mental Disorder of Canada* as ground-breaking research that has been critical in helping to validate the importance of the forensic system as a whole.

"We know because of research that the forensic system is good for the patients," says Dr. Dufour. "They recover better, faster, and can be re-integrated into the community quicker."

Depression risk calculator: New tool strives to create healthier workplaces

It was in a paediatrician's office following the birth of his daughter that Dr. JianLi Wang was first inspired to develop tools that could predict people's risk of developing mental health issues like depression.

It may seem like a peculiar jump to action, but for Dr. Wang, a mental health researcher, it dawned on him that while we engage in countless check-ups and tests related to our physical health over the course of our lives (starting from birth) to prevent us from getting sick, the same strategies are not available when it comes to mental illness.

// When it comes to mental health, the problem is that we are almost always reactive—people wait until they become depressed to see a doctor and get treated. Furthermore, not all workers recognize when they are mentally not well, and often fail to seek help."

"When my daughter was born, follow-ups with our family doctor let us know whether things like her height and weight were on track, and whether she was growing in a normal way," says Dr. Wang.

"It made me realize that while we engage in similar tests as adults to see if we are at risk for things like heart disease or diabetes, there isn't a parallel way to evaluate our personal risk for depression."

In 2008, through a Canadian Institutes of Health Research grant, Dr. Wang developed the first-ever risk calculator of its kind in Canada, which estimates personal probability of having a major depressive episode in the next four years, by asking questions related to demographics, family history, ongoing negative life events and childhood trauma.

This tool also informs people how their level of risk compares to the general Canadian population.

The risk calculator was launched online in 2013, and has since been used over 80,000 times.

Now, as director of the Work and Mental Health Research Unit at The Royal's IMHR, Dr. Wang has been focused on adapting his personal risk calculator tool for organizational use.

This new tool, tailored for employers, incorporates cumulative personal risk assessments and workplace predictors of depression, including job stress, work/family conflicts, and job performance. By enabling employers to evaluate how many of their employees are likely to develop depressive and anxiety disorders in the coming years, says Dr. Wang, organizations could better ensure that the right policies and resources are in place to keep workers healthy.

Dr. Wang is currently in the preliminary stages of launching a demonstration study using his risk calculator at a large Ottawa-based organization.

Throughout the year, he has also been travelling across the country, presenting his risk calculator and related workplace mental health research to a number of organizations that are keen on providing resources and tools to their employees.

In addition to the benefits it can offer both employers and individuals, Dr. Wang hopes that future iterations of his risk calculator could also have wider policy implications. On a larger scale, he says, this sort of information could help with population health planning, by forecasting mental health trends across cities, provinces and/or nationally, and allocating sufficient resources accordingly.

Overall, says Dr. Wang, research and strategies related to the prevention of depression and other



Dr. JianLi Wang

related mental illnesses must continue to move to the forefront of our mental health care landscape.

“When it comes to mental health, the problem is that we are almost always reactive—people wait until they become depressed to see a doctor and get treated. Furthermore, not all workers recognize when they are mentally not well, and often fail to seek help,” he says.

“This is why prevention can be worth so much more than treatment.”

If you are 18 or over, visit predictingdepression.com to estimate your personal likelihood of developing major depression in the next four years, and begin taking preventative actions (if necessary).

Employers taking action

As it stands, mental illness—and depression in particular—has a major impact on the Canadian workforce and economy.

Each week, 500,000 Canadians do not go to work due to depression and other mental health issues.

Dr. Wang says the huge financial and social burden and level of lost productivity that mental illness continues to impose for workplaces is finally causing employers to sit up and take notice.

“When I started doing research in this area 15 years ago, employers were not talking much about the mental health issues in their workplaces,” he says.

“Now, more and more organizations are witnessing and acknowledging significant depression and anxiety amongst their employees, and are beginning to take action to implement strategies to help keep their workforces well.”

