Research is **Care**

Report to the IMHR Board
Fiscal Year **2024**

University of Ottawa
Institute of Mental Health
Research at The Royal

The | Le Royal
Mental Health - Care & Research
Santé mentale - Soins et recherche

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Letter from the Chair

Reflections from 2019

It has been an honour to have served as the board chair of IMHR for the past five years and I am delighted to welcome Michael Von Herff as the incoming chair; his previous board tenure and experience will be a great asset for the organization. During my time as Chair, I have seen the IMHR evolve from being a discrete research institute into a fully integrated mental health care-enabling enterprise. Our new purpose, that Research IS Care, underpins the whole rationale of what we do, and why we do it.

During my tenure, IMHR has seen a transformation of leadership and I wish to express my thanks to Florence Dzierszinski for her incredible stewardship, along with the whole IMHR team of passionate researchers and scientists, for their amazing work and dedication. Under Florence's leadership and management, IMHR has established itself as one of the country's top research institutes in mental health. Our grants have more than doubled in the past five years. Similarly, our collaborative research partnerships have now established IMHR as partner in research across the country. I am very excited that our new integrated Strategic Research Plan will be launched shortly; it will be a game changer for IMHR, patients and families.

We have seen some great board members transition during my time as Chair, and I would like to thank past directors for their excellent work and support to the IMHR. We continue to recruit great leaders and experts to our board and our committee chairs have provided tremendous direction, ensuring our board is operating at a world class level. Our track record on improving board diversity is, for example, a testament to our advocacy and governance strength.

When I think about changes over the past five years, certain significant impacts come to mind. The Brain Imaging Centre is now truly established as a keystone for all our research programs. More than four thousand scans since inception have contributed to our research programs and clinical trials. We have seen the establishment of our rTMS clinic, the Esketamine clinic and now we have created our program of Interventional Psychiatry, where patients can receive ground-breaking access to research that can change their lives.

The IMHR continues to innovate in new ways to help patients and families, Music and Mental Health, Virtual Reality and Cognition, clinical trials to help burnout in healthcare workers, are all examples of how IMHR is changing the world.

Finally, I am very proud of how IMHR has become an integral part of the Royal Ottawa Health Care group. All three board chairs of The Royal, The Foundation and the IMHR operate together to ensure we are working as a singular team to bring improved access and outcomes to patients and families. The IMHR is truly making a difference to access, diagnosis, treatment and prevention of mental health and addiction disease. It has been a privilege to be part of this transformation and I am sure that IMHR will continue to have a major beneficial impact on our community.

Steven M. West
Chair of the Board, IMHR

Lettre du président du Conseil d'administration

Réflexions depuis 2019

Ce fut un honneur d'avoir présidé le conseil d'administration de l'IRSM au cours des cinq dernières années et je suis ravi d'accueillir Michael Von Herff en tant que nouveau président ; son mandat antérieur au sein du conseil d'administration et son expérience seront un grand atout pour l'organisation. Au cours de ma présidence, j'ai vu l'IRSM passer d'un institut de recherche individuel à une entreprise pleinement intégrée facilitant les soins de santé mentale. Notre nouvel objectif, à savoir que la Recherche, c'est le Soin, sous-tend toute la logique de ce que nous faisons et pourquoi nous le faisons.

Au cours de mon mandat, l'IRSM a vu une transformation du leadership et je tiens à exprimer mes remerciements à Florence Dzierszinski pour son incroyable intendance, ainsi qu'à toute l'équipe de chercheurs et de scientifiques passionnés de l'IRSM, pour leur travail et leur dévouement incroyables. Sous le leadership de Florence, l'IRSM s'est imposé comme l'un des meilleurs instituts de recherche en santé mentale au pays. Nos subventions ont plus que doublé au cours des cinq dernières années. De même, nos partenariats de recherche collaborative ont désormais permis à l'IRSM de devenir partenaire de recherche à l'échelle du pays. Je suis très heureux que notre nouveau plan de recherche stratégique intégré soit lancé prochainement ; cela changera la donne pour l'IRSM, les patients et les familles.

Nous avons vu d'excellents membres du conseil d'administration effectuer une transition au cours de mon mandat à titre de président, et j'aimerais remercier les anciens administrateurs pour leur excellent travail et leur soutien à l'IRSM. Nous continuons de recruter d'excellents leaders et experts pour notre conseil d'administration et nos présidents de comités ont fourni une orientation formidable, garantissant que notre conseil d'administration fonctionne à un niveau de classe mondiale. Notre bilan en matière d'amélioration de la diversité au sein du conseil d'administration témoigne, par exemple, de notre force en matière de plaidoyer et de gouvernance.

Quand je pense aux changements survenus au cours des cinq dernières années, certains impacts importants me viennent à l'esprit. Le centre d'imagerie cérébrale s'impose désormais véritablement comme la clé de voûte de tous nos programmes de recherche. Depuis sa création, plus de quatre mille analyses ont contribué à nos programmes de recherche et à nos essais cliniques. Nous avons assisté à la création de notre clinique rTMS, la clinique Esketamine, et maintenant nous avons créé notre programme de psychiatrie interventionnelle, où les patients peuvent bénéficier d'un accès novateur à des recherches qui peuvent changer leur vie.

L'IRSM continue d'innover dans de nouvelles façons d'aider les patients et leurs familles. La musique et la santé mentale, la réalité virtuelle et la cognition, les essais cliniques pour lutter contre l'épuisement professionnel chez les travailleurs de la santé sont autant d'exemples de la façon dont l'IMHR change le monde. Enfin, je suis très fier de la façon dont l'IRSM est devenu partie intégrante du groupe des soins de santé du Royal. Les trois présidents des conseils d'administration du Royal, de la Fondation et de l'IRSM travaillent ensemble pour garantir que nous travaillons comme une équipe unique afin d'améliorer l'accès et les résultats pour les patients et leurs familles. L'IRSM fait véritablement une différence en matière d'accès, de diagnostic, de traitement et de prévention des maladies mentales et des dépendances. Ce fut un privilège d'avoir fait partie de cette transformation et je suis sûr que l'IRSM continuera d'avoir un impact bénéfique majeur sur notre communauté

Steven M. West
President du Conseil d'administration, IRSM

Letter from the President

There is no single metric that can sufficiently capture the success of a research organization. Rather, success is more accurately communicated by the many individual improvements and achievements over the course of a year – the number of studies and clinical guidelines published, the number of implementations into practice, the number of clients receiving care through research, the value of individual or team / interdisciplinary grants received, the number of patents or licences, prizes and accolades, etc. In the following pages, we have highlighted some of the successes that contributed to an excellent year for Research at The Royal/IMHR. Not all successes can be reduced to a data point, of course, though sometimes those have the greatest impact.

One of the most important things we do, by bringing research to the point of care, is provide the opportunity for those living with mental illness to contribute to a better future – not only for themselves, but also for those who follow. Because Research is Care. The impact of that cannot be captured in a number, but it is core to who we are and what we do.

A new feature in this year's annual report highlights a few of the important research papers published by our scientists and clinician scientists. We wanted to give people an opportunity to dig into the science and better understand the questions we are pursuing to prevent, diagnose and treat mental illnesses. In reviewing the list, you are likely to focus in on the titles. Unless you happen to be or know one, you might ignore the sometimes long list of researchers – for instance, one article includes 14 co-authors. Detailing an important breakthrough in neuroimaging and PTSD research, that article is a marker of success for the IMHR. But so too is the list of 14 people who contributed to that work, including eight IMHR-affiliated scientists and five research staff and trainees. It represents to me a core success – having created the conditions for interdisciplinary collaboration that drive results faster while highlighting early career researchers' innovative approaches.

The American hedge fund manager, mathematician, and philanthropist Jim Simons, who died recently, reportedly said "The best way to conduct research on a larger scale is to make sure everyone knows what everyone else is doing... The sooner the better – start talking to other people about what you're doing. Because that's what will stimulate things the fastest."

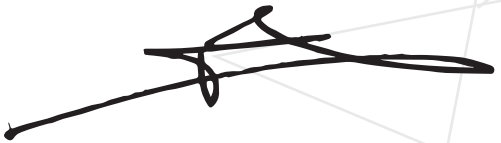
I would go one step further. At the IMHR, it's also about deliberately bringing together a broad range of expertise and experience to tackle puzzles we are trying to solve from many angles. I feel so strongly about the power of such teams that we have shaped our strategy around this tenet.

Over the past year, we have developed our first formal strategic research plan at The Royal/IMHR – a core document that will drive our focus over the coming years, while evolving with us. The plan is designed to guide the research organization towards priority research areas, in allocating resources, and exploring ideas. At the core of this research plan is talent.

Our success in delivering this plan hinges on five pillars, most importantly our ability to attract and retain great Talent and then empower them to succeed. This annual report shares our progress across that and the four other pillars that underpin our success: do Great Research that has impact; create strong Partnerships to both stretch funding and bring together collaborators; build a Brand and Advocacy ability to both attract the best team mates, partners and donors, and to support the translation of research into practice; and make sure that the Funding is there – both for the organization and for the researchers themselves, so they are free to pursue the endless mysteries about mental health that are still yet to be tackled.

In this year's report, we have made a point of profiling and celebrating the talented people that have contributed to our success this year. Thank you to each of you who engaged in our research this year – scientists, clinicians, clients and their family, learners, technicians and administrative staff, donors and fundraisers, and our board members. Each of you plays an important and necessary role in creating hope for those living with mental illness.

Sincerely,



Florence Dzierszinski, PhD
President, IMHR / Vice President Research, The Royal

Lettre de la présidente

Il n'existe pas de mesure unique capable d'évaluer suffisamment le succès d'un organisme de recherche. Le succès est plutôt communiqué avec plus de précision par les nombreuses améliorations et réalisations individuelles au cours d'une année – le nombre d'études et de lignes directrices cliniques publiées, le nombre de mises en pratique, le nombre de clients recevant des soins grâce à la recherche, la valeur des soins individuels. ou les subventions d'équipe/interdisciplinaires reçues, le nombre de brevets ou de licences, les prix et distinctions, etc. Dans les pages suivantes, nous avons souligné certaines des réussites qui ont contribué à une excellente année pour la recherche au Royal/IRSM. Bien entendu, tous les succès ne peuvent pas être réduits à un point de données, même si ceux-ci ont parfois le plus grand impact.

L'une des choses les plus importantes que nous faisons, en amenant la recherche au point de service, est de donner la possibilité aux personnes vivant avec une maladie mentale de contribuer à un avenir meilleur – non seulement pour elles-mêmes, mais aussi pour celles qui suivront. Parce que la recherche est un soin. L'impact de cela ne peut être chiffré, mais il est au cœur de qui nous sommes et de ce que nous faisons.

Une nouvelle fonctionnalité du rapport annuel de cette année met en lumière quelques-uns des documents de recherche importants publiés par nos scientifiques et cliniciens-chercheurs. Nous voulions donner aux gens l'occasion d'approfondir la science et de mieux comprendre les questions que nous étudions pour prévenir, diagnostiquer et traiter les maladies mentales. En examinant la liste, vous vous concentrerez probablement sur les titres. À moins d'en être ou d'en connaître un, vous risquez d'ignorer la liste parfois longue des chercheurs – par exemple, un article comprend 14 co-auteurs. Détaillant une avancée importante dans la recherche en neuroimagerie et sur le TSPT, cet article est un marqueur de succès pour l'IRSM. Mais il en va de même pour la liste de 14 personnes qui ont contribué à ce travail, dont huit scientifiques affiliés à l'IRSM et cinq chercheurs stagiaires. Cela représente pour moi une réussite fondamentale : avoir créé les conditions d'une collaboration interdisciplinaire qui permet d'obtenir des résultats plus rapidement tout en mettant en valeur les approches innovantes des chercheurs en début de carrière.

Le gestionnaire de fonds, mathématicien et philanthrope américain Jim Simons, décédé récemment, aurait déclaré : « La meilleure façon de mener des recherches à plus grande échelle est de s'assurer que tout le monde sache ce que font les autres... Le plus tôt sera le mieux – commencez. parler à d'autres personnes de ce que vous faites. Parce que c'est ce qui stimulera les choses le plus rapidement.» J'irais encore plus loin. À l'IRSM, il s'agit également de rassembler délibérément un large éventail d'expertises et d'expériences pour aborder des énigmes que nous essayons de résoudre sous plusieurs angles. Je suis tellement convaincue du pouvoir de telles équipes que nous avons façonné notre stratégie autour de ce principe.

Au cours de la dernière année, nous avons élaboré notre premier plan de recherche stratégique officiel au Royal/IRSM – un document de base qui guidera nos priorités au cours des prochaines années, tout en évoluant avec nous. Le plan est conçu pour guider l'organisation de recherche vers les domaines de recherche prioritaires, dans l'allocation des ressources et l'exploration d'idées. Le talent est au cœur de ce plan de recherche.

Notre réussite dans la mise en œuvre de ce plan repose sur cinq piliers, le plus important étant notre capacité à attirer et à retenir les meilleurs talents, puis à leur donner les moyens de réussir. Ce rapport annuel partage nos progrès dans ce domaine et dans les quatre autres piliers qui sous-tendent notre succès : mener une recherche de qualité qui a un impact ; créer des partenariats solides pour à la fois étendre le financement et rassembler les collaborateurs ; développer une capacité de marque et de plaidoyer pour à la fois attirer les meilleurs coéquipiers, partenaires et donateurs, et soutenir la mise en pratique de la recherche ; et assurez-vous que le financement est là – à la fois pour l'organisation et pour les chercheurs eux-mêmes, afin qu'ils soient libres de poursuivre les mystères sans fin de la santé mentale qui restent encore à résoudre.

Dans le rapport de cette année, nous avons mis un point d'honneur à présenter et à célébrer les personnes talentueuses qui ont contribué à notre succès cette année. Merci à chacun d'entre vous qui a participé à notre recherche cette année – scientifiques, cliniciens, clients et leur familles, apprenants, techniciens et personnel administratif, donateurs et collecteurs de fonds, ainsi que les membres de nos conseils d'administration. Chacun d'entre vous joue un rôle important et nécessaire dans la création d'espoir pour les personnes vivant avec une maladie mentale.

Sincerely,

Florence Dzierszinski, PhD
présidente / vice-présidente - recherche, Le Royal

A year of progress

In 2023 we outlined 15 developments to watch for the fiscal year ended March 31, 2024. We are proud to confirm the delivery of each them among our accomplishments.

Great Research

Further developed the interventional platform of the Clinical Brain Research Centre

Developed the digital platform with predictive capability at the Brain Imaging Centre in partnership with CAMH and the Heart Institute

Further developed our work with community partners

Strategic Research Plan developed

Scientific Advisory Council formed

uOttawa affiliation agreement and associated research agreement executed

Further developed interprofessional research and knowledge mobilization portfolio

Talent & Culture

Developed a tailored talent plan to support the Strategic Research Plan and successful hires

Partnerships

Deepened existing partnerships, for example with uOttawa and Wabano

Scoped development of private sector and governmental partnerships

Brand, Reputation & Advocacy

Branding / Identity work led by the Foundation initiated

Advocacy with HealthCareCAN on federal budget and research funding

Funding

$2 million gift to the BMO Innovative Clinic for Depression

CFI proposals reviewed, 3 awarded

Further diversification of funding portfolio

Participation in large initiatives as opportunities arise

FY2024 in Numbers (vs FY2023)

Value of grants awarded:
$8.3 million vs **$7.3 million**

Active research grants: **201** vs **175**

20 vs **18**
Scientists:

Peer review publications: **186** vs **245**

REB approved studies active:
166 vs **156**

Visiting Scholars:
13 vs **7**

155 vs **138**
New grant submissions:

Volunteer hours contributed:
3164 vs **2404**

New grants awarded: **68** vs **56**

Postdoctoral fellows: **11** vs **11**

Regulatory training modules completed: **428** vs **274**

Students:
86 vs **74**

Clinical Investigators:
36 vs **48**

Research Agreements executed:
105 vs **69**

A New Strategic Research Plan

While there are limitless questions to be explored related to mental health, prioritizing a select group of them allows us to create a roadmap for the areas on which we will focus our attention and resources at The Royal and its University of Ottawa Institute of Mental Health Research (IMHR). In the past year, we developed our hospital's first integrated Strategic Research Plan, which outlines our areas of excellence and how we will build on them in our current ecosystem.

The Strategic Research Plan is anchored on the unique opportunities provided by having a research institute embedded in a hospital to increase access to evidence-based care through cutting-edge research and technology, and by bringing research at the point of care. We ensure we take advantage of our hospital setting by creating interprofessional and interdisciplinary teams of researchers, clinicians, learners, administrative and operational staff, patients and their families. A research question can come from anywhere in our organization, anywhere in our community, and we build teams to pursue those questions that bring different experiences and expertise to the table.

The Strategic Research Plan is spearheaded by the IMHR Integrative Research Committee and IMHR Senior Management. It identifies four top-level goals.

