McMaster University | Institute for Research on Aging

Labarge Centre for Mobility in Aging
MIRA | Collaborative for Health & Aging

Annual Report 2019

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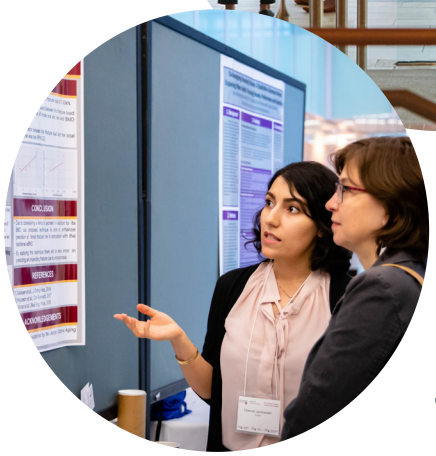

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Leveraged funds

$2.3M 2018
↓
$6.1M 2019

Research support

Researchers
100 2018 → **122** 2019

Catalyst grants
13 2018 → **19** 2019

Planning grants
7 2018 → **12** 2019

Major programs of research
2 2018 → **3** 2019

Knowledge translation

Stories in the media
129 2018 → **225** 2019

Twitter followers
1,111 2018 → **1,675** 2019

Education and training

Mobility scholars

4 2018 → **6** 2019

Mobility post-doctoral fellows

1 2018 → **1** 2019

Strategic partnerships

8 2018 → **16** 2019

Trainee Network

80 **6 PDFs** 2018 → **185** **9 PDFs** 2019

Community outreach and programming activities

Walkability report published internally

Intergenerational hub established and article published in *Gerontology & Geriatrics Education*

Age-Friendly Committee implemented to support AFU

*Values reported are cumulative since inception except for Leveraged Funds, which are reported per year.

"THE AFTERNOON OF LIFE IS JUST AS FULL OF MEANING AS THE MORNING; ONLY, ITS MEANING AND PURPOSE ARE DIFFERENT. AGING PEOPLE SHOULD KNOW THAT THEIR LIVES ARE NOT MOUNTING AND UNFOLDING BUT THAT AN INEXORABLE INNER PROCESS FORCES THE CONTRACTION OF LIFE. FOR A YOUNG PERSON IT IS ALMOST A SIN AND CERTAINLY A DANGER TO BE TOO MUCH OCCUPIED WITH HIMSELF; BUT FOR THE AGING PERSON IT IS A DUTY AND A NECESSITY TO GIVE SERIOUS ATTENTION TO HIMSELF."

Carl Jung

Message from the Scientific Director

As the McMaster Institute for Research on Aging comes to the end of its third year of operations, I take great pride in knowing that we have a real influence on the culture of aging research at McMaster University, as well as in Canada and internationally. In this year's report, we highlight areas of future development and outline our progress and accomplishments, including within our two established centres, the Labarge Centre for Mobility in Aging and the MIRA | Collaborative for Health and Aging.

— Dr. Parminder Raina, Scientific Director, McMaster Institute for Research on Aging

Message from the Chair of the International Scientific Advisory Committee (ISAC)

In the past year, MIRA has made significant strides to support and advance interdisciplinary research in aging at McMaster University. MIRA has pivoted many of its members to include an aging lens in their research projects while also including the end user in the process. This has been demonstrated through three major research programs in mobility and aging. Overthe past two years, the ISAC has mentored, guided and supported the research teams. These projects are now launched and have received funding from the Labarge Centre for Mobility in Aging (LCMA). The Committee visited MIRA in August 2019 to receive an update on the major research projects in mobility and aging, to strategize how to position MIRA for ongoing success, and to discuss emerging research themes for future funding opportunities. The ISAC endorses and congratulates MIRA's Scientific Director and the team on their success putting McMaster on the forefront of interdisciplinary aging research. We support MIRA's creative and forward-thinking approach to develop the capacity necessary to address the most pressing aging-related questions facing older adults, caregivers, health professionals and policy makers. We look forward to our ongoing involvement with MIRA.

— Dr. David B. Hogan, Professor and Academic Lead, Brenda Strafford Centre on Aging, University of Calgary

Chapter 1: MIRA's vision, mission and values

The vision driving the McMaster Institute for Research on Aging (MIRA), is a **future in which interdisciplinary research supports and enables people of all ages to live longer, healthier lives**. MIRA embraces this vision and strives to advance and connect to it through all elements of operation, including leading-edge research, education, and stakeholder collaborations. MIRA's values are cemented in integrity, excellence, collaboration, inclusion and transparency.

MIRA's two established research centres facilitate and support advancements in aging research. Its first focused centre, the Labarge Centre for Mobility in Aging (LCMA), supports research on the broad topic of mobility in aging. The newest centre, the MIRA | Collaborative for Health & Aging, brings together MIRA and the McMaster School of Nursing's Aging, Community and Health Research Unit (ACHRU) to build capacity in aging research and strengthen patient-research-policy-practice connections.

Management and governance

Staff

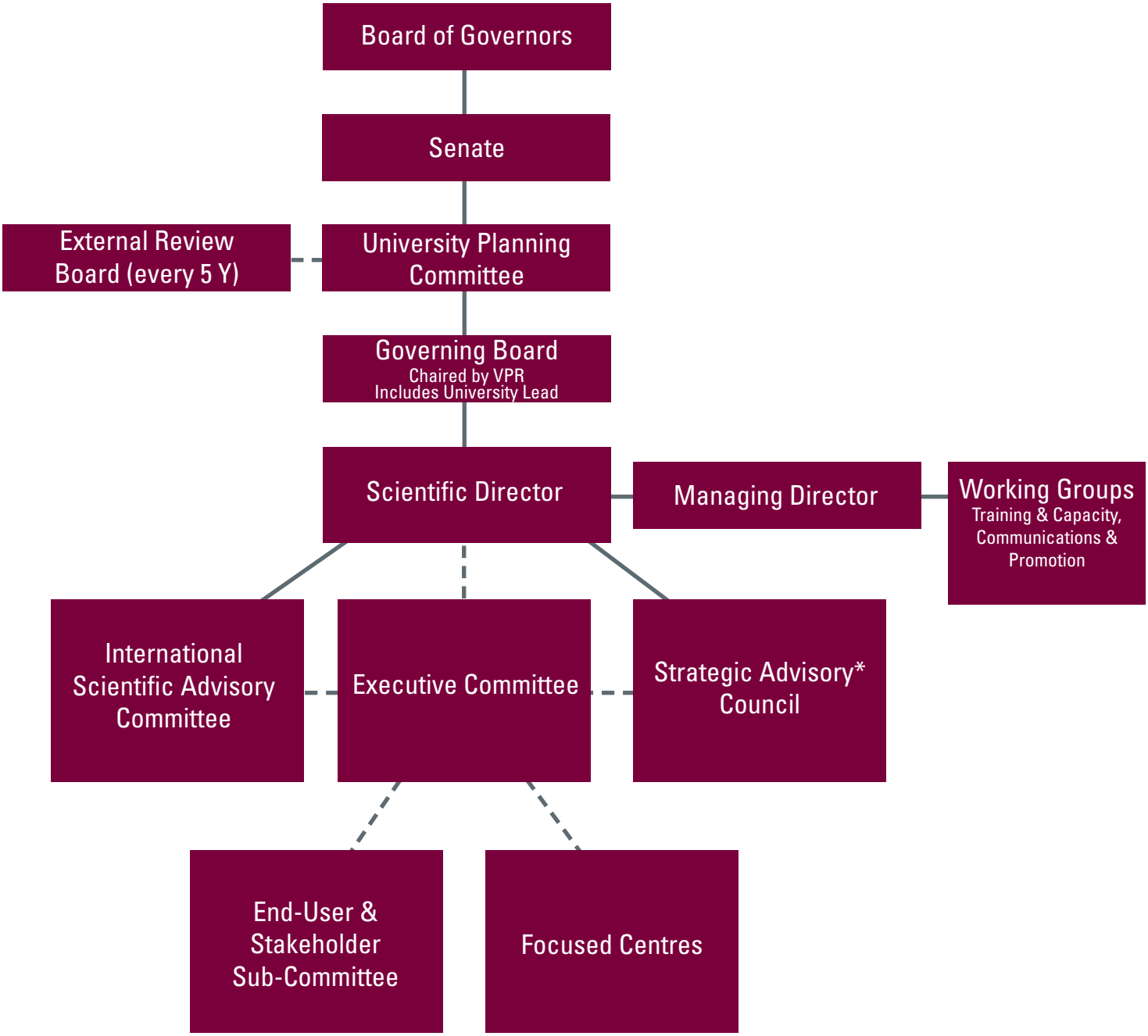
MIRA staff are housed in an office space withing the McMaster Innovation Park, which is funded by the VP Research. The Institute's full staff complement is outlined below:

- > Dr. Parminder Raina, Scientific Director
- > Dr. Ine Wauben, Managing Director
- > Audrey Patocs, Research Coordinator
- > Kara Aaserud, Communications Manager
- > Dr. Allison Ward, Project Manager
- > Alison Outtrim, Administration Assistant
- > Casual/Work-study students (as needed)

In addition to the formal staff of the Institute, MIRA also offers opportunities to undergraduate students through internships (2) and project assistants (1).

Governance

MIRA has established the following governing bodies to oversee and inform its activities:



*Not yet formulated

Members of the International Scientific Advisory Committee (ISAC)

Dr. David Hogan (Chair), University of Calgary
Academic Leader, Brenda Strafford Centre on Aging, O'Brien Institute for Public Health, Cumming School of Medicine

Dr. Amelia DeFalco, University of Leeds
University Academic Fellow in Medical Humanities/Cultural representations of aging, disability, dementia and care

Dr. Tom Kirkwood, Newcastle University
Professor Emeritus (formerly Associate Dean of Ageing), Institute for Ageing

Dr. James Nazroo, University of Manchester
Professor of Sociology, Honorary/Director, Cathie Marsh Centre for Census and Survey Research

Dr. S.V. Subramanian, Harvard University
Professor of Population Health and Geography, Department of Social and Behavioural Sciences

Prof. Nicola Palmarini, Newcastle University
Director, National Innovation Centre for Ageing

Members of the Executive Committee

Dr. Paula Gardner, Humanities
Dr. Michel Grignon, Social Sciences
Dr. Milena Head, Business
Dr. Bhagwati Gupta, Science
Nick Markettos, Research Partnerships
Dr. Peter Mascher, International Affairs
Dr. Alexandra Papaioannou, Health Sciences (Clinical)
Dr. Ravi Selvaganapathy, Engineering
Dr. Michael Surette, Health Sciences (Basic Science)
Dr. Brenda Vrkljan, Health Sciences (Design Thinking)

Members of the Training and Capacity Working Group

Dr. Andrew Costa (Co-Chair), Health Sciences
Dr. Janet Pritchard (Co-Chair), Science
Dr. Yvonne LeBlanc, Social Sciences
Dr. Magda Stroinska, Humanities
Dr. Kim Dej, Science
Lorraine Carter, Centre for Continuing Education
Dr. Jocelyn Harris, Health Sciences
Sarah Novosedlik, Engineering
Dr. Bhagwati Gupta, Science
Dr. Milena Head, Business

Members of the End User and Stakeholder Committee (EUSC)

Dr. Brenda Vrkljan (Chair), McMaster University
Dr. Hugh Boyd, St. Joseph's Villa
Jordan Antflick, Ontario Brain Institute
Liz Conti, City of Hamilton
Dr. Anju Joshi, McMaster University
Lisa Maychak, City of Hamilton
Janine Mills, Thrive Group/Able Living
DM Marie-Lison Fougére, Government of Ontario
John Oliver MP, City of Oakville
Deb Schulte MP, King-Vaughan
Mary Lou Tanner, (former) City of Burlington
Tricia Woo, McMaster University, St. Peter's Hospital
Barry Spinner, Hamilton Seniors Advisory Committee

Members of the Communications and Promotions Working Group (CPWG)

Kara Aaserud, McMaster Institute for Research on Aging, Communications Manager
Brittany Dinallo, McMaster Optimal Aging Portal, Lead, Marketing Strategy
Laurie Kennedy, Aging, Community and Health Research Unit, Administrator
Laura Lawson, Canadian Longitudinal Study on Aging, Communications Manager
Steven Lott, McMaster Health Forum, Senior Lead Communications
Erin Young, GERAS Centre for Aging Research, Administration and Communications

MIRA's governance committees have been very active this year. MIRA's International Scientific Advisory Committee (ISAC) has met both remotely and in person in Hamilton, ON, and the Executive Committee continues to participate in several strategic discussions. The End User and Stakeholder Committee continues to meet and provide MIRA researchers with valuable feedback on implementation and connections to the community; and the Working Groups in both communications and training/education have been assisting in the development of strategic approaches to advance MIRA's mission, as well as identifying opportunities to leverage existing assets at the University.

Message from Committee Chairs

Through ongoing dialogue, MIRA has leveraged the expertise of the End User and Stakeholder Committee members to inform research priorities and advance projects currently under development. The Committee provides an enthusiastic and welcoming environment where MIRA researchers, including the two major projects teams, have an opportunity to share their work with external stakeholders and build relationships with the committee members. The diverse portfolios of committee members allow our researchers to understand the broad impact and potential of their research across a number of sectors. It has been a privilege to serve in the role of Chair, and I look forward to continuing to lead the work of this important committee on behalf of MIRA.

— Dr. Brenda Vrkljan, Chair, MIRA End User and Stakeholder Committee

Over the past year, MIRA's Training and Capacity Working Group has provided feedback to support the development of an education and training area for MIRA's website. The group has also shared their interdisciplinary perspectives on the interests of trainees to support the cross-campus expansion of macPAGE, an experiential education program, in the coming year. The group continues to share other ideas and explore emerging opportunities to broaden access to programs currently at the University, while identifying approaches to close gaps. As co-Chairs, we have appreciated the continued engagement of group members, and we look forward to exploring new, innovative opportunities in the years to come.

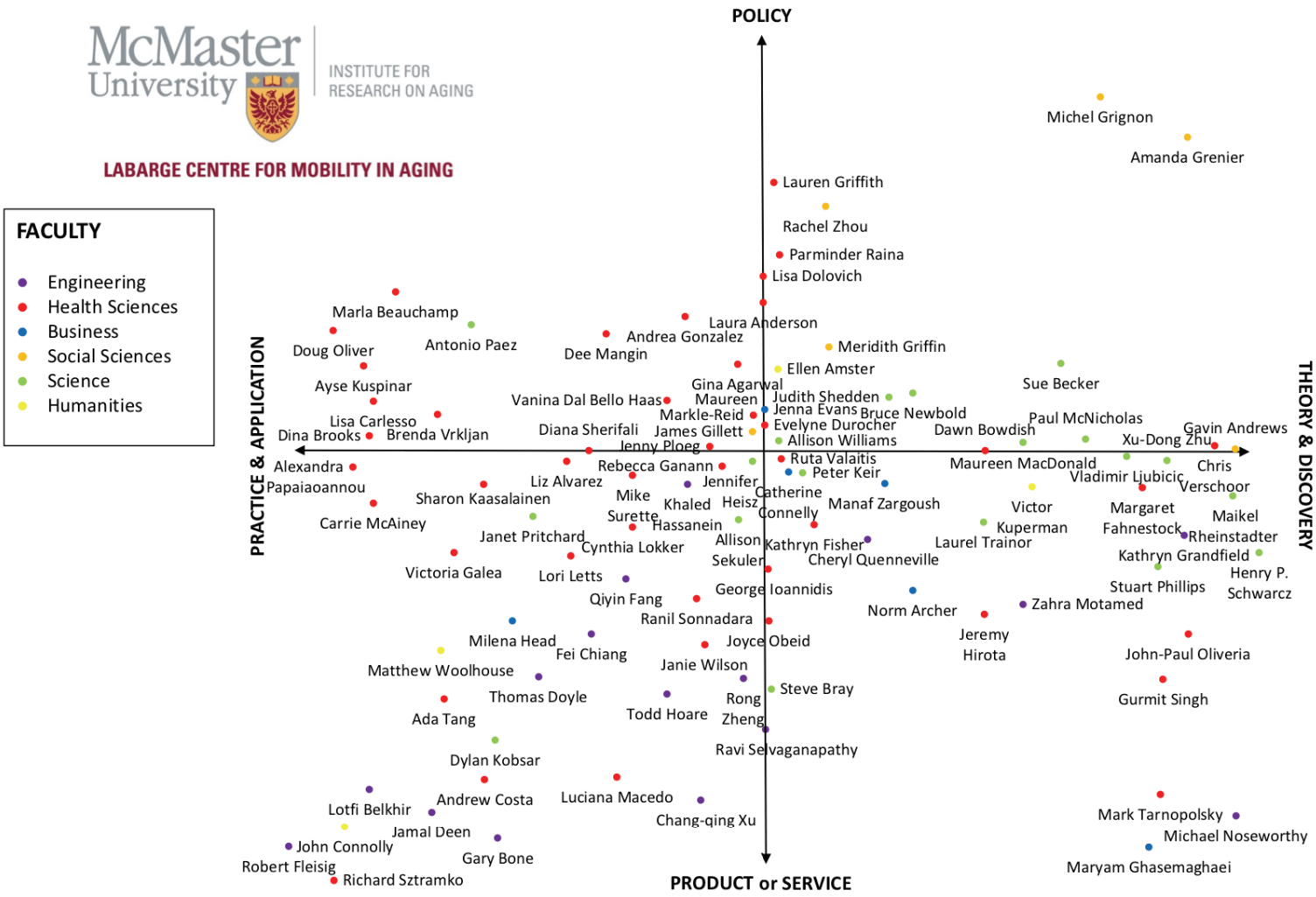
— Drs. Janet Pritchard and Andrew Costa, Co-Chairs, MIRA Training and Capacity Working Group

MIRA's approach

Design thinking and interdisciplinary research

MIRA leads several initiatives that facilitate design thinking and user-centred research as part of its mandate to foster an interdisciplinary community of aging research at McMaster. These initiatives include the creation of spaces and platforms – physical, conceptual, and digital – that promote collaboration, design and end-user engagement in research. The examples below illustrate several ways that MIRA is working toward these goals.

