



2019 Annual Report to the **LABARGE GIFT BOARD**



LABARGE
Optimal Aging
INITIATIVE

Labarge Centre for
Mobility in Aging

Institute for
Research on Aging



**BRIGHTER
WORLD**

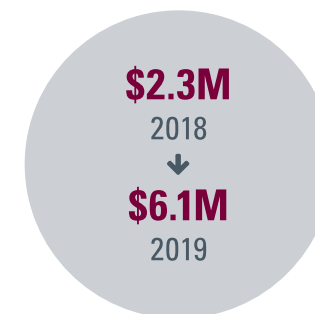


MIRA is committed to sharing Labarge-funded research and educational initiatives in aging with members of the community through public events and platforms, like the McMaster Optimal Aging Portal.

Contents



2 Introduction



4 By the numbers:
2019 in review



7 **PART 1:**
Labarge Optimal
Aging Initiative



18 **PART 2:**
Projects funded by the
Labarge Foundation



21 **PART 3:**
McMaster Institute for
Research on Aging



24 **PART 4:**
Labarge Centre
for Mobility in
Aging: **Research**



56 **PART 5:**
Labarge Centre for
Mobility in Aging:
Capacity Building



63 **PART 6:**
Labarge Centre for
Mobility in Aging:
**Community and
stakeholder engagement**



67 **PART 7:**
Other initiatives
supported by
Labarge funds

Introduction

In 2016, the **Labarge Centre for Mobility in Aging** was developed as a means to facilitate and amplify research initiatives from McMaster University that mitigate the risk and consequences of declining mobility with age. Housed within the McMaster Institute for Research on Aging (MIRA), and built on the foundation set by the **Labarge Optimal Aging Initiative** and the **Labarge Foundation**, the Centre fosters interdisciplinary approaches to all aspects of mobility in aging. Through the generosity of Suzanne Labarge, McMaster's strength in aging research has been amplified, with the aim of developing evidence-based interventions that will impact the lives of today's aging population.



David Farrar



Susan Denburg



Parminder Raina

McMaster University is actively expanding its capacity in order to address the most pressing aging-related questions facing older adults, caregivers, health professionals and policy makers today. As an age-friendly university, McMaster is committed to making aging a strategic research priority, as well as supporting educational and community initiatives.

McMaster's forward-thinking approach in bringing together researchers from all disciplines and faculties, as well as community groups, students and older adults, is paramount to driving the development of practical solutions for our aging population. As such, McMaster's innovative approach to research is making global and national impact, all of which has been made possible because of the vision and generosity of Suzanne Labarge.

I invite you to read more about the impact McMaster is making in this year's report. I am pleased and proud to be a part of a community that is committed to elevating the aging experience for all.

David Farrar
Acting President and Vice-Chancellor

I am so pleased to champion the Labarge Centre for Mobility on Aging, which is housed within the McMaster Institute for Research on Aging. I have observed and supported its progress over the last three years and have witnessed an incredible transformation at McMaster University.

Through the support of research projects and student trainees as well as McMaster's involvement with community members and stakeholders, McMaster is receiving the recognition of becoming an international leader in aging research. Importantly, it is also translating those findings for people in Canada and worldwide to make well-informed choices which will add productive years to their lives.

The impact of the investments made by Suzanne Labarge is unparalleled and will continue to grow to benefit all.

Dr. Susan Denburg
Associate Vice-President, Academic,
Faculty of Health Sciences
University Lead, Labarge Centre for Mobility in Aging
and McMaster Institute for Research on Aging

At the Labarge Centre for Mobility in Aging and the McMaster Institute for Research on Aging, our approach is to conduct research in cross-Faculty teams and engage the older adult community, their families, healthcare providers and other key stakeholders through every stage of our activities, from research to evaluation and implementation of interventions and technologies.