1. Focus on Distinctive Research Areas: We aim to propel The Royal's impact by concentrating on specialty areas such Depression and Anxiety, Trauma and Stress-related disorders, Severe and Complex Mental Illness, Intersection of Substance Use and Mental Health, and Mental Health in Equity-Deserving and At-Risk Populations. Sleep, Cognition, Suicide Prevention and Culture/Gender, Advanced and Predictive Analytics, Music encompass multiple specialty areas.

In each specialty concentration, we will build up research programs addressing: Key determinants of illness, Person-tailored care pathways, Novel and integrative diagnostics and interventions approaches, Health promotion and prevention solutions, and Evidence-based practice and policy.

2. Establish a Rapid Learning Health System: By integrating data and research insights directly into clinical practice, we are making strides towards becoming a learning organization that continually improves patient care.

3. Bridge the Discovery-Impact Gap: Our objective is to enhance the translation of research findings into tangible benefits for patients, families, and society at large. We cannot wait the typical 17 years to bring our innovations to care.

4. Achieve Global Recognition: We strive to position The Royal as a leading academic health science center in mental health research and innovation.

The Strategic Research Plan naturally provides more detail on each of the goals and priority areas and how we will achieve them. It was created through the engagement across our ecosystem and participation of our team members, our partners, deep analysis of our strengths and opportunities and through benchmarking of peer organizations. At the end of the fiscal year, the Plan had received support from Scientists, our Client and Family advisory councils, senior leadership, the Medical Advisory Committee, Hospital and Foundation Board Chairs and executives, with approval from the IMHR Board anticipated in early FY25. A presentation to our recently established Scientific Advisory Council, which includes internationally renowned researchers and clinicians, is planned.

Research Environment

In FY24, we undertook a number of activities to ensure that we maintain or exceed expectations related to Research Quality and Compliance.

- We launched a training blitz in February, providing compliance and regulatory training for research staff at the IMHR.
- In the fourth quarter, we circulated a Research Participant Satisfaction survey to ensure that we are meeting our client expectations.
- The REB and IMHR leadership jointly conducted a routine clinical trial monitoring visit in the fourth quarter under the Quality Assurance for Research Excellence (QARE) program, an internal audit program.
- The benefit of investing in the development of strong foundational practices when starting a clinical trial through collaboration and consultation with the QARE team was demonstrated in a study that aimed to assess off-label use of adjunct psychostimulants in patients with schizophrenia in a tertiary mental health centre, focusing on efficacy and safety. Dr. Naista Zhand and her research team are successfully completing a clinical trial that meets the regulatory requirements as set out in the Health Canada Division 5 Food and Drug Regulations as well as the International Good Clinical Practice guidelines. Thank you to Tammy Beaudoin and Alexis Dorland.

Research Governance

In 2023, we created the Scientific Advisory Council (SAC) with the mandate to inform, challenge and catalyze our new Strategic Research Plan and its implementation in the context of The Royal's integrated strategy. To achieve excellence in research, care and education, we know that The Royal/IMHR must push the boundaries of knowledge and integrate approaches across disciplines. The SAC will identify and connect the ideas upon which we build a game changing scientific strategy, incorporating the notions of equity, diversity, inclusion, indigeneity and accessibility, inter/transdisciplinarity, cross-sectoral partnership development, knowledge mobilization and entrepreneurship.

The SAC sits alongside our IMHR Integrative Research Committee in guiding our research at The Royal/IMHR.

Scientific Advisory Council Members

Jocelyn Côté, PhD
Jeff Daskalakis, MD, PhD
Florence Dzierszinski, PhD
Chris Fennell, PhD
Rafik Goubran, PhD, PEng
Andrew Greenshaw, PhD
Damian Jankowicz, PhD
Ruth Lanius, MD, PhD
Bernard Le Foll, MD, PhD
Marco Leyton, PhD
Frank MacMaster, PhD
Jennifer Payne, MD
Jennifer Phillips, PhD
Mark Salter, PhD
Dawn Stacey, RN, PhD

Research Operations and Planning Advisors

Research Council

Reporting to Florence Dzierszinski, the inter-professional Research Council is an operations-level committee that brings together researchers, functional leaders and front-line clinicians from across The Royal to promote research and evaluation, and the integration of research, care, and education.

Research Ethics Board

Reporting to the Royal Ottawa Health Care Group Board of Trustees via its Quality committee and comprising 12 experts in the field without conflict of interest, the Research Ethics Board reviews and provides ethics oversight of all research involving human participants at The Royal including the IMHR.

Scientific Advisory Council

Formed in 2023 and reporting to Florence Dzierszinski and Jennifer Phillips, the Scientific Advisory Council (SAC), comprises external experts in mental health research, including representatives from the University of Ottawa and Carleton University.

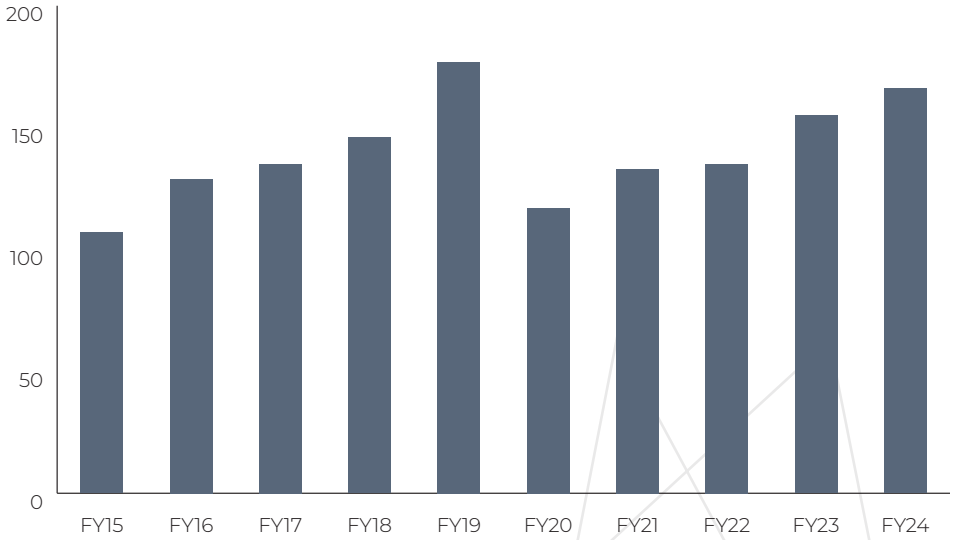
Research Ethics Board Activity

Providing access to care through research creates hope for clients for whom other treatments haven't provided the desired support, but we are ever mindful of the ethical considerations of research involving clients with mental illnesses. The Research Ethics Board (REB) at The Royal exists to ensure an ethical lens on all proposed research before that research starts.

Comprising 12 voting members from the community with varied backgrounds including law, pharmacy, social work, nursing and psychiatry, as well as both researchers and clients, the REB is charged with determining the ethical acceptability of all research involving human participants at the ROHCG or by the investigators/personnel of the institution, as well as reviewing adverse event reports; conducting continuing annual review; and reviewing amendments before they are implemented.

Because all research projects must be approved by the REB before beginning, the activity levels of the REB provide an excellent indicator of the overall level of research activity at the IMHR.

Total Active/ Approved Studies



In FY24, the volume of research activities at IMHR increased by 7%, and has climbed 42% over FY20 activity, highlighting recovery from the COVID-19 pandemic, with unfortunate delays, however.

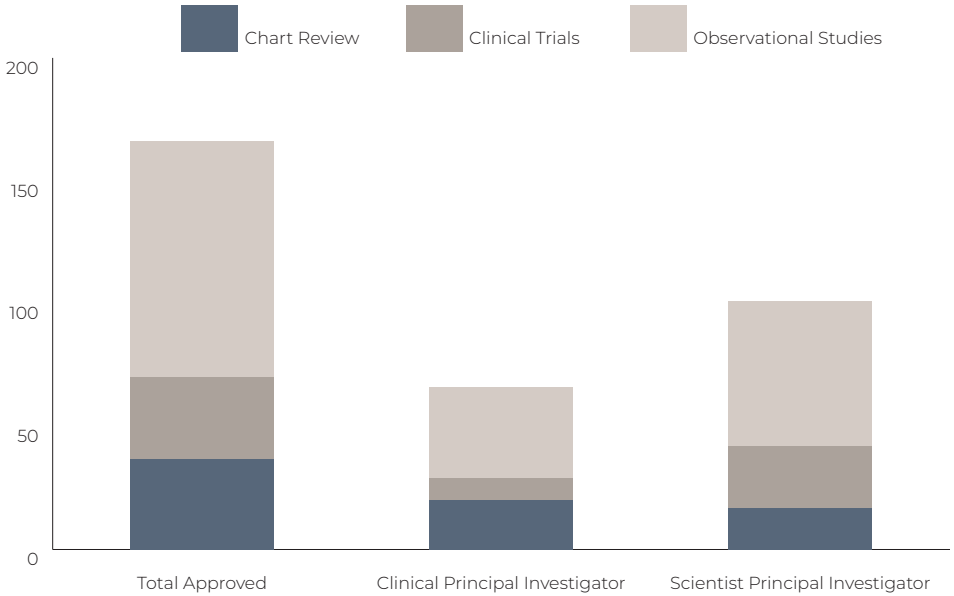
This year, we worked with The Ottawa Hospital and its Ottawa Hospital Research Institute to simplify the approval process for collaborative research. Previously, both institutions had to approve research proposals. With a new bilateral agreement, time for review will decrease at least by half, since the REB at one site will accept the REB decision at the other site, eliminating the double review process.

REB training continues and new sessions are under development. The beta version of the REB system was launched in April 2024.

Research Ethics Board Members

Dominique Bourget, MD
Carin Campbell, RN, BSc, BScN, CPMHN(C)
Alan Douglass, MD
Janice McFarlane, MSW, RSW
Ann-Marie O'Brien, MSW, RSW
Glenda O'Hara, BComm (Hon)
Olabisi Owoeye, MD
Nelson Pearce, BSc (Hon), BSc Pharm
Pierre Robichaud, BASc, LLB, P.Eng
Michael Seto, PhD
Jennifer Shamess, M.Sc
Caitlin Sigg, MA, RP, Phd (c)
Reggie Taylor, PhD
Amanda Paliotti, BCogSci (non-voting)
Alexis Dorland, MSc, (non-voting)

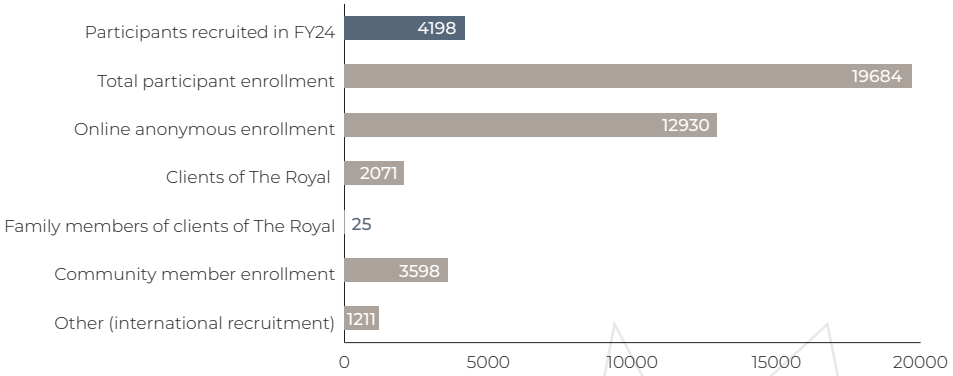
Types of Studies by Lead Investigator



We could not conduct the research we do without the generous support of research participants, who commit time and energy and put their trust in our work. We recruit participants from among clients of The Royal, but also the general public. The data below represent a new baseline to measure growth.

Participant Recruitment Across 166 Active Studies FY24

(Cumulative enrollment from date of initial study approval)



Over the last few years we have worked ensure that all clients of The Royal are aware of the opportunity to participate in research. Doing so can sometimes provide clients access to cutting-edge treatments that are not funded by the government or private health insurance. What we have learned as we better communicate opportunities to participate is that there is a strong demand to get involved, from within The Royal, in the community and even abroad.

The research participant satisfaction was launched in May 2023 and to date, has been sent to 300 participants, with an average response rate of 18%. The majority of respondents indicated that this was the first time they had participated in a clinical research study. Overall, the feedback from respondents was very positive: 85% were satisfied with the overall experience, 80% would recommend research participation to a family member or friend and 95% indicated that they would take part in another research study if given the opportunity.

We will continue to circulate the satisfaction survey and will add questions that align with the strategic research plan, including measuring the integration of research into care and ongoing quality improvement initiatives for the research enterprise. Congratulations and thank you to Ann-Marie O'Brien (REB Chair), Tammy Beaudoin and Alexis Dorland.

Guiding IMHR Research Through the Lens of Lived Experience – Glenda O'Hara

After many years of volunteerism representing clients across activity at The Royal, including as Chair of the Client Advisory Council, O'Hara joined the REB in 2023. It opened a whole new world to her. "Its raison d'être is to protect the participants of research and it's just a great experience," O'Hara said.

The process to join was rigorous, O'Hara said, requiring a lot of reading and learning, as well as testing to demonstrate appropriate levels of knowledge for the role.

During the first year on REB, O'Hara said she has embraced the large amount of reading every month and feels the work is very rewarding. She has joined a wonderfully diverse group to discuss exciting new research which provides hope for the future of mental health and substance use care.

O'Hara is also a voting member of the IMHR's Integrative Research Committee, which oversaw the development and execution of the Strategic Research Plan.

"Having a vote is even better than having a voice," O'Hara said. "It ensures the client's voice is heard and counted. The IMHR is leading the charge in ensuring client and family voices are part of everything they do."

O'Hara applauds the new Strategic Research Plan with goals of reducing the gap between discovery and impact for clients and families and distinctive research in specialty areas. The words "Research is Care" are quite meaningful to O'Hara as she feels that these words define the collaboration of research with clients and families, as well as with the community, clinicians and academics.

Research Infrastructure

Over the last year, we have worked to develop our research information technology team to provide technological support for our researchers, given the sophisticated data and technological advances in brain research. We hired Owen Clarkin as a dual report to IT and research, and we have additional hires planned for FY25, including staff hired to support the Cardio-Neuro-Mind Data Platform.

Development the Cardio-Neuro-Mind Data Platform

Research shows a strong connection between the brain and the heart. Cardiac patients often show psychiatric symptoms such as anxiety and depression, for example, and people with major depressive disorder, bipolar disorder and anxiety disorders often show abnormalities in heart functions. Understanding these connections is crucial for developing innovative strategies for prevention, diagnosis, and treatment. However, current medical practices often treat these conditions in isolation, even within the same individual; this fragmented approach hinders comprehensive care. This is the central theme of the recently awarded CFREF grant 'Brain-Heart Interconnectome' led by uOttawa ($109 million), with Dr. Peter Liu (Heart Institute) and Dr. Ruth Slack (uOttawa Brain and Mind Research Institute), in partnership with all affiliated academic hospitals in Ottawa, McGill University, and SaskU.

Since 2021, we have been working on the development of the Cardio-Neuro-Mind Data Platform (CNMDP), funded by the Canada Foundation for Innovation (CFI, Innovation Fund 2020, $3.5 million to the IMHR). The CNMDP is a multi-centre research data platform that will allow us to collect, store and analyze heterogenous data in a standard and accessible way to support research at The Royal, in line with federal policies on research data management, and with the vision to develop predictive capabilities.

By following the principles of open science, the CNMDP will accelerate discovery in mental health, neurological, and cardiac conditions while minimizing duplication of efforts. By openly sharing research data, methodologies, findings and research outcomes, scientists can avoid duplicating efforts by building on existing work, leveraging data to accelerate the pace of discovery.

To implement the CNMDP, we partnered with CAMH and its Krembil Centre for Neuroinformatics in 2022, given their international leadership position in this field (executive leads: Damian Jankowicz, Florence Dzierszinski). The IMHR team, with Katie Dinelle, Owen Clarkin, Rami Hamati and Christie Aguiar (Rami's and Christie's positions are grant (CFI)-funded,) is leading the project to be launched after year-end for beta-testing. The project is a wonderful example of collaboration through important partnerships. CAMH's Krembil Centre for Neuroinformatics, which had already developed a similar platform, has contributed countless hours and expertise. Colleagues from The Ottawa Heart Institute, uOttawa and the Bruyère Research Institute have also been essential in the platform's development.