Interdisciplinary research map



In consultation with research support facilitators in all six Faculties, MIRA has developed the Research Map (previous page) to illustrate the focus and impact of individual MIRA researchers' work. MIRA researchers have positioned themselves on the two-dimensional plot; the X-axis represents their research focus, ranging from theory and discovery to practice and application, and the Y-axis represents their research output, ranging from products/services at the bottom, to academic in the middle, and to policy at the top. The map is intended to facilitate connections by highlighting areas of strength and opportunity among MIRA members, while enabling MIRA researchers to view themselves as part of a broader community. MIRA is currently working with the McMaster Library's Experts platform and McMaster's Research & High-Performance Computing Support (RHPCS) team to transform this map into an interactive tool that will allow users to see how MIRA researchers are connected to each other and to MIRA's research projects and initiatives. This interactive map is expected be operational in 2020.

Stakeholder and user engagement

MIRA continues to engage with its End User and Stakeholder Committee (EUSC), which includes representative from government, community partners, researchers from other institutions, and older adults. The EUSC interacts with several of MIRA's funded research projects and programs, offering insights, connections, and a variety of perspectives on the challenges, wants and needs of older adults.

Further, MIRA has cultivated a community of connections and allies, who are keen to interact with researchers and trainees in the development of research directions. For example, in early 2019, MIRA convened a design-thinking-driven stakeholder engagement session to assist MIRA Postdoctoral Fellow Dr. Irene Mussio in the development of her research project evaluating flu vaccination behavior in older adults. Stakeholders from Hamilton Public Health, St. Joseph's Villa, the Hamilton Public Library, Wesley Urban Ministries, and the Hamilton Council on Aging attended the session and shared valuable insights and contacts with this emerging researcher. She continues to work with these contacts as her study rolls out.

Advancing design thinking and user-centred research approaches

One of MIRA's aims is to explore and promote the use of design thinking, or user-centered research approaches in aging, both within McMaster and more broadly. MIRA collaborates with experts in these fields, such as Dr. Robert Fleisig (McMaster, Faculty of Engineering), Dr. Harry Mahler (OCADU, Toronto), and Dr. P.J. White (IT Carlow, Ireland). Following a JS Flaherty Foundation-funded Visiting Scholar Award to work with MIRA in late 2018, Dr. White presented at the International Association of Gerontology and Geriatrics (IAGG) 2019 meeting in Gothenburg, Sweden, describing the collaborative approach to employ design to facilitate interdisciplinary research in aging at McMaster.

The MIRA Trainee Network has embraced MIRA's philosophy of interdisciplinary research, and has received a MacPherson Institute Priority Areas for Learning and Teaching (PALAT) Grant to explore the impact of involvement in an interdisciplinary research network. The Trainee Network researchers have applied qualitative and quantitative methods to answer these questions, and have submitted a manuscript and presented a talk at the 2019 annual MacPherson Conference on Teaching and Learning.

Furthering its efforts to contribute to the conversation and literature surrounding design thinking and user-centred interdisciplinary research, MIRA's Research Coordinator, Audrey Patocs, gave talks on this topic at the Canadian Association on Gerontology (CAG) Annual Meeting in late 2018 and at the Canadian Association of Research Administrators 2019 meeting in Banff. Audrey's presentations have described MIRA's rationale in employing design thinking, the methods MIRA has applied in fostering these approaches, the outcomes thus far, including the types of projects funded and level of interdisciplinary and stakeholder engagement, and lessons learned. This engagement with the design thinking and interdisciplinary research community continues to establish MIRA and McMaster as leaders in innovative approaches to aging research.

Through the establishment of MIRA's newest centre, the **MIRA | Collaborative for Health & Aging**, led by Parminder Raina and Maureen Markle-Reid, who are scientific directors of MIRA and ACHRU respectively, MIRA will fill a gap in aging expertise for patient-oriented researchers in Ontario while advancing the science of patient-centred research. The new OSSU Research Centre in Aging brings together world-class researchers from both platforms and its mandate is to build capacity and advance Ontario's health care system by using an integrated, coordinated, and people-centred approach. The collaborations that established within the Collaborative will address the unique needs of older adults and their caregivers through resources, consultation supports, data access, and technical services. The Collaborative will position Ontario as a leader in patient-oriented research in aging.

Chapter 2: Research activities

MIRA grew out of the recognition that the best way to tackle the complex issues facing an aging population was as an organized, interdisciplinary team that integrates the input of multiple perspectives. MIRA mobilizes researchers at McMaster to coordinate their efforts to enhance the University's research strengths in aging through the following means:

- A coordinated, collaborative research agenda that brings together academic researchers and clinicians from all Faculties;
- The generation of human-centred solutions through active engagement of research end users and the consideration of perspectives arising from various disciplines and life experiences; and
- Ongoing interaction with diverse stakeholders.

MIRA's research approach is designed to generate solutions that are built upon the foundation of curiosity-driven activities that are practical, readily implemented and promote aging in place whenever possible.

MIRA's first focused centre, the Labarge Centre for Mobility in Aging (LCMA), supports research on the broad topic of mobility in aging. Interactions between biological factors and the built and social environments combine to impact older adults' mobility, social engagement and overall health. However, few studies have addressed these interactions across multiple levels. By better understanding the range of issues associated with mobility in aging, there is greater potential to optimize the well-being of Canadians. At the LCMA, McMaster researchers have identified three priority areas for study:

1. Understanding, defining, and exploring mobility in aging;
2. Maintaining and restoring mobility through prevention, intervention and interaction with health systems; and
3. Examining environmental facilitators and barriers that influence mobility.

The LCMA has distributed financial support to advance these priorities through several mechanisms, including **exploration and planning grants, major research initiatives, student scholarships** and a **post-doctoral fellowship**.

Exploration Grants

Exploration grants offer the opportunity to conduct collaborative, interdisciplinary research focused on mobility in aging. These grants are intended to stimulate new collaborations and allow researchers to collect preliminary data to support future proposals for full-scale studies. There are two types of exploration grant, each requiring the participation of researchers from multiple disciplines:

Planning Grants to explore and establish new cross-Faculty partnerships with the goal of generating research questions that integrate the perspectives of multiple disciplines.

Catalyst Grants to conduct feasibility/pilot studies or scaling of interventions for groups that have already established cross-Faculty partnerships.

Now in its third year of funding exploration grants, the breadth of MIRA's impact continues to grow through the support of the LCMA.

Planning Grants

Funding from MIRA/LCMA has supported the following initiatives in fostering new connections collaborations and developing research questions in aging:

Mobility, aging and animal-assisted interventions in long-term care

Completed February 2019

Research has demonstrated that older adults who own dogs are more physically active and are more likely to maintain mobility into later life, and that walking a dog regularly contributes to a greater sense of community and social mobility. Similarly, studies of animal assisted therapy show that interaction with therapy animals improves the physical and emotional well-being of older adults. James Gillett from the Faculty of Social Sciences led an initiative to explore the viability of a study that seeks to understand the effect of animal-assisted therapy on patient mobility in long-term care. Researchers from the Faculties of Science, Health Sciences, and Humanities joined stakeholder partners from the SPCA and the City of Hamilton, Macassa Lodge and Wentworth Lodge to discuss, plan and co-design a potential study. The team employed student research assistants who conducted phone interviews with various program aids of long-term care homes in the Hamilton region. In the phone interviews, information was gathered on the use of animals in their present programs, as well as their opinion on the program's effectiveness. Long-term care homes that were willing to participate in a forum regarding AAI were invited to McMaster University. In April of 2019, program aids at Pine Villa and The Meadows Long Term Care attended and shared their experience with animal-based programs.

Defying barriers

Completed May 2019

Defying Barriers Workshop, a joint initiative of McMaster University and the artist-run organization Centre[3], was held on May 15, 2019, in downtown Hamilton. More than 50 participants toured Centre[3] facilities, learned from talks by artists Rebecca Baird and Dave Bobier, and participated in discussions about their lived experiences and knowledge as artists, advocates, and community members with disabilities. The workshop aimed to increase awareness of the need for accessible and intergenerational creative environments, contribute to research on inclusive design, and facilitate partnerships reflecting the diversity of our communities. The workshop was organized by School of the Arts, faculty Carmela Laganse and Briana Palmer, with support from the McMaster Institute for Research on Aging and the Wally and Mavis Pieczonka Endowment for the Arts. It generated ideas regarding existing barriers in artistic spaces, practices, and infrastructure and how production, exhibition, and performance spaces could be collaboratively and equitably designed to enrich our creative culture.

Emerging opportunities in mobility and aging research

Completed June 2019

MIRA hosted a half-day workshop and planning session to mobilize researchers around emerging opportunities in mobility and aging research. The purpose of this day was to consider next steps and future direction for MIRA-supported research in mobility in aging, and to help teams prepare for major interdisciplinary funding calls. More than 40 researchers and members of the University's research leadership attended and contributed to facilitated brainstorming sessions around complex challenges in aging that can only be addressed through interdisciplinary approaches. The session resulted in three themes: 1) Enhancing technology equity to promote optimal aging; 2) Exploring the characteristics of "Blue Zones" and related potential interventions; and 3) Disrupting healthcare in Canada to meet the needs of our aging population. Teams continue to explore these themes and are currently conducting a literature review, exploring funding opportunities, and connecting with potential partners and stakeholders.

The future of aging

Completed July 2019

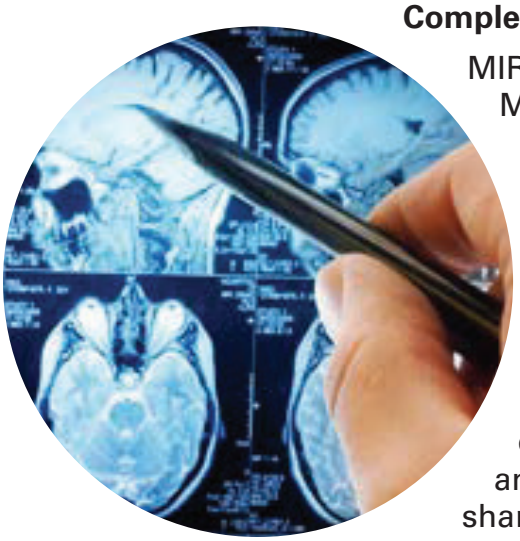
"The challenges faced by our aging population may be met with technological solutions, but their development, evaluation, and implementation will call for interdisciplinary collaboration and stakeholder engagement. MIRA is pleased to support this event that encourages interdisciplinary research at McMaster to drive innovation in aging."

Parminder Raina, Scientific Director, MIRA

MIRA partnered with the Faculties of Engineering, Health Sciences and Science for a full day event dedicated to exploring the future of research on technologies that will allow older adults to live more independently and longer in their place of choice. The event featured snapshot presentations from researchers leading aging and technology initiatives across all six McMaster Faculties. These included "Engineering ways to prevent broken bones in older adults" (Cheryl Quenneville, Engineering), and "Aging & housing: Preconditions for leveraging smart technology's benefits" (Jim Dunn, Social Sciences), and a keynote lecture by iGeriCare founder and MIRA researcher Dr. Richard Sztramko. The event also included a poster session and exhibit hall, as well as tours leading McMaster research facilities LIVELab, PACE and the Wesdale Smart Home. More than 100 participants attended and interacted with exhibitors and presenters from industry (ABBY, Centivizer, The Forge), research funding (AGE-WELL, CABHI), academia (Michael DeGroote Centre for Digital Transformation, ARiEAL Centre), and learned about collaboration and funding opportunities.

Cannabis and aging research directions

Completed November 2019



MIRA partnered with the Michael G. DeGroote Centre for Medicinal Cannabis Research (CMCR) to host an initiative to elicit and support research questions related to aging and cannabis use. More than 20 researchers from disciplines including social work, geriatric medicine, biochemistry, nursing, and kinesiology participated in an initial brainstorming session that resulted in four broad themes: 1) Basic science of cannabis action in the aging body; 2) Epidemiological approaches to cannabis consumption rates and outcomes; 3) Clinical research in context treatment and contraindication for specific diseases and disorders; 4) Knowledge translation and best practices for sharing evidence with patients, providers and stakeholders. The group will continue to collaborate through early 2020 to develop proposals for potential internal or external funding.

Catalyst Grants

MIRA and the LCMA continue to support research collaborations focused on mobility in aging, working with each of McMaster's six Faculties to identify a new interdisciplinary project that aligns with both Faculty and MIRA/LCMA objectives. To date, 19 Catalyst Grant projects have been funded by the LCMA, driving 57 new collaborations from outside researchers' own disciplines. These projects have also supported 64 Highly Qualified Personnel (HQP), including undergraduates, graduate students, Postdoctoral Fellows, and research staff.

Six projects will be funded in the 2019-2020 year, representing one from each Faculty. Over the last three years, the following projects were supported by seed funding of $465,502 through the LCMA as well as matching funds of $270,016 from other sources:

Catalyst Grants: 2017 Projects

Implications of driving cessation amongst Canada's older adults living in rural and small urban communities

Bruce Newbold (pictured), Darren Scott, Jim Dunn, Amanda Grenier, Kai Huang, Brenda Vrkljan (pictured)

Having a range of mobility options, including the personal automobile, public transit and active transit (e.g., walking, bicycling), enables an individual or household to fulfill their out-of-home mobility needs. For older adults living in rural areas and small towns, however, a lack of mobility options means a greater reliance is placed on the personal automobile. For older adults in these areas, the implications of limited mobility options are magnified, particularly for those who have self-restricted their driving or have ceased to drive. The purpose of this study was to explore the automobility behaviors of Canada's aging population and how it changes according to their specific needs, relative location, and stage in the life course as they age through retirement and approach and complete driving cessation, with a focus on older adults in rural and small urban areas. Results reveal the lack of transportation options and highlight the negative impacts of driving cessation including reduced out-of-home activity levels.

Cognitive vs. chronological age as barriers to using wearable activity monitors in older persons

Maryam Ghasemaghaei (pictured), Manaf Zargoush (pictured), Stuart Phillips, Reza Samavi (pictured)

The healthcare industry is characterized by its increasing costs from one year to the other, which adds burden to the economy and increases the pressure on healthcare providers. Governments have sought solutions to this problem through the use of technology. For example, the United States passed the HITECH legislation to encourage the meaningful use of electronic medical records in hospitals and clinics. Among the technologies sought were wearable devices. Wearable devices are smart devices that capture information about users and their environments to enhance the users' knowledge of themselves, subsequently allowing users to incorporate this information for their own benefit. In healthcare, wearable devices can provide valuable information about daily physical activity, and they can be a strong predictor of morbidity and mortality. Hence, such devices may provide important information to care providers to predict the overall health and development of patients.
The value of using wearable devices is even greater for older adults. Elderly patients often suffer from many co-morbidities, and by capturing information regarding their daily activities, caregivers and physicians can assess their level of independence and predict developments regarding their medical conditions. Unfortunately, the use of healthcare technology, including wearable devices, is very low among the senior population. Moreover, limited studies have been conducted on the effect of wearable devices on seniors' health and quality of life. That's why it is important to understand not only the efficacy of these devices but also the factors that influence seniors' use of such technology. This interdisciplinary study was aimed at assessing factors that influence seniors' use of wearable devices. The efficacy of a healthcare intervention does not imply its adoption. So, it is not enough to assess the benefits of using wearable devices; it is also important to study the factors that influence seniors' decision to utilize these devices. To assess those factors, this study took both a qualitative and quantitative approach to explain the factors that influence the use of such devices.

The ultrastructure of osteoporotic bone and its medical implications in aging populations

Kathryn Grandfield, Henry Schwarcz (pictured), Jonathan Adachi, Justin De Beer, Janet Pritchard, Alex Papaioannou

Osteoporosis affects over 1.5 million Canadians. Older adults are the greatest population affected by this disease, with 10 per cent of all Canadians over 40 suffering from it. Understanding how changes arise in bone and to what degree these changes are remedied with drug treatments is still lacking. In this study, small length scale structures (less than 100 nm, termed ultrastructural characteristics) of the mineral and organic phases of healthy, osteoporotic, and drug-treated bone were studied to find differences in mineralization and potential clues for the cause of osteoporosis. We developed a new method to measure nanoscale biomarkers for disease in osteoporosis using transmission electron microscopy. Our findings, forthcoming in two journal publications and comprising in a MASc thesis, show that there are measurable nanoscale indicators of osteoporosis. These findings demonstrate a new method for diagnostic imaging for patients to track disease progression and the effectiveness of therapies.

A comprehensive framework for the conceptualization of physical mobility as an essential construct to address in both the assessment and treatment of older adults

Ayse Kuspinar (pictured), Chris Verschoor, Lori Letts, Ruta Valaitis, Ellen Amster, Carol Bassim, Dawn Bowdish, Vanina Dal Bello-Haas, Jonathan Dushoff, Jocelyn Harris, Carrie McAiney, Sarah Neil-Sztramko, Julie Richardson, Brenda Vrkljan

Life-space mobility, which is the ability for individuals to safely move within and across environments that expand outwards from their home to their wider community, has been emphasized in aging research. In particular, it is important to understand the association between life-space mobility and factors that may be amenable and sensitive to change with intervention. For such an analysis, a large and representative population-based dataset can help identify factors that can impact life-space mobility. The Canadian Longitudinal Study on Aging (CLSA) is one of the world's largest population-based datasets, and, as such, offers a unique opportunity to evaluate a comprehensive set of putative factors that can impact life-space mobility in the aging population. The aim of this study was to determine the association between potentially modifiable factors and life space mobility in older adulthood. The study had two important findings: First, driving, social support and walking speed are the most important contributors to life-space mobility in older adulthood. Second, life-space mobility is multifactorial and interventions that are pragmatic in their design and testing are needed that consider the complexity involved.