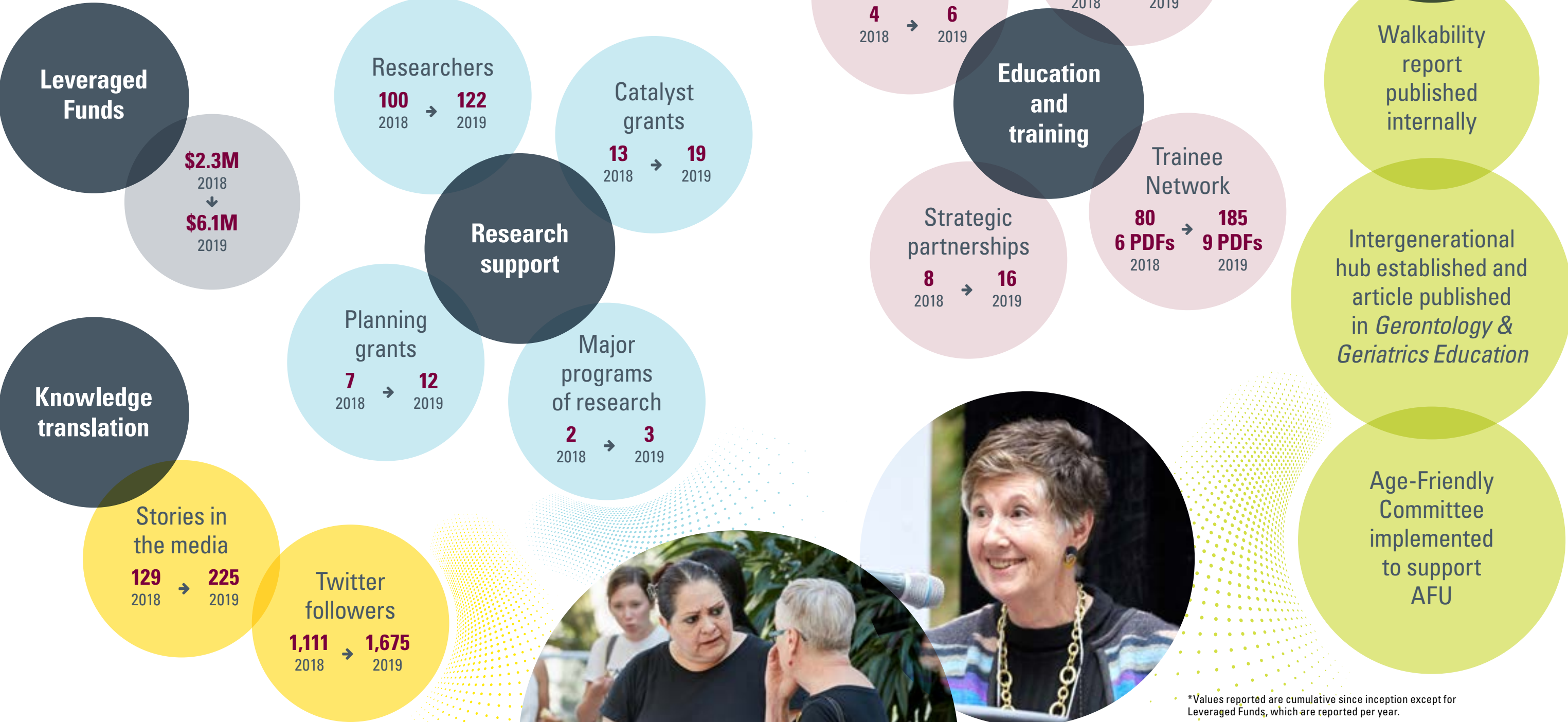
This report highlights the work that is a result of the input of multiple perspectives and complementary areas of expertise. This approach ensures our research is, from the outset, optimized to create useable, practical, older adult-centred solutions.

Our progress is enabled both by our strong team that shares a commitment to advancing research and knowledge sharing activities as well as the generosity of Suzanne Labarge.

Dr. Parminder Raina
Scientific Director of the Labarge Centre for Mobility in Aging and the McMaster Institute for Research on Aging

By the numbers: 2019 in review

Figures below illustrate how MIRA and the LCMA have leveraged both Labarge and University in support in order to continue growing year after year.



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

PART 1: Labarge Optimal Aging Initiative

The Labarge Optimal Aging Initiative has provided seed funding to support interdisciplinary teams investigating health or social topics related to aging. Since its launch in 2012, the Initiative has funded 26 research projects, including 21 cross-Faculty or cross-department collaborations. These opportunities have allowed McMaster researchers to develop robust research projects that have translated to longer-term partnership opportunities.

Since MIRA's launch in 2016, Labarge-funded projects have generated 40 academic papers and participated in 93 conference presentations related to their work.

Labarge funding has supported more than 185 trainees in 2019.