04

It's Not 'All in Your Head': It's in Your Brain— And Your Biology

Bringing a new baby home can be unpredictable—but mom's mental health doesn't have to be

The weeks and months that follow bringing a new baby into the family can be both physically and mentally challenging. New mothers often find themselves riding a rollercoaster of emotions, feeling joyful one minute and dejected and depressed the next. These feelings of depression (sometimes known as the "baby blues") are common—and usually don't last long. However, for some new moms, this can trigger profound clinical depression.

Postpartum depression (PPD) is a type of mood disorder that can manifest during pregnancy, or up to a year after childbirth. It can affect any new parents—both moms and dads, as well as parents who adopt—though it is most common in biological mothers.

In Canada, about 7.5% of women report depressive symptoms in the postpartum period, but it is estimated that PPD affects closer to 10–20% of new mothers (as many cases go undiagnosed).



Despite its prevalence, PPD can be difficult for a parent to recognize and seek help for—and by the time they do reach out (that is, *if they do*), the wait for treatment can be long, and the symptoms can be quite severe.

But what if new or soon-to-be mothers could objectively predict their risk of developing PPD—before it even happens?

Would this help them to more quickly identify symptoms and begin treatment faster? And in some cases, could this knowledge help prevent PPD from manifesting altogether?

These are some of the questions Dr. Zachary Kaminsky, DIFD Mach-Gaensslen Chair in Suicide Prevention Research is trying to answer. In a National Institute of Health (NIH)-funded study, he is assessing the mental health outcomes of women with (or at risk for) PPD, who become informed of their risk levels in *advance* of any symptoms presenting themselves.

The risk levels of these women will be predicted through Dr. Kaminsky's recently validated blood test-based biological markers (or "biomarkers"—akin to glucose for diabetes) for PPD.

These biomarkers show that women who are at risk of developing PPD demonstrate specific epigenetic changes (changes in how the gene gets expressed), due to higher sensitivity to the estrogen level changes that occur during pregnancy.

Dr. Kaminsky first discovered these biomarkers during his tenure at Johns Hopkins University, and has spent the past five years testing them through a series of validation studies.

His most recent findings demonstrate that this test is highly predictive in indicating PPD risk at any point in a woman's pregnancy, and works just as effectively in predicting risk in women with or without a previous psychiatric diagnosis.

Now that Dr. Kaminsky has been able to prove the effectiveness of these biomarkers with an 80–90% accuracy rate, his latest study will seek to understand whether this sort of test would actually be useful in a clinical setting.

In collaboration with a research team at Sunnybrook Hospital in Toronto, Dr. Kaminsky is hoping to recruit approximately 1,700 participants to be tested for these PPD biomarkers.

What this study is really trying to understand is whether women who are made aware of their risk levels find the information empowering, and take steps to seek out resources, support and other preventative strategies ahead of actually developing depressive symptoms.

Dr. Kaminsky says that this sort of early detection and prevention strategy for maternal mental health could not only help improve outcomes for new mothers, but for newborns as well.

"If we're able to reduce PPD, we're also helping the next generation, since the postpartum period is a critical time for a baby's neurodevelopment," he says, adding that child neglect during this time can lead to poor mental health outcomes later in life, such as developmental delays, lower IQ, and elevated risk for mental health disorders.