Assessing and improving mobility in older adults using a smart knee monitoring system

Jamal Deen (pictured), Khaled Hassanein, Tapas Mondal, David Cowan

The rapid growth of the aging population has become a significant socio-economic concern in terms of social welfare and healthcare needs for many societies, including Canada. The loss of mobility among older adults is particularly critical as it may result in social, mental and physical consequences. Aging, coupled with poor mobility due to gradual deterioration of the musculoskeletal system makes older adults more vulnerable to falls, which may lead to serious health risks, such as joint injuries, hip and bone fractures, and traumatic brain injury. The costs associated with the treatment and management of these injuries incur a huge financial/social burden on government, society and family. The knee is one of the key joints that bear most of the body weight, so its proper function is essential for good mobility. Continuous monitoring of knee joints can provide a complete set of data related to gait and mobility, which can be used for early diagnoses of mobility-related problems. The team has developed a wearable, easy-to-use multi-sensor-based smart knee monitoring system to record and assess mobility-related parameters from the knee joints. This can be interpreted by medical experts to provide useful information about the overall mobility status of an individual. Thus, the smart wearable knee monitoring system can be used for early diagnoses of joint disorders, such as osteoarthritis, and osteoporosis, post-surgery monitoring of patients' mobility, and rehabilitation.

ABLE: Arts-based therapies enabling longevity for geriatric outpatients

Paula Gardner (pictured), Patricia Hewston, Alexandra Papaioannou, Courtney Kennedy, Laurel Trainor, Rong Zheng (pictured)

As mobility declines, older adults are at greater risk for a range of physical, cognitive, and mood issues. However, research shows that exercise, arts-based engagement and social interaction together has a synergistic impact, producing physiological, cognitive, affective and social benefits. Digital technologies offer a range of solutions for encouraging mobility to produce such positive impacts. The transdisciplinary research team, including artist/designers, computer scientists, and medical/health professionals is collaborating to create such a solution in the form of ABLE, Arts-Based exercise enabling LongEvity. ABLE Is an arts-based rehabilitation platform consisting of wearable technologies, an app and a screen/speaker system. The simple, portable, and affordable system engages older adults in exercise and movement, producing a visual and audio feedback that encourages sustained, pleasurable engagement. Using a co-design approach, where the team collaborates closely with older adults, they are investigating the feedback most interesting to diverse older adults, and how this engagement might enhance physical and mood health, particularly in those experiencing cognitive decline.

Meanings of (im)mobilities: A 'new mobilities' perspective

Amanda Grenier (pictured), Meridith Griffin, Gavin Andrews, Jim Dunn, Alexandra Papaioannou, Rob Wilton

Traditional understandings about mobility often surround physical function, ability, travel or movement of the body in some manner. Mobility and immobility are often examined as binary, with a negative connotation attached to experiences of immobility. These ingrained definitions often blur the actual experiences of mobility while aging, specifically by those who are frail and/or living with a disability. The 'new mobilities' perspective, however, challenges such understandings, drawing attention to the complex power relations and privileges of mobility that operate across a range of relationships, settings, sites, and contexts. This research involves 15 interviews with older adults within three subgroups: Five older adults considered frail; Five people who are aging with a disability, and; Five older people who self-identify as active. The aim of the study is to shed light on the mobility experiences and perspectives of those often silenced in conversations related to mobility in order to evaluate the merits of a 'new mobilities' perspective. The findings from this research showcases the diversity in mobility experiences and the issues with utilizing a static definition of mobility as a uniform occurrence. It challenges the taken-for-granted assumptions about mobility while aging and examines the often overlooked embodied experiences and meanings associated with (im)/mobility.

Catalyst Grants: 2018 Projects

An intergenerational and life course program of research (in Hamilton)

Andrea Gonzalez (pictured), Parminder Raina, Marla Beauchamp, Terry Bennett, John Connolly, Andrew Costa, James Gillett, Jeremiah Hurley , Nick Kates, Melissa Kimber, Lauren Griffith, James MacKillop, Harriet MacMillan, Margaret McKinnon, Katherine Morrison, Stuart Phillips, Ravi Selvaganapathy, Gregory Steinberg, Brenda Vrkljan

Behaviors, lifestyle factors, social and economic mobility, and health problems are evident across multiple generations within families. Few studies have looked at how relationships between biology, the environment and lifestyles may interact across time and generations, and how this ultimately affects healthy aging. For the first time in history, we have up to four generations living at the same time. This provides a unique opportunity to examine the multi-leveled impact on functional changes including mobility limitations, mental well-being and social participation across generations within families over time. In this project, the team aims to review the literature on intergenerational effects across outcomes, and, based on findings from the review, the team proposes to engage the local research community, potential participants and key stakeholders to develop an intergenerational cohort within Hamilton. A greater understanding of why some individuals develop diseases, while others remain healthy, especially in the face of risk factors (e.g., obesity), will enable us to move forward to a more personalized prevention and personalized medicine, ultimately maximizing years of healthy living.

Supplementation with n-3 polyunsaturated fatty acid-enriched fish oil to mitigate skeletal muscle-disuse atrophy in older women

Stuart Phillips, Thomas Hawke, Michael Noseworthy, Tanya Holloway (pictured), Chris McGlory (pictured)

The loss of skeletal muscle mass and strength with advancing age, termed sarcopenia, is related to future mobility disability and frailty. This is especially true in women who, in comparison to men, experience a greater incidence of mobility disability. Women outlive men and are more likely to experience the consequences of reduced muscle size and function. Periods of skeletal muscle-disuse or pronounced inactivity are more frequent in older persons and can arise due to hospitalization, homebound sickness, or recovery from injury that requires immobilization and/or inactivity (i.e., knee or hip surgery or fracture repair). Periods of skeletal muscle-disuse are a significant problem as the restoration of lost muscle mass, strength, and function following disuse is often incomplete, particularly in older women. New pilot data from the teams' lab demonstrated that younger women who supplemented with fish oil-derived n3-polyunsaturated fatty acids (n3 PUFA) four- weeks prior to single-leg immobilization had much smaller losses of muscle mass and improved recovery of muscle mass and strength on return to normal activity. The aim of the current investigation is to examine the efficacy of n3 PUFA-enriched fish oil supplementation on muscle mass, strength and function in older women undergoing a period of skeletal muscle-disuse (seven days), including recovery. This project will yield novel and highly relevant data for the development of strategies to combat disuse-induced loss of muscle function and improve health care for older women.

Addressing alternate level of care issue facing older Canadians: A co-designed comprehensive data analytics approach

Manaf Zargoush (pictured), Alexandra Papaioannou, Reza Samavi (pictured)

There is increasing concern that Canadian older adults wait too long in hospitals after receiving the care for which they have been hospitalized. Such patients, referred to as Alternate Level of Care (ALC) patients, stay on acute and post-acute care beds before being transferred to a more appropriate level of care. This delayed discharge of frail geriatric patients leads to a rapid deterioration of their overall health, including their functional mobility. Moreover, ALC waiting leads to significant costs and inefficiencies in the healthcare system. The upward trend in the number of ALC patients is indicative of healthcare system failure to address the issue, whereas, with the projected exponential growth in the population of older adults across Canada, the number of ALC patients is also expected to grow substantially. Therefore, ALC has become one of the most pressing healthcare challenges concerning older Canadians with implications for other patient groups as well. To address the issue, the team is using a large amount of data in order to provide analytical solutions for smooth ALC patients' movement within the healthcare system (i.e., the transition from acute and post-acute care to home and community). To this end, this project utilizes advanced data analytics and optimization techniques in addition to the design thinking principles to provide a more comprehensive and updated understanding of the challenge. The outcomes from this project are anticipated to provide policymakers with enhanced insights regarding older patient mobility through the healthcare system focusing on ALC challenges and their associated implications. This will, in turn, contribute to the wellbeing of those patients designated as ALC. Given the added insights, the team hopes the ALC issue can be better managed and appropriate resources can be assessed by relevant stakeholders to ensure that older patients are receiving the right care at the right place and time.

Maintaining the mobility of older Canadians: Examining the transition from driving to driving cessation

Saiedeh Razavi (pictured), Bruce Newbold, Brenda Vrkljan, Hany Hassan, Mark Ferguson

This study provides a better understanding of older Canadians' perceptions, preferences, and needs in driving or using other modes of transportation and emerging technologies. The research is based on a self-reported questionnaire survey that was carried out among a sample of older Canadians in the Greater Golden Horseshoe Region, which has a range of transportation options. The survey instrument captured a broad range of areas with respect to (1) older adults' travel habits, transportation preferences, challenges/difficulties associated with using different modes of transportation; (2) driving habits and challenges while driving; (3) importance of advanced vehicle technologies to assist older adults and respondents' preferences, concerns and willingness to use two levels of autonomous vehicle technology: semi-automated vehicle and fully automated vehicle. The findings of this research showed that automobiles were the most popular mode of transportation used by respondents to reach their destinations. Many other transportation options were underutilized with all forms of public transit (bus, train, subway) having never been utilized by more than 55 per cent of the participants. The results also suggest that several factors influence older Canadians' willingness to use semi and fully automated vehicles and that autonomous vehicles might provide older adults

with a new form of transportation, especially after driving cessation to maintain their quality of life. However, it was found that several factors affect older Canadians' preferences and willingness to use semi and fully automated vehicles. The most influencing factors included awareness of the importance of advanced in-vehicle technologies to assist older drivers; preference to use automobile as a passenger, gender, level of education, and the need for assistance while driving.

Managing pain in older adults: A virtual learning environment for understanding the physiology of acute pain and its impact on mobility in older adults

David Harris Smith, Vickie Galea (pictured), Norm Buckley, Milena Head, Ada Tang, Matthew Woolhouse

The research team has conducted preliminary interviews, observations, and consultations with physicians, physiotherapists, and anaesthesiologists at Sunnybrook Holland Centre. The insights gained in understanding and managing acute pain in the older adult has been incorporated in the design, development and learning outcomes of an online Virtual Learning Environment (VLE) for understanding acute pain (VLE). The project moves next into a user studies phase in collaboration with Dr. Milena Head, to test the pedagogical efficacy of the VLE. These participant focused studies have been granted conditional approval by the Hamilton Integrated Research Ethics Board (HiREB).

Aging and mobility in nature: A McMaster and Royal Botanical Gardens collaboration

James Gillett (pictured), Meridith Griffin, Gavin Andrews, Marla Beauchamp, Rong Zheng, Nancy Bouchier (pictured), Maryam Ghasemaghaei (pictured), Manaf Zargoush (pictured), Jennifer Heisz

With a growing aging population, there is an imperative to document, understand and analyze the engagement with natural built environments by older adults. This knowledge will facilitate the improved mobility of older adults in environments designed to be meaningful, enjoyable and to enhance well-being. In collaboration with the Royal Botanical Gardens (RBG), this research explores the mobility practices and meanings of older adults in natural built environments. The project takes three forms: (1) a 'mobility in nature' survey of older adults who make regular use of the gardens; (2) an observational study of guided interpretative walks at the gardens by older adults; (3) a series of ethnographic studies of nature-based active leisure programming with a specific focus on mobility and aging in these contexts. This research serves as the foundation for an interdisciplinary series of projects in collaboration with the RBG in the areas of mobility and aging. Through engagement in these studies, the team will explore viability and utility of extending the youth-oriented Back to Nature Outdoor Charter to older adults. The major deliverable associated with this project to date is in laying the groundwork for a robust relationship with the RBG and its faculty and staff, and the engagement of two Master's and two PhD students in this exercise in developing community engaged research partnerships. It has helped to create closer ties to the RBG, and been instrumental in addressing broader issues around how to best do community engaged research and also theorizing what aging means for people in relation to mobility. Thus far, the grant has led to further collaborations between Social Sciences and Humanities, including a grant within Humanities to work with the archives at the RBG, and has sparked connections with other community organizations with a stake in aging and mobility.

Catalyst Grants: 2019 Projects

Writing of age: Linguistic markers of cognitive, emotional and social well-being among older adults

Victor Kuperman (pictured), James Gillett, Ranil Sonnadara, Aki-Juhani Kyrolainen

Aging brings forth changes in life circumstances, some of which can negatively affect the quality of life and well-being of older adults. According to the Canadian census data, roughly 30 per cent of people aged 65 and older who live alone are at risk of being socially isolated and lonely. Social isolation and loneliness are associated with decreased physical and mental well-being, and so their prevention can lead to a demonstrable improvement in quality of life. Yet, it is difficult to identify people experiencing social isolation because it is often highly stigmatized. The goal of this project is to develop web-based software applications to (1) identify older adults who are at risk of being socially isolated and lonely; and (2) also provide opportunities to increase social interactions. To achieve these goals, this project tackles this challenging issue through the prism of language use by collecting written life-stories. Building on machine learning techniques, the goal is to find linguistic markers of social isolation and loneliness. Our suite of applications will enable older adults to share their life stories and to tap into the experiences of others, boosting social connectivity. The team believes that the ability to share life experiences with others provides a unique opportunity for increased social interactions among older adults even when physical mobility is limited.

How can we improve mobility through alternative transportation modes for seniors? Measuring what works and what does not work in road safety improvements for pedestrians and cyclists

Michel Grignon (pictured), Niko Yiannakoulias, Emmanuel Guindon, Tara Marshall, Jean-Eric Tarride, Mohamed Hussein

As in many other North American cities, Hamilton was designed for cars and drivers. As a result, its streets are not always safe or pleasurable for pedestrians and cyclists, and these active transportation modes are not used as often as they should be. This is particularly true for older adults. Seniors are more likely to be the victims of collisions as pedestrians; but they also benefit from walking, which is their main source of exercise. An evaluation of the "complete streets" approach found that elderly citizens residing in safer environments are much more likely to walk and reach a level of healthy activity. Seniors could also benefit from cycling, an activity perceived as too risky for them. (Complete streets are those that are designed for cars, cyclists and pedestrians of all abilities. They may include protected bike lanes and wide sidewalks, shade, benches, and traffic calming measures.) This project will help Hamilton design effective interventions to make its streets safer and more enjoyable to pedestrians and cyclists, thus encouraging a culture of recreational, social as well as utilitarian walking and cycling for the elderly. The team's contribution will be to provide a method to measure the effectiveness of various interventions that will allow the City of Hamilton to implement the most cost-effective traffic-calming measures to improve safety for pedestrians and cyclists.

A multidisciplinary approach to addressing mobility limitations after orthopaedic joint replacement surgery

Janie Wilson (pictured), Lisa Carlesso, Luciana Macedo, Cheryl Quenneville, Elizabeth Hassan, Rong Zheng, Dylan Kobsar, Manaf Zargoush, Dan Tushinski, Dale Williams, Tom Wood, David Wilson, Anthony Adili, Kim Madden

Knee osteoarthritis is a progressive disease that causes significant disability and loss of mobility for many Canadians. When the symptoms of osteoarthritis become advanced, ultimate treatment is total joint replacement surgery, with the goals of removing pain and improving a patient's function and mobility. Joint replacement surgery successfully provides pain and symptom relief for most patients. However, the reality is that mobility and joint function is rarely restored toward healthy adult levels, and aspects of continued disability after surgery plague many patients. This may hinder an individual's ability to live independently and to participate in society. The desire for improved function and mobility is a key factor in a patient's decision to seek surgery. Questions such as "How mobile will I be after my surgery?" and "When will I be able to walk normally again?" are ranked as some of the most important by patients. The team of researchers thinks that we can do better than this, but innovation in this space will only happen when we begin to incorporate technology into orthopaedic clinics to collect objective data on function and use it to improve our understanding of why some patients have better outcomes than others. The team's research will focus on developing a clinical tool that will collect important information on pain, symptoms, mobility and joint function before and after surgery. This information will be used to understand if there are groups of patients who may benefit from different strategies for surgery and rehabilitation. The ultimate goal of the research will be to improve mobility outcomes for patients by using patient-specific data gathered in the orthopaedic clinic before and after surgery.

Movement sonification for testing mobility in the context of interacting with complex environments

Laurel Trainor (pictured), Dobromir Dotov, Marla Beauchamp, Tara Packham, Janie Wilson, Qiyin Fang, Matthew Woolhouse

The ability to predict fall risk in older adults is important, as effective interventions exist, but clinical screening tests for balance and mobility often fall short of determining who is at risk. These relatively simple tests may not fully capture abilities to perform sensory-motor interactions with every day complex and dynamically changing environments. The team has developed a test of dynamic motor response that involves integration between auditory sensory input and movement, whereby the user must adapt their motor movements to perturbations or changes in the tempo and/or amplitude of a sound in order to stay in sync with the sound. Community-living adults over the age of 65 are participating in this study. They are also taking part in the large study of Beauchamp and colleagues in which extensive data is being collected on participants' balance, mobility, medical history and demographics. These participants are being followed so that Beauchamp and colleagues can measure fall risk from these factors prospectively. The team aims to determine whether the ability to adapt motor movements in response to changing sensory input from the environment can better predict fall risk. If successful, the team hopes to better determine who is most at risk in order to implement interventions known to be successful.