Marla Beauchamp

Investigators

Marla Beauchamp
Dina Brooks
Roger Goldstein
Stewart Pugsley
Julie Richardson

Pilot study of a tailored home balance exercise program for reducing falls in older adults with Chronic Obstructive Pulmonary Disease

Chronic obstructive pulmonary disease (COPD) is an age-dependant respiratory condition affecting approximately 1.5 million Canadians. While respiratory impairment is the hallmark of the disease, people with COPD also have significant balance problems and a high risk of falls. Annual fall rates in older adults with COPD are estimated to be up to five-fold higher than in older adults without COPD and are linked with an increased risk of injury and death. This research project is examining the feasibility and preliminary effects of the first entirely home-based exercise program for reducing falls in older adults with COPD. Recruitment is 100 per cent complete and the team expects to have final results by the end of 2019. This pilot study has also informed the design of a CIHR-funded international multi-centre trial of fall prevention for at-risk older adults with COPD.

This Labarge-funded study informed the design of a CIHR-funded international multi-centre trial of fall prevention for at-risk older adults with COPD.

“Labarge funding provided an opportunity for our team to embark on the first study of home-based fall prevention in older adults with COPD. It enabled us to recruit several graduate students and highly qualified personnel to join our team and gain valuable expertise in aging, chronic disease and fall prevention.”

Marla Beauchamp

Preventing hip fractures in older adults by mapping subject-specific finite element models

Osteoporosis is a skeletal disorder that leads to reduced bone strength and increased risk of fragility fracture. This is common in older adults, with broken hips being a significant health care concern. In the US, 50 per cent of older adults hospitalized for hip fractures are unable to live independently after the injury. Prevention methods exist, such as hip pads and pharmaceuticals; but those at greatest risk need to be correctly identified. To diagnose osteoporosis (and, correspondingly, fracture risk) DXA (Dual Energy X-ray Absorptiometry) scans are used to measure the bone density. However, this has been shown to be a poor predictor of fracture risk. Quenneville’s team has used image processing techniques to extract more information from this image, as well as account for important factors such as bone density distribution and shape of the hip in predicting fracture risk. This has been verified and optimized through comparison with bone fracture tests. Quenneville’s team hopes that combining this new approach with the standard clinical approach will help clinicians better identify those who should be using protective measures, thus reducing the incidence of this devastating injury.



Cheryl E. Quenneville

Investigator

Cheryl E. Quenneville

“Funding from the Labarge Optimal Aging Initiative has allowed us to develop better methods for identifying older adults who are at greatest risk of breaking a hip from a fall. We do this through the use of a standard clinical diagnostic image, which will help targeted interventions reduce the frequency of these injuries.”

Cheryl Quenneville

Quenneville's team hopes their methods will help to identify older adults who are at risk for bone fracture before an incident occurs.



Dee Mangin
and Joanne Ho

TAPER-Mobility: Team approach to polypharmacy reduction to improve mobility in long-term care

Multiple diseases, polypharmacy (taking multiple medications), and age, predispose seniors to drug toxicity, which increases the risk of mortality, and may impair mobility and cognition. Individuals living in long-term care are particularly at risk. GeriMedRisk-TAPERMD provides access to GeriMedRisk, an interprofessional geriatric clinical pharmacology and psychiatry consultation and education service, and TAPER, a clinical pathway which integrates patient priorities, electronic screening for potentially harmful medicines, supporting evidence tools, and a monitoring pathway. The goal of the approach is to support medication optimization. The aim of this Labarge-funded project is to investigate the feasibility and signals of effectiveness of GeriMedRisk and TAPER in a long-term care home setting. The team hopes findings will help refine their approach further, and inform a larger randomized controlled trial in long-term care.

Investigators

Joanne Ho
Dee Mangin
Andrew Costa
Gordon Guyatt
Anne Holbrook
Reza Mirza
Julie Richardson
Justin Lee
Lehana Thabane
Kristina Frizzle

“Funding from the Labarge Initiative has helped implement and test a new pathway to potentially reduce polypharmacy and its mobility-related effects to improve the lives of people living in long-term care.”