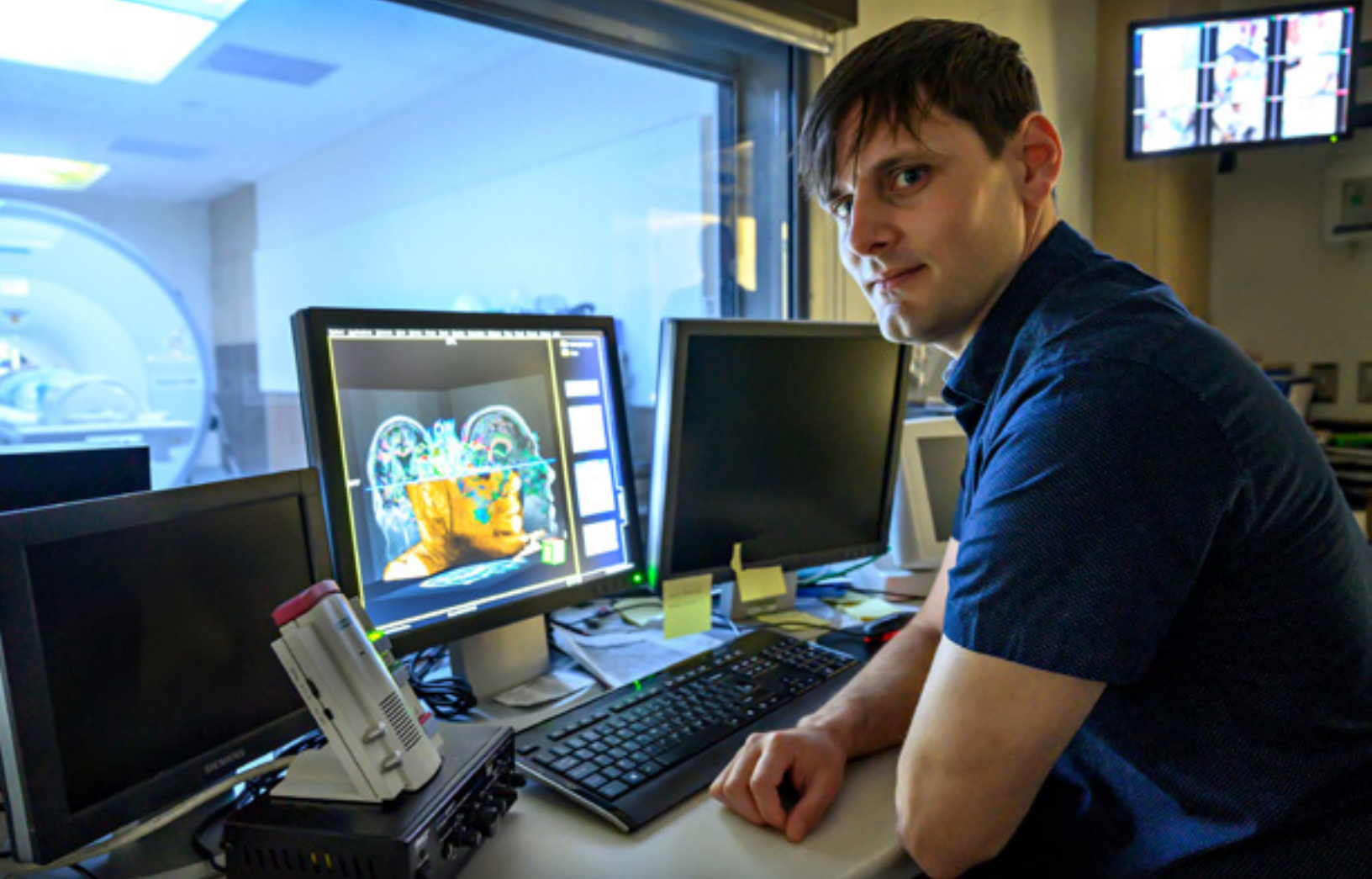
If the new study yields the results he thinks it will—that the knowledge of PPD risk will empower women to seek out help early—Dr. Kaminsky hopes to eventually translate his findings into a clinical blood test that could be administered as part of routine checkups for pregnant women.

"Postpartum depression can really rob people of joy—but with the knowledge that biomarkers can provide us with, we think that we can help reduce unnecessary suffering and help to restore that joy," he says.



An objective test for postpartum depression could help improve outcomes for new mothers and newborns





New brain-based biomarker could lead to an objective test for schizophrenia

While people living with schizophrenia can experience a much-improved quality of life with the right treatment, a number of barriers can stand in the way of their recovery, including delayed or mistaken diagnosis.

Thanks to recently published research in the *Proceedings of the National Academy of Sciences of the United States of America* by Dr. Clifford Cassidy, schizophrenia could soon be diagnosed using a unique and objective brain imaging technique.