Bioprinted 3D in-vitro models to determine mechanisms of cognitive benefits of exercise in the elderly

P. Ravi Selvaganapathy (pictured), Margaret Fahnestock, Aimee Nelson, Christopher Patterson

As we age, we lose cognitive skills. Regular physical exercise, particularly aerobic exercise, is the best-known approach to preventing or delaying cognitive decline. However, as we age, frailty, disease or injury may make physical exercise difficult or impossible. Thus, those who lose mobility as they age are at major risk for cognitive decline and ultimately, dementia. Unfortunately, in-vitro models that can recreate the complex dynamics of the influence of exercise on the brain do not exist currently and are a significant impediment to the development of not only an understanding of the biological mechanisms underlying this effect, but also in discovering new therapeutic agents that could potentially work synergistically with exercise to delay cognitive decline. Through this project, our aim is to understand the molecular basis of how exercise protects against cognitive decline. In addition, we will also develop new in-vitro models and fabrication methods that will allow researchers worldwide to investigate neurodegenerative processes in the brain through the lens of systemic interaction with other tissues in the body, thereby providing a more meaningful and realistic yet complex picture to understand diseases processes and discover new therapeutic interventions. In the long term, we expect that these finding will allow the design of pharmaceuticals that mimic the effects of exercise for those who have limited mobility. In the short term, this understanding will help us optimize exercise protocols that maximize the protective effects of exercise for the physically limited, aging population.

Older adults, ageism, and entrepreneurship: Learning from failure and success and the interplay of national culture and institutional policies

Benson Honig (pictured), Bruce Newbold, Byron Spencer, James Gillett

The Canadian population aged 65 and above is expected to hit 20 per cent by 2024 and to reach over 10 million by 2036. Layoffs and job displacement are associated with ageism, and many older workers face limited prospects when unemployed, and are prone to an increased level of depression. To regain this loss of labour workforce segment has important implications for the economic productivity cycle, the potential overall size of the labour market, the economic growth, and distribution of the national income. Equally important, evidence indicates that individuals who work have better health and psychological outcomes and are more satisfied than those who do not. Reducing barriers and increasing incentives for older adults to remain in the workforce while accounting for different national, regional, internal migration and experiences may reduce the negative influences of the ageing population phenomenon in Canada. “Elderpreneurship” occurs when older adults pursue opportunities by integrating active ageism with entrepreneurial behaviours based on opportunity-seeking and business creation. In this project, the team envisions entrepreneurship through self-employment as one possible avenue influencing elements of optimal aging, such as labour mobility, social reintegration and better mental and physical health.

Major research initiatives

In 2017, MIRA and the LCMA launched a process to support interdisciplinary teams who are working towards understanding, developing and evaluating critical issues in aging and mobility through two major research projects. The two broad fields identified as central themes were Exercise, Nutrition and Mobility in Aging (ENM) and Technology, Environment and Mobility in Aging (TEM). The purpose of each of these working groups is to develop world-class research programs with a direct impact on the lives of older adults and their caregivers, while securing McMaster's reputation as a global leader in aging research. Since this research is meant to involve and benefit the end user, the principles of design thinking have been embedded in the process of developing and evaluating the proposals.

Developing interdisciplinary programs of research

To launch the two research projects, a call for participation was distributed to all MIRA members and shared with McMaster researchers who have interests in aging. More than 80 researchers participated in initial meetings facilitated by design thinking experts, where participants stepped out of their so-called silos to place themselves within a context of opportunity, need, and possibility. Researchers were asked: "What are the great challenges in this area of research?" and "How could the skills and assets within MIRA be leveraged to address these challenges?"

Following these initial sessions, MIRA-facilitated meetings, workshops, and stakeholder consultations, where researchers began to develop plans for a program of research in each stream. Over the ensuing year, researchers further developed their research questions while interacting with stakeholders from the City of Hamilton, the public libraries, the Hamilton Council on Aging, City Housing, IBM, public transit, local hospitals and health care providers, and older adults and caregivers. Ultimately, the two teams focused on two mobility-related challenges: The ENM team developed a plan for neighbourhood-level interventions that would jointly

address gaps in nutrition, physical activity, and social isolation through leveraging existing programs and platforms; the TEM team, envisioning mobility at the "sixth vital sign", sought ways to bring together tools from rehabilitation science, wearable sensors, machine learning, medicine and nursing to develop a mobility metric that older adults and their caregivers can use to understand their own mobility trajectories, and how to change them if necessary.

Through this process, researchers and stakeholders uncovered an opportunity to address an additional challenge in mobility in aging: the decline in older adults' physical mobility that often follows even a short hospital stay. MIRA researchers partnered with leadership and front line staff at Hamilton's Juravinski hospital to develop a **third major program of research** that will measure the effects of an early mobilization program intended to prevent declines in patient mobility levels associated with hospitalization. Through co-funding with the Faculty of Health Sciences and the Labarge Centre for Mobility in Aging, this project has been granted pilot funds.

Proposals were submitted for review by MIRA's International Scientific Advisory Committee, as well as to external reviewers with relevant expertise, and were ultimately granted funding in mid-2019. Each of these projects has begun to build capacity, apply for external funds, and conduct environmental scans and preliminary data collection.

The projects

The EMBOLDEN trial: Enhancing physical and community MoBility in OLDEr adults with health inequities using commuNity co-design

Investigators: Rebecca Ganann, Stuart Phillips, Courtney Kennedy, Bruce Newbold, Elizabeth Alvarez, Sarah Neil-Sztramko, Ruta Valaitis, Ayse Kuspinar, Darryl Leong, Diana Sherifali, James Gillett, Marla Beauchamp, Julia Abelson, George Ioannidis, Terry Flynn, Pasquelina Santaguida, Chris Verschoor, Gina Agarwal, Maureen Markle-Reid, Meridith Griffin, Carol Bassim, Parminder Raina, Lehana Thabane

EMBOLDEN
Getting Out for Health

Physical mobility and social participation are necessary to maintain independence and quality of life for adults who are over 55 years of age. Mobility barriers can lead to social isolation, poor physical and mental health and are recognized precursors to frailty, increased hospitalizations and premature death. Programs designed to support physical and social mobility may be highly effective in a research setting, but many older adults face barriers accessing these programs, and optimal design features for a real-world setting are not known. Co-design is a research approach that engages citizens and research stakeholders to ensure better alignment of research with existing community programs, leverageable assets, and applicable and appropriately contextualized experiences of older adults. The team is near completing an assessment of local community assets and gaps, as

well as a systematic review of existing best practices in group-based programs to promote mobility in older adults. Together these projects provide a foundation for co-designing an innovative group-based community intervention that targets physical and community mobility, healthy eating, social participation, and system navigation. Older adult citizens and other key stakeholders will partner with researchers to co-design the intervention. The overall aims of the EMBOLDEN study are to 1) promote health and mobility among community-dwelling older adults; 2) address community needs and existing service gaps through the new intervention; 3) foster real-world uptake and impact; and 4) address health inequities.

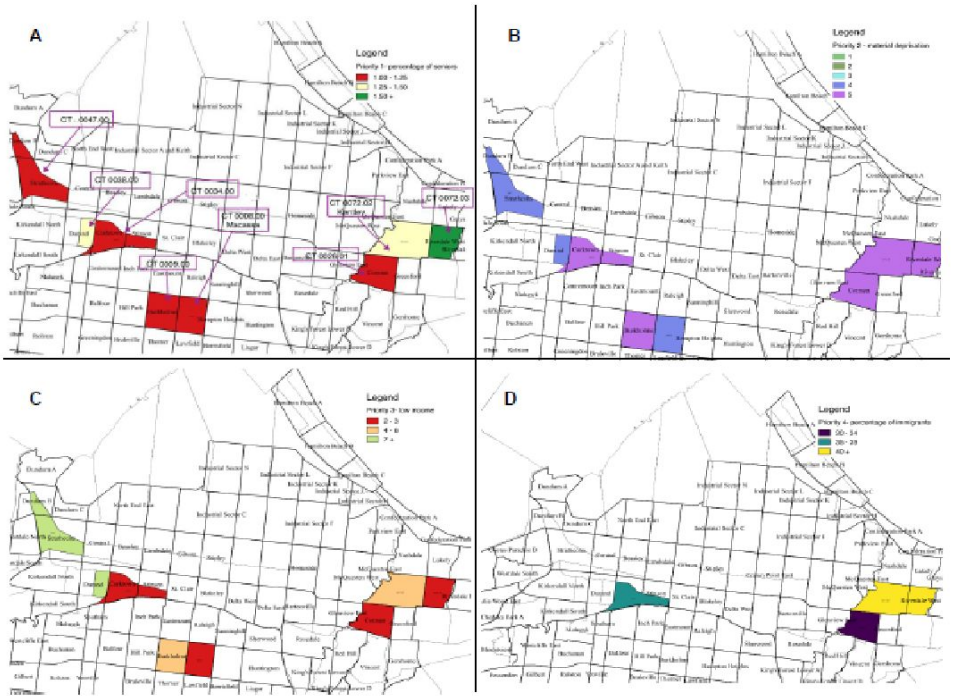


Figure: Maps showing Census tracts and corresponding neighbourhoods identified for EMBOLDEN based on A) % of older adults, B) material deprivation, C) % of low income and D) percentage of immigrants.

A real-time mobility monitoring and assessment tool for preventing decline in older hospitalized medical patients

Investigators: MyLinh Duong, Lauren Griffith, Rong Zheng, Nick Miller, Manaf Zargoush, Marla Beauchamp, Paul McNicholas, Jennifer Kodis, Samir Raza, Ameen Patel, Jinhui Ma, Kathryn Fisher, Parminder Raina

Older adults hospitalized for acute medical problems are at risk of significant loss in muscle strength and decline in mobility from restricted physical activity during hospitalization. Early Mobility Programs (EMP), which encourage early mobilization and scheduled physical activity while in hospital, are showing some benefits with shorter hospital length of stays and better functional outcomes. However, these findings are not consistent across studies, suggesting that a more tailored approach is needed. This requires a better understanding of the relationship between intensity and type of physical activity with health and functional outcomes in different patients. We propose to use wearable activity monitors, combined with machine learning algorithms to collect and analyze continuous activity data in older hospitalized patients. The data will help to better highlight

the relationship between activity with health and functional outcomes, and help design more effective EMPs. This technology can be transformative in the way we deliver care to older hospitalized patients. It will address current gaps in healthcare delivery by providing a low-cost, widely accessible mobility sensing and analytic tool that can offer a point-of-care individualized risk assessment of mobility decline, predict mobility trajectory, and inform on interventions to ameliorate hospital related mobility decline.

Monitoring my mobility (MacM3): Technological approaches for advancing the assessment of early mobility limitation in older Canadians

Investigators: Marla Beauchamp, Qiyin Fang, Ayse Kuspinar, Paul McNicholas, Bruce Newbold, Julie Richardson, Brenda Vrkljan, Manaf Zargoush, Fei Chiang, Jamal Deen, Rebecca Ganann, Saiedeh Razavi, Ann Fudge Schormans, Darren Scott, Ravi Selvaganapathy

Mobility limitations, such as difficulty walking or transferring to and from a car, are a common and costly problem affecting older adults with a range of chronic health conditions. Studies have consistently shown that mobility limitation is a strong predictor of adverse outcomes, such as disability, hospitalization, and death. In recognition that the health of an older person may be best assessed through measures of physical function rather than by the presence of disease, mobility has been coined by some as the "sixth vital sign" and as the "hallmark" of aging. Current methods for detecting early mobility limitation, such as self-reported screening questionnaires or clinical tests, are usually performed at discrete times and typically focus on particular aspects of performance (e.g., self-reported ability to walk a predefined distance or performance-based tests of gait speed). However, the understanding of the actual level of mobility undertaken by people in their daily lives is limited. A number of technologies have emerged over the past decade that can track the health and functioning of older adults. Beyond traditional physical measures, multi-sensor data, including location (e.g. GPS) and actual activity levels (e.g., step count) within and outside the home, can be collected and processed accordingly. While these sensors are capable of monitoring basic physiological functioning through to more complex movement and travel patterns, this technology can generate enormous amounts of data, which must be stored, managed, and carefully analyzed. By enabling the integration of a broad range of mobility-related data, these technological solutions can, for the first time, be applied to understand early mobility limitation and to identify distinct trajectories of mobility over time. The overall goal of this program of research is to improve, through the use of advanced technologies, the identification and assessment of early mobility limitation at the individual, home, and community level among older Canadians. Advancing our understanding and identification of early mobility limitation is critical for developing effective prevention strategies for mobility disability.

Research funding impact

Key outcomes

MIRA researchers have seen success beyond the funding allocated by MIRA and the LCMA. The examples below are meant to illustrate the types of projects that have experienced recent success.

One of the goals driving MIRA's major research initiatives is to position the teams for success in large interdisciplinary funding calls. The MacM3 team, led by Marla Beauchamp, found early success soon after receiving Labarge funding. They received two additional grants to expand the scope of the project. Following the thorough process of developing the proposal to submit to MIRA, the team was poised to submit competitive applications to one internal grant (Strategic Alignment Fund, McMaster Office of the Provost) and one external grant (AGE-WELL Core Research Programs). The team has received $501,357 through the Provost's SAF, enabling them to increase the size of their participant cohort from 1,000 to 2,000 older adults. In addition, the team's proposal was selected by AGE-WELL as part of its Core Research Programs, receiving $30,000 in the first year as a catalyst grant, which is accompanied by the opportunity for full project funding of $600,000 in March 2020, pending AGE-WELL's network renewal.

2017 Labarge Catalyst Grant recipient Paula Gardner, has built an interdisciplinary research program around the ABLE platform, attracting trainees from multiple disciplines. Paula's team has received $50,000 from the Centre for Aging and Brain Health Innovation (CABHI)'s Spark Program and an additional $5,000 from the Alzheimer's Society to expand this research into the long term care setting. The team continues to seek further funding and has been advanced to the application stage for the Tri-council's New Frontiers in Research Fund.

MIRA's Postdoctoral Fellowship program attracts increasingly competitive candidates who are able to leverage MIRA's funding extending their projects through additional awards. Sophie Hogeveen, 2019 MIRA Postdoctoral Fellow, has received additional funding ($155,000) from the CIHR Health Systems Impact Fellowship program, allowing her to extend her project by two years, while bringing in partner institution Women's College Hospital. Tatiane Ribeiro, also a 2019 MIRA Postdoctoral Fellow, received the Michael G DeGroote Fellowship ($60,000), which enabled her to extend her research over a two-year period. Both of these fellows will be active members of the MIRA Trainee Network and MIRA research community for the duration of their fellowships.

Key outcomes for MIRA include:

Growth in membership from 83 in 2017 to 122 in 2019 across all Faculties

185 graduate students, postdoctoral fellows and undergraduate research fellows in MIRA's trainee network

More than $400,000 in funding allocated to support trainees in aging and mobility

Leveraged $10M in funding to complement $15M gift dedicated to mobility in aging (as of June 2019)

HQP development:

156 HQP supported, including 53 undergraduates, 36 Master's and 23 PhD students

Research outputs:

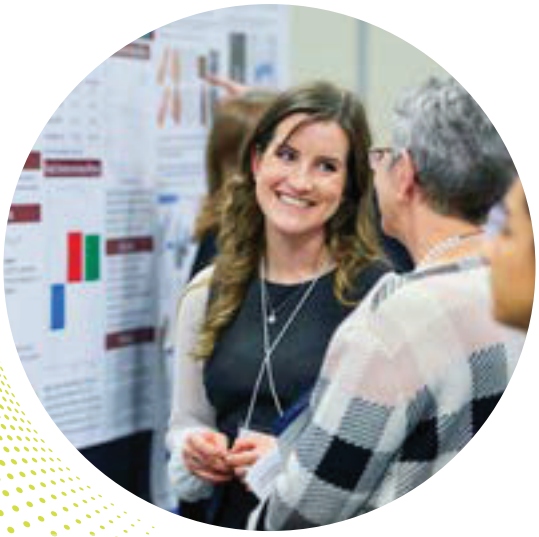
105 presentations at relevant conferences and special events

52 publications

Partnerships:

21 new industry and community partnerships

More than 90 stakeholders in multiple disciplines and industries assisting with research development and dissemination



Communications:

Traditional and new media:

101 pieces of media coverage specifically mentioning MIRA or MIRA leadership: readership equaled **24.5M**, with an estimated **93.1K** coverage views, **3.31K** in social media shares

2.11K links back to McMaster University from this coverage

Social media:

Established Twitter following: **growth from 1,111 to 1,675 followers**

Twitter impressions in 2019: **405,100**

Facebook and **LinkedIn** pages launched

Top tweet earned **10.3K** impressions

Events and speaking engagements:

More than 20 speaking engagements with members of the public and government stakeholders

Hosted **five** public events

Newsletter:

Regular dissemination of an exclusive research-specific newsletter to members and a public newsletter highlighting research in aging to **more than 600 opt-in subscribers**

Chapter 3: Capacity building

Membership

MIRA membership

After rapid growth in the first year, MIRA continues its efforts to engage with and attract researchers who are working in the field of aging from all Faculties and disciplines across the University. In particular, MIRA draws new membership from junior or new faculty members with research interests in aging, as well as those who are pivoting toward aging research, applying their skills and expertise to challenges and opportunities in the aging landscape.