Dr. Dee Mangin

DANcing for Cognition and Exercise pilot randomized controlled trial

GERAS DANcing for Cognition & Exercise (DANCE) provides high-quality programming for older adults (aged 60+) who have early cognitive and mobility limitations. It’s a program built on the research that shows that exercising your mind and body together has optimal benefits for physical and cognitive health. GERAS DANCE was developed by rehabilitation and geriatric medicine specialists at the GERAS Centre for Aging Research at Hamilton Health Sciences and McMaster University, and is offered in partnership with YMCA locations across Southern Ontario to help seniors to remain active and socially connected in the community. After only three months of GERAS dance (twice-weekly classes), participants had improvements in physical performance (balance, walking speed, and lower extremity strength) and global cognitive functioning. Participants also reported improvements in social connectivity, such as making new friendships outside of the class.



From left to right: Courtney Kennedy, Alexandra Papaioannou, Justin Lee, Sarah Radcliffe, George Ioannidis, and Aidan Giangregorio

Investigators

Alexandra Papaioannou
Courtney Kennedy
George Ioannidis
Richard Sztramko
Dafna Merom
Laurel Trainor
Matthew Woolhouse
Amanda Grenier
Sharon Marr
Christopher Patterson

“The 2017 Labarge Optimal Aging Initiative enabled our team to conduct the GERAS DANCE pilot study aimed to improve mind-body health of older adults (aged 60+) who have early cognitive and mobility limitations. Funding from the Labarge Optimal Aging Initiative program sparked the growth of GERAS DANCE into a well-known program across Southern Ontario.”

Alexandra Papaioannou



Martin von Mohrenschildt and Judith M. Shedden

Investigators

Martin von Mohrenschildt
Judith M Shedden

Staying mobile: Age-related enhancement of multisensory integration

Maintaining independent mobility is vitally important for self-sufficiency, quality of life, and self-esteem. The team is most interested in the critical perceptual and control factors that lead to maintenance of safe and skillful driving for healthy aging drivers. Neural processes change with age, and some drivers are able to adapt to maintain safe performance on the road. Can key aspects of perception and behaviour that might improve adaptation for other drivers be identified? The team uses physiological and brain-imaging techniques in a multisensory (visual, auditory, proprioceptive, and vestibular) driving simulator to examine how age-related enhancement of multisensory integration may be critical for older drivers. The team looks at behavioural and brain responses while drivers navigate through familiar and unfamiliar spaces, interact with pedestrians and other vehicles, and respond to physical motion such as acceleration, turning rotation, bumpy roads, and inclement weather. An understanding of the neural and behavioural changes involved in driving and aging will lead to strategies to maintain mobility for aging drivers, increasing self-sufficiency, self-esteem, and quality of life.

Outcomes of this research will lead to strategies for maintaining mobility among aging drivers, as well as increasing self-sufficiency, self-esteem and quality of life.

“The Labarge Initiative has had a major impact on our program of study of driving control. Basic questions about perception, multisensory integration, cognitive control, and navigation while driving are expanded to ask about brain and behaviour across the lifespan. This work will lead to strategies for maintaining safe driving, mobility, and self-sufficiency for seniors.”

Judy Shedden

Improving confidence and behind-the-wheel skills: Evaluating the feasibility of an older driver-health promotion intervention to optimize safe mobility

Over the past year, a total of 80 older drivers aged 65 to 79 participated in the team's study, which evaluated the effectiveness of a training program aimed at improving behind-the-wheel performance of older adults. Working together with industry partner Young Drivers of Canada®, this tailored training program used video clips of each participant to provide personalized feedback on their behind-the-wheel behavior. The team is currently in the process of completing a six-month follow-up to examine long-term impact of this training on participants. The team was invited to speak at both the American Occupational Therapy Association (AOTA) conference in New Orleans and at the Canadian Association of Occupational Therapy (CAOT) in Niagara Falls where their innovative approach to older driver training was showcased.

Over the past year, a total of 80 older drivers participated in the team's study, which evaluated the effectiveness of a training program for improving behind-the-wheel performance.

“Using the most up-to-date evidence and by partnering directly with older drivers and other key stakeholders, we are excited to have co-designed and tested a training program that has real-world benefits on the behind-the-wheel behavior of seniors.”