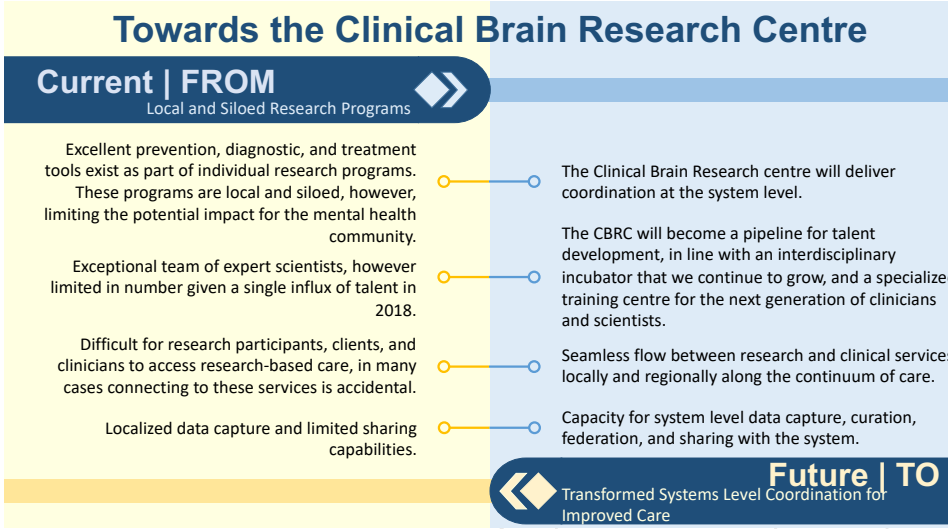
Clinical Brain Research Centre

The Clinical Brain Research Centre aspires to bring together interprofessional talent and research technologies for treatment, diagnosis and prevention. The first phase, the treatment / Interventional Psychiatry Program (IPP), will have a central intake approach, coordinated with the organization's navigation system, and powered by our digital platform, to make it easier for clients to access and move between research-based diagnostics and treatments, shared clinical and scientific staff to improve efficiency, and support for the return of a client's care to their primary caregiver. Teams of clinicians and researchers will meet regularly to triage incoming clients to the most appropriate treatment and/or diagnostic stream, identify cases of non-response to treatment and discuss alternate options within the clinic. The goal is to link a number of interventional treatment options, including rTMS, esketamine, IV ketamine, ECT, creating triage options and more personalized treatment approaches. Other modalities (e.g., psilocybin-assisted psychotherapy) will be added in the future.

These component parts are already operational as single units. Bringing them together is where the magic happens.

The Interventional Psychiatry Program Steering Committee, co-chaired by Dr. Florence Dzierszinski, Dr. Jakov Shlik and Linda Mohri, continued work this year to co-design the Interventional Platform. The Committee is developing a roadmap and guiding principles that will inform patient intake and flow, detail physician role, funding, sustainability and shared resources.

We expect the Interventional Psychiatry Program to be operational in FY25 and plan to apply to uOttawa for an interventional psychiatry fellowship targeted to start in 2025. The IPP is one step in an evolution to create system-level coordination for improved client care at The Royal.



A special thank you to Katie Dinelle, Stefan Trivunovic, Jeanne Talbot, Sandra Antochi, Lisa McMurray, Jennifer Phillips, Sara Tremblay, and Stacey Shim.

Neuromodulation Research Clinic

Repetitive transcranial magnetic stimulation (rTMS) is a non-invasive neuromodulation technique that directly stimulates specific brain circuits that are known to be altered in people with mental health disorders such as depression.

We currently have two clinical trials underway, and a third one that will be starting in the spring of 2024. All trials have a common point – using brain imaging tools to help personalize treatments to improve efficacy and predict potential responses to treatment to avoid trial and error. For example, we have shown that our treatment specifically modulates a circuit that is key in emotion regulation. Presently, we are conducting a trial to explore whether individuals exhibiting a more pronounced effect on this circuit following a single session also experience enhanced therapeutic outcomes. We have also started a collaboration with a team of researchers in Australia that developed a tool to fully personalize

treatment based on the connections in their brain. Altogether, our studies involve collaborations with numerous clinicians and scientists from the Royal, but also from around the world.

By integrating imaging data with rTMS therapy, we have been able to optimize stimulation parameters leading to more effective and targeted interventions for patients. This is reflected in our current response and remission rates, where 50% of clients had reached remission at the end of the acute treatment course and about 70% had at least experienced a response. This is quite a significant impact when comparing to current literature for rTMS which reports 30-40% remission and 45-55% response rates, similar to medication trials.

We have increased our capacity in the last fiscal year and hired psychiatrist Dr. Ram Brender, who brings rTMS experience from the Temerty Centre for Therapeutic Brain Intervention at CAMH, and works in the Mood & Anxiety clinic at the Royal. We have also focused on the expansion of the rTMS clinic, where we have created a treatment room for our third rTMS machine and office space for clinicians and future fellows, thanks to a $1.25 million donation in FY23 from Yann Robard and Dawson Partners. As a result, we can treat significantly higher number of clients, 48 within this fiscal year, for a total of 100 clients since the launch of the clinic in 2021.

Neuromodulation Clinic Metrics	To date	FY24
Referrals	310	89
Enrolled (i.e. signed consent)	124	58
Randomized (i.e. started treatment)	100	48
Finished Acute Treatment Course	80	40
Continued to Maintenance	50	19

Raija Hilska, who experienced a significant improvement from our main clinical trial, has gone on to speak publicly about her positive experiences with rTMS (e.g., Globe and Mail, CityNews "An Hour to Give"). Hilska, who has experienced depression and thoughts of suicide, saw progress almost immediately. "This research has helped me. I'm not sad like I was. There are sad things in life, but then you go on to think of other things. And that's the difference. My anxiety and worry about how I am going to carry on has gone away."

What to watch for in FY25

- Streamlining the current referral process in a more centralized approach with other interventional services at the Royal
- Development of a fellowship program in interventional psychiatry
- Expanding the current treating demographic, with the start-up of a youth rTMS trial in the summer of 2024
- Planning for intravenous ketamine infusion at the BMO Innovative Depression Clinic to expand patient eligibility

BMO Innovative Depression Clinic

In 2021, The Royal launched an integrated clinical research service offering a form of ketamine treatment that is delivered intranasally, called esketamine. The clinic provides up to six months of treatment to those with difficult-to-treat depression due to major depressive disorder or bipolar depression. Ketamine can rapidly reduce depressive symptoms and thoughts of suicide in individuals who have failed to respond to antidepressant medications. It targets specific pathways in the brain and increases the brain's ability to make new connections.

"The way my brain processes things has absolutely changed."

Adding a second treatment room this year doubled our capacity. We increased the number of referrals from community partner hospitals through teaching sessions to psychiatrists about the ketamine treatment we offer. This outreach also increased awareness of this novel treatment for depression.

The impact of expanded capacity and awareness contributed to growth in the care we were able to provide clients. Last year, our team administered 237 esketamine treatments, far exceeding the previous 18 months since launch. Of those, 61% of individuals derived sufficient clinical benefit to move to the maintenance phase of ketamine treatment.

There are numerous research studies connected to our esketamine treatments, including one that Dr. Jennifer Phillips is leading to examine whether changes in inflammatory and metabolic biomarkers of depression can help predict clinical outcomes. Preliminary data implicates metabolic alterations in depression with treatment-nonresponse and suggests this link is mediated through chronic, low-grade inflammation. Esketamine may elicit anti-inflammatory effects contributing to its antidepressant effects.

The excitement of being able to treat individuals with resistant depression is tempered by the reality that repeated administration of ketamine is usually needed to maintain the benefits. Our second line of research, led by Dr. Jeanne Talbot, is a prospective randomized controlled trial that will examine the effect of offering concurrent treatment with behavioural activation, meaning combining an evidence-based treatment for depression with esketamine versus esketamine treatment alone.

Our research has been generously supported in the past year with meaningful grants.

Personnel Award for Black Scholars from Brain Canada, CIHR Institute of Circulatory and Respiratory Health, and Heart & Stroke awarded to Favour Olaoluwa for graduate studies under the supervision of Jennifer Phillips	2023-2025	$50,000
University Medical Research Fund (UMRF) grant to support clinic trial adding psychotherapy to esketamine treatment awarded to Edward Horn and Jeanne Talbot	2024-2026	$100,000
University Medical Research Fund (UMRF) grant to support initiate IV ketamine research awarded to Pierre Blier and Jennifer Phillips	2024-2026	$100,000

In May 2023, the clinic was named the BMO Innovative Depression Clinic, recognizing an unprecedented $2 million donation from BMO, the largest corporate contribution in The Royal's history. That funding provides the clinic with financial sustainability for the next 10 years, filling critical funding gaps that research grants and medical insurance do not cover.

Special thank you to Jennifer Phillips, Jeanne Talbot, Stefan Trivunovic Katie Dinelle, Dr. Raj Bhatla, Dr. Ed Horne, Maria Da Silva, Dr. Kelly Mascioli.

What to watch for in FY25

- A priority is developing a clinical pathway for intravenous ketamine which can treat individuals with suicidal thoughts in our in-patient services and those presenting to psychiatry emergency services in our partner hospitals.
- A neuroimaging research project under development aims to harness the rapid effects of intravenous ketamine to shed light on neural pathways underlying the antidepressant and anti-suicidal effects of ketamine treatment.
- Specialized training offered to senior psychiatry residents as a key component of the Interventional Psychiatry Fellowship.

Sleep Research Clinic

The Sleep Research Clinic's main research program focuses on sleep and mental health, exploring technologies to monitor brain and heart activity outside the lab. This notably leverages artificial intelligence to process sleep states in real time, holding tremendous potential to expand the way we measure sleep and interact with it.

Within the Royal, we converge nearable and wearable technologies for clients from the Sleep Research Clinic to develop less invasive and more accessible sleep monitoring tools while also refining sleep-staging algorithms adapted to diverse groups. Led by Dr. Rébecca Robillard, researchers are implementing and testing a stepped-screening process to identify sleep apnea, an often-undetected sleep disorder, in clients from the Youth Program. They also assess how treating insomnia affects brain health in seniors with affective disorders in collaboration with the Geriatric Program.

In the community, IMHR sleep researchers are part of a network assessing dark therapy for people hospitalized during a manic episode. In the last year, they validated new sleep apnea screening tools for Ottawa Police officers and assessed the impacts of sleep apnea on biomarkers of reproductive health in women with fertility problems.

Nationally, our researchers partnered with Veterans Affairs Canada to

learn about veterans' expertise and experiences surrounding cannabis use in the context of PTSD and contributed to interprovincial clinical trials.

Recent Research Findings
New findings for this year span from community-based research to complex neurophysiologic signal processing. For instance, with the Ottawa Aboriginal Coalition, we learned how urban Indigenous organizations, and the communities they serve, demonstrated high levels of resilience despite the major challenges they faced during the Covid-19 pandemic. With colleagues in bioengineering, IMHR sleep researchers are unveiling new components of brain activity during sleep that reshape the way we understand sleep physiology, in both healthy and pathological states, like insomnia. The team contributed to economic studies showing that even just a 5% decrease in insomnia would save the Canadian economy $353 million each year and examined sleep characteristics in Canada through a diversity and equity lens.

Impact on Knowledge
The sleep group published more than 12 articles this year. Students at all levels presented research work at national and international conferences. Through research-based sleep assessments, the team uncovered and treated undiagnosed sleep disorders in many people, often leading to major gains in cognitive and mental health. Through various research projects, the Sleep Clinic now offers the recommended first line treatment for insomnia (previously unavailable at the Royal).

Robillard and her team co-created the national CIHR-funded Canadian Sleep Research Consortium, which notably aims to foster interdisciplinary research and education while advocating for sleep as a pillar of mental and physical health. Meeting with provincial PMs and parliamentarians, Robillard and her team worked to get sleep recognized as a strategic target from prevention and health promotion initiatives, to chronic illness management. Through the Mental Health Commission of Canada, the team provided briefing notes to inform policy development for Veteran Affair's medical cannabis program.

What to watch for in FY25

Locally:
- Applying novel sound-based brain stimulation techniques to boost deep sleep in people with insomnia;
- Develop a CBT-I research clinic at The Royal
- Expanding research collaborations focused on the brain-heart interconnectome;
- Filling a long standing gap in access to evidence-based care for the most prevalent sleep disorder (affecting over 50% of people with mental disorders) by creating and piloting an Insomnia Clinic bridging research and care within the Royal.

Nationally:
- Partnering with Physical Health Canada to integrate sleep health in the curriculum for students;
- Campaign with school boards to advocate for later school times for teens to support better mental, cognitive and physical health;
- Generate new Canadian data to advocate against daylight savings time;
- Work with members of the Senate to develop Canada's first sleep bill.

Brain Imaging Centre

At the heart of the CBRC is the Brain Imaging Centre (BIC), where research and care are integrated across all of the clinics. Established in 2016, the Brain Imaging Centre is the go-to hub for brain imaging in the Ottawa region.

In the last eight years, we have conducted more than 4,000 medical imaging scans across 75 research protocols, providing access to more than 40 researchers. Our users represent every university and hospital-based research institute in the region.

40 Researchers imaging at the BIC	**4000** Scans completed to date
>100 Trainees have accessed the BIC to support their learning	**50+** Active projects

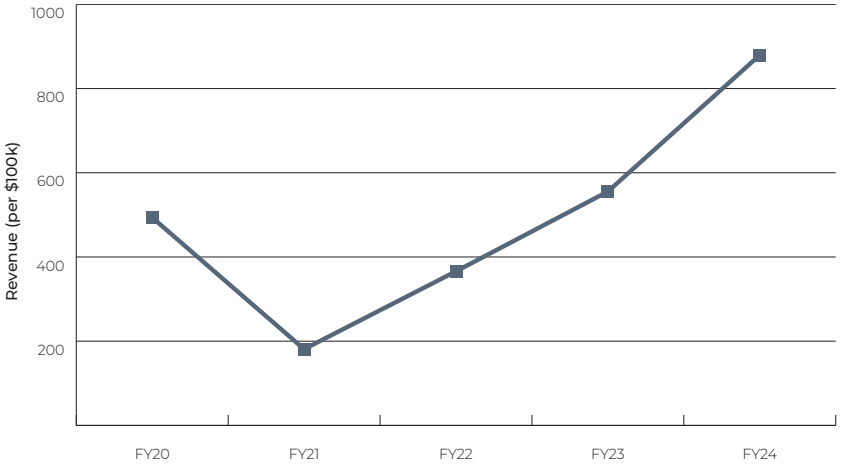
Demand is growing. The scanner's occupancy rate was 84% last year, up from 55% a year earlier, reflecting a focus on both increasing demand and improving operational efficiency.

In the last year, the total number of scans conducted rose to 1,113, up from 765 in FY23, including inpatient scans that rose to 54 in FY24 from 30 a year earlier. PET scan bookings rose 10%.

Services Provided

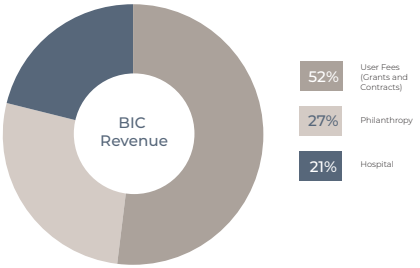
The BIC supports truly innovative research projects and provides a crucial resource for the scientific community. We have one of only five dual modality PET/MRI scanners in Canada. With this unique piece of equipment, researchers can probe brain structure (MRI), connectivity (fMRI), and function (PET) simultaneously. Our PET program functions in close partnership with the Heart Institute Radiochemistry Lab, where our PET nuclear imaging tracers are produced. The BIC provides a host of services to our users to support their imaging research.

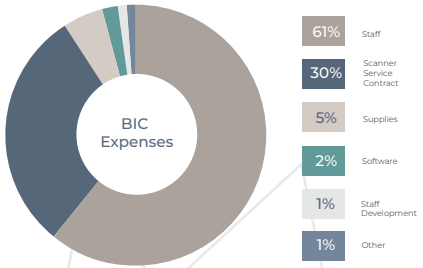
Funding Model and Revenue Streams



**FY21 revenue was limited by a Covid-related shutdown.*

BIC operations are funded by a mix of user fees, philanthropy and hospital support, typical of research imaging facilities across the country. We include an allowance for costs like support staff to operate the equipment and the service contract for the PET/MRI scanner (about $340,000 annually) in every grant application that permits it. But granting agencies will not cover the full cost of brain scans, not just at the BIC, but across the country. At the same time, equipment expenses are ineligible for government funding, so it is only with hospital contributions and philanthropy that we are able to keep this important regional health asset operational. Donor and hospital support, which collectively comprise almost half of the budget, has covered the significant gap and meant a relatively stable budget over the lifetime of the BIC.