Faculty	2016	2017	2018	2019
Health Sciences	18	33	41	55
Engineering	4	16	19	19
Social Sciences	3	8	8	9
Science	5	15	18	23
Humanities	1	5	6	6
Business	4	6	6	10
Total	35	83	98	122

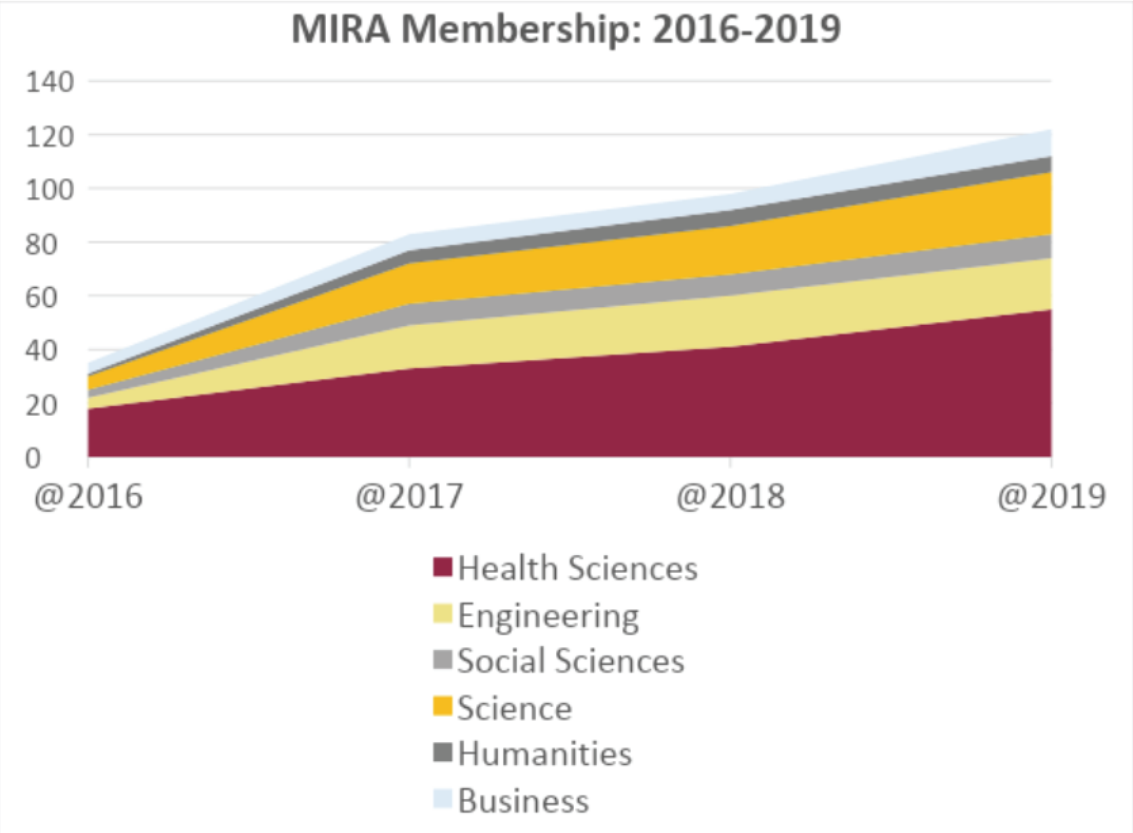


Figure: The growth of MIRA membership from 2016 to 2019. Membership continues to increase steadily and attract interest from across all six McMaster Faculties. As of 2019 end of year, MIRA has 122 members.

MIRA members survey

This summer, MIRA sent out a survey to its membership asking several questions that ranged from topics such as researcher engagement to satisfaction with the work we've been doing. These questions covered member communications, public and scientific events, funding calls, and support for interdisciplinary research activities. The MIRA member survey was completed by 53 of MIRA's 120 researchers (45 per cent). We received responses from researchers in each of the six Faculties.

The survey showed that:

- Respondents enjoy MIRA events, especially scientific lectures and seminars. However, members are busy and noted it is sometimes hard to schedule impromptu events. Respondents also like to know who the intended audience is for events (public, scientific, etc.) so they can share the invitation with appropriate audiences.
- Most respondents read MIRA's e-mail newsletters; fewer follow us on Twitter, and members mainly visit the website to find out about funding or learn more about other MIRA members.
- Respondents want to learn more about the aging research going on at McMaster in all disciplines and what other MIRA researchers are working on.
- Although respondents find interdisciplinary work challenging, half told us that MIRA has encouraged them to collaborate with researchers outside their disciplines or start a new aging-related project. In other words, interdisciplinary work may be hard but it has payoffs.

As MIRA moves forward with its planning for the next year, MIRA will implement some changes based on this feedback. These changes include:

- Offering a regularly-scheduled series of scientific talks on diverse topics in aging research that are announced well in advance.
- Including information about MIRA researchers and aging research at McMaster from varied disciplines in the internal newsletter and external newsletters.
- Examining new methods and optimizing processes for sharing funding information to make sure it is easy to find and that it reaches researchers in a timely fashion. Some of these strategies might include sending separate funding information e-mails (as opposed to including funding information in the newsletters); targeted poster and e-mail distribution to departments where there is an interest in aging research; and revisiting application language to ensure it is clear and consistent across all applications and with other funding bodies.

Training and education

MIRA and the LCMA are proud to invest in the development of the next generation of researchers in aging. Activities include awarding graduate scholarships, creating an active and engaged Trainee Network made up of graduate students, postdoctoral fellows and MIRA undergraduate research fellows with interests in research on aging, and forming a Training and Capacity Working Group that explores new ways to build capacity among students with interests in research on aging.

Educational programming

MIRA continues to support partners in the University and in the community to expand educational opportunities for a number of audiences. In 2018, MIRA partnered with the McMaster Centre for Continuing Education (CCE) to develop a course for caregivers that was piloted in three Ontario communities. This project was funded through a Seniors Community Grant from the Province of Ontario. In 2019, Regional Geriatric Programs of Ontario (RGPO) entered a partnership that will enable CCE to continue free offerings of the program for the next two years as part of their Senior Friendly Caregiver Education Project. CCE co-designed new modules for a second program to align with the RGPO's Senior Friendly 7 toolkit. The two programs include learning opportunities and supports in relation to the identity of a caregiver of an older adult and strategies for caring for an older adult living with frailty. Both programs will be open to the Ontario public and are being promoted in strategic and multiple ways. Desire2Learn has been an important industry partner in this initiative. MIRA and CCE have also signed a Memorandum of Understanding with the Alzheimer Society of Brant, Haldimand Norfolk, Hamilton, Halton to explore opportunities to promote the CCE-MIRA course and provide support to those caring for family members with dementia.

MIRA continues to support opportunities for student engagement with older adults and research on aging. Dr. Andrew Costa and his team in the Faculty of Health Sciences at the Michael G. DeGroote School of Medicine Waterloo Regional Campus, together with project partners at Schlegel Villages, the Research Institute for Aging, and MIRA have continued their work on macPAGE: McMaster Passport for Geriatric Education. The macPAGE program is designed to encourage learners to engage in experiential education opportunities

related to working with older adults, and enhance their skills and geriatrics-related competencies. The macPAGE program was launched last year and was trialed at the Waterloo Region Campus by undergraduate medical students. Feedback from early participants was overwhelmingly positive, and will be incorporated into future iterations of the program. MIRA submitted its certifi cate of completion for this program, the "MIRA Certificate of Enhanced Geriatrics Competencies & Education" to McMaster's Undergraduate Council in Fall 2019.

In 2019, MIRA and the macPAGE team developed macPAGE 2.0. MIRA's Training and Capacity Working Group and a student working group drawn from MIRA's trainee network and undergraduate student fellows provided guidance and feedback throughout the development process to ensure the platform meets the learning needs and interests of students from diverse faculties. macPAGE 2.0 features updated platform content and functionality, and will be accessible to all students with a MacID. It will be launched to MIRA trainees and researchers in December 2019. The Student Success Centre (SSC) and MIRA ensured the learning outcomes of macPAGE 2.0 align with tracking tools that will be used in the SSC's forthcoming experiential learning transcript, which will make it easier for students to communicate the value of the skills and knowledge they have acquired through their experiences working with older adults and in research on aging.

MIRA continues to work on increasing awareness of educational opportunities currently available on campus and in the community. The Institute conducted research on the kinds of opportunities available for learners at different levels including older adults, graduate and undergraduate students and practicing professionals. MIRA has created a section on its website for this content, which highlights educational opportunities that are available on campus and in the community. MIRA's Training and Capacity Working Group continues to discuss new ways to encourage student interest in research on aging and ensure students at McMaster are able to access available aging-related learning opportunities.

Graduate Scholarship recipients

Funded by the LCMA, six graduate students have now been supported to develop skills and experience in aging research at the graduate level. The recipients were selected for their demonstrated high academic achievement, proven interest in aging and mobility research, ambition to collaborate with other disciplines, and participation in research activities that show potential to benefit older adults.

2017 Labarge Mobility Scholars

2017 Labarge Master's Scholarship: Sydney Valentino

The effects of exercise on heart structure and function in cardiac rehabilitation

Supervisor**:** Maureen MacDonald, Science Mentor**:** Eva Lonn, Health Sciences

Cardiac rehabilitation exercise is an important part of recovery after a heart attack, and it has been shown to improve heart function using standard ultrasound assessments. Studies have suggested that novel measures of heart function may be more sensitive in comparison to these standard ultrasound measures, yet these novel measures have not been examined in individuals completing stair climbing-based high intensity cardiac rehabilitation exercise training. This work examined the changes in both novel and standard ultrasound measures of heart function after either stair climbing-based High Intensity Interval Training (HIIT) or traditional moderate intensity exercise training in individuals who have heart disease. While this study found that both stair climbing-based HIIT training and traditional cardiac rehabilitation both resulted in increases in cardiorespiratory fitness after 12 weeks of training, no changes were observed in any of the standard measures of heart function. This research supports the concept that novel measures of heart function might be more sensitive, as some training associated changes were observed in the novel measures of heart function. Awarded the Labarge Master's Scholarship in 2017, Sydney has transferred into the PhD program and will continue her Labarge-funded research for an additional three years.

2017 Labarge PhD Scholarship: Michael Kalu

Mobility enhancement comprehensive care model

Supervisor: Vanina Dal Bello-Haas, Health Sciences; Mentor: Meridith Griffi n, Social Sciences)

Many factors cause mobility problems for older adults. These factors can be cognitive (e.g. memory) psychological (e.g. depression), physical (e.g. muscle weakness), environmental (e.g. bad roads), financial (e.g. low income), social (e.g. isolation) and personal (e.g. culture). Presently, clinicians consider these factors separately when assessing older adults' mobility after discharge, although evidence shows that considering these factors together will provide comprehensive information on older adults' mobility. This team decided to conduct seven reviews to describe examples of each of the factors mentioned above. The resulting evidence shows that (a) older adults with better mobility perform better on assessments of global cognition, executive function, memory and processing speed (cognitive factor); (b) older adults with better mental health had less fear of falling, greater confidence and emotional well-being and better mobility (psychological); (c) among other physical factors, older adults with better muscle strength, endurance and power, body composition (e.g. normal body mass index), and good vision have better mobility (physical); (d) older adults who do not have access to transportation, live in congested cities and hilly terrain have more mobility limitation (environmental); (e) older adults with higher education, higher income and who have skilled jobs have better mobility than those with lower education, income and hold

unskilled jobs (fi nancial); and (f) non-Hispanic white male older adults have better mobility than black or Hispanic female older adults (personal). The next study is to co-develop clinical questions for each of the determinants of mobility with international stakeholders using a modifi ed Delphi process.

2018 Labarge Mobility Scholars

2018 Labarge Master's Scholarship: Stephanie Chauvin

Technology for promoting exercise adherence and mobility in older adults

Supervisor: Marla Beauchamp, Health Sciences; Mentor: Meridith Griffin, Social Sciences

Balance impairments continue to be a growing problem within the aging population and can lead to falls, thus, potentially leading to disability, hospitalizations, and death. While older adults in general have a high risk of falling, older adults with Chronic Obstructive Pulmonary Disease (COPD) are at an even greater risk and are up to 55 per cent more likely to suffer a fall compared to those without COPD. To better understand how to prevent falls in older adults with COPD, two secondary analyses and a qualitative study are currently being conducted. The first secondary analysis focuses on whether different subcomponents of the Balance Evaluation Systems Test (BESTest), a balance screening test, are better able to distinguish fallers from non-fallers, as well as determining the cutoff scores for each subcomponent to determine fall risk. The second analysis explores whether balance impairments in individuals with COPD are affected by supplemental oxygen usage. Additionally, a logistic regression is used to identify the relationship between fall history and balance measure scores. Lastly, a qualitative study is being conducted to understand the perspectives of individuals with COPD who completed a six-month home balance exercise program. By conducting these three studies, the team will be able to better understand how to screen for fall risk using balance measures and subject characteristics, as well as improve future home balance exercise programs for older adults with COPD.

2018 Labarge PhD Scholarship: Tanner Stokes

Whole milk to augment muscle protein synthesis in older women: a randomized, controlled trial

Supervisor: Stuart Phillips, Science; Mentor: Gregory Steinberg, Health Sciences

The loss of muscle mass and strength with age, termed sarcopenia, impairs the ability to perform activities of daily living and predisposes older adults to an increased risk of metabolic comorbidities such as type 2 diabetes. Research suggests that age-related muscle loss can be offset by increasing dietary protein intake above current recommendations. Cow's milk is a nutrient dense source of protein that has been shown in young adults to stimulate the synthesis of new muscle proteins, particularly whole-fat milk. Whether whole milk also stimulates muscle growth to a greater degree than fat-free (skim) milk in an older population is unknown. A significant proportion of older women are not currently meeting basic protein requirements and since, on average, they live longer than men, they may be more affected by the cumulative effects of sarcopenia. The aim of this investigation is to test the efficacy of proteins contained in whole and skimmed milk compared with a common dairy alternative (i.e., almond beverage) on skeletal muscle protein synthesis in older women. This study will be divided into three phases of equivalent length (three days): controlled diet and habitual activity; intervention diet and habitual activity; and intervention diet and increased physical activity. Before and after each phase, the team will obtain muscle samples and measure muscle protein synthesis to investigate how dairy protein and increased physical activity affect skeletal muscle. Increasing daily protein intake through milk consumption, if effective in stimulating muscle protein synthesis, is a practical and easily-implementable strategy that has the potential to reduce the impact of sarcopenia in the aging population.

2019 Labarge Mobility Scholars

2019 Labarge Master's Scholarship: Giulia Coletta

Supervisor: Stuart Phillips, Science; Mentor: Rebecca Ganann, Health Sciences

Mobility is defined as the ability to move oneself within community environments that expand from one's home to the neighbourhood. Mobility is necessary for older adults to access resources in the community and participate in meaningful social, cultural, and physical activities. Declines in individual physical mobility are often a precursor to social isolation and poor physical and mental health. Reduced physical mobility and the ability to carry out activities of daily living are common with aging and are also risk factors for frailty, increased hospitalizations, and premature mortality. Community-based physical activity programs have been shown to enhance dimensions of mobility including cognitive-perceptual skills and physical performance. The majority of mobility-enhancing interventions are designed by researchers and applied to older adults in highly controlled settings. The result is often limited translation of the results to scalable programs. Intervention co-design is a research approach that engages target populations, citizen partners and research stakeholders to ensure better alignment of research with existing resources, applicable experiences of the target population with the broad aim of enhancing implementation, sustainability and scalability of the intervention. The aim of the study is to increase participants' physical mobility and awareness of health and social services to foster positive changes in physical mobility, social participation, health, and quality of life. The team aims to build on existing relationships and introduce new partnerships with researchers and other key stakeholders including older citizen partners in order to mitigate the risk and consequences of declining mobility with age.

2019 Labarge Master's Scholarship: Erynne Rowe

Supervisor: Janie Wilson, Health Sciences; Mentor: Liz Hassan, Engineering

Walking is the most common and fundamental of human movements. As we age, the likelihood of experiencing mobility impairments increases. Walking impairments can lead to social isolation, decreased physical activity and accompanying health co-morbidities which can significantly impact the independence of older adults. Walking impairments also greatly impact the health care system with costs of surgical interventions and physical therapies for those affected. As the average age of the Canadian population increases, a comprehensive understanding of age-related changes in gait is critical to improve longevity of mobility and independence in older adults. Men and women differ significantly in their walking biomechanics, suggesting that the effects of aging may also differ between men and women. The aim of this investigation is to comprehensively examine how jointlevel biomechanics and muscle activity changes with aging, in both men and women respectively, to identify specific deviations that could better inform clinical decisions. The team hopes that the findings from this study will provide diagnostic information to recognize early mobility decline, and provide knowledge for patient specific targeted strategies to improve mobility in older adults.

Post-Doctoral Fellowship recipients

Labarge Post-Doctoral Fellowship in Mobility: Patricia Hewston

Can dance reduce falls risk in older adults with cognitive impairment?

Supervisor: Alexandra Papaioannou, Health Sciences; Mentors: Amanda Grenier, Social Sciences; Steven Bray, Science

In 2018, MIRA and the LCMA awarded the inaugural Labarge Post-Doctoral Fellowship in Mobility, and Dr. Patricia Hewston was the successful candidate. The goal of Dr. Hewston's project is to assess the impact of a dance intervention on mobility and falls risk, and to build infrastructure and capacity to initiate a program in aging and mobility with a technology that measures gait called GAITRite. Falls are the leading cause of injury among older adult Canadians. Older adults at increased falls-risk walk slower with less rhythm and reduced whole-body coordination. Ultimately, this research will inform best practices for falls prevention to optimize mobility and well-being of older adults with mild cognitive impairment (MCI). Dance is a mind-body activity that involves precise integration of rhythm and whole-body coordination. This project hypothesizes dance can improve gait parameters (rhythm and whole-body coordination) and ultimately reduce falls-risk in older adults. Labarge funding has enabled an in-depth biomechanical investigation to determine if dance reduces fall-risk in older adults with MCI, with the aim of developing simple, yet highly predictive technologies. These technologies will provide precise and standardized feedback to assess and track change in fall risk before and after intervention and inform best practices for falls prevention. Since receiving Labarge funding, Dr. Hewston has secured an additional $38,322 through AGE-WELL's SIP Program, while her team has been awarded $522,916 from CABHI to expand the GERAS Dance research program.