Brenda Vrkljan



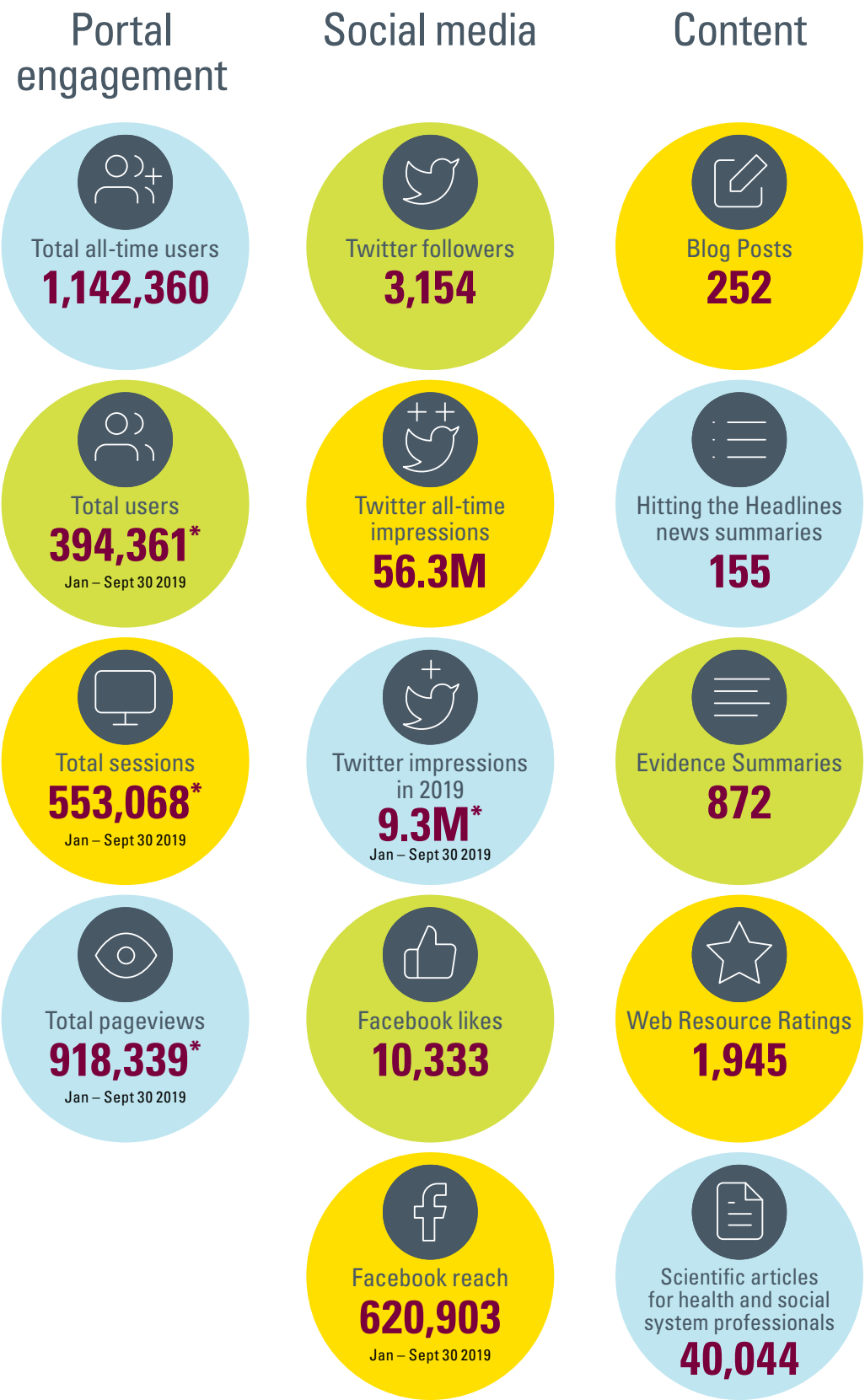
From left to right: Jessica Gish, Brenda Vrkljan, and Lauren Griffith

Investigators

Brenda Vrkljan
Jessica Gish
Lauren Griffith

The McMaster Optimal Aging Portal

The McMaster Optimal Aging Portal continues to grow as a key resource to support older adults, caregivers, clinicians, public health professionals, social system professionals, and policymakers from around the world who are looking for a trusted source of credible, evidence-based information about the health and social aspects of aging.



Social Systems Evidence and Portal content on social aspects of aging

Social Systems Evidence (SSE) was launched in fall 2017 with support from the Labarge Optimal Aging Initiative, the Faculty of Health Sciences, the McMaster Institute for Research on Aging (MIRA), and the Provost's Strategic Alignment Fund. SSE is the world's most comprehensive, continuously updated repository of synthesized research evidence relevant to 20 government sectors and program areas (e.g., community and social services, culture and gender, economic development and growth, education, transportation) and to all of the Sustainable Development Goals (SDG). It covers the governance, financial and delivery arrangements within which these programs, services and products are provided, and the implementation strategies that can help to ensure that these programs, services and products get to those who need them.