Dr. Cassidy, a scientist at The Royal's IMHR has been working with a team at Columbia University in New York City to develop a brain-based

biomarker that can help identify malfunctioning brain cells or neurons, using specific neurotransmitters and harnessing specially configured magnetic resonance imaging (MRI) machines (which are widely available).

This promising new diagnostic tool would help people with schizophrenia get the right treatment faster, and effectively improve their quality of life.

The technique used in the research is called neuromelanin-sensitive MRI (NM-MRI). It has previously been effective in showing the death of particular neurons involved in movement in patients with Parkinson's disease, but its utility



has never been demonstrated in individuals *without* neurodegenerative illnesses—until now.

In this National Institute of Mental Health (NIMH)-funded research, Dr. Cassidy and his team demonstrated that NM-MRI can, in fact, serve as an effective, brain-based “marker” of dopamine function in individuals with psychosis.

Dopamine is a brain chemical that helps regulate movement, attention, learning and emotional responses.

We know from advanced, diagnostic brain imaging techniques like positron emission tomography (PET) that there is excess dopamine release in individuals who are at risk of developing schizophrenia, or who are experiencing psychosis—making the presence of this chemical a good objective diagnostic marker.

However, PET scans can be expensive, invasive and difficult to access within a clinical setting—which means that diagnosis and evaluation of treatment response through the measure of dopamine is rather impractical.

Neuromelanin, on the other hand—a dark pigment created from the breakdown of dopamine—is detectable through much more commonly accessible MRI scans.

Through the use of NM-MRI, Dr. Cassidy was able to validate that neuromelanin can serve as a proxy measure of dopamine; and thus, as a biomarker for psychosis.

“With NM-MRI, we can understand some of the same things that PET tells us, but in a much more practical and accessible way,” he says.

To put things into perspective, there are 366 MRI units in Canada, which, theoretically, would be capable of performing such diagnostic tests, compared to just 51 PET-CT units.

Dr. Cassidy adds that another advantage of this technique is that NM-MRI does not involve injecting radioactive materials, allowing it to be used repeatedly for monitoring the progression of illness and response to treatment.

With evidence in hand showing the effectiveness of this technique, the hope is that it could eventually be integrated into clinical settings, to help psychiatrists make more precise diagnoses faster, and get patients on the correct course of treatment as early as possible.

“In mental health care, we still don’t have widely available diagnostic tests for mental disorders,” says Dr. Cassidy. “This means that psychiatrists still have to rely on a patient’s description of symptoms and clinical behavioural observations in order to make a diagnosis, which can sometimes mean significant trial and error.”



*Dr. Clifford Cassidy
in The Royal’s
Brain Imaging
Centre*

// With NM-MRI, we can understand some of the same things that PET tells us, but in a much more practical and accessible way.”



Looking beyond the brain to treat trauma

Post-traumatic stress disorder (PTSD) has long been one of the most difficult mental illnesses to diagnose and treat.

Many individuals try to hide or downplay symptoms and often do not want to share painful, traumatic events with others. Those in active lines of duty may also try to avoid or manage their symptoms in isolation, due to the expectations of “toughing it out”, or for fear of facing stigma or being sidelined.

In fact, says Dr. Jakov Shlik, Clinical Director of The Royal’s Operational Stress Injury (OSI) clinic, by the time most individuals with PTSD show up at the doors of the OSI Clinic, their symptoms are quite complex and chronic—and are often ones they have been struggling with for decades.

What complicates things even further is that we now know that PTSD has distinct subtypes.

Research recently uncovered a dissociative PTSD subtype (PTSD-DST), which is associated with high PTSD severity, predominance of derealization (the feeling that the external world is unreal) and depersonalization (where parts of the body are perceived as being detached and out of control).

About 15–30% of those with PTSD are estimated to fall under this subtype, rather than the more classic understanding of the disorder, which is associated with hyper-arousal-type symptoms such as difficulty sleeping and becoming easily irritated.