MIRA Post-Doctoral Fellowships

Through a competitive process vetted by MIRA's internal reviewers, the Institute has now funded and awarded nine post-doctoral fellowships to incoming trainees. Each one-year award includes $50,000 for salary and $15,000 for research expenses and professional development, and is matched by $10,000 from the supervisor. Candidates have one primary supervisor and two mentors from other Faculties.

2017 MIRA Post-Doctoral Fellows

Tara Kajaks

Addressing the challenges of caregiving using a 'co-occupation' perspective: An integrated research program examining aging and mobility in the community

Supervisor: Brenda Vrkljan, Health Sciences; Mentors: Jennifer Heisz, Science; Cheryl Quenneville, Engineering

This project aims to investigate the challenges experienced by older adult caregivers and their spouses as care recipients using a unique 'co-occupation' perspective. This research is particularly important given the propensity for older adults to choose to age in place, and Canada's shift to a health care system that encourages homecare but is not yet capable of addressing all the needs of Canadians being cared for in their homes. In particular, there is often a dependency on the spouse to provide much of the care, even in older adulthood where the caregivers themselves may have compromised health. Researchers have sought to

understand homecare challenges by looking at individual components of the care system, such as the care recipient, the caregiver, the environment, and the availability of equipment and assistive devices; however, the team is unaware of research that considers the caregiver and recipient dyad combined with the physical and cognitive workload of care provision using a 'co-occupation perspective', where both individuals work in synergy to accomplish the mutual goal of completing the given activity of daily living. In addition to receiving MIRA post-doctoral funding, Tara was the successful candidate for the 2018 AGE-WELL-MIRA post-doctoral fellowship, which allowed her to secure a second year of funding through AGE-WELL ($50,000) by leveraging MIRA support.

Caitlin McArthur

Portable technology to support exercise in the homes of frail older adults: A development and pilot study

Supervisor: Alexandra Papaioannou, Health Sciences; Mentors: Paula Gardner, Humanities; Amanda Grenier, Social Sciences

This research project focused on the development and testing of a portable technology platform to promote sustainable exercise participation within the homes of frail, older adults who have been discharged from hospital. The project engaged cross-disciplinary perspectives by incorporating the expertise of faculty members from the Faculties of Health Sciences (Dr. Papaioannou), Humanities (Dr. Gardner), and Social Sciences (Dr. Grenier) into the design and evaluation of the platform. The technology that has been developed will increase the enjoyment, affordability, and sustainability of rehabilitation in the home. Older adults who receive limited home care services and cannot access community exercise classes will be able to participate in enjoyable exercise within their home. In the future, the platform will be available to be used across several sectors where older adults access services, for example in communities, complex continuing care or long-term care. Further, limited physical therapy home care resources will not be additionally burdened. The team has used design thinking and participatory methods to incorporate older adults into the design and implementation of the platform. As noted above, Caitlin was successful in competing for CIHR funds, and continues her work at McMaster, in part, working with Paula Gardner's ABLE team, which was funded by a 2017 Labarge Catalyst Grant.

2018 MIRA Post-Doctoral Fellows

Ya-Tang Chuang

Improving mobility of Alternate Level of Care (ALC) seniors in the Canadian health care system: Data driven solutions

Supervisor: Manaf Zargoush, Business; Mentors: Alexandra Papaioannou, Health Sciences; Reza Samavi, Engineering

According to the Canadian Institute for Health Information, there are 6,671 patients in Canada listed as "alternate level of care" (ALC) patients. ALC patients are hospitalized patients who no longer require hospital resources and services yet have not been discharged because bed resources in rehabilitation or long-term care facilities are very limited. The average wait time for admission to long-term care (LTC) facilities in Ontario is approximately 94 days. This has resulted in two major issues of concern: 1) The large number of ALC patients prevent access to care for other patients who need intensive care; 2) ALC patients do not receive an appropriate level of care, which negatively affect their health outcomes. With the majority of ALC patients being older adults, the severity of the situation increases at an alarming rate as Canada's senior population grows rapidly each year. To reduce the current number of the patients on the LTC wait list by half would cost more than $5 billion annually. Considering the increasing rate of seniors in Ontario is nearly 4 per cent annually over the next 20 years, the government would need to spend more than $215 million annually just to stabilize the current wait

time for LTC beds. This has motivated the team to rethink management of seniors' care needs. The group's research aims to provide a new and clear picture of the current ALC challenge and elaborate the benefits from using jointly advanced data analytics and optimization techniques in the healthcare management area.

Wael Brahim

Remote monitoring of breathing patterns and mobility patterns

Supervisor: Lotfi Belkhir, Engineering; Mentors: Qiyin Fang, Engineering; Joshua Wald, Health Sciences

The key objective of Dr. Brahim's project is to develop a point-of-care infrared-based system for effective, safe, inconspicuous and low cost respiration assessment. This solution will deliver early diagnostics for a variety of medical conditions, such as dementia, sleep apnea, and chronic obstructive pulmonary disease (COPD), all of which are illnesses of global scale and rapidly growing both in population and severity. Dr. Brahim participated in the design of the overall subsystem and system architecture, and directly interacted with the developers of the motorized arm required for tracking of the subject's head during sleep. Dr. Brahim has developed, tested and debugged the various software modules for this project, such as (i) the real-time detection and tracking of the subject's breathing area using a motorized arm; (ii) the detection and classification of the subject's breathing patterns; and (iii) the health analytics and interpretation of the breathing signal. MIRA funding has permitted sufficient project development and preliminary results, and as a result, Dr. Brahim received a second offer letter for an additional postdoctoral year to continue working in the field of aging and deliver a commercial product that will drastically improve the quality of life of the aging population. The project team will work with two retirement facilities committed to providing real-world conditions to test and validate the system. Those collaborators and partners are a great source of participant recruitment, knowledge exchange and real-world self-development capabilities. In addition, this project involved experienced and skilled experts from many disciplines, to which Dr. Brahim credits a uniquely enriching experience, honing both existing technical skills as well as new and multidisciplinary skills and perspectives.

Irene Mussio

Vaccinating to protect peers: Analyzing flu vaccinations and beliefs in small network settings

Supervisor: Jeremiah Hurley, Social Sciences; Andrew Costa, Health Sciences; Jean-Eric Tarride, Health Sciences

Yearly seasonal influenza (flu) epidemics can seriously affect populations through rapid spreading of the disease. This happens particularly in the case of at-risk groups, including older adults. To date, most confirmed hospitalization and death cases from the flu have been among adults 65 and older. Yet, a majority of seniors do not consider themselves to be at risk of serious consequences of the flu. The aim of this research is to examine the impact of information and peers on beliefs about the flu and the flu vaccine. Dr. Mussio has a policy objective of increasing vaccination rates and constructing herd immunity, particularly for seniors, one of the groups with the highest risk of the flu. She aims to understand how changes on how the information about the vaccine is provided may impact vaccination decisions in networks of seniors. She will present the information to key participants in the network and analyze how that information is passed on to different individuals. She will also gather information on participant characteristics before and after the flu season, including vaccination history, altruistic behaviors and health-related behaviors. This will help to identify key people in each group to provide information to, as well as to analyze whether individual risk and time preferences are directly related to the decision to vaccinate. Dr. Mussio hopes that the findings from this study will clarify how network and peer dynamics impact individual decisions, particularly in the case of seniors. MIRA funding has allowed Dr. Mussio to fund and design a field experiment to test actual vaccination decisions in seniors. Measuring actual decisions is essential to quantify the impact of interventions.

2019 MIRA Post-Doctoral Fellows

Lea Ravensbergen

Supervisor: Bruce Newbold, Science: Mentors: Rebecca Ganann, Health Sciences; Christine Sinding, Social Sciences

A key factor relating to older adults' quality of life is their mobility, a basic human need associated with independence, health, and well-being. Previous research has found that older adults rely primarily on the private automobile as their means of transportation. However, as health problems arise many older adults must either reduce their driving or "give up the keys". In places with transportation systems built primarily around the car, such as Hamilton, driving cessation is often a difficult and emotional transition that is associated with negative outcomes such as declines in health indicators and decreased participation in activities outside of the home. There are, of course, transportation modes other than the private car such as public transit, walking and cycling. These alternatives to the car have the potential not only to keep older adults active and healthy, but to maintain their independent mobility. However, very little is known about older adults' experience using these modes. Dr. Ravensbergen's post-doctoral research will examine older adults' experience with active travel (i.e. public transportation, walking, and cycling). Specifically, she will explore the challenges and motivations associated with older adults' use of active modes, and the formal and informal work practices that are needed for older adults to meet their daily travel needs using active modes. Findings from this research will contribute to a greater understanding of older adults' lived experiences using active travel modes and have the potential to contribute to municipalities, planners, and community organization on how to foster age-friendly transportations systems. This MIRA funded project will provide considerable insight into how older adults can maintain independent mobility as they age and transition from driver to non-drivers. Ultimately, this project will contribute to a greater understanding of how to foster age-friendly cities.

Tatiane Ribeiro

Supervisors: Deb Sloboda, Health Sciences; Dawn Bowdish, Health Sciences; Jose Mirabal Moran, Science; Jim Dunn, Social Sciences

Canada's population is aging, and it is becoming apparent that its healthcare system is not prepared for this unprecedented demographic change. While age is undoubtedly a major contributor to health outcomes later in life, it is chronic disease that truly challenges the health care system. The presence of one or more chronic conditions (e.g. cardiovascular disease, dementia, diabetes) are stronger predictors of health care and social service utilization than chronological age. Chronic conditions increase with advancing age, as does susceptibility to pneumonia. The most frequent cause of pneumonia in older adults is the bacteria Streptococcus pneumoniae, which also causes invasive pneumococcal disease when the bacteria spreads to the blood or cerebrospinal fluid. Having pneumonia in mid- to late-life is associated with increased risk of developing cardiovascular disease, metabolic disorders, and dementia. More than 30 per cent of older adults who are hospitalized for pneumonia will develop dementia or become cognitively impaired earlier than expected. The outcomes for those who have had an invasive pneumococcal disease are even more grim. More than 80 per cent of patients die earlier than expected of diverse causes, even when pre-existing co-morbidities are accounted for. The aim of this investigation is to examine if prenatal adversity will accelerate age-related inflammation, increase susceptibility to infection and predispose a person to unhealthy premature aging. We will also examine if prenatal adversity increases susceptibility and decreases recovery from infection. If our hypothesis is correct, we will be uniquely positioned to test interventions such as anti-inflammatories to prevent post-pneumonia sequelae. Dr. Ribeiro hopes that the findings from this study will lead to the testing of interventions such as anti-inflammatories to prevent post-pneumonia sequelae and to improve the health of older adults. Dr. Ribeiro has been awarded a Michael G. DeGroote Postdoctoral Fellowship, and will be leveraging MIRA funds to extend her project over the course of two years.

Sophie Hogeveens
Supervisors: Andrew Costa, Health Sciences; Manaf Zargoush, Business; Arthur Sweetman, Social Sciences

Specialized geriatric services (SGS) play a vital role in caring for frail, older adults with multiple, complex needs. These interdisciplinary teams of geriatric health care professionals are specially trained to provide a spectrum of services to frail older adults whose health, dignity, and independence are at risk. Their holistic approach to managing health considers the social aspects of illness, emphasizes functional status, balances the benefits and harms of different treatments, and provides care that is guided by patient goals and preferences. Unfortunately, not all older adults who would benefit have access to SGS in Ontario. Not only is there a lack in the amount of SGS services available, services are not equitably distributed geographically, with a disproportionate concentration in regions with population density (e.g., Greater Toronto Area). Access to SGS is further limited by factors such as lack of caregiver support, difficulty moving around, and availability of transportation. It is generally accepted that SGS should be targeted to the most vulnerable older adults, but there is a lack of evidence for how to best allocate these limited resources. The aim of this investigation is to explore factors associated with access to SGS, investigate future supply and demand for these services, and develop a mechanism to equitably allocate SGS resources to home care clients who would most benefit. Findings from this study are intended to help improve access to specialized services for the most vulnerable older adults. MIRA funding and its interdisciplinary culture and approach will allow for a deeper understanding of the current and future state of health care for older adults in Ontario. Dr. Hogeveen has secured a two-year CIHR Health Systems Fellowship, and will leverage MIRA funding to extend this project over three years.

2019 AGE-WELL/MIRA Post-Doctoral Fellows

AGE-WELL, Canada's National Centre for Excellence focusing on aging and technology, funds research and trainees through annual, competitive requests for proposals. MIRA and AGE-WELL share an interest in developing trainees whose research on aging is focused on user-centred approaches to solving problems in aging. MIRA has committed to co-funding McMaster trainees selected through AGE-WELL's trainee competition, provided that the proposed research is aligned with MIRA's research priorities and interdisciplinary mandate. In 2019, Rasmi Kokash was selected as the AGE-WELL/MIRA Postdoctoral Fellow.

Rasmi Kokash
Supervisor: Benson Honig, Faculty of Business

This is an exploratory study about entrepreneurship and technology adoption in the aging population. In this project, Dr. Kokash will study specific economic, social, and educational factors that influence digital inequality among older adults that, in turn, may influence their decisions around self-employment while actively aging. Evidence shows that individuals who work have better psychological and health outcomes and are more satisfied than those who do not. Further, some individuals experience declines in health and well-being post-retirement. Specifically, this project investigates how social positioning and ICT accessibility influence older adults' adoption of technology, their socio-psychological wellbeing, and likelihood of self-employment post-retirement. It will enable us to form insights and suggest recommendations to policymakers and key stakeholders regarding the best policies and practices to promote success in entrepreneurship in aging. The benefits of this research are to individuals and to society, to regain the labour workforce segment lost to retirement will have significant implications on the economic productivity cycle, the potential overall size of the labour market, economic growth, and distribution of the national income. The MIRA/AGE-WELL funding offers a valuable opportunity to develop a unique multidisciplinary training and research program, addressing the possible roles of entrepreneurship and technology in meeting the needs and interests of older adults.

Professional development for trainees

As part of its mandate to build capacity among trainees, MIRA continues to develop several initiatives to support the development of undergraduate and graduate students and post-doctoral fellows as well as junior faculty members.

Trainee Network

The MIRA Trainee Network includes graduate students, postdoctoral fellows and MIRA undergraduate research fellows with interests in research in aging. The network connects trainees from across all six McMaster Faculties, creating an opportunity for interdisciplinary exchange and networking. Currently, the Network has more than 180 members. Organized and governed by a seven member executive committee, the group meets for coffee, research presentations and informal conversation. During this time, trainees have the opportunity to discuss challenges and opportunities related to their research on aging, gain interdisciplinary perspectives on their work and learn about potential future careers.

In 2019, the Trainee Network hosted several special events for trainees, including:

- a trainee research fair, held in conjunction with Bridging the divide: How social inequality impacts health, a MIRA event in partnership with its International Scientific Advisory Committee (ISAC) on social equity;
- a speed mentoring session with global leaders in aging research from MIRA's ISAC;
- Pitch Your Project, an aging-focused three-minute thesis networking event; and
- Meet My Method, a knowledge translation and networking event for developing interdisciplinary collaborations in aging.

Within the network, an interdisciplinary team of trainees with interests in analyzing and documenting the impact of the Network has emerged. The team has submitted a manuscript that reflects on the qualitative experiences of trainees in an interdisciplinary framework, and has conducted an accompanying survey of members, which will inform a quantitative manuscript as well as future

directions for the Trainee Network. The Network presented this research at the 2019 Canadian Association on Gerontology (CAG) Conference in Moncton in October, and received a grant from the MacPherson Institute to advance this work. Members of the Trainee Network also manage the MIRA Trainee Network blog, which highlights trainee research and Network activities as well as opportunities.

In the summer of 2019, the Trainee Network welcomed MIRA's second cohort of MIRA Undergraduate Summer Research Fellows (USRFs). Through the course of their summer research, ten undergraduates from all six Faculties interacted with senior trainees and potential role models in graduate and post-graduate research, and were given the opportunity to reflect and present on their summer research experiences at their final meeting.

Undergraduate and graduate student development

In 2018, MIRA introduced two new funding programs to support trainee development: an undergraduate summer student fellowship and a travel award program for graduate students. MIRA continued this support in 2019, providing 10 $1,000 fellowships to undergraduate students working with MIRA members over the summer, which leveraged funds from other sources to fully fund these positions. Many MIRA undergraduate fellows had outstanding experiences, and many were inspired to consider future careers or research opportunities in the field of aging.

"The undergraduate students today are the scientists of tomorrow. MIRA USRF is a great opportunity to engage undergraduate students in learning more about research in aging. In the past summer, I worked with Dr. Rheinstadter on the molecular mode-of-action of potential anti-Alzheimer's drug candidates. I am fascinated by this project, and I am continuing my project this term."

Kate Zhou
2019 Undergraduate Summer Research Fellow

In addition to building capacity among undergraduate students, MIRA also promotes graduate student development through travel awards to support students presenting research at conferences or collecting data. As in 2018, MIRA awarded 10 graduate travel awards of $500 each to 10 Master's and PhD students to support travel to national or international conferences or professional development opportunities.

"Attending the Canadian Academy of Geriatric Psychiatry (CAGP) 2019 Annual Scientific Meeting provided me an opportunity to present initial findings from my dissertation work. I was able to present the results of a scoping review that I conducted, and it was through this poster presentation that I was able to network with colleagues from across the country. This included other student trainees as well as researchers who share my interest in mood disorders and the impact of chronic disease among older adults. In addition, my poster presentation gave me the opportunity to receive valuable feedback."