SSE includes 3,039 documents and the team anticipates this number to be closer to 3,500 by the end of the year.

- During 2019, the McMaster Optimal Aging Portal:
- harvested a total of 96,269 documents, which are being evaluated for their eligibility to be included in the repository;
 - launched the SSE evidence summary e-newsletter, providing monthly updates of new evidence on topics of interest to individual registered users;
 - expanded the number of government sectors and program areas covered by SSE from 16 to 20.

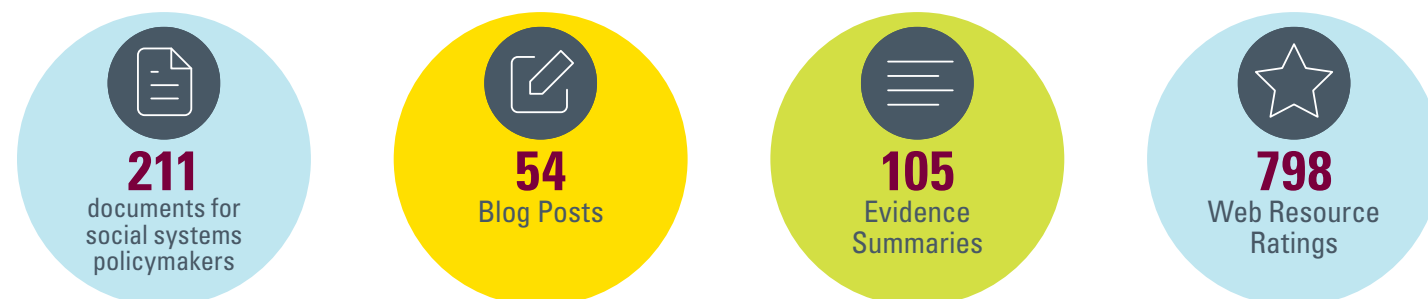


SUSTAINABLE DEVELOPMENT GOALS



- updated the home page of SSE with a user-friendly visual representation of the 17 SDGs, that allows users to access pre-selected content on individual SDGs by clicking on the respective tile;
- gave two presentations and one workshop together with its partners from the Monash Sustainable Development Institute about SSE at the United Nations General Assembly (New York September 2019);
- reached 3,600 unique users and 12,000 page views of SSE.

The McMaster Optimal Aging Portal content on social aspects of aging continues to grow and be widely promoted and used. It currently includes the following products focused specifically on the social aspects of aging:



Sustainability

Efforts to secure the long-term sustainability of the Portal continued at an increased level during 2019, following a renewed strategy to ensure its longevity and expansion. The Portal employed a combination of business collaboration and fundraising initiatives (with support from Advancement), grants and government relations. The Portal team was successful in obtaining a \$150,000 grant from AGE-WELL and is continuing discussions about a long-term collaboration pending their own funding renewal. The Portal confirmed interest from key target sponsors such as Revera and Chartwell and hopes to continue promising conversations with TD Canada Trust. Given the McMaster Health Forum's role in leading the Rapid-Improvement Support and Exchange (RISE) to support Ontario Health Teams as part of the government's OHT Central Program of Supports, the Portal is planning to explore the integration of its content into patient portals throughout Ontario through collaboration agreements with OHTs and personal health records stakeholders, to harness the Portal's power in achieving measurable improvements in health.



PART 2: Projects funded by the Labarge Foundation



Patient/caregiver engagement in community- based research on older adults

The team at the Aging, Community and Health Research Unit (ACHRU) value opportunities to work with older adults who have multiple chronic conditions, as well as with their caregivers and members of the public. These partners help to inform the design, implementation, and evaluation of innovative service delivery approaches to meet the needs of this population, as well as disseminating research findings from their unique perspective through co-authoring articles and presentations. ACHRU's evaluation of patient and caregiver engagement in research found that partners felt their involvement was a critical first step for achieving the desired outcomes of the study. Engaging partners throughout research and reporting back on how input was used created a sense of connection to the study. It also empowered partners to share their unique perspectives with researchers. ACHRU's partners continue to be involved in interpreting study findings and develop main messages. As well, they are assisting in planning a citizen panel to discuss study findings and develop a comprehensive approach for addressing hospital-to-home transitions for older adults and their caregivers. Through their participation, the team can enhance the potential for real-world impact and inform Ministry directions for new care delivery models.