Given our increasing understanding of the complexities of PTSD and the challenges associated with accurate diagnosis, Dr. Shlik has teamed up with a group of researchers at The Royal’s IMHR to identify and translate a novel, whole-body



biosignature to help rapidly detect PTSD (and its associated subtypes), and improve its clinical management.

Currently, PTSD is diagnosed strictly based on the symptoms expressed or reported, rendering the process largely subjective.

This approach can—and does—work when patients report symptoms accurately, and when they are experiencing symptoms associated with the more commonly understood PTSD subtype.

However, we know from research that those in the PTSD-DST group often experience different responses to treatment.

This is why, says Dr. Shlik, our one-size-fits-all approach needs to change.

The new PTSD team study (led by Dr. Zachary Kaminsky, The Royal's DIFD Mach-Gaensslen Chair in Suicide Prevention Research) will combine a number of cutting-edge approaches including genetics and epigenetics; inflammation; electroencephalography (EEG); neuroimaging; sleep; and clinical treatment, to develop a biomarker that could objectively distinguish PTSD-DST from other PTSD sub-types.

The goal of the study will be to translate findings into clinical tools that would enable a whole-body approach to personalized medicine and clinical management of patient needs.

"We hope that this biomarker will help to improve recognition of PTSD-DST, and make our treatment interventions more targeted to the differences between these sub-types in the future," says Dr. Shlik.

He adds that beyond its potential to help treat the brain-based symptoms of PTSD, developing a whole-body biomarker could also help to better manage and treat the many physical symptoms that PTSD can present.

Of the individuals with a PTSD diagnosis being seen at The Royal's OSI clinic, for example, many also have other medical conditions such as musculoskeletal, chronic pain, hearing/vision problems, and sleep disorders.

Many patients also report a number of psychosocial stressors including employment, social relationships, family, financial issues, and transition from the Canadian Forces—issues that require complex support and resources beyond drug or cognitive behavioral therapies.

"[PTSD] is a complex disease, so understanding these biomarkers may help lead us to more personalized treatment, better prognosis and other ways of how to best provide services for those affected," says Dr. Shlik.

Transforming military mental health

This team study is being funded by the Department of National Defence's (DND) Innovation for Defence Excellence and Security (IDEaS) Program, an initiative that is helping to support leading-edge military-related research. PTSD largely affects active duty members of the Canadian Armed Forces (CAF) and veterans, and innovative research in this area is a priority for DND.

Colonel Rakesh Jetly, the Canadian Forces Brigadier Jonathan C. Meakins, CBE, RCAMC Chair in Military Mental Health at The Royal's IMHR, says that being able to objectively identify PTSD with a biosignature has been an international research goal for decades.

"Through these approaches, opportunities to prevent operational stress injuries before they occur could be developed. We will also be able to more quickly identify those adversely affected by combat trauma exposures," says Col. Jetly.

The study's benefits for CAF members in the community could be particularly significant, as the study will leverage key resources and participant referrals from The Royal's OSI Clinic.

Of the approximately 600 registered clients at the OSI Clinic, about 89% of clients are CAF (serving and veteran). In 52% of the total cases that the OSI Clinic sees, PTSD is the primary diagnosis.

Dr. Jakov Shlik



Providing real-time treatment alternatives through depression research

Depression is often a treatable condition—but for some people, conventional and publicly funded therapies such as traditional anti-depressants can be ineffective.

Imagine, then, the promise of a drug for depression that could alleviate symptoms—including suicidal ideation—within minutes, with little to no side effects.

Or, a non-invasive, non-drug brain stimulation therapy that could rapidly and effectively treat individuals for whom drug interventions may not be an option (e.g. youth and the elderly).

Thanks to innovative research being conducted by scientists at the Depression Research Centre at The Royal's IMHR, new alternative therapeutic options such as ketamine treatment and repetitive transcranial magnetic stimulation (rTMS) are here—and they are leading to positive outcomes for some of the 50–60% of individuals for whom little else has worked.

Ketamine shown to provide lasting relief of severe depression

For many people with severe depression who have tried medications but have not found anything that helps, ketamine has proven to be a life-changing (or even life-saving) intervention.