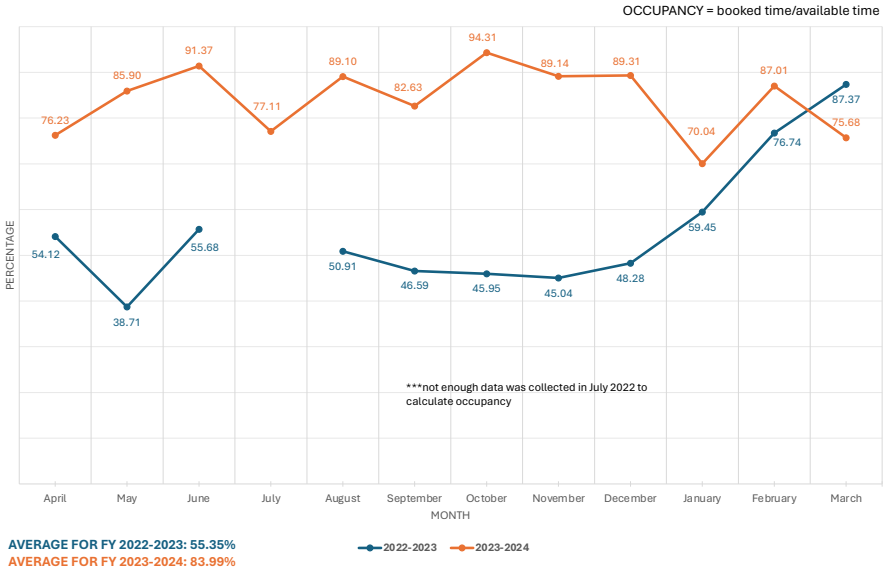


Over time we expect the technology at the Brain Imaging Centre to provide a more predictable and meaningful revenue stream. In mid-2021 the BIC began an expansion of its PET imaging program to encourage increased use of the PET functionality of the scanner and support a greater number of research imaging studies. Revenue in the past year was $288,000 greater than budgeted.

Five new studies were onboarded in the past year, including a new collaboration between John Anderson of Carleton University and Shanna Kousaie of uOttawa. In this case, the technology itself prompted the new collaboration. Both scientists were working at the BIC on similar projects, which prompted IMHR staff to introduce them. In their new interdisciplinary project, they are using diffusion and fMRI techniques at the BIC to define structural and/or cognitive changes that occur in the brain as a result of bilingualism. These changes have a potential role in cognition during aging.

Because we are home to the only PET/MRI scanner in the region, and thus many are unaware of the opportunities it provides, education and awareness building has been a focus in the past year. Our Neuroimaging Series included seven sessions last year, including outside speakers and showcasing some of the data collected at the BIC. Congratulations and thank you to Katie Dinelle, Dr. Tram Nguyen and the whole BIC team.

Scanner Occupancy



AVERAGE FOR FY 2022-2023: 55.35%
AVERAGE FOR FY 2023-2024: 83.99%

Interprofessional Research

This year, thanks to federal funding from the Canadian Institutes of Health Research (CIHR), we launched our **Nursing Research Incubator**, intended to cultivate a culture that nurtures and sustains nursing research at The Royal. The working group includes frontline nurses, Advanced Practice Nurses, Nurse Managers of Clinical Programs, Nurse Researchers and of client and family representatives. Together they have identified three priority nursing research gaps; conducted an environmental scan of relevant literature to refine the questions to explore through research; and planned research projects to pursue funding for.

The Nursing Research Incubator is one means of stimulating research from those that are closest to the clients, and supporting them by creating interprofessional research teams as well as education and initial funding to move from 'good questions' to answers. More broadly we are building capacity among interprofessional healthcare providers and continuing to work towards establishing sustainable processes to support ongoing efforts for interprofessional research development and knowledge mobilization.

We are actively working towards strengthening our relationships with academic institutions and developing opportunities for graduate studies to obtain research training and experience. We are also coming up with innovative approaches to support (and properly fund) the engagement of interprofessional practitioners in research while still delivering clinical care. Special thank you to Shruti Patel.

Data to Steer The Royal's Trishaw Program

'Go outside and get some fresh air.' We've long believed that getting outside is good for mood, but – as for so many aspects of mental health - haven't had the research data that showed exactly how or why. For The Royal's long-term care facility, The Royal Ottawa Place, having that evidence could support their ability to get funding for their trishaw program, which gives residents an opportunity to get outside on the three-wheeled bike with bench-seating, and integrate it into their routine care for residents.

An interprofessional partnership, led by Dr. Natalia Jaworska, a Scientist and the Director of the Clinical Electrophysiology Lab at The Royal/IMHR, set about developing an approach to get the much needed data. With a $6,000 seed grant from the IMHR, an integrated research team set out to research improved care for residents of the long-term care home experiencing chronic mental or neuropsychological illness.

A pilot research project gathered data that indicated that those who had the opportunity to go out on the trishaw showed a decrease in agitation and stress levels and an increase in mood. With the initial research data, the team is now positioned to apply for expanded funding to explore scaling and spreading the program. At the same time, the team has shared their early results with both researchers and those involved in patient care.

The trishaw research is a great example of the value that small research grants can provide to drive research and evidence-based care in partnership with the community.

Client & Family Participation in Research – Christine Taylor

Christine Taylor joined the Family Advisory Council in July 2023. She has lived experience caring for a loved one who experienced mental health and substance use issues. As part of the Nursing Research Incubator, Taylor was involved in proposing avenues for potential research, and suggested a focus on 'what does family involvement look like for those in the substance use stream'.

Seeing her interest reflected in the eventual three research questions identified by the working group told her that The Royal/IMHR's public commitment to including clients and families is more than perfunctory – rather she feels as though she's making a meaningful contribution to improved care.

The group is conducting a literature review on two of the questions to support protocol development, with a plan to apply for funding in the fall of 2024.

For Taylor, research is a means to create hope for those living with mental illness. "You never know when something might come up that will help you. And you just have to hold on to that – the hope that someday there will be something in the research that can help you."

Key Publications in FY24

Over the past year, 186 articles were published in scientific and academic journals by scientists from The Royal/IMHR. Here is a selection to showcase the breadth of that work. (Co-authors in bold are IMHR scientists. Italicized authors are IMHR-affiliated research trainees and staff.)

Evidence for locus coeruleus-norepinephrine system abnormality in military PTSD revealed by neuromelanin-sensitive MRI.

Biological Psychiatry. 2024 Jan 29:S0006-3223(24)00056-8. doi: 10.1016/j.biopsych.2024.01.013.

Adelina McCall, Reihaneh Forouhandehpour, Seyda Celebi, Claude Richard-Malenfant, Rami Hamati, **Synthia Guimond, Lauri Tuominen,** David Weinshenker**, Natalia Jaworska, Robyn J McQuaid, Jakov Shlik, Rebecca Robillard, Zachary Kaminsky, Clifford M Cassidy**

This research uses advanced brain imaging (MRI) techniques to study how a specific brain area, the locus coeruleus, behaves differently in military veterans with PTSD compared to those without. It finds that this area is more active in veterans with PTSD, particularly related to symptoms of being on high alert. This suggests that imaging this brain area could help in better diagnosing PTSD and understanding its neurobiology, potentially leading to more personalized and effective treatments for those affected by this condition.

Eye movements during phasic versus tonic rapid eye movement sleep are biomarkers of dissociable electroencephalogram processes for the consolidation of novel problem-solving skills.

Sleep, 14;46(8):zsad151. doi: 10.1093/sleep/zsad151.

Nicholas H van den Berg, Aaron Gibbings, Daniel Baena, Alyssa Pozzobon, Julia Al-Kuwatli, Laura B Ray, **Stuart M Fogel**

The research explores how different types of eye movements during sleep relate to brain activity and learning. It shows that specific eye movements during REM (rapid eye movement) sleep correspond with

brain processes that enhance learning, particularly for solving new problems. This insight suggests that observing eye movements during sleep could be a useful tool for understanding and potentially improving how people learn and consolidate new skills. This could have significant implications for educational methods and understanding cognitive functions related to sleep.

Temporal imprecision of phase coherence in schizophrenia and psychosis-dynamic mechanisms and diagnostic marker.

Molecular Psychiatry. 2024 Jan 16. doi: 10.1038/s41380-023-02337-z.

Annemarie Wolff, **Georg Northoff.**

The research focuses on how individuals with schizophrenia and psychosis have irregular timing in brain wave synchronization during thought processes, which can affect their cognitive functions. The study suggests that these irregularities can potentially serve as a diagnostic marker for these mental health conditions. This could lead to better understanding and potentially earlier diagnosis of schizophrenia and psychosis, improving treatment options and outcomes for individuals affected by these conditions

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Using virtual reality to improve verbal episodic memory in schizophrenia: A proof-of-concept trial.

Schizophrenia Research: Cognition. 2024 Mar 7:36:100305. doi: 10.1016/j.scog.2024.100305.

Bryce JM Bogie, *Chelsea Noël*, *Feng Gu*, *Sébastien Nadeau*, *Cecelia Shvetz*, *Hassan Khan*, Marie-Christine Rivard, Stéphane Bouchard, Martin Lepage, **Synthia Guimond.**

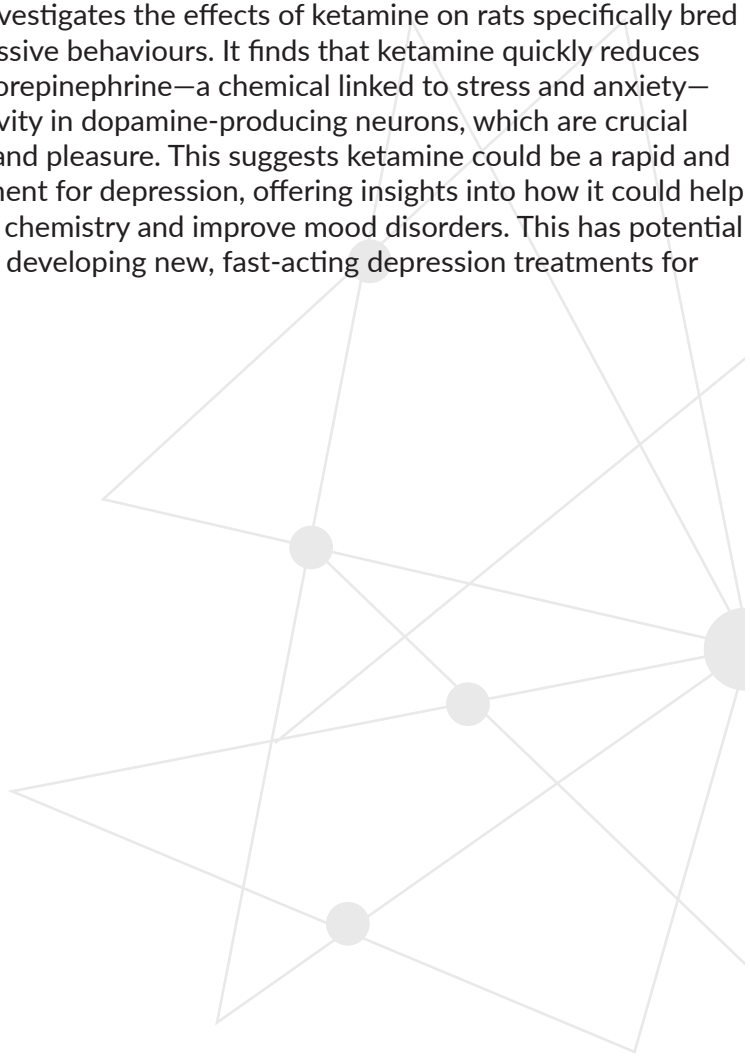
The study examines how virtual reality (VR) can enhance verbal memory skills in individuals with schizophrenia. It tests VR as a tool for helping these individuals remember verbal information more effectively, which is often a challenge due to the disorder. This approach could revolutionize therapy for schizophrenia by offering engaging, effective new ways to improve cognitive functions, particularly memory, which can significantly impact daily functioning and quality of life.

Ketamine promptly normalizes excess norepinephrine and enhances dopamine neuronal activity in Wistar Kyoto rats.

Frontiers in Pharmacology. 2023 Oct 31:14:1276309. doi: 10.3389/fphar.2023.1276309

Stephen Daniels, *Mostafa El Mansari*, *Rami Hamoudeh*, **Pierre Blier**

The research investigates the effects of ketamine on rats specifically bred to model depressive behaviours. It finds that ketamine quickly reduces high levels of norepinephrine—a chemical linked to stress and anxiety—and boosts activity in dopamine-producing neurons, which are crucial for motivation and pleasure. This suggests ketamine could be a rapid and effective treatment for depression, offering insights into how it could help rebalance brain chemistry and improve mood disorders. This has potential implications for developing new, fast-acting depression treatments for humans.



Personalizing Treatment Using rTMS – Dr. Sara Tremblay

In the evolving landscape of mental health, Dr. Sara Tremblay stands at the forefront, pursuing innovative therapies that offer a whole new way of looking at mental health treatment. Her work focuses on neuromodulation, in particular, repetitive transcranial magnetic stimulation (rTMS), which can identify and treat malfunctioning circuits in the brain and effectively treat them in a non-pharmacological, non-invasive way, and with few side effects.

Having secured more than $2 million in funding in federal and provincial grants as well as philanthropy, Tremblay's research focuses on optimizing rTMS treatments for mental health disorders and developing neurobiological predictors of response. She established the Neuromodulation Research Clinic in 2021, providing access to rTMS treatment for depression through research.

The clinic offers personalized rTMS treatments, leveraging the use of the Brain Imaging Centre. Together, Tremblay and her team have successfully treated more than 80 individuals with hard-to-treat depression, boasting significant symptom improvements in about 70% of cases, including full remission in more than half. Because the treatment is not funded by the government in Ontario, Tremblay is creating access to care through research that would be out of reach for many.

At the same time, Tremblay is sharing her expertise and learnings through interdisciplinary collaboration with clinicians, graduate students, volunteers, and research staff, and working with other IMHR scientists such as Dr. Rébecca Robillard and Dr. Lauri Tuominen to explore how rTMS impacts sleep and how it modulates brain function using positron emission tomography. With more than 15 graduate students across three universities, uOttawa, Carleton University and Université du Québec en Outaouais (where she is a tenure-track assistant professor), Tremblay is also training future clinicians and scientists with the most advanced neuromodulation technology.

What to watch for in FY25 in Great Research

- Launch of the Music and Mental Health Research Clinic
- Launch of the Cognitive Remediation Research clinic
- Launch of the Interventional Psychiatry Program and Fellowship

Talent & Culture

Great research is enabled by great talent, of course, and so along with the 2024 Strategic Research Plan, we created a new talent plan to support its execution. The new talent plan details how we will further build the capacity and quality of the team (including scientists, clinician scientists, research staff, trainees and administrative and research development staff) and the ways of working that allow us to scale without losing sight of our core values, principles and the focus on impact as we grow.

Our approach to talent is captured below.

1. **Systems and Processes** are the architecture of our talent function at the IMHR, including how we manage performance, compensation, recruitment, onboarding and orientation, and skills development, and how we create the best possible environment for research to thrive.

2. **Behaviours and Practices** capture the expectations of our team members, for example as it relates to equity, diversity, inclusion, indigeneity, anti-racism and accessibility.

3. While the latter two groups are evergreen, serving as the foundation of our talent strategy, **Initiatives and Actions** are specific proactive strategies that we undertake to create elasticity for success – the elements that support exceptional impact.

Joining the IMHR Team

In FY24 we made a number of key hires to support our Strategic Research Plan.

- Dr. Tanya Halsall as Early Career Scientist
- Dr. Gilles Comeau as Senior Scientist
- Dr. Jeanne Talbot and Dr. Jakov Shlik as Physician Scientists
- Dr. Ruxandra (Sandra) Antochi, Dr. Ram Brender and Dr. Kelly Mascioli as close Physician Collaborators.

Dr. Jakov Shlik is The Royal's first Physician Scientist Lead of Research. This is a new leadership position that will help to support physicians, physician scientists and scientists in the pursuit of research at The Royal. This is a key role in our work to encourage more research led by clinicians, and to provide support to that community. As an experienced physician scientist himself – Shlik holds both an MD and a PhD in Medical Sciences – his medical expertise and scientific knowledge will enable him to act as a highly effective liaison, strengthening connections between research and care. In his new role, Shlik will help to bring the wealth of medical and scientific knowledge that exists at The Royal together to drive innovation and advancements in care. He will also help in fostering partnerships with organizations outside of The Royal to further build our clinical research capacity and enhance academic endeavors.

Research Awards

A 3-Minute Thesis competition provides opportunities for promising talent to advance their profile and research careers, as well as our inaugural 2023-24 IMHR Graduate Student and Postdoctoral Award Competition. Awards can be used towards educational training opportunities (e.g., a course, workshop, training on a new technique) or for travel to conferences of relevance to the trainee's area of research.

Dr. Caroline Wallace Postdoctoral Fellow in Nutrition and Mental Health	Postdoctoral winner	$1,000
Dr. Andrew Lapointe Atlas Institute for Veterans and Families	Postdoctoral runner-up	$500
Patricia Burhunduli Project focused on characterizing suicidal ideation using structural neuroimaging	Postdoctoral runner-up	$1,000
Rami Hamati Research interests include elucidating drug effects on neural activity, identifying mediators of psychiatric illness and response to medications using electrophysiology and multimodal neuroimaging (PET, fMRI, NM-MRI).	Doctoral runner-up	$500
Malika Lanthier Sleep and Mental Health	Master's winner	$1,000
Favour Olaoluwa Project focused on characterizing suicidal ideation using structural neuroimaging	Master's runner-up	$500

Early-Career Researcher Development – Dr. Tanya Halsall

With a prestigious CIHR award intended to support the career launch of the next generation of patient-oriented researchers, we appointed Dr. Tanya Halsall, previously an IMHR post-doctoral fellow with Dr. Kim Matheson, as a Scientist for a three-year term in September 2023. With a background in psychology and human kinetics, Halsall's early research focused on sport-based programming for equity deserving young people and the evaluation of systems-level transformation within child and youth mental health.