Labarge funding has supported partner involvement in research, evaluation of a patient engagement strategy, as well as four ACHRU patient and public research partners to co-design training and orientation materials (see <https://achru.mcmaster.ca/patient-public-engagement>). Additionally, the team engaged two ACHRU patient and public research partners to present this work in Halifax to a standing-room-only audience during one of the final sessions at the annual Canadian Association of Health Services and Policy Research conference. The work was also shared by researchers at the annual Primary Health Care TUTOR national training program held in London, Ontario with positive reviews and will be shared at the upcoming Canada Research Chair Seminar focused on patient engagement. The research team also created a video focused on strategies that ACHRU has used to engage patients and the public in their program of research (<https://achru.mcmaster.ca/knowledge-transfer-publications/videos>). Finally, a new group of patient and public research partners are currently reviewing the website described above to suggest improvements, and the brochures are being translated into French for a broader Canadian reach.



Investigators

Ruta Valaitis
Carrie McAiney
Maureen Markle-Reid
Rebecca Ganann

(back row from left to right): **Carrie McAiney, Rebecca Ganann, Maureen Markle-Reid** (front row from left to right): **Jenny Ploeg, Ruta Valaitis** (study lead)

"With support from the Labarge Foundation, we have not only been able to build patient and public research partners' capacity in health services research, but we have also strengthened researchers' capacity to engage with patients and caregivers to foster research that is meaningful and impactful for society."

Project Team



PART 3:

McMaster Institute for Research on Aging

The McMaster Institute for Research on Aging (MIRA) was created in 2016 with the mandate to optimize the longevity of Canada's aging population through research, education, community outreach and collaboration. Interdisciplinary teams work alongside older adults and key stakeholders to find ways that will help Canadians spend more years living well. MIRA also acts as a robust entry point to McMaster's existing research platforms in aging, including the Labarge Centre for Mobility in Aging, it's first focused centre, the McMaster Optimal Aging Portal and the MIRA | Collaborative for Health & Aging.



McMaster Toolkit for Working with Older Adults

The McMaster Toolkit for Working with Older Adults was developed by an interprofessional group of researchers and clinicians at McMaster University. The online Toolkit is free to use, and is made up of an online course, a trigger video to prompt group discussion, and a website with additional resources. The goal of the Toolkit is to build competence in older adult care by providing instruction and resources focused on increasing comfort levels and enhancing communication skills.

The Toolkit is included as a component of MacPAGE, a platform developed by Andrew Costa, who is a MIRA member and assistant professor and Schlegel Chair in Clinical Epidemiology and Aging at McMaster University, to stimulate and recognize student interest in geriatrics that has been piloted by the medical school at the Waterloo campus. The online course within the Toolkit is included as a component of MacPAGE, and as a resource in the expansion of this platform to other areas of campus.

To date, the Toolkit has been accessed by 50 students a year and 16 users a year have completed the course. More than 90 per cent of users felt the course met their learning needs and the stated goals of the course, and 80 per cent said they would recommend the course to a colleague.

The Toolkit can be found at: machealth.ca/programs/mcmaster-toolkit/.

In addition to the support that MIRA provides to the research and communications activities outlined in this report, the Institute also advances strategic initiatives related to educational and community engaged opportunities on campus and beyond. Major highlights include:

- Publication of "Creating an intergenerational university hub: engaging older and younger users in the shaping of space and place" in *Gerontology & Geriatrics Education*. Authors included Brenda Vrkljan, Amanda Whalen, Tara Kajaks, Shaarujaa Nadarajah, P.J. White, Laura Harrington and Parminder Raina.
- Working with stakeholders to develop and communicate about intergenerational programming at the University.
- Publication of an internal report on the results of a research study