Clinical research has found that small doses of ketamine (an anesthetic agent that has been widely used for over 45 years) can rapidly lower depressive symptoms and reduce suicidal ideation almost immediately—or within hours of infusion.

Thanks to a ground-breaking new study, Dr. Pierre Blier, Director of Mood Disorders Research, along with his research team, has now been able to demonstrate that the effects of ketamine are not only fast—but can be long-lasting, as well.

With this knowledge in hand, Dr. Blier, along with collaborators Dr. Jennifer Phillips, Dr. Natalia



Jaworska and Dr. Lisa McMurray, is working to determine how ketamine treatment measures up to electroconvulsive therapy (ECT)—the current “gold standard” treatment for those with difficult-to-treat depression.

Harnessing the advanced neuroimaging technology at The Royal’s Brain Imaging Centre (and partnering with four other research sites across Ontario and Québec), Dr. Blier and his fellow researchers have just begun a new multi-site study funded by the Ontario Brain Institute through CAN-BIND to compare patients’ response(s) and remission rates with ketamine treatment, versus ECT.

Because ketamine treatment is less expensive and less labour intensive than ECT, says Dr. Blier, the results from this study could be a boon for increasing accessibility to care through treatment alternatives.

Dr. Sara Tremblay (left) and Dr. Lisa McMurray (right) are working together to develop a clinical research platform for rTMS

Building a clinical research platform for rTMS

In contrast to medications that act on particular chemicals in the brain to alleviate symptoms of depression, rTMS directly stimulates the specific brain circuits that are dysfunctional in depression, by delivering a brief magnetic field via a coil placed against the scalp.

This alternative therapy has repeatedly shown very positive outcomes in patients with hard to treat depression, and has been approved by Health Canada since 2002 as a safe and effective option for those who haven’t responded to typical antidepressants. However, rTMS still remains out of reach for many Canadians.

Currently, this therapy is only publicly funded in two provinces—Saskatchewan and Quebec. Those who live in large urban centres with private clinics can pay out of pocket for treatment, but for many, the only other way to access rTMS (much like ketamine) is through research.

This access barrier is why Dr. Sara Tremblay is hard at work developing a clinical-research platform for rTMS, in collaboration with Dr. Lisa McMurray, a psychiatrist at The Royal, and clinical lead of the Electroconvulsive Therapy Service. This platform will be the first of its kind in the Ottawa region, and will help to make rTMS treatment more accessible to people with major depression.

Dr. Tremblay envisions the platform as an in-demand, no-cost treatment option for individuals in the community—the only caveat being that the data gathered would be used for research purposes, to help better predict and refine rTMS treatment on a continuous basis.

In addition to offering much-needed treatment alternatives, Dr. Tremblay hopes that the clinical research platform will also help inform the development of different “brain profiles”.

These profiles could assist in increasing the effectiveness of treatment in the future, by objectively predicting who might respond best to rTMS, ECT, ketamine or other treatments.



05

Giving the Gift of Research

A beautiful mind lives on through support for young researchers

On a sunny day in early spring, J.D. Lees casts a glance outside his office window, where a ray of light is beaming in, and the last traces of winter's snow are melting into a steady stream of droplets on the pane.

"Allie loved this time of year," he says, with a wide but pensive smile.

// By getting involved with research, it does feel like my family and I can make a small difference in helping these students to help improve the lives of others with mental illness."

"In the springtime, she was like a flower—she would just blossom. That's partially how we could tell at first when she was really struggling, as her moods would almost change drastically with the seasons. Winter was usually a much darker time."

J.D. and his older sister Allison were extremely close—only 16 months apart, in fact, to the day.

He recalls most of his favourite memories growing up involving "Allie" (as he affectionately calls her): skiing at Mont Blanc; spending summers at his family cottage on Lac Pemichangan; nervously showing up for his first day of ninth grade at Lisgar Collegiate Institute, only to find that all of the older students already knew who he was because of his sister.