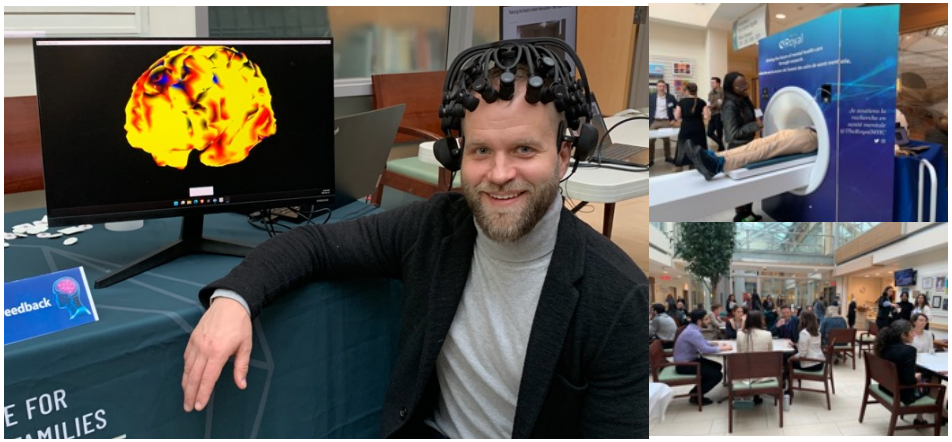
For her PhD, Halsall examined a youth leadership program implemented by Right to Play Canada for Indigenous youth. This collaboration with Indigenous communities highlighted: 1) the importance of applying a holistic lens that includes an emphasis on the social determinants of health (and consideration of the natural world), 2) the significance of relationship building with community partners, and 3) the critical need to translate research findings to support real-world impacts (including the use of narrative). This work led her to a key question that would shape research to come: how do we integrate youth lived experience to support health equity?

Recognized twice by CIHR through the highly competitive Patient-Oriented Research – Transition to Leadership award, she is leading the development of a national research collaboration to examine the implementation of the Icelandic Prevention Model, aimed at reducing the influences that lead youth to drugs and alcohol, and support alignment with Integrated Youth Services networks across Canada.
Recently, Halsall's research is also focused on 'lifestyle drift', in which attention to upstream (or population-level) prevention initiatives are diverted towards campaigns that focus on the individual, a trend that could put the implementation of the Icelandic Prevention Model at risk. We can't yet measure lifestyle drift, something Halsall is addressing, with the aim of supporting population-level initiatives to drive better mental health outcomes.

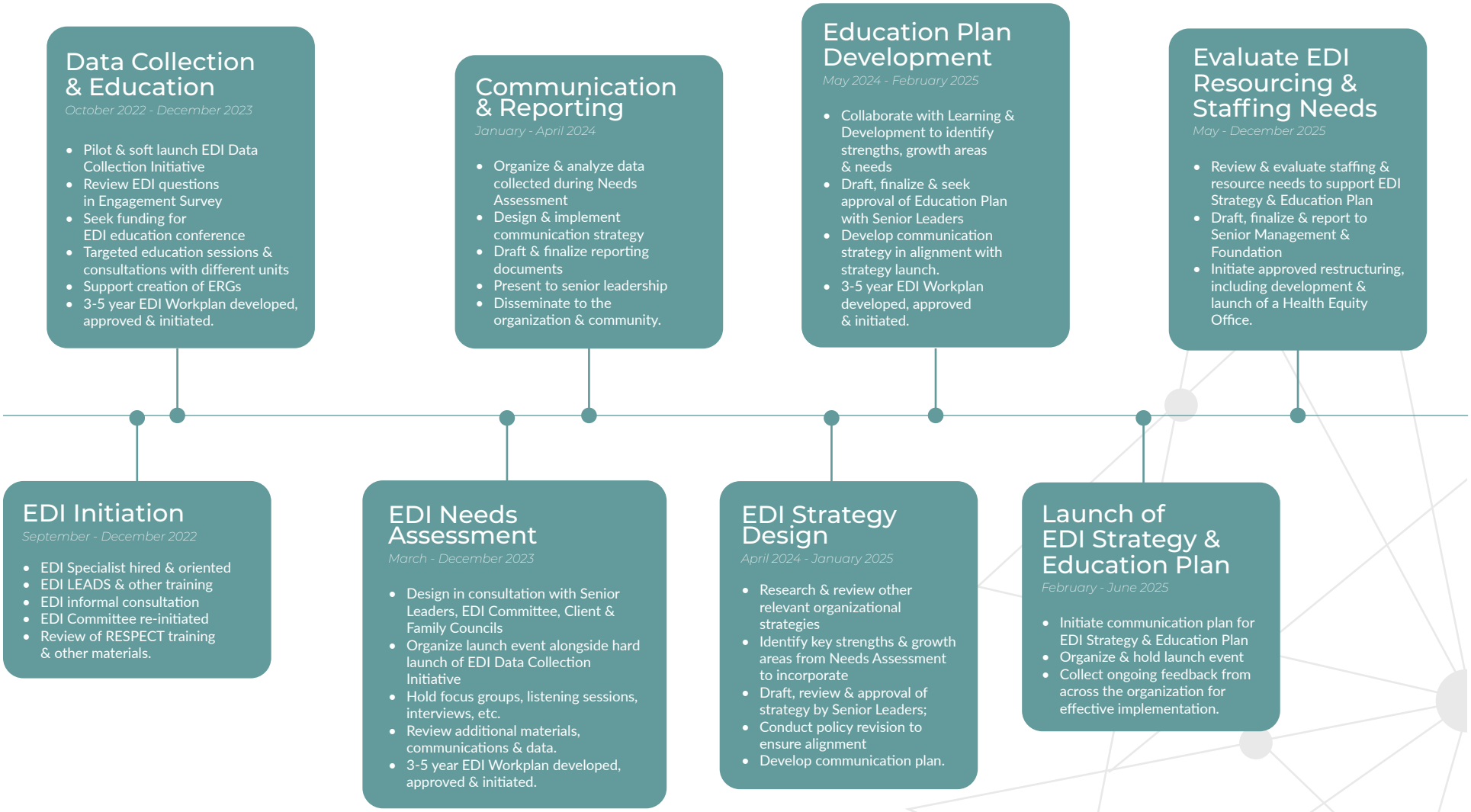
Halsall's career journey has been shaped by early and ongoing work with The Royal; her earliest work at the Royal was focused on supporting the evaluation of the youth program, later involved with launching Frayme, a network of those involved in youth mental health, and then through her post-doctoral work. It's a great example of an early-career researcher making contributions to the work of the IMHR and in turn the organization's success at developing researchers with interdisciplinary thinking and experience.

The **Neuroscience and Mental Health Trainee Network** (NeuMe-TN), a network comprising trainees at The Royal, is one example of joint talent development. The network holds an annual conference, encouraging the community to pursue careers in research. This year's co-chairs, Dr. Caroline Wallace (Postdoctoral Fellow, University of Ottawa) and Zacharie Saint-Georges (MD/PhD candidate, University of Ottawa), delivered NeuMe-TN's signature annual conference in October 2023, in collaboration with Invest Ottawa and Sonya Shorey's team, with the theme of "The Future of Mental Health Research."

Research Week 2024



In January 2024, the IMHR held its inaugural Research Week at The Royal. Designed to educate and engage the hospital's full staff in the research of the IMHR, we held five days of activities that exposed participants to the principle of Research is Care, some of the many research studies being conducted at The Royal, and how clients can get involved in research. Participants could see some of the technology up close and speak with individual researchers, serving to demystify the research happening all around. Turn out to the week's events was strong, and we believe will support our efforts to ensure all clients are provided with the option of participating in research, and spurring more interest in participation in multidisciplinary teams.



Our work on equity, diversity and inclusion is led by The Royal's Dr. Beth Robertson. In FY24, she continued her work against the plan detailed above, delivering the results of the Needs Assessment to management of The Royal, including the leadership of the IMHR, in early 2024. The IMHR has committed to providing full support with the recommended work that will result from her evaluation in the coming years, both in terms of specific training and education, but also in terms of needed commitment to culture setting, allyship and hiring practices, to name a few.

Employee Resource Groups at The Royal

Among the many employee resource groups at The Royal, we have several specifically created to foster stronger equity, inclusion, and diversity.

Formed in 2023, the **Intersectional Women in Science** group within The Royal brings together women and non-binary colleagues at all levels of their career. Membership is voluntary and all are welcome with the long-term goal of supporting the successful careers of women, addressing specific and systemic issues that arise at The Royal and in science more broadly.

Formed in 2023, the **Anti-Racism Employee Resource Group** focuses on advancing anti-racism and supporting EDI at The Royal.

The **LGBTQ2SAI+ Working Group** was formed in early 2024 and focuses on supporting LGBTQ2SAI+ team members and advancing EDI at The Royal and uOttawa.

Culture and Gender Mental Health Graduate Student Research Award

The goal of the Culture and Gender Mental Health Graduate Student Research Award (created in 2022) is to support capacity and engagement of Indigenous youth in graduate research in mental health and wellness. This award (scholarship) is currently held by Karen Aglukark, in the master's degree in neuroscience at Carleton University, working with Dr. Kim Matheson. This program will be evaluated and renewed at graduation.

What to watch for in FY25 in Talent

- Share Emerging Research Innovators in Mental Health (eRIMh) alternative academic model and develop proposal for eRIMh 2.0
- Develop of a fellowship in interventional psychiatry in collaboration with the University of Ottawa and The Ottawa Hospital
- Develop at least one new proposal for research chairs
- Relaunch the Client- and Family-Oriented Research Working Group to implement strategic initiatives
- Create salary scales for IMHR scientists, and review existing scales for IMHR staff

Partnerships

Across our country and around the world, researchers are working to improve the care we can provide to better support those with mental illness. We share the belief that bringing together interdisciplinary teams accelerates discovery. At the same time, partnerships keep us close to the communities we serve. And because no research organization is without financial limitations, creating partnerships allow us to get more value by sharing both fixed costs and learnings in real time.

Partnerships are a key tool for the IMHR to have an outsized impact on mental health research and we are fortunate to have worked with an impressive group of partners in the last year. Our partnerships serve many roles:

- Working together with research partners allows us to take on more ambitious projects and apply (and qualify for) larger grants.
- We gain diverse perspectives, lived experience through our community partnerships and create a means for two-way knowledge transfer.
- Co-funding research roles, particularly with uOttawa, allows us to create research roles that independently neither organization could satisfactorily fund.

The Strategic Research Plan allows us to mature our partnership strategy, mapping the ecosystem of stakeholders implicated by our Plan, and then identifying synergies and gaps to complement our existing partners. In the coming year, we will continue to:

- Expand partnerships with communities, community-based organizations and service providers as well as provincial and federal entities to co-design, spread and scale mental health solutions beyond the walls of The Royal.
- Lead and catalyze new multi-institutional, multi-sectoral partnerships focused on addressing mental health as a major societal challenge.

uOttawa

Over the last year we have continued to work to deepen our partnership with the University of Ottawa, with which we have a formal academic training and research relationship. Our deepest relationships are with

the Faculty of Medicine and the Faculty of Social Sciences (School of Psychology, School of Social Work), which have been key collaborators in co-funding research positions, supporting exchanges of learnings, and catalysts of co-creation:

- Founding partner in the establishment of the Brain Imaging Centre
- Dr. Rébecca Robillard's scientist and tenured associate professor position
- Dr. Stuart Fogel's position as academic liaison between our units
- Dr. Andra Smith's mentoring of our early career researchers in brain imaging
- Dr. Andrew Nicholson's new position as Assistant Professor
- Dr. Gilles Comeau's new role as Senior Scientist and head of the Music and Health Research Institute.

In February 2024, Dr. Florence Dzierszinski, President of IMHR and VP Research at The Royal, addressed the uOttawa Research Commission to share the work of the IMHR and a vision for deeper collaboration across a greater number of faculties, with interdisciplinary teams. A fruitful conversation on the development of a regional map for mental health research took place.

Bringing Music to The Royal – Dr. Gilles Comeau

Dr. Gilles Comeau is known as a visionary, harnessing the power of music to promote health and well-being. He joined the IMHR team in August 2023 to study the connection between music and mental illness. We know that musical experiences can have significant effects on the brain but know less about how music affects brain function in people with mental health problems. The underlying mechanisms and individual differences remain poorly understood and we lack evidence-based exemplary practices and strategies..

Understanding which music programs work, for whom, and for what conditions, is a challenge that can best be tackled through multisectoral partnerships. Comeau has established several multidisciplinary groups of experts from universities and hospital affiliated research institutes, who closely collaborate with community centres, community music schools, and community organizations. These partnerships bring together researchers and community partners from around the world who think about music as a meaningful resource that can improve wellbeing for people living with mental illnesses.

For example in Ottawa-Vanier, we work together with Vanier Community Services Centre to offer music programs in the community rooms of two subsidized apartment buildings where many new immigrants live. The programs address social isolation, encourage participants to stay active and aim to improve their quality of life.

As The Royal becomes a leader in the study of the relationship between music and mental health, we aspire to create the first international Music for Mental Health consortium. The clinic will position The Royal as the

unifier and international spokesperson for this major social innovation approach for promoting mental health through community-based music programs.

Gilles Comeau is a senior scientist at the IMHR and a full professor in the School of Music at the University of Ottawa. His visionary work has earned him election to the Royal Society of Canada and the prestigious Prix Acfas Jacques-Rousseau pour la multidisciplinarité.

Ottawa Academic Health Network

In October 2023, the leadership of six Ottawa hospitals and six research institutes came together to formally execute a new agreement for the Ottawa Academic Health Network (OAHN). This committee is co-chaired by Sylvain Charbonneau, Vice-President, Research and Innovation at uOttawa and Alex Munter, President and CEO at CHEO, with representation from all uOttawa affiliated hospitals' CEOs and research leads (Cara Vaccarino and Florence Dzierszinski for The Royal/IMHR).

While the hospitals have a long history of collaboration, the OAHN will foster a dynamic, collaborative and impactful health research community, enhancing Ottawa as a national and international leader in health research and education.

We expect the work in the coming years to focus on collaboratively:

- Setting research priorities and strategic directions
- Research infrastructure (including space, equipment and core facilities)
- Administration of research grants and contracts
- Intellectual property / innovation
- Seeking and maintaining linkages with funding agencies, industry and governments
- Human resources
- Regulatory oversight
- Common conduct of research standards, including but not limited to research ethics and responsible conduct of research
- Communications, branding and fundraising in support of research.

For the IMHR, this partnership serves to build the reputation of Ottawa as a research hub nationally and internationally (drawing attention to us as a research home), and create greater opportunities for researchers through our collective scale. Broadening the potential pool of collaborators, technology and experience, and the potential to work on more ambitious projects creates a more compelling employee proposition.

A Client Question Leads to Research Collaboration into PTSD Treatment

It started with a question from client Cory Taylor, CD to his doctor, psychiatrist Rebecca Gomez. 'What do you know about the use of Stellate Ganglion Block for PTSD?' Taylor, a former member of the Canadian Forces living with PTSD, had heard about it listening to an interview and wondered if it could help him. The treatment is simple. A very fine needle – guided by an ultrasound – is used to inject a local anesthetic (similar to what a dentist would use) into a star-shaped bundle of nerves at the base of the neck connected to our 'fight-flight-or-freeze' response.

Members of the SGB research team at The Royal: Dr. Jakov Shlik, Krysta Boutin-Miller, Dr. Clifford Cassidy, Dr. Rebecca Gomez, Cory Taylor and his service dog Cueinn.

The treatment was not available at The Royal, but Gomez, Psychiatrist in our Operational Stress Injury Clinic, wanted to know more. Dr. Dan James at The Ottawa Hospital was experienced in using SGB for pain reduction, and was willing to partner to trial the treatment as a mental health intervention. With the IMHR's Translation of Research into Clinical Care program, the research team was able to pilot SGB treatment for veterans with PTSD, particularly those not improving with traditional treatments. The early results gave them hope, and armed with that pilot data, the team applied for and secured funding through the University Medical Research Fund competition (which is funded by The Royal's psychiatrists,) to extend their learning. The team is currently seeking external funding to focus on the innovative features of SGB, such as exploring the biomarkers of central noradrenergic activity by advanced magnetic resonance imaging as predictors of SGB response.

That the research started from a client, was embraced by a clinician who at that point was not involved in research, and made possible through the programs and partnerships available at The Royal/IMHR is a testament to the culture we've worked to create – one that truly empowers anyone to be the spark for research, and champions research that serves the needs of our clients and the community.