Carly Whitmore, PhD Candidate

"The MIRA Graduate Travel award enabled me to attend and present my research at the Canadian Gerontological Nursing Association (CGNA) 2019 conference in Calgary, Alberta. Many clinicians and researchers with various professional backgrounds such as nursing, recreational therapy, and social science attended my presentation on the experiences of nurses in delivering care for older adults with responsive behaviours of dementia and healthcare professionals' perceptions of P.I.E.C.E.S. education. Following my presentation, the audience members asked multiple questions and shared their interest in my work. I received positive comments about my work and was congratulated for my efforts in shedding light on dementia care practices.

Marie-Lee Yous, MSc Candidate

Other professional development opportunities for trainees

Over the past year, MIRA continued to invest in professional development for trainees with a focus on promoting interdisciplinary research and collaboration and developing grant writing capacity.

In preparing trainees for funding success, MIRA organized events, webinars, information sessions and outreach to trainees through webinars, on-campus information sessions, and a guest presentation to the undergraduate Life Science 2L03 course on aging. MIRA also hosted funding partner AGE-WELL at a MIRA Trainee meeting, where AGE-WELL's Samantha Sandassie delivered a presentation on AGE-WELL's trainee funding calls, and their own funding priorities. MIRA further supported applicants by providing insight and reviewing applications before their submission to AGE-WELL. Ultimately, more than 15 McMaster trainees applied for AGE-WELL trainee funding, and three MIRA Trainee post-docs (Rasmi Kokash, Business; Aki Kyrolainen, Humanities; and Vahid Assadi, Business) were selected for AGE-WELL trainee awards, an increase in both applicants and awardees relative to previous years.

In partnership with the National Centers of Excellence, MIRA is in its third year of offering trainees access to a webinar series on topics in professional development, such as science communications, career trajectory, and grant writing. Each network contributor offers one webinar, but gains access to all sessions for their trainees. MIRA's contribution in 2019 was a presentation by Paula Gardner (Humanities), who presented a webinar on "Getting out of your silo: How and why you should." Dr. Gardner described her successes and challenges in conducting interdisciplinary research, and how this has impacted her research career.

For the first time, MIRA also allocated Labarge Planning Grants for trainees in 2019, which invited graduate students and postdoctoral fellows to develop proposals and execute interdisciplinary research events. Trainees submitted proposals that were evaluated by MIRA leadership. Two MIRA Trainee Planning Grants were awarded for "Pitch Your Project" held in April 2019 and "Meet My Method" held in November 2019. Both of these grants came with in-kind support and mentoring from MIRA, assistance in skills-development related to planning, promoting and executing research-related events [See the next page for more detailed descriptions of both events.]

Pitch Your Project: A MIRA Trainee Network Event

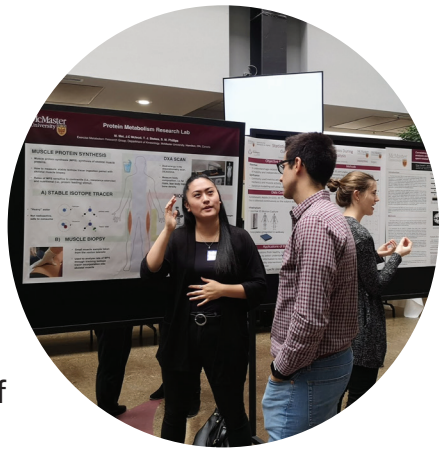
Completed April 2019

The first MIRA Trainee-driven Planning Grant event, Pitch Your Project, was built on the model of the 3 Minute Thesis ™ competition, with the goal of creating an opportunity for Trainee Network members to learn about the breadth of research being conducted by their fellow trainees in aging research at McMaster, and to promote new connections and collaborations among trainees as well as faculty members. More than 45 attendees heard presentations from 14 trainee researchers on topics such as managing pain in the elderly, older adults, entrepreneurship and ageism and why the bathtub is always a recipe for disaster. This non-competitive aging research showcase included a networking session to allow presenters to connect with faculty members and other trainees around mutual interests in aging.

Meet My Method

Completed November 2019

Trainees indicated one of the barriers to collaboration was not understaning how colleagues in other disciplines conduct their research. The trainees wanted an outlet where they could communicate what they do, why the do it, and what it can tell us about a particular issue in aging. MIRA Trainees proposed "Meet My Method" as an opportunity to use interactive demonstrations to share the methods they use in their research and get attendees thinking about how they might collaborate with other researchers to advance their collective research goals. Twenty trainees presented their methods, using video and live demonstrations with equipment such as as ultrasound monitors, an infrared, remote breathing monitoring device, eye-tracking tools and traditional oral and poster presentations. The research methods demonstrations were accompanied by talks from three MIRA faculty members (Ravi Selvanganapathy, Mechanical Engineering; Marla Beauchamp, Rehabilitation Science; and Manaf Zargoush, Information Systems) who are leading interdisciplinary projects and platforms in aging research. Following the event, *87 per cent of trainees in attendance reported that they made new connections with potential collaborators in other disciplines,* and 100 per cent indicated an interest in participating in a similar event if held again in the future.



Chapter 4: Community and stakeholder engagement

In 2017, McMaster University joined the international Age-Friendly University (AFU) network, a global body made up of higher education institutions that are committed to being more accessible to older adults. The AFU network was launched in 2012 by Dublin City University (DCU) in Ireland as a way to assist in addressing the challenges and opportunities associated with the world's aging population. It builds on the World Health Organization's Age-Friendly Communities Initiative, which encourages all communities to shape their physical and social environments to support people of all ages.

In 2018, MIRA undertook several studies to understand the alignment of McMaster University's existing facilities and programs with the 10 principles of an AFU, including:

- a walkability study of the McMaster campus for older adults;
- a survey of McMaster's performance relative to the AFU guiding principles;
- focus groups with older adults regarding their perceptions of McMaster as an AFU.

The findings of this research were compiled into a report on the university's current status in order to identify recommended areas for future growth. MIRA, research partner Brenda Vrkljan, and McMaster University Facility Services shared the findings of this research with its community partners in a public event hosted at the Hamilton Public Library in July 2019. Results from the focus groups and surveys confirmed that McMaster University has a well-developed research program focused on improving the lives of older adults and keeping people in good health as they age. Survey and focus group participants were able to identify a broad array of programs and activities at McMaster University that older adults can participate in, as well as programs that can support McMaster employees as they age and progress through their careers.

Through this research, MIRA identified three key areas through which McMaster University could improve its alignment with AFU principles and continue developing the campus into a welcoming and inclusive space for people of all ages:

1. **Communications and outreach:** Ensuring members of the public are made aware of relevant events on campus, including research on aging and aging-specific programming; making online information accessible and easy to find and navigate for the public, including older adults.
2. **Accessibility and inclusion:** Ensuring accessibility features on campus are installed and maintained; continue to develop the experience of first-time visitors to campus; communicating the value that older adults can contribute in society and the McMaster community.
3. **Programming and engagement:** Developing educational programming that appeals to older adults and allows this group to learn about McMaster's diverse research strengths; creating new opportunities to bring older adults on campus; encouraging older adults to become or continue to be part of the McMaster community as a means to support the creation of new social networks and combat social isolation.

MIRA assembled a steering committee to act on the recommendations of the report and support of efforts to meet the principles of an AFU that held its initial meeting in September 2019. The committee is comprised of 40 members from 30 different units within McMaster including student, staff, alumni and community service units as well as aging platforms at McMaster, representatives from the McMaster University Retirees Association and the Age-Friendly Hamilton Committee, and representatives from MIRA's Trainee Network. The committee will identify its long and short term priorities and develop an implementation plan that will begin in 2020.

MIRA continues to seek opportunities to engage with older adults in the community through the development of intergenerational programming. Beginning in 2017, a project team led by researcher Brenda Vrkljan and MIRA conducted a study on establishing an intergenerational hub on McMaster's campus. This study also looked at student and older adult interest in participating in programming together. Both groups indicated they had a strong interest in participating in programming together and felt it would be enjoyable and beneficial. Based on the findings of this study, MIRA has partnered with Residence Life Services to offer intergenerational programming through a Living Learning Community in residence as a pilot program. Living Learning Communities bring together students who have self-identified living and learning in an integrated academic residential environment focused on a particular area of interest. Currently there are 28 students and 20 older adults enrolled in this social program. The program meets monthly and provides students and older adults with an opportunity to spend time and engage in activities together. Based on the findings of this pilot program offering, MIRA will explore expanding this programming either with Residence Life or to the broader campus community.

Chapter 5: Communications and outreach

MIRA continues to raise the profile of McMaster's strength in aging research through strategic communications. These include:

- **The MIRA website**, which has attracted more than 41,909 views in 2019, compared with 27,000 views in 2018.
- **Storytelling and public relations**. Communications staff at MIRA have written or facilitated 101 pieces of media coverage specifically mentioning MIRA or MIRA leadership. Of the 101 pieces of coverage, readership equaled 24.5 million, with an estimated 93.1k coverage views and 3.31K in social media shares. Appendix I at the end of this document includes some highlights of this coverage.
- An **internal newsletter** that is sent monthly to MIRA members highlighting relevant events and funding opportunities, both internal and external, and an external newsletter that is distributed to more than 600 opt-in newsletter subscribers highlighting news stories, researcher profiles, recent publications and more (published two to four times a year).
- **Social media**. This form of marketing continues to be a strong tool for elevating the profile of MIRA among its audience of researchers, clinicians, caregivers, policymakers and members of the community. It is regularly used to market events and researcher activities, including in real-time. MIRA has experienced continuous growth in its Twitter following, from 1,111 to 1,675 followers in one year. In 2019, MIRA launched Facebook and LinkedIn pages.
- Capacity building through **internal relations**. MIRA facilitates the Communications and Promotions Working Group, which is made up of communications representatives from other platforms in aging research at McMaster University, including the Geriatric Education and Research in Aging Sciences (GERAS) Centre, Gilbrea Centre for Studies in Aging, the McMaster Optimal Aging Portal, the McMaster Health Forum, the Aging, Community and Health Research Unit (ACHRU), and the Canadian Longitudinal Study on Aging (CLSA).
- **Internships and work-study employment**. MIRA continues to work with McMaster's Department of Communication Studies and Multimedia internship program as well as its work-study program. Students focus on a number of tasks to build skills in the area of communication, including creation of promotional material and ads for MIRA, social media strategy and implementation, event support and some writing support. MIRA had three interns in 2019.

"I have gained a new understanding of what it means to work as a communications professional within a health research field. The knowledge, skills and experience I have acquired have been essential to my professional development. I have learned about the various areas of aging research at McMaster, how researchers from all six Faculties contribute to research in aging, and strategies for effectively communicating the topic of aging. The MIRA team strongly believes in what they do and I find it very empowering to be part of such an encouraging, hardworking, passionate team." — **Janet Bell, Communications Assistant**

Chapter 6: Partnerships

MIRA has developed a wide network of collaborators and partners that support the research driven by MIRA and its centers as well as MIRA's educational endeavors and community-based initiatives. In the past year, MIRA developed several new relationships and collaborations with both internal and external partners. MIRA continues to engage with its existing partners in 2019 to broaden and expand its scope and reach.

External Partnerships

In November of 2018, MIRA was invited to join a delegation traveling to the U.K. to develop partnerships and stimulate investment in aging research in Canada. The visit was hosted by the British Consulate in Toronto. As a result of this networking opportunity MIRA signed a memorandum of understanding with a new international alliance between the **Northern Health Science Alliance and the Centre for Aging and Brain Health Innovation** and its Canadian partners: Michael Smith Foundation for Health Research; AGE-WELL Network of Centres of Excellence; University of Waterloo; and Simon Fraser University STAR Institute. The intent of the MoU was to work together to drive knowledge exchange and innovation in Heathy aging.

Further, MIRA is also in the process of negotiating an MoU with both **Lancaster University** and the University of Leeds to demonstrate the strong alignment and partnership opportunities available at the intersection of aging and mobility. The aim of the MoU with Lancaster University is to demonstrate commitment for the establishment of international partnerships that can support HQP through exchange opportunities for visiting scholars, post-doctoral fellows and post graduate students as well as accessing infrastructure and research funding from counterpart regions.

The collaboration with the **University of Leeds** is positioned around international collaborations for emerging funding opportunities to study frailty in population-based cohorts. In order to support Highly Qualified Personnel (HQP) development and trainee exchange opportunities internationally, MIRA is supporting its partner **Institute of Technology (IT) Carlow's** application towards developing a PhD program. Once IT Carlow has this designation, the partnership will formalize a process involving joint supervision of graduate students, which will further extend to the broader research community.

In 2019, MIRA signed a new MoU with the Alzheimer Society and Diabetes Action Canada. The **Alzheimer's Society of Brant, Haldimand Norfolk, Hamilton Halton** is working with MIRA and the McMaster Centre for Continuing Education to further develop, promote and disseminate the Caregiver Essentials course in order to support caregivers currently engaged with the Alzheimer's Society.

A partnership with the **Regional Geriatric Programs of Ontario** was also developed to enable the offering of the Caregiver Essentials course for an additional two years up to fall 2021.

Ontario Strategy for Patient Oriented Research Support Units (OSSU). MIRA's Scientific Director, Dr. Parminder Raina, in collaboration with Dr. Maureen Markle-Reid, Scientific Director of the Aging, Community and Health Research Unit (ACHRU) co-lead MIRA's newest centre, the MIRA | Collaborative for Health and Aging, established in the last year through the CIHR SPOR Network. MIRA is reaching out to other SPOR centres in Ontario to develop potential opportunities for collaboration in the areas of patient engagement, co-design, implementation, evaluation and scale and spread of patient-centred interventions; connecting data platforms, fostering partnerships and collaborations; and capacity building. The collaborations will leverage the donor funds and support many of the research initiatives and funded projects within MIRA.

Through a collaboration with **Diabetes Action Canada**, MIRA is facilitating the development of a program of research in the area of diabetic retinopathy using the Canadian Longitudinal Study on Aging (CLSA) data set, specifically retinal images collected in the CLSA, and applying advanced analytics such as AI, math and machine learning. Through the newly formed MIRA | Collaborative for Health and Aging, MIRA will help to build capacity among researchers and trainees through involvement in this proposed program of research and collaborate in knowledge translation and research outcome dissemination activities.

MIRA recently announced a new partnership with the **Canadian Longitudinal Study on Aging (CLSA), Metabolon** and the **Canadian Frailty Network** to develop a $4,000,000 research program on frailty, metabolomics and aging. To date, there has been little consensus on the biological mechanisms underpinning frailty. Frailty is known to result in mobility issues and the ability to perform routine tasks in older adults. Analysis of CLSA samples will allow researchers to identify metabolites that will help to improve early prediction of frailty, and also lead to further research on treatments addressing specific aspects of frailty.

MIRA has met with several retirement-living and long-term care service organizations to explore synergies with MIRA's vision. These organizations are interested in participating in research projects around technology, mobility and well-being, as well as providing valuable resources for residents, such as the Caregiving Essentials course and the Optimal Aging Portal. This relationship building is intended to develop future collaborations and/or support of MIRA initiatives. These relationships are being developed with **Revera, Promerita, Shannex** and **Ressam Gardens**.

MIRA has ongoing partnerships with **Aditum Health, Ontario Neurotrauma Foundation, Shalom Village, Thrive Group, Institute of Technology Carlow,** and **Microgrid Solutions**. The MoU's for these partnerships focus on developing collaborative research proposals, partnering on events or outreach activities, cross-promoting initiatives as appropriate, and a general commitment to look for opportunities to work together. Several of these partners are also part of MIRA's End User and Stakeholder Committee, which assists with sustained contact and engagement.

MIRA continues its partnership with **AGE-WELL.** This partnership allows MIRA to expand its network and co-fund research projects and trainees whose interests align with both organizations. This year, MIRA supported an AGE-WELL Postdoctoral Fellowship award to conduct research on entrepreneurship among older adults and related technology adaptation. MIRA also supported a Strategic Investment Program award to develop strategies towards optimal design and protocols of continuous monitoring technologies in a home setting for older adults living with chronic diseases. Both awards are held at McMaster University.

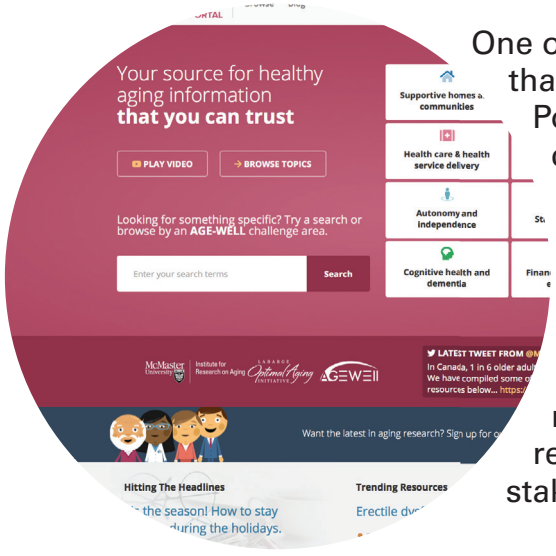
MIRA's partnership with **Canadian Frailty Network** includes co-funding research projects for trainees through the CFN Interdisciplinary Fellowship Program & Summer Student Awards Competitions. In the past year, MIRA co-funded a post-doctoral fellow to work at the McMaster Evidence Review Synthesis Team's (MERST's) to develop physical activity clinical practice guidelines for older adults living with frailty. This co-funding will leverage LCMA funds, and hiring has recently been completed.

Internal partnerships

MIRA continues to foster its ongoing partnerships and expand its internal partnerships within McMaster University:

Through a partnership with the **Office of International Affairs**, MIRA supported the **McMaster Institute for Health Equity** by sponsoring a visit by Professor Martin Bobak from the Institute of Epidemiology and Public Health, University College London to deliver MIRA's first health equity seminar. Professor Bobak spoke about health equity and aging in societies undergoing rapid social change in the context of a large population-based cohort study he has established in Russia, Poland, Lithuania and Czech Republic.