As they grew up, J.D. says that his relationship with Allison remained strong, but her struggles with intermittent periods of depression—and an eventual diagnosis of bipolar disorder in her late teens became difficult for their family.

Allison tried many different medications over the years, but struggled with the side effects, as well as with her diagnosis.

She eventually took her life in 2007, at the age of 27.

In the twelve years since losing his sister, J.D. and his family have experienced extreme feelings of grief and loss that no one should ever have to bear.

But they've also taken those experiences and have turned them into something hopeful: a fund established in Allison's memory through The Royal's Foundation that has been helping to support young scientists at The Royal's IMHR.

Through the *Allison Lees Depression Research Fund*, J.D. and his family currently support the IMHR's annual Graduate Student Research Awards, along with two other families who have also lost beloved young women in their lives to mental illness.

Together with the *Jennie James Depression Research Fund* and the *Louise Helen Waddington Research Fund*, Allison's fund provides research and



J.D. Lees holds a favourite photo of his sister Allison

educational opportunities to promising graduate students at The Royal's IMHR who are making important strides towards better understanding mental illness in the brain, and subsequently helping to inform new prevention and treatment strategies.

J.D. says that his family's experience getting to know these bright young students over the years has given his family some much needed hope that the research they are helping to support

will prevent future suffering for other families like them.

"By getting involved with research, it does feel like my family and I can make a small difference in helping these students to improve the lives of others with mental illness," he says. "The thought that we can play a role in just one or two people getting better really does help with the healing process."

Congratulations to Michael Iro, Emma Lynn and Patricia Burhunduli—the 2018 recipients of the IMHR Graduate Student Research Awards.

Through their academic work, these young researchers are currently making important strides in understanding the biological underpinnings of depression and suicide (Patricia); investigating the effects of a cutting-edge anti-depressant alternative on brain activity (Michael); and improving daily cognitive functions for formerly depressed individuals to help reduce the risk of relapse (Emma).

Meet the next generation of leaders in mental health research

They're seven young scientists with the potential to revolutionize mental health care.

They're the Emerging Research Innovators in Mental Health (eRIM^h), part of an innovative incubator program designed by The Royal's IMHR, thanks to a record \$6 million donation from an anonymous benefactor.

"These young men and women will usher in a new age in mental health research," says Dr. Zul Merali, IMHR's President & CEO.

// Using PET and functional MRI, I would like to understand how brain processes work to generalize fear responses. Combining these two imaging technologies can potentially inform us on the biology leading to mental illness, and open new doors for treatment." —DR. LAURI TUOMINEN

"We are creating an ecosystem where the best and brightest early career-researchers get a chance to boost their careers while helping to build much-needed capacity in mental health research."

To launch this initiative, a worldwide search was conducted for the best and brightest young researchers. By June 2018, all seven eRIM^h scientists had been chosen by a blue-ribbon selection committee.

Now integral members of the IMHR team, the eRIM^h scientists are working in a supportive environment alongside experts in their field (both



researchers and clinicians), with salary and grant support for up to five years.

Over the past year, they have each hit the ground running in terms of building their research teams; designing and piloting cutting-edge studies; and establishing critical partnerships and collaborations with other researchers, clinicians and patient partners, who are helping them to effectively drive innovation forward.

"By fuelling the careers of bright young minds willing to defy convention and explore new approaches, curiosity can lead to new ways to prevent, diagnose and treat mental illness," said the anonymous donor in a written statement.

"Curiosity is a driver of innovation and mental health needs more of it."

eRIM^h year one: A brave new experiment in curiosity and collaboration

Our seven eRIM^h scientists have diverse interests, but they are all intently focused on research that will make a difference for people living with mental illness. Here's what they've been up to for the past year:



Left to right: Dr. Michael Bodnar; Dr. Sara Tremblay; Dr. Rébecca Robillard; Dr. Synthia Guimond; Dr. Lauri Tuominen; Dr. Robyn McQuaid; Dr. Natalia Jaworska

Dr. Synthia Guimond is working on better understanding cognitive deficits through neuroimaging, and developing tailored cognitive rehabilitation therapies for schizophrenia patients.