Wabano – Partnering to Research Impact of Indigenous Drumming

Drumming and singing are a core part of Indigenous culture and play a core role in healing and community. Allison Fisher, Executive Director of Wabano Centre for Aboriginal Health eloquently said,

> "Drumming is the heartbeat of Mother Earth, and her heartbeat helps us still today. She cries for us to sing to her."

While music has long been believed to play a role in improving mental health around the world, the data to show just what happens in the brain when people create, move and listen to music have been absent.

The IMHR is partnering with Wabano to change that. Dr. Georg Northoff, Dr. Gilles Comeau and Dr. Florence Dzierszinski of the IMHR are working with Allison Fisher and Carlie Chase to design a project that will document and measure the impact of drumming on mental health, so that best practices can be developed for the use of music in prevention and treatment.

Partnering on Bipolar Research – Dr. Gayatri Saraf

New junior research chair Dr. Gayatri Saraf, a clinician-researcher at The Ottawa Hospital (TOH) cross-appointed at the IMHR, is excited to be collaborating with teams from The Royal and uOttawa on research projects relating to bipolar disorder, specifically depression associated with bipolar disorder over the next year.

The junior research chair is a partnership between TOH, the uOttawa Department of Psychiatry, and the IMHR. 'Junior research chair' is a prestigious position typically awarded to early-career researchers who have demonstrated significant promise in their area of study. This year it was awarded for the first time by this group of partners.

Saraf, who has previously studied the role of brain inflammation in bipolar disorder, is excited about tapping into the resources of The Royal's Brain Imaging Centre. One of the questions she's trying to answer with IMHR researchers relates to the density of neurons in the brain and whether this density has an impact on the severity of bipolar disorder. The team is looking for evidence that shows whether effective treatments are effective because they increase density; that knowledge could potentially open up new areas for treatment.

"We are using PET-MRI to look at changes in the brain. It is amazing because it will tell us mechanistically how those treatments work – we don't know yet exactly how they work," said Saraf.

What to watch for in FY25 in Partnerships

- Development of a Partnerships plan to support the Strategic Research Plan
- Lead and catalyze new multi-institutional, multi-sectoral partnerships focused on addressing mental health as a major societal challenge
- Partner with uOttawa in the development of the OAHN and Health Innovation hub
- Partner with Invest Ottawa on digital health opportunities
- Further develop our partnerships with Wabano
- Build capability and provide education across the research enterprise on effective and respectful community partnership and participatory research methods to co-lead and co-develop mental health solutions

Brand, Reputation & Advocacy

Media Highlights

Media coverage is a key means to bring our research to the public, aides in the transfer of knowledge, raises awareness of the IMHR and often prompts clients to come to The Royal. Our research and researchers were featured in about 60 news articles in the last year, across radio, television, print and digital media.

OTTAWA CITIZEN Sign In

News / Local News

Ottawa researchers using brain imaging to probe smoking-schizophrenia link

One theory is that smoking is a risk factor for schizophrenia. Another is that people with schizophrenia smoke as a form of self-medication.

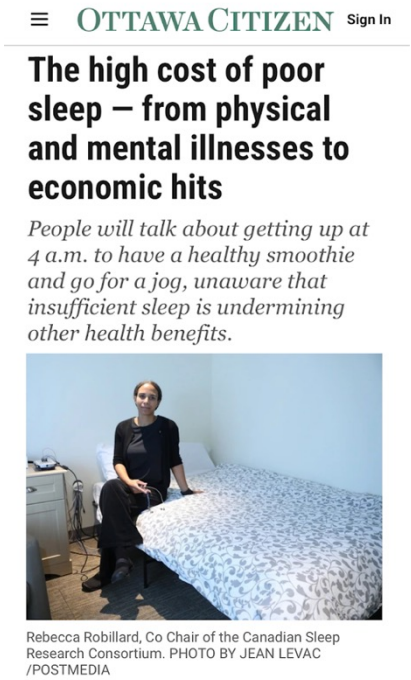
Joanne Laucius

Published Feb 09, 2024 • Last updated Feb 12, 2024 • 4 minute read

Lauri Tuominen, a neuroscientist at The Royal, and his research colleagues are aiming to take brain images of about 50 people to focus on the cholinergic system, which plays an important role in memory, digestion, control of heartbeat, blood pressure, movement and other functions. PHOTO BY JEAN LEVAC /POSTMEDIA

February 9, 2024

While today's schizophrenia medications treat psychosis with great success, many people with schizophrenia still face significant cognitive difficulties as a result of their illness. Dr. Lauri Tuominen, one of the IMHR's Emerging Research Innovators in Mental Health, is using the advanced technology at The Royal's Brain Imaging Centre to explore the relationship between schizophrenia, smoking and brain function – knowledge that may lead to new, personalized treatments to improve cognition without the negative health impacts of smoking.


OTTAWA CITIZEN Sign In

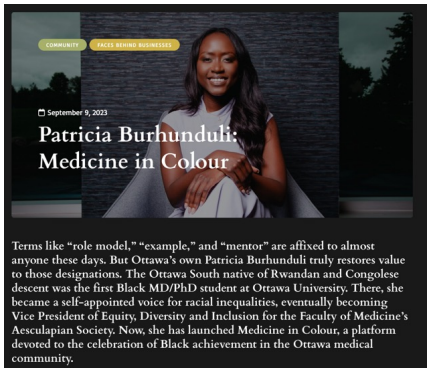
The high cost of poor sleep — from physical and mental illnesses to economic hits

People will talk about getting up at 4 a.m. to have a healthy smoothie and go for a jog, unaware that insufficient sleep is undermining other health benefits.

Rebecca Robillard, Co Chair of the Canadian Sleep Research Consortium. PHOTO BY JEAN LEVAC /POSTMEDIA

December 28, 2024

An important element of mental health research is the role it can play in health promotion of prevention of illness. In this article, Dr. Rébecca Robillard, scientist in the IMHR's sleep research unit, raises awareness about the critical importance of sleep for both physical and mental health. Robillard is also driving awareness and advocacy for sleep health through the Canadian Sleep Research Consortium, a national collaboration of sleep scientists and clinicians that she helped to create.



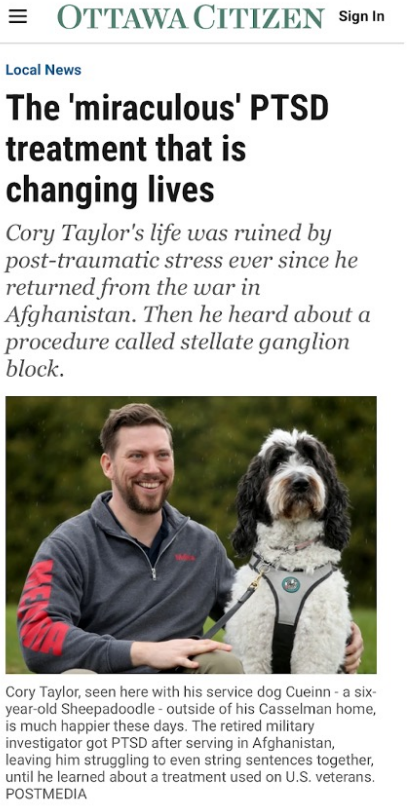
August 31, 2023

The IMHR is committed to enabling and supporting talented early career scientists to build their research and bring new insights to the world. This Faces magazine story highlights the impressive work and advocacy of Patricia Burhunduli, an MD/PhD Student at uOttawa and the IMHR. Burhunduli discusses her launch of Medicine in Colour, a platform devoted to the celebration of Black achievement in the Ottawa medical community.

BMO donates $2 million to The Royal fund depression treatments

May 31, 2023

Research is Care – the BMO Innovative Clinic for Depression exemplifies that philosophy by bringing novel treatments for depression directly to clients in The Royal's Mood and Anxiety program.


OTTAWA CITIZEN Sign In

Local News

The 'miraculous' PTSD treatment that is changing lives

Cory Taylor's life was ruined by post-traumatic stress ever since he returned from the war in Afghanistan. Then he heard about a procedure called stellate ganglion block.

Cory Taylor, seen here with his service dog Cueinn - a six-year-old Sheepadoodle - outside of his Casselman home, is much happier these days. The retired military investigator got PTSD after serving in Afghanistan, leaving him struggling to even string sentences together, until he learned about a treatment used on U.S. veterans. POSTMEDIA

May 1, 2023

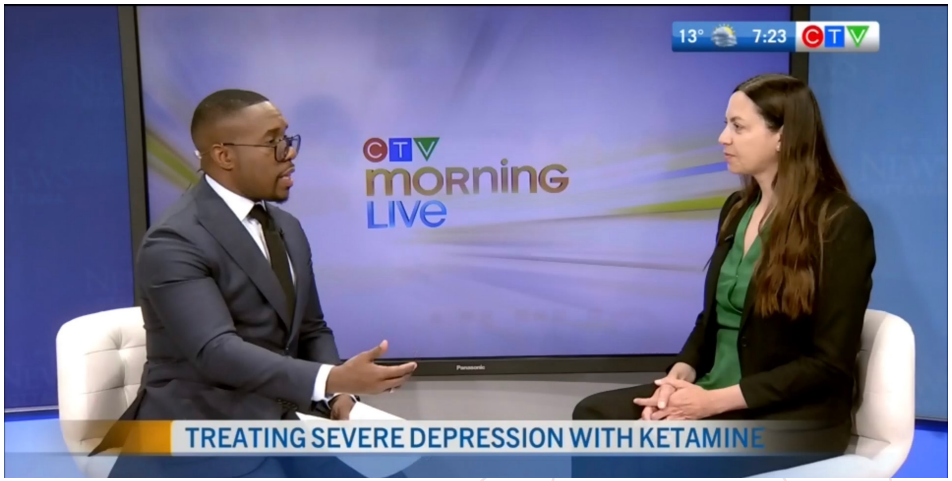
Cory Taylor is not a scientist or a clinician but he has extensive expertise in PTSD based on his personal experience of the illness and that makes him an integral part of the research team highlighted in this article. Taylor, along with researchers and the IMHR and The Royal Operational Stress Injury Clinic, is leading research into a life-changing treatment for PTSD.

Raising Awareness of the BMO Innovative Clinic for Depression – Dr. Jennifer Phillips

The goal of any new medical treatment is for it to be translated from research into clinical practice; this is the success story for ketamine at The Royal. Leading this charge has been Dr. Jennifer Phillips. Since her involvement in Canada's first clinical trial using ketamine to treat depression (led by Dr. Pierre Blier at the IMHR), Phillips has worked tirelessly to develop a new service to administer ketamine at The Royal.

Ketamine, a medication in use for over 60 years to provide general anaesthesia and pain relief, has rapid antidepressant effects when administered in small (sub-anaesthetic) doses. This discovery has been hailed as the most important breakthrough in depression in the past half century. In 2020, Health Canada approved a nasal spray form of ketamine, called esketamine, for the treatment of severe and/or hard-to-treat depression. In 2021, an interdisciplinary team that included Phillips leveraged their collective expertise to open a new clinic at The Royal offering access to this novel treatment option.

The team's success has not gone unnoticed. In the single largest corporate donation in The Royal's history, BMO awarded $2 million to the esketamine team to officially open the BMO Innovative Clinic for Depression. This funding has enabled the clinic to realize its full potential, integrating patient care, research, and education, while increasing capacity and expanding its offerings to include treatment combined with psychotherapy and intravenous ketamine. A celebratory event at The Royal to announce this historic philanthropic gift attracted significant media attention, which serves to both inform the public about new treatment options and demonstrate to potential donors the impact their gifts can have. In June 2023, Phillips spoke to media about the new clinic and how it is providing access to care through research on the radio (CBC Ottawa Morning, 580 CFRA), television (CBC News, CTV Morning Live), and in print media (Ottawa Citizen). Media provide an opportunity for scientists to share their work and contribute to positive brand awareness for the hospital.



Jennifer Phillips is the Interim Scientific Director of the IMHR, an Assistant Professor in the Departments of Psychiatry and Biochemistry, Microbiology and Immunology at the University of Ottawa, and the Co-Lead of the Mental Health Pillar in the University of Ottawa Brain and Mind Research Institute

Advocacy Through Partnerships

The IMHR relies on organizations such as HealthCareCan and the Ontario Hospital Association (OHA) to advocate to governments on issues such as research funding. Dr. Florence Dzierszinski represents The Royal/IMHR with both.

HealthCareCan, which brings together health organizations and hospitals across the country, has been outspoken in its calls for increased research funding. Paul-Émile Clouthier, HealthCareCan President and CEO, wrote an op/ed piece for The Hill Times in February: "Rather than supporting and encouraging talent, governments are squeezing researchers financially, implicitly telling them there may be no careers in science in Canada, and that they are better off leaving for other countries where their talent is treated far better. Researchers who have often looked to Canada as a great place to pursue their careers may decide they can no longer afford to come here. Canada will be the loser."

Ahead of the federal budget, he called on the federal government to "immediately invest $3.8-billion to double current funding to the three federal granting agencies and commit to an annual increase that keeps pace with inflation" as well as increase minimum funding for graduate and postdoc studies.

In a related effort, Dzierszinski, on behalf of The Royal/IMHR, along with her peers, supported this campaign in a letter to Finance Minister Chrystia Freeland.

Similarly, given the impending loss of federal funding for the Canada Brain Research Fund, administered by the Brain Canada Foundation, a coalition of mental health research institutions in Canada, including the IMHR, and organized by Dr. Gustavo Turecki (McGill), submitted a letter to The Honourable Ya'ara Saks, Minister of Mental Health and Addictions of Canada. Dzierszinski continues to advocate for research funding to government officials, including Yasir Naqvi, MP Ottawa Centre.

Exploring Advocacy on Health Policy

With the Strategic Research Plan, we identified advocacy as an opportunity for leadership. With our expertise in mental health and addiction, we see a responsibility to create and support rapid learning health systems and ensure that treatment, program design and policy are evidence-based and evolve as we learn.

As part of the action plan for the Strategic Research Plan, we will evaluate the most effective means to develop an advocacy function within the IMHR, which may be best achieved through our relationships with organizations such as the Ontario Hospital Association and the Ottawa Academic Health Network.

Direct participation in advisory boards and councils is one avenue to advance policy. In early 2024, Dr. Florence Dzierszinski, IMHR president and VP Research at The Royal, was named to the Institute of Neurosciences, Mental Health and Addiction (INMHA) Advisory Board, one of 13 institutes of the Canadian Institutes of Health Research (CIHR).

Updating The Royal's Brand

In FY24, The Royal engaged communications and marketing agency Stiff to support an assessment of The Royal's brand and implementation of recommendations. That work will continue through FY25, and IMHR team members will support the process, which naturally will affect the IMHR as the research arm of the hospital.

What to watch for in FY25 in Brand, Reputation & Advocacy

- Exploration of advocacy opportunities
- Progress on The Royal's brand work
- Continued work with Ontario SPOR (Strategy for Patient-Oriented Research) Support Unit
- Advocacy for research support at the federal and provincial levels

Funding

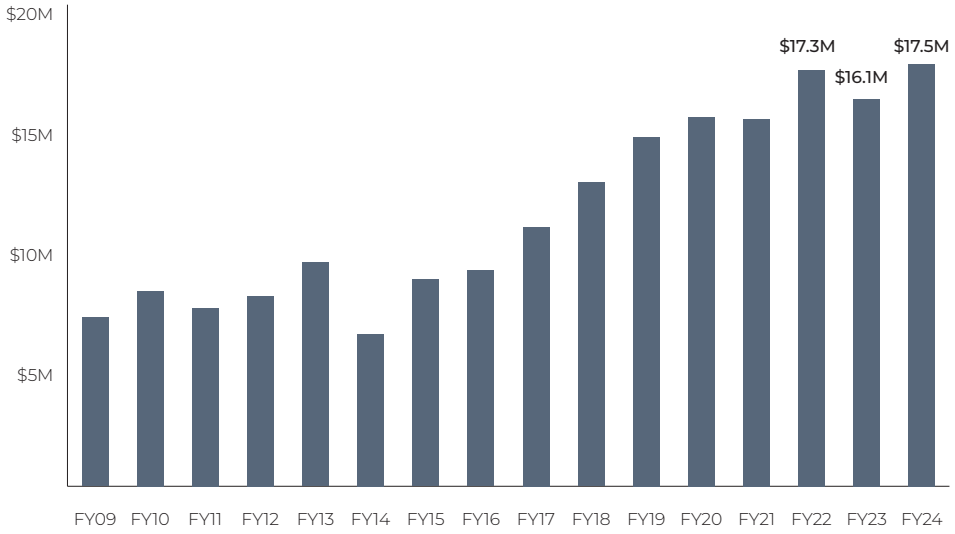
Federal Budget 2024

In 2022, the federal government convened an Advisory Panel on the Federal Research Support System. The resulting 2023 report to the federal government made 21 recommendations on how to turn around long-term trends, including the creation of the Canadian Knowledge and Science Foundation that would sit at the centre of a more thoughtful and coordinated approach to research in Canada.