University Advancement has also committed to working with MIRA and the LCMA around sustainability planning for the Optimal Aging Portal. There is a broad commitment from the University that aging is a key priority for fundraising and donor relations.



One of MIRA's key strategic partnerships is the team that supports the **McMaster Optimal Aging Portal**. The Portal is one of the major platforms within MIRA, and communications teams from both work closely together to ensure that efforts are aligned and build upon each other. MIRA leadership and University Advancement is working closely with John Lavis and Ileana Ciurea of the Portal team to identify and secure potential sponsors in order to support the growth and sustainability of this important platform. This partnership will remain top of mind in the months and years to come, as the Portal serves as both a research and knowledge translation tool to support multiple stakeholders at the University and beyond.

MIRA has continued its partnership with the **VP Administration** and **AVP Facility Services** to promote and distribute outcomes from both the Age-Friendly University (AFU) Network and Walkability surveys. MIRA has worked with both groups to promote and launch these reports at the Hamilton Public Library. MIRA has also established an Age-Friendly University Committee that has a broad membership from **McMaster University's Service Units for students, staff and alumni, major academic units and aging platforms** and the **McMaster University Retiree Association**. This committee works collaboratively with MIRA to implement initiatives that will ultimately help McMaster in becoming a fully established Age-Friendly University. These include supporting strong communication and more widespread knowledge across campus of the Age-Friendly University initiatives and principles

The VP Administration continues to work with MIRA on the intergenerational hub space intended to facilitate interactions between older adults and University students. In 2019, MIRA continued to work with Facility Services on this initiative and has now launched pilot programming in partnership with **McMaster Residence Life**. This pilot program is expected to move into the new Peter George Centre for Living and Learning early 2020.

MIRA has deepened its collaborative efforts to train the next generation of interdisciplinary researchers in the field of mobility and aging. Through the establishment of collaborations with several groups and institutes at McMaster, MIRA has strengthened its support for HQP development through co-funded opportunities for research trainees while leveraging LCMA and MIRA funds. This has resulted in greater reach in nurturing and deepening interdisciplinary connections across the University. MIRA co-funded a catalyst grant with the **Institute for Pain Research and Care (IPRC)** and co-funded a PDF with the **McMaster Evidence Review Synthesis Team (MERST)**. MIRA has also established a collaboration with the **McMaster Education Research, Innovation and Theory Program (MERIT)** to support a post-doctoral fellow who will work to evaluate MIRA's certificate program in geriatric competencies and research on aging. In collaboration with the **Michael G. DeGroote Centre for Medicinal Cannabis Research (CMCR)**, MIRA is developing research opportunities in the areas of polypharmacy, deprescribing, addictions, pain, medicinal or recreational cannabis use and will be providing pilot funding to support the development of novel and multi-disciplinary research ideas in the areas of aging and mobility

Other outcomes related to partnerships

MIRA has been actively exploring the creation of additional centers within MIRA in addition to the Labarge Centre for Mobility in Aging, the McMaster Optimal Aging Portal and the MIRA | Collaborative for Health & Aging. By including new centers within the umbrella of MIRA, MIRA hopes to better coordinate major research initiatives, share resources, access knowledge and skills, and leverage funds. This will further strengthen McMaster's position as a leader in interdisciplinary aging research that can address and respond to the most pressing issues facing older adults, caregivers, health professionals and caregivers.

To this end, MIRA has had conversations with the **McMaster Evidence Review Synthesis Team's (MERST)**, with the goal of providing evidence review and synthesis to the MIRA network as well as to major research initiatives. Discussions are ongoing with St. Joseph's Villa to develop a **Centre on palliative care and end of life** within MIRA. A proposal has been developed to create a **Centre for Communication and Aging** in the School of Rehabilitation Science to advance scholarly activity and knowledge translation in the areas of aging and communication through collaborative cross-disciplinary research, training, dissemination, education and creative endeavours.

In 2018, MIRA formed an important partnership with the **Ministry for Seniors and Accessibility** (formerly, Ministry of Seniors Affairs) in Ontario. Working closely with the Deputy Minister and Associate Deputy Minister, MIRA gathered leaders from institutes and centers in Ontario to discuss ways to strengthen collaboration, better inform policy development and increase Ontario's competitiveness in national and international funding activities. In late 2018, MIRA submitted a proposal for a formal provincial entity that will fund and facilitate aging research across the province. A change in provincial government in June 2018 and a federal election in October 2019 resulted in an ongoing freeze on spending and the ability to establish an Ontario institute dedicated to aging research. However, MIRA continues to maintain its relationship with the Ministry and seek support from stakeholders to re-engage the government once future directions are clear.

MIRA funded a catalyst grant "**An intergenerational and life course program of research (in Hamilton)**". Through this grant, MIRA has engaged with the **City of Hamilton** and **McMaster University** to design and create a local cohort of City and University employees. The goal of the project is to leverage the engagement of Hamilton-dwelling adults to better understand the health impacts of their work environment as they age. The project is moving forward with the City of Hamilton and, following a successful pilot, McMaster employees will also be approached to join this cohort.

Government relations

MIRA has engaged in a number of initiatives focused on building awareness among government partners about MIRA and McMaster's strengths in aging research and knowledge translation.

For example, MIRA's scientific director, Parminder Raina, continues to hold his appointment as Canada Research Chair in Geroscience (Tier 1) and as a member of the National Seniors Council where he advises on key priorities related to the older population.

In 2018, MIRA met with several stakeholders within Public Health Ontario (PHO), which resulted in an invitation to participate in a PHO Grand Rounds presentation in January 2019

In the spring, MIRA worked with McMaster's public affairs team to develop a brochure for government officials highlighting McMaster's work in aging research, which included Augmented Reality technology. The goal for the brochures was to get researchers in front of decision makers in Ottawa and Toronto and be a useful, unique tool to garner support from government on some of McMaster's large priorities. The brochures have been published and are currently in distribution.

In September 2019, Dr. Raina became an elected fellow of the Canadian Academy of Health Sciences, considered one of the highest honours for members of the country's health sciences community. Elected fellows are chosen through peer review for their demonstrated leadership, creativity, distinctive competencies, and commitment to advance academic health sciences. All fellows also agree to serve the Academy and be active in promoting improved health, health care and health-related government policies.

Throughout the year, McMaster's Government Relations office has assisted with contacting various government officials for information sharing, communications and public affairs work with MIRA on an ongoing basis to develop strategies that will continue raising the profile of MIRA and aging research at McMaster and the broader community. MIRA was visited by several councilors from Hamilton, Burlington and Oakville in the past year to learn about McMaster's work in the aging sphere and how their local communities may benefit from the important work McMaster and MIRA are doing. As well, MIRA continues to engage with government representatives through MIRA's End User and Stakeholder Committee.

Government relations activities continue to be a high priority within the Institute. MIRA recognizes the importance of local government champions, as well as leaders who have a broader, national mandate.

Leveraging MIRA and LCMA funds

In partnership with MIRA's stakeholders, the Institute continues to leverage both MIRA and LCMA funds in order to support many of its initiatives. In 2019, thanks to several new partnerships listed in this report and support from MIRA's stakeholders, the Institute leveraged LCMA and MIRA funds for a total of $6.1 million. Examples of leveraged MIRA funds include:

- Requiring matching funds for the Labarge Mobility Scholarships ($30,000);
- Requiring matching funds from the Faculties or other sources to support the catalyst grants ($30,000) and planning grants ($7,500);
- Requiring supervisor contributions to the MIRA PDF awards as well as PDF to attract additional funds for their research ($195,000);
- Co-funding three PDFs with the Canadian Frailty Network, AGE-WELL and MERIT, and through co-funding of the IPRC Catalyst grant (for a total of $105,000);
- Securing funds from the Office of International Affairs ($5,000) to support the McMaster Institute for Health Equity for contributing to a visiting Professor (Martin Bobak) from the Institute of Epidemiology and Public Health, University College London to deliver MIRA's first health equity seminar;
- Leveraging MIRA funds for graduate student travel ($18,000);
- Utilizing the University's work-study program to supplement intern salary ($5,000);
- Leveraging MIRA's investment in CCEs Caregiver Essentials course by obtaining commitment and support from the Regional Geriatrics Program of Ontario for an additional two years ($40,000);
- Through a research investment in a new partnership with the CLSA, Metabolon and CFN, MIRA leveraged its funds to support the development of a frailty and mobility biomarker platform ($4,600,000);
- The MacM3 project funded by LCMA has been able to secure additional funding ($537,357) through the McMaster Strategic Alignment Fund and AGE-WELL Core Research Program Catalyst Funding;
- Finally, in collaboration with ACHRU, MIRA was able to successfully obtain additional funding ($300,000) from SPOR to support many of the research initiatives and funded projects within MIRA.

MIRA's approach is to conduct research in cross-Faculty teams and engage key stakeholders through every stage of activity, from research to evaluation and implementation of interventions and technologies. This approach contributes to MIRA's ability to rapidly expand its network and engage with a wide range of partners. Since inception, MIRA has leveraged its funds by more than $10.5 million.

Events

MIRA continued to host and co-host several scientific and public events throughout the year in order to raise its internal and external profile and bring attention to McMaster as a powerhouse of aging research, as well as facilitate the development of new partnerships while enhancing existing relationships. Events in 2019 included:

Science in the Park | *February 5, 2019*
MIRA and the McMaster Innovation Park (MIP) partnered for a 'Science in the Park' lecture featuring Dr. Parminder Raina, who explored the question of how increased lifespans change the way we live as individuals and as a society.

Funding information sessions | *February 10-11, 2019*
MIRA hosted two sessions inviting researchers, students, and post-doctoral fellows to learn more about MIRA and LCMA catalyst grants, matching funding for external grants, MIRA graduate student travel awards, MIRA undergraduate summer research fellowships, MIRA postdoctoral fellowships, Labarge graduate scholarships in mobility in aging and AGE-WELL/ MIRA fellowships and graduate scholarships.

MIRA Webinar series: Aging research funding information | *March 14, 2019*
MIRA held its first webinar of the year featuring MIRA research coordinator Audrey Patocs who shared information about all MIRA and LCMA funding opportunities.

AGE-WELL/MIRA Co-Funded Trainee Awards information session | *March 29, 2019*
McMaster graduate students and postdoctoral fellows in aging and technology research attended an information session to learn more about the co-funded awards that will be given to trainees who are working to drive innovation and create technologies and services that benefit older adults and caregivers.

Pitch your Project | *April 2, 2019*
At this networking event, students and faculty members watched McMaster graduate students and postdoctoral fellows present their research in three minutes. This was not a competition, but an opportunity for junior researchers to share their research interests with a diverse aging research community at McMaster.

Defying Barriers | *May 15, 2019*
Defying Barriers Workshop, a joint initiative of McMaster University and the artistrun organization Centre[3], was held downtown Hamilton on May 15, 2019. More than fifty participants toured Centre[3] facilities, learned from talks by artists Rebecca Baird and Dave Bobier, and participated in discussions about their lived experiences and knowledge as artists, advocates, and community members with disabilities. The workshop aimed to increase awareness of the need for accessible and intergenerational creative environments, contribute to research on inclusive design, and facilitate partnerships reflecting the diversity of our communities. The workshop was organized by School of the Arts, faculty Carmela Laganse and Briana

Palmer, with support from MIRA and the Wally and Mavis Pieczonka Endowment for the Arts. It generated ideas regarding existing barriers in artistic spaces, practices, and infrastructure and how production, exhibition, and performance spaces could be collaboratively and equitably designed to enrich our creative culture.

For the Ages: How McMaster University is becoming Age-Friendly | *June 26, 2019*
MIRA, McMaster Facility Services and the School of Rehabilitation Science co-hosted a free public presentation at the Hamilton Public Library Central Branch to outline the steps they are taking to transform McMaster's campus into a welcoming and accessible place for older adults.

MIRA Webinar series: Get out of your silo – how and why you should | *July 7, 2019*
During this co-hosted SMRTS webinar, Paula Gardner, Associate Professor in McMaster's Department of Communication Studies and Multimedia, the Asper Chair in Communications, and director of the Pulse Lab, shared her own approaches to interdisciplinary research, strategies for success, as well as some of the challenges of working with people outside of your discipline.

The Future of Aging | *July 17, 2019*
MIRA partnered with the Faculties of Engineering, Health Sciences and Science for a full day of exploring new research and smart technologies that can allow older adults to live more independently and longer in their place of choice. The event featured research snapshot presentations, a poster and exhibit hall, a keynote speaker and tours of leading McMaster facilities, including LIVELab, PACE and the Westdale Smart Home. More than 100 participants who attended interacted with exhibitors from industry and academia, and heard about aging and technology research led by MIRA members from across all six Faculties.

Bridging the divide: How social inequality impacts health and aging | *August 21, 2019*
MIRA's International Scientific Advisory Committee (ISAC) members, along with Steve Buist, Investigative Reporter for the Hamilton Spectator's Code Red series discussed the societal factors that contribute to healthy aging in a public panel presentation downtown Hamilton.

MIRA seminar: Are population perspectives enough to understand and address health inequalities | *August 22, 2019*
In order to efficiently and effectively address health inequalities in our communities, it's critical to find ways to produce the most accurate and up-to-date evidence on the current state of health and well-being. MIRA's ISAC member, Dr. S.V. Subramanian, Professor of Population Health and Geography, Department of Social and Behavioural Sciences, Harvard University, conducted a scientific seminar at McMaster University exploring this important topic.

Music and Hearing Loss: Can they go together? | *September 11, 2019*
The Hamilton Philharmonic Orchestra and MIRA, along with the McMaster Institute for Music and the Mind and the Burlington Public Library, partnered to examine whether music and aging-related hearing loss can go together. This engaging multidisciplinary talk featured the music of Beethoven and explored how his life evolved due to his own struggles with deafness.

Meet my method | *November 4, 2019*
McMaster trainees, faculty and the aging research community at McMaster were invited to the McMaster Innovation Park to showcase and share their research methods in aging, with the goal of inspiring collaboration and interdisciplinary connections with faculty members and fellow trainees.

MIRA and Labarge Centre for Mobility in Aging Research Day | *December 12, 2019*
MIRA's largest internal event, the MIRA and Labarge Research Day is an opportunity to celebrate and showcase aging research across the University. This event will include oral and poster presentations, poster awards for trainees, and networking opportunities for researchers. Following the public session, the members of the Labarge Gift Board will have their annual meeting.

In addition to the events hosted, supported or facilitated by MIRA, the Institute also had a presence at a number of community events (55+ Seniors Active Living Fair; Retired Teachers of Ontario Wellness Fair; the Older Adult Network of Hamilton's 2019 Seniors Kickoff and Wellness Fair; Hamilton's International Day of Older Persons (IDOP)) as well as national events (Baycrest's Annual Rotman Research Institute Conference; Canadian Frailty Network Conference; Canadian Association for Gerontology conference in Moncton, NB).

MIRA is committed to sharing groundbreaking research and educational initiatives in aging at McMaster University with members of the community through public events such as these. Participating in and leading events, both internal and external, is an important way for MIRA to raise its profile and bring attention to aging research at McMaster. MIRA will continue to seek strategic opportunities to engage with internal and external partners through events in the years ahead.

Chapter 7: Goals for 2020 and Beyond

MIRA's first couple of years have focused primarily on building relationships, reputation, capacity and infrastructure, and on establishing an identity within McMaster and beyond. MIRA has worked toward building many partnerships and creating mechanisms to provide support for researchers in aging, including developing its major programs of research and building a culture of interdisciplinarity within its membership. In 2019, MIRA continued to drive forward its major research initiatives and supported capacity building in all areas of campus.This included building the foundation for creating new research centers within MIRA, developing and rolling out intergenerational programming and strengthening MIRA's educational initiatives in aging and mobility. MIRA further strengthened McMaster's position as an Age-Friendly University. Finally, MIRA worked in the past year to streamline its administrative processes and initiated the development and collection of metrics in order to measure the outcomes and impacts that result from MIRA's investments and the generous contributions from our donor, Suzanne Labarge. Looking forward to 2020 and beyond, MIRA will focus on the following activities:

Strategic Growth

1. Strategic approaches on how to grow MIRA's network and engage MIRA members to enhance MIRA's vision and activities, including optimizing the MIRATrainee membership model;
2. Continue to look for opportunities to create new research centers within MIRA based on McMaster's strengths and expertise;
3. Strategize on how to build and expand MIRA's education capacity;
4. Determine the focus for the development of the next two major research programs;
5. Development of funding opportunities for 2020 and beyond.

Development of Metrics

6. Expand the development of metrics to evaluate the impact of MIRA's activities;
7. Develop alignment with Research Impact Canada;
8. Develop robust and ongoing member and stakeholder surveys to inform and support MIRA activities and strategic growth.

MIRA Stakeholder Engagement

9. Continue to increase and grow MIRA's profile and reputation among key stakeholders;
10. Expand on MIRA's partnership model to support MIRA's strategic directions; including building national and international partnerships;
11. Continue to deliver McMaster's position as an Age-Friendly University;
12. Grow and fine tune MIRA's Community engagement approaches;
13. Raise additional funding to support the ongoing development of an on-campus space to house intergenerational programming for older adults and university students, as well as educational programming to expose more undergraduate students to topics in aging.

Communications

14. Expand on MIRA's web-based platform to share information about opportunities for students/ trainees and community members and to highlight MIRA's major research projects;
15. Establish activities and/or initiatives intended to enhance internal and external collaboration;
16. Partner with the Office of International Affairs to bring in a prominent international speaker in order to further enhance McMaster's global reputation.
17. Develop future annual reporting strategies.