Dr. Sara Tremblay is conducting research into the powers of brain stimulation using repetitive transcranial magnetic stimulation (rTMS) therapy. She aims to develop a better standard of care for people seeking non-invasive, non-drug therapies.

Dr. Lauri Tuominen is using combined PET-MRI technology at The Royal's Brain Imaging Centre to understand how brain processes work to generalize fear responses. This cutting-edge neuroimaging approach could inform us on the biology leading to mental illness and open new doors for treatment.

Dr. Rébecca Robillard is uncovering new ways to assess and treat mental illness through sleep research, and is working to implement a sleep intervention program tailored for patients with depression.

Dr. Natalia Jaworska is using clinical electroencephalography (EEG) to monitor brain activity patterns, as well as neuroimaging techniques (e.g. fMRI) to research depression in adolescents and develop more personalized interventions.

Dr. Robyn McQuaid is working with Indigenous peoples and youth to try to understand how external factors can impact one's brain biology and contribute to mental health issues both personally and inter-generationally.

Dr. Michael Bodnar is developing a greater understanding of the negative symptoms of schizophrenia (e.g. loss of motivation, apathy, lack of social interest), and is helping to inform the creation of new, more individualized evaluations and therapies for schizophrenia patients.

// I have developed a clinically-based research evaluation (CBRE) system to collect data over a two-year follow-up period in people with schizophrenia. I have also worked on the negative symptoms neuroimaging project that will run concurrently with the CBRE project. The overarching goal of both of these projects is really to create new, more individualized therapies for schizophrenia patients."

—DR. MICHAEL BODNAR

Preventing child maltreatment from leaving a (mental) mark

Dr. Tracie O. Afifi has spent much of her career so far making some truly terrible discoveries.

For years, the accomplished mental health researcher has pored over data she has collected related to child maltreatment, and has learned of disturbing consequences of physical, sexual and emotional abuse and neglect involving children.

// Just knowing that my research might help prevent one or two—or many—children not to experience abuse makes it all worthwhile.”

Time and again, her research has found that the impact of child maltreatment is enduring, and does not go away once affected individuals reach adulthood; instead, it often translates into mental health disorders later in life.

Though she admits it is a difficult area of research to work in, Dr. Afifi says what really motivates her is how resilient children are.

As the 2018 winner of the prestigious Royal-Mach-Gaensslen Prize for Mental Health Research, Dr. Afifi, an associate professor at the University of Manitoba and a research scientist at the Children’s Hospital Research Institute of Manitoba, plans to use her \$100,000 award to help uncover new, innovative strategies for child abuse prevention and mental health interventions.

Dr. Afifi’s team is working to put together a cohort of adolescents who have experienced childhood maltreatment—but haven’t developed mental health disorders (or other poor mental health outcomes).

By understanding what factors have led these individuals to be more resilient, Dr. Afifi hopes to build programs and provide evidence-based recommendations to policy makers, community-based organizations and healthcare professionals, to help improve outcomes for those who have experienced trauma.

“We’re trying to learn what is it in [these individuals’] lives that contributed to their resiliency, whether it is at the individual level, or within their family, in the school, or in the community—essentially, what factors are contributing to better mental health outcomes for these people,” she says.

“Just knowing that my research might help prevent one or two—or many—children not to experience abuse makes it all worthwhile.”

The Royal-Mach-Gaensslen Prize for Mental Health Research, established in 2015, celebrates early-career researchers in the area of mental health, and encourages them to continue their work in Canada. The prestigious national prize, awarded jointly by the Mach-Gaensslen Foundation of Canada and The Royal’s IMHR recognizes excellence in clinical research, innovative thinking, collaboration, and imagination.

In her career so far, Dr. Afifi’s research has generated significant global media attention, and has informed policy. She has also received numerous awards, including the prestigious CIHR Gold Leaf Prize for Outstanding Achievements by an Early Career Investigator (2019).



Dr. Tracie O. Afifi

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