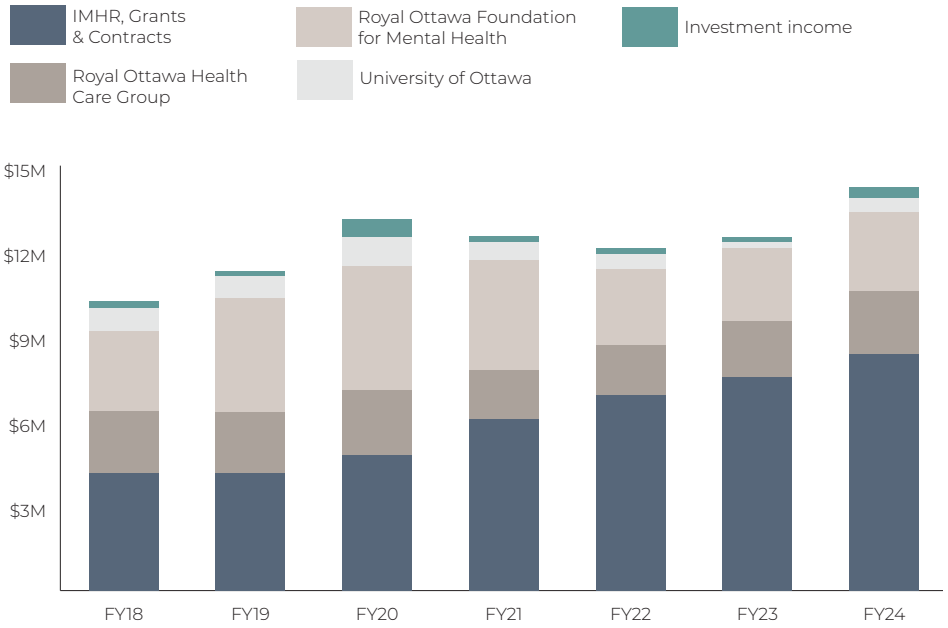
After the end of The Royal/IMHR fiscal year, the federal government's April 2024 budget allocated spending to implement some of the Advisory Panel's recommendations, including more money towards grants issued by CIHR, where we get the majority of our research grants, the creation of a new capstone research funding organization "to provide better coordination across the federally funded research ecosystem," and the creation an advisory Council on Science and Innovation to guide priority setting and increase the impact of federal funding. And after more than 20 years without an increase, the government allocated money to increase the annual value of master's and doctoral student scholarships to $27,000 and $40,000, respectively, and post-doctoral fellowships to $70,000. The total number of scholarships and fellowships will also rise.

HealthCareCan, of which the IMHR is a member, advocated strenuously on behalf of The Royal/IMHR and our peers to secure greater federal investment in research, and we are grateful for their work. We welcome these investments announced by the government, and look forward to contributing to rethinking how we approach funding research in Canada.

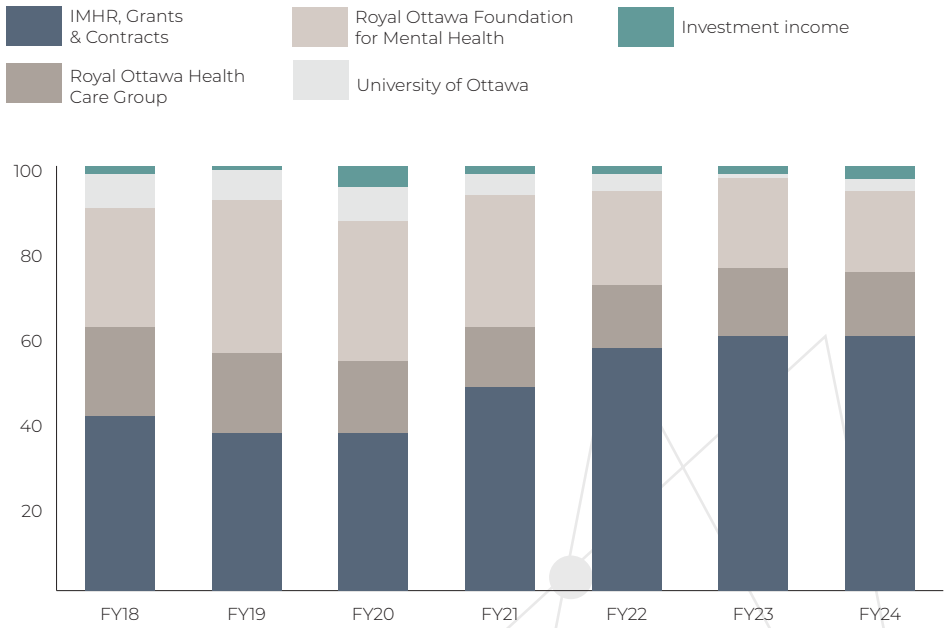
Research Activity Levels



Research Revenues by Source ($)



Research Revenues by Source (%)

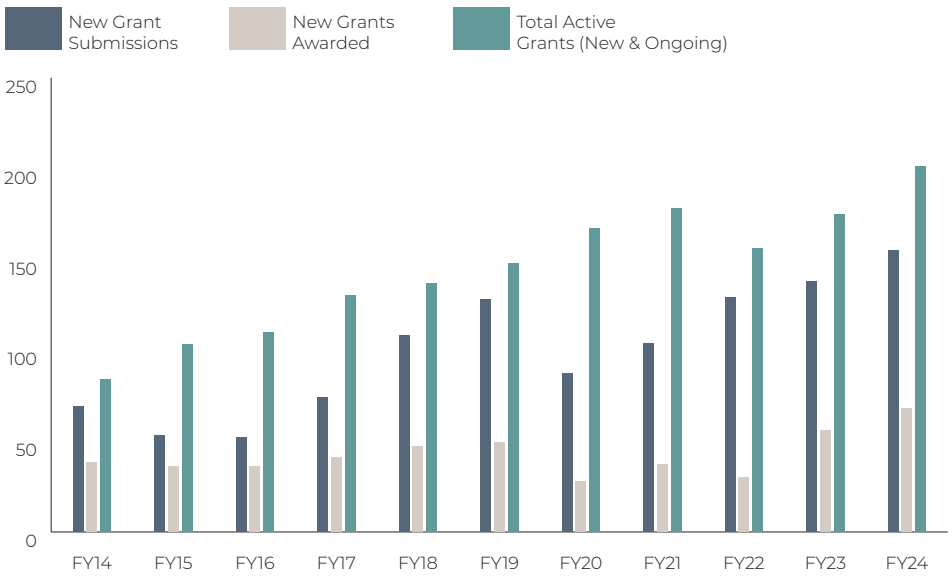


Research activity levels reached $17.5 million in FY24, a 14% increase over the last five years, and more than double our level 10 years ago. Over that same 10 years, our ranking in Canada's Top 40 Research Hospitals has moved from the 36-37 range to a band around 32-33. Our goal is to reach the top 20 in 10 years.

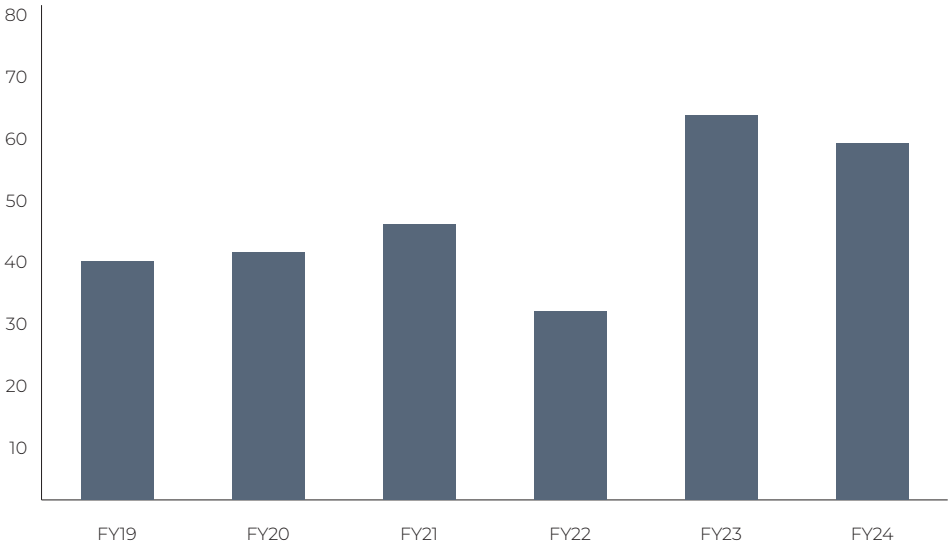
Research revenues through external grants and contracts continues to increase, reaching $8.3 million in FY24 year, up 14% from $7.3 million a year earlier. On a percentage basis, grants and contracts now comprise 60% of our research revenues, up from 37% in FY20, when philanthropy comprised a third. While the research enterprise and its sustainability continue to develop, our organization (like all other hospital-based research institutes in Ontario) remains reliant on hospital funding and philanthropy to support scientist salaries and research administration. (These expenses are not eligible under grants, unlike in the U.S.)

Thank you to Lisa Stockton and Florence Wilson for their work pre- and post-award.

Grants, Contracts & Salary Awards (#)



Grant Success Rate (%)



The number and value of grants received in FY24 increased from a year earlier, as did the total number of active grants, which climbed almost 15%. While we were unsuccessful in some Canada Foundation for Innovation (CFI) grants last year, we reworked some for re-submission. Our successful grants spanned our research agenda, but a few stand out. Our researchers received a remarkable three grants in FY24 from the CFI John R. Evans Leaders Fund (JELF), totalling about $2 million.

Quantitative Functional MRI Technologies For Assessing Brain Health in Depression

Led by Dr. Avery Berman, IMHR Scientist, Assistant Professor, Carleton University
Depression is a leading cause of disability in Canada and is strongly associated with other neurological disorders, including cerebrovascular impairment. Tools that can measure brain health, such as functional magnetic resonance imaging (fMRI), are critical for improving our understanding of depression. Brain blood flow and metabolism have predictive power to determine how patients with depression respond to treatment, making brain imaging a key input for personalized medicine strategies. Berman and his team will use the infrastructure funded by this grant to develop fMRI techniques for measuring blood flow, and making the measurement of brain metabolism more robust and broadly applicable. These emerging fMRI techniques may be used for future personalized medicine strategies, helping to reduce the burden of depression.

Molecular Determinants & Effects of New Treatment Approaches in Psychiatry

Led by Dr. Lauri Tuominen, IMHR Scientist, Assistant Professor, uOttawa
High-risk high-reward research is needed to tackle some of the most difficult questions in mental health. Tuominen and team use positron emission tomography (PET) imaging, an advanced technology used to visualize molecular processes within the brain. The assessment of new treatment approaches in psychiatry will include psychedelics-assisted psychotherapy, neuromodulation, and treatment targets for schizophrenia. This trailblazing research offers hope for improved mental health solutions. It also positions the National Capital Region at the forefront of brain PET imaging.

Identifying the Best Music Education Programs for Rehabilitation

Dr. Gilles Comeau, IMHR Senior Scientist, Professor, uOttawa
Music education expert Comeau will be joining uOttawa Professor Anna Zumbansen from the School of Rehabilitation Sciences, Faculty of Health Sciences, to explore the benefits of group music programs on mental health, speech, cognition, and motor skills for children and older adults. A multidisciplinary research team from The Royal and the Music and Health Research Institute (MHRI), will evaluate singing, movement, and instrument-based programs. The expected benefits of incorporating music-making into rehabilitation are promising, spanning improved health and reduced health care costs.

This study also received a $1 million grant from Public Health Agency of Canada.

Characterizing the Neural Profiles of Bipolar Disorder with and without Auditory Hallucination

Dr. Natalia Jaworska, IMHR Scientist
Bipolar disorder is a psychiatric condition that affects ~2% of people. About a third of those experience hearing voices in the absence of external sounds, or auditory hallucinations, at some point during their illness. Jaworska, as principal applicant, has received $462,825 over five years of new Canadian Institutes of Health Research (CIHR) operating funding to study these auditory hallucinations. This work will clarify the impact of auditory hallucinations in bipolar disorder on functioning, quality of life and suicide risk. Using brain imaging technology, the study will assess how hallucinations impact the brain, which, in turn, will inform treatment.

Such a grant is a very significant career milestone for early career researchers like Jaworska.

We are also preparing a New Frontiers in Research Fund Transformation grant for the 2026 application year with a focus on mental health at a systemic level. The Transformation stream is designed to support large-scale, Canadian-led global interdisciplinary research that addresses a major challenge with the potential to for real and lasting change.

Commercialization & Entrepreneurship

One of the ways we see to both mobilize knowledge and diversify our revenue away from our dependence on grants to expand our expertise in commercialization. In the last quarter of FY24 we began working on our funding strategy that will include an approach formalizing commercialization of research. An Office of Commercialization would also create opportunities for future researchers by offering a path to private sector-level incomes while remaining in research.

To date, we have a few researchers who have pursued commercialization opportunities, creating small ongoing revenue to the IMHR.

Terran Biosciences, Inc., a biotech platform company developing therapeutics and technologies for patients with neuropsychiatric illnesses, which licenses a patent from Dr. Clifford Cassidy, received FDA clearance in 2023 to market NM-101, a cloud-based software platform to analyze neuromelanin-sensitive MRI scans. Research is showing that "neuromelanin MRI is a promising approach with the potential to become part of the standard of care for the workup of all patients suspected of Parkinson's and related diseases," according to Terran.

Cassidy was an IMHR scientist until December 2023, and the IMHR agreement with Terran over time has provided funding for scientist and trainee salaries, and indirect costs. His continued affiliation with the IMHR, as well as the maintenance of his team at the IMHR, ensures continuity.

Dr. Zachary Kaminsky's work with Dionysus Digital Health is another example of IMHR's nascent commercialization work. Kaminsky's work on detecting markers that predict post-partum depression has led Dionysus to partner with the U.S. Department of Defense and the National Institutes of Health for clinical trials of a blood test that "uses machine learning to compare epigenetics — how genes are expressed — in a blood sample with benchmarks developed during a decade of research into pregnant people who did and didn't develop postpartum depression," as described in The Washington Post. The vision is for that test to be made widely available and covered by insurance.

Historically there can be a long lag time between scientific discovery and its application in care. While both of these initiatives have been

years in the making, they are reaching the point where they may have a direct impact at scale, and much faster thanks to corporate involvement, providing rewarding examples of the real impact that scientific discovery in mental health can play in the lives of those with mental illness.

What to watch for in FY25 in Funding

- Completion of IMHR funding plan
- Scientist training on commercialization
- Start developing a strategy for attracting industry-led, revenue generating trials
- Continue developing a revenue generation strategy related to unique research services (e.g., through the BIC and CBRC)
- Develop a strategy and mechanisms for innovation, commercialization and entrepreneurship, including with uOttawa and Invest Ottawa

Leveraging International Foundations for Research on Abuse Prevention – Dr. Michael Seto

Child sexual abuse is a global problem that demands multinational and integrated solutions. Governments have focused mostly on criminal justice responses and treatment for victims and perpetrators rather than prevention. Recognizing that child sexual abuse can be prevented, non-profit organizations and foundations have stepped in to address this funding gap to find proactive approaches. Canada, and The Royal, are leaders in the development and dissemination of proactive solutions, through international and national partnerships between academic organizations, non-profit organizations, foundations, and practitioner networks.

Dr. Michael Seto is the director of the Forensic Research Unit at the IMHR, and a Professor in Psychiatry at the University of Ottawa (with cross-appointments at Carleton University and the University of Toronto, and a member of IMHR's strategic planning workgroup, client and family oriented research workgroup, and the Research Ethics Board.

Seto partnered with Prof. Elizabeth Letourneau at the Bloomberg School of Public Health at Johns Hopkins University, to secure five-year US$10.3 million funding from the Oak Foundation, a Geneva-based, internationally engaged, organization that includes Prevent Child Sexual Abuse as one of its funding priorities.

Thanks to that funding, Seto is leading an international team to identify, evaluate, and disseminate effective child sexual abuse perpetration prevention programs. Promising candidates include an anonymous, online

cognitive-behavioral therapy intervention from Sweden, a U.K. self-help website, an innovative in-person treatment program in Canada, and a U.S. school-based education program.

Cultural adaptations of the online intervention are being evaluated in Sweden, Portugal, and Germany through a €1.2 million grant from the European Commission. International foundations have funded other child sexual abuse prevention research by Seto, including child sexual abuse perpetration prevalence estimates (Human Dignity Foundation), evaluation of an online peer support forum (Tiny Foundation), and surveys of youth and parents about risk and protective factors (Thorn Foundation). Research aiming to better understand the causes of intrafamilial child sexual abuse is funded by the government of Canada through the Social Sciences and Humanities Research Council (SSHRC).

Coordinating research projects can build and share effective and cost-efficient programs that can be delivered in Canada, and at a global scale, in order to protect children from sexual harm. This work is aligned with IMHR's strategic focus on youth mental health, at-risk populations, and health promotion and prevention solutions.

Our People

Scientists at the IMHR

Ruxandra Antochi, MD, FRCPC
Physician
Neuromodulation Clinic

Avery Berman, PhD
MRI Physics

Pierre Blier, MD, PhD, FRSC
Mood Disorders

Michael Bodnar, PhD
Schizophrenia

Gilles Comeau, PhD, FRSC
Music & Mental Health

Stuart Fogel, PhD
Sleep & Mental Health Research

Synthia Guimond, PhD
Schizophrenia

Tanya Halsall, PhD
Youth Mental Health

Natalia Jaworska, PhD
Clinical EEG & Neuroimaging

Zachary Kaminsky, PhD
Suicide Prevention Research

Kim Matheson, PhD
Culture & Gender

Robyn McQuaid, PhD
Culture & Gender

Andrew Nicholson, PhD
Neuroimaging in PTSD and trauma-related disorders
Director of Clinical Research, Atlas

Georg Northoff, MD, PhD, FRCPC
Mind, Brain Imaging & Neuroethics

Jennifer Phillips, PhD
Mood Disorders

Scientists at the IMHR (continued)

Michael Seto, PhD
Forensic Mental Health

Rébecca Robillard, PhD
Sleep & Mental Health

Jakov Shlik, MD, PhD
Physician Lead of Research

Lauri Tuominen, MD, PhD
Schizophrenia
Military Mental Health

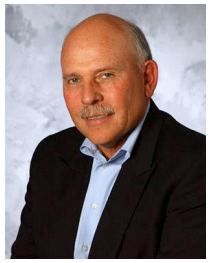
Jeanne Talbot, MD, PhD
IMHR Physician Scientist,
Depression, Suicidal Ideation, Fast-acting anti-depressants, Neuro-psychology

Reggie Taylor, PhD
PET/MRI Physicist

Sara Tremblay, PhD
Neuromodulation

Affiliate & Adjunct Scientists

Marie-Claude Audet, PhD, BA, MSc, BSc
Adjunct Scientist at IMHR
Primary: uOttawa
Nutrition Sciences, Cellular and Molecular Medicine, Neuroscience



John Bradford, MBChB DPM FFPsych MRCPsych
DABFP FRCPC CM
Visiting Senior Scientist at IMHR
Psychological Medicine, Forensic Psychiatry

Clifford Cassidy, PhD
Stony Brook
Military Mental Health
Schizophrenia

Dave Holmes, PhD, M.Sc, B.Sc.
Visiting Senior Scientist at IMHR
Primary: uOttawa
Public Health, Forensic Nursing, Critical Theory, epistemology, law, ethics, psychiatric nursing, correctional nursing, the sociopolitical aspects of nursing, sexuality, and public health nursing

Colonel Rakesh Jetly (Retd) OMM, CD, MD, FRCPC
Senior Advisor at IMHR
Post traumatic stress disorder and operational psychiatry, military mental health

Affiliate and Adjunct Scientists (continued)

Cary Kogan, M.A., PhD, M.Sc, B.Sc
Visiting Scientist at IMHR
Primary: uOttawa
Mental Health and Society, Community Health / Public Health

Verner Knott, PhD
Visiting Senior Scientist at IMHR
Clinical EEG & Neuroimaging

Martin Lalumière, PhD
Visiting Senior Scientist at IMHR
Primary: uOttawa
Forensic Mental Health

Andrew (Hyounsoo) Kim, PhD
Adjunct Scientist at IMHR
Primary: U of T
Addiction Psychology, concurrent disorders,
Addiction Substitution, Crowdsourcing, Behavioural Addictions

Patricia Pezzoli, PhD
Adjunct Scientist at IMHR
Primary: UCL
Interpersonal violence and its relation to Mental Health, elucidating factors and mechanisms that contribute to individual differences in victimization and offending

Gayatri Saraf, MD
Associate Scientist at IMHR
Primary: TOH
Bi-polar disorder

Michael Schlossmacher, MD
Adjunct Scientist at IMHR
Primary: OHRI
Parkinson's, Neuroscience

Marco Solmi, MD, PhD
Associate Scientist at IMHR
Primary: TOH
Epidemiology, Early intervention, Medical intervention, Medical comorbitities, Psychopharmacology, Meta-research

Monnica Williams, PhD, ABPP
Adjunct Scientist at IMHR
Primary: uOttawa
psychedelic-assisted psychotherapy and trauma, psychological and pharmacological treatments of OCD, PTSD, and anxiety disorders, role of culture and race on mental illness

JianLi Wang, PhD
Senior Adjunct Scientist at IMHR
Primary: Dalhousie (CRC Tier 1)
Workplace Mental Health Research

Clinical Research Administration & Development Team

Christie Aguiar
Project Manager, CNMDP

Hussein Bdair
PET Development and Production
Radiochemist

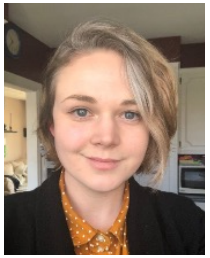
Tammy Beaudoin
Director, Clinical Research Administration

Owen Clarkin
Lead, Research IT

Maria da Silva
Administrative Assistant

Clinical Research Administration & Development Team (continued)

Katie Dinelle
Administrative Director, CBRC



Alexis Dorland
Research Ethics Board Facilitator

Lydia Fang
MRI Analyst

Rami Hamati
Systems Specialist, CNMDP

Jennifer Hayes
Human Resources Coordinator

Tram Nguyen, PhD
Manager, BIC

Amanda Paliotti
Secretary

Garnet Rodger
Manager, Research Operations

Shruti Patel
Director, Inter-Professional Research and Knowledge Mobilization

Lisa Stockton
Senior Research Development Specialist

Cross-Functional Team Members

Sue Walton, Executive Assistant to the President/VP-Research and Board Liaison, Board of Directors

Florence Wilson
Finance and Grant Administrator

Beth Robertson, PhD
Equity, Diversity and Inclusion Specialist

Elizabeth Kozyra
Pharmacy Professional Practice Lead

Board of Directors

Geneviève Bonin

Kevin Brousseau

Florence Dzierszinski, PhD
President, IMHR / Vice President
Research, The Royal

Martine Lagacé, PhD

Lewis Leikin, PhD

Bill Matthews
Vice Chair
Chair, Finance & Audit Committee
(April to June 2023)

Frances McRae

Pierre Noel
Interim CEO, ROHCG
(April to December 2023)

Susan Richards
Chair, Finance and Audit Committee

Sonya Shorey
Chair, Integrative Research Committee

Sharon Squire
Chair, ROHCG Board

Arun Thangaraj

Cara Vaccarino
CEO, ROHCG
(January 2024 -)

Michael von Herff
Vice Chair
Chair, Board Governance Committee

Steve West
Chair, IMHR Board

Board of Directors (continued)

Stephanie White

Committee Members

Susie Gignac

Kevin Fitzgibbons

Brian Ludlow

Glenda O'Hara

Diana Sarakbi, PhD

Donna Wong

Appendix

IMHR Board & Committees (Research Oversight and Planning)

Steve West (Chair, IMHR Board)
Geneviève Bonin
Kevin Brosseau
Florence Dzierszinski (Non-Voting)
Martine Lagacé
Lewis Leikin (cross-appointed, Board of Trustees)
Frances McRae
Susan Richards (Chair, F&A)
Sonya Shorey (Chair, IRC)
Sharon Squire (Chair, Board of Trustees)
Arun Thangaraj
Cara Vaccarino (CEO, ROHCG)
Michael von Herff (Chair, BGC; Vice-Chair IMHR Board)
Stephanie White (Vice-Chair, BGC)

The IMHR board of directors has three committees that oversee the work of the IMHR, with the Chair of the Board, Steve West, and Florence Dzierszinski (non-voting) serving on each of the committees.

Finance & Audit
(legislated)

Governance
(legislated)

Integrative Research
(non-legislated)

The Integrative Research committee oversees the development and execution of the strategic research plan, which is being developed in FY24.

While this is an IMHR board committee, it includes additional members, including voting representatives from our Client and Family advisory councils, and non-voting representatives of the Foundation, the hospital, the IMHR, and the community.

IMHR Board Committees

IMHR Board committees include additional voting members from stakeholder groups, as well as non-voting participants as noted below.

Governance

Chair: Michael von Herff

Cara Vaccarino
Geneviève Bonin
Lewis Leikin
Sharon Squire
Steve West
Stephanie White
Florence Dzierszinski (Non-Voting)

Finance & Audit

Chair: Susan Richards

Steve West
Kevin Brosseau
Suzie Gignac (Public member)
Donna Wong (Public member)

Non-Voting Participants

IMHR
Florence Dzierszinski

The Royal
Cal Crocker
Carolyn Jodouin

Integrative Research

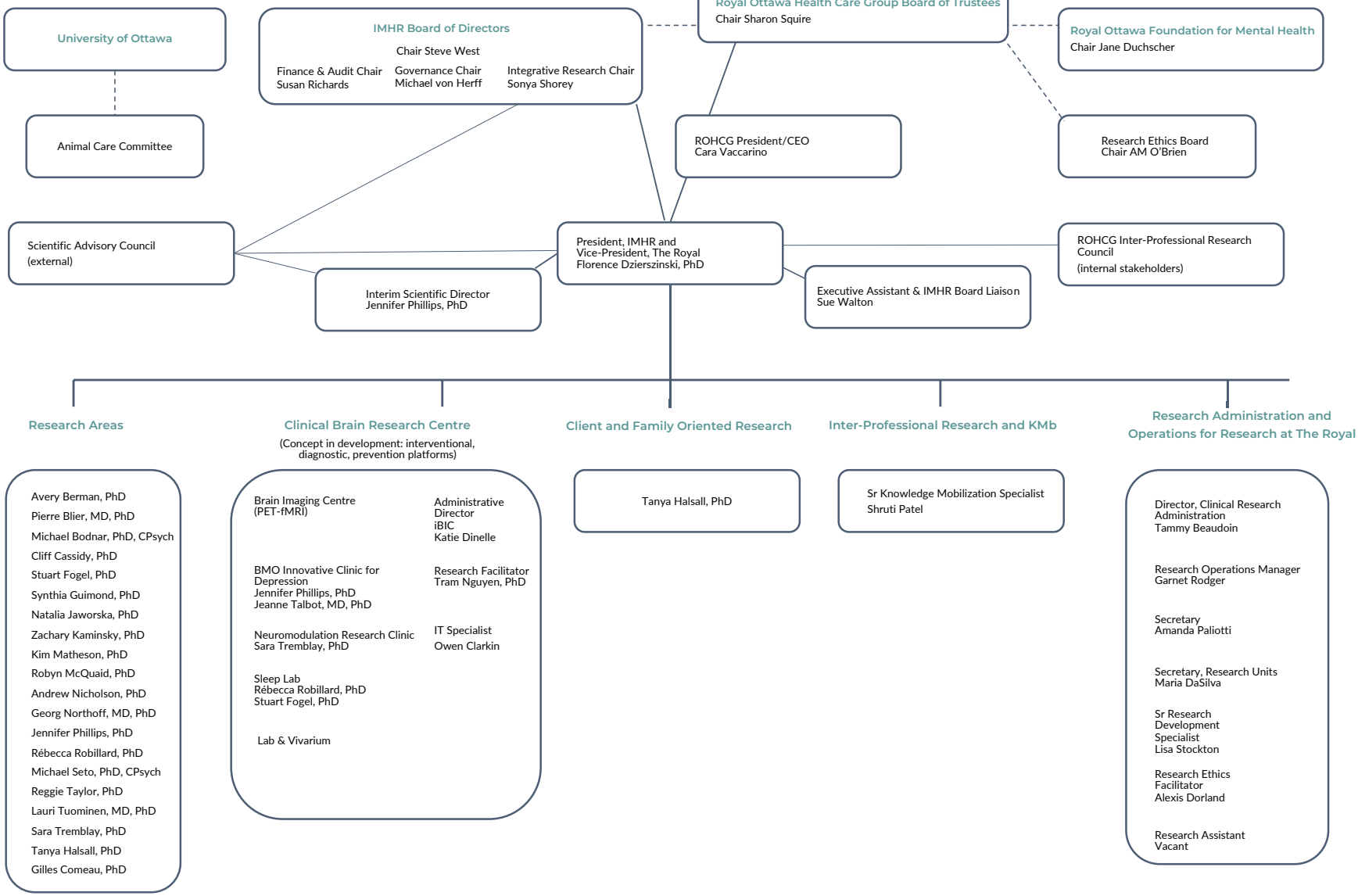
Chair: Sonia Shorey

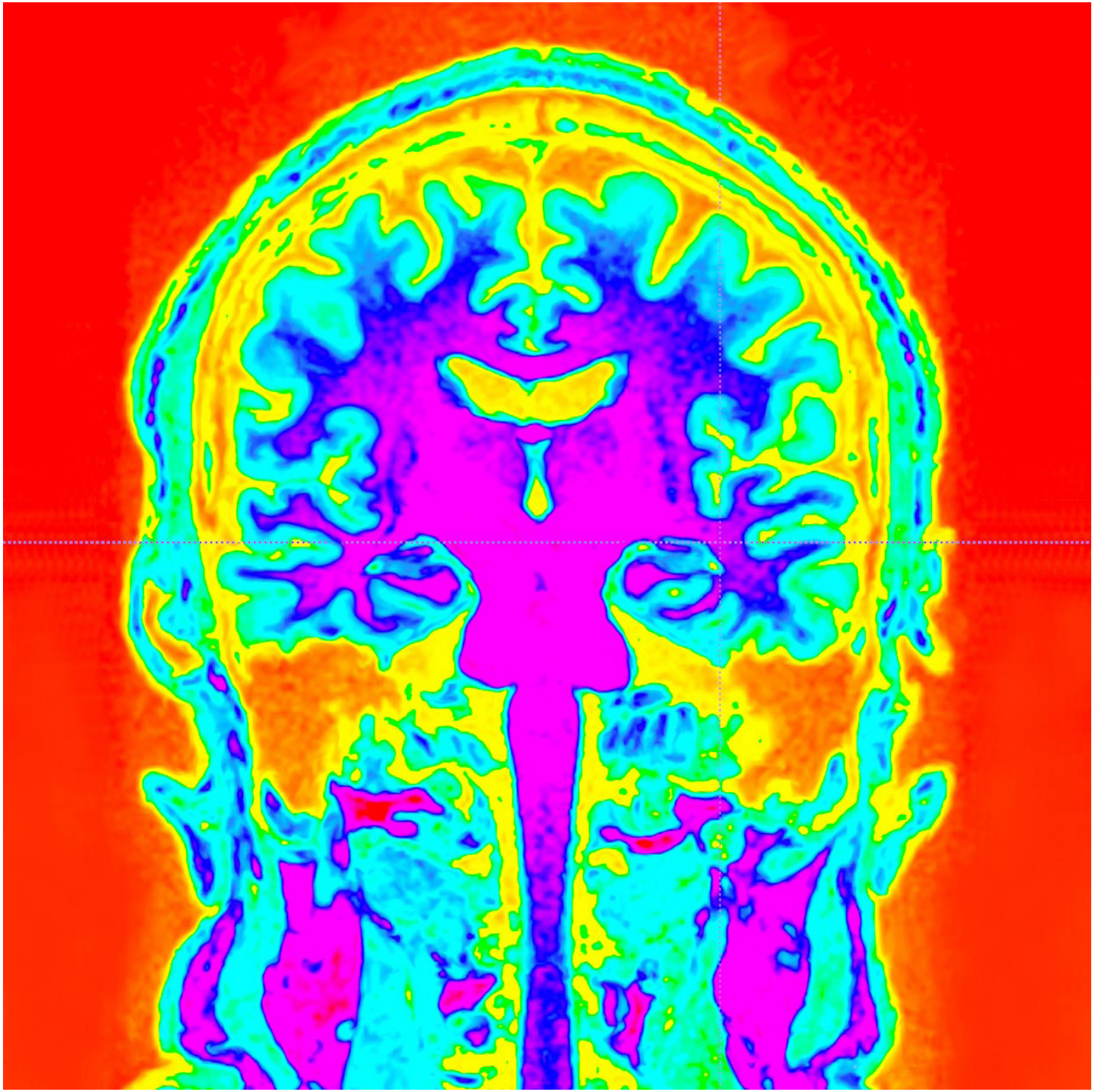
Lewis Leikin
Steve West
Martine Lagacé
Cara Vaccarino
Glenda O'Hara (Client Advisory Council)
Brian Ludlow (Family Advisory Council)
Kevin Fitzgibbons (Public member)
Diana Sarakbi (Public member)

Non-Voting Participants

Jakov Shlik
Ann Symington
Chris Ide
Florence Dzierszinski
Jennifer Phillips

IMHR Organizational Chart as at May 31, 2024





Paradox of Resonance
Steven M. West