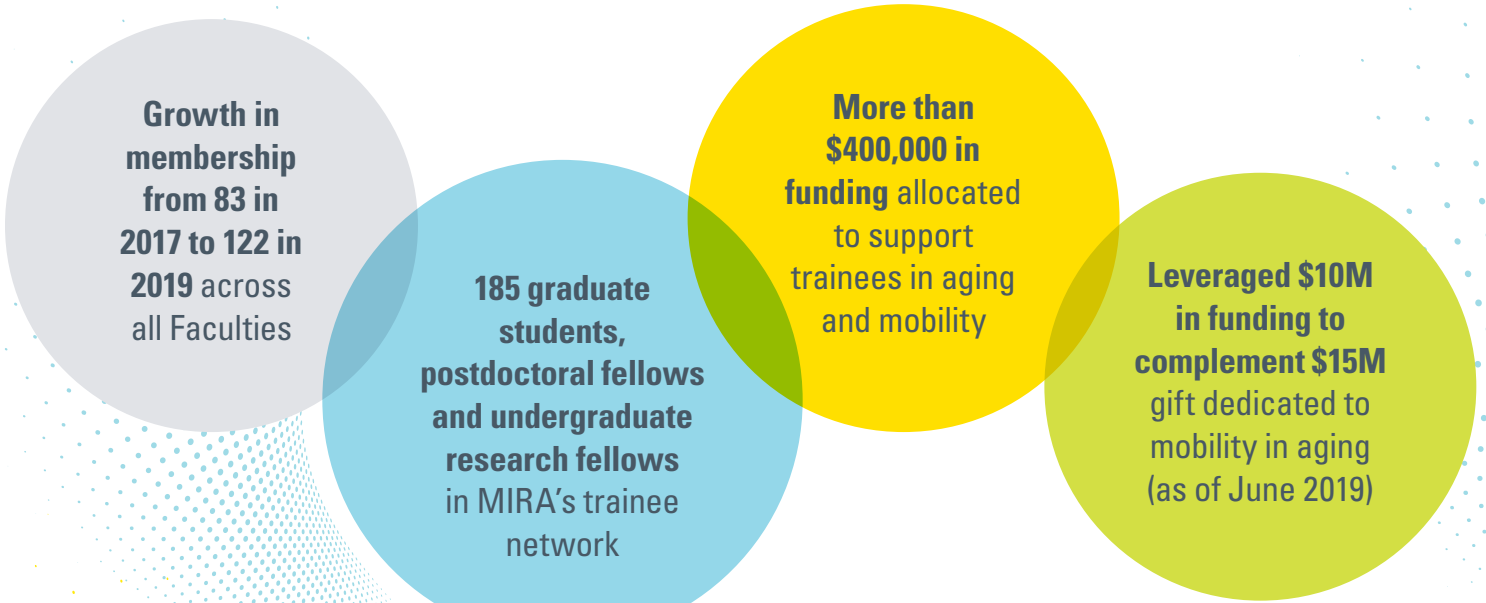
assessing the walkability of the McMaster campus for older adults and other stakeholders, in partnership with Facility Services.

- Continued leadership of the development of the AFU action plan for McMaster.
- Continued participation as a member of the Age Friendly University (AFU) global network, including publication and public launch of the AFU report and presentations at relevant conferences, such as the Canadian Association on Gerontology (CAG) conference in Moncton.
- Participation in city-wide partnership activities, such as the City's Age-Friendly Hamilton Five-Year Update.
- We continue to engage with the province through regarding the development of stakeholder consultations related to the creation

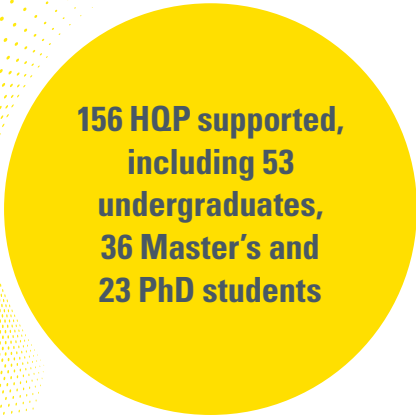
of a province-wide interdisciplinary research network on aging with the Deputy Minister for Seniors.

- Establishing new research partnerships with industry, health system or academic collaborators, such as co-creating a research program related to mobility within the Internal Medicine department at Juravinski Hospital.
- Development and distribution of a membership survey intended to identify successes and areas for improvement. Nearly half (53 out of 120) of MIRA members responded to the survey. Half (50%) of the respondents surveyed stated that MIRA had encouraged them to start a new aging-related project or program of research and collaborate with researchers outside of their discipline. They stated that MIRA had increased the likelihood that they would consider research projects related to aging in the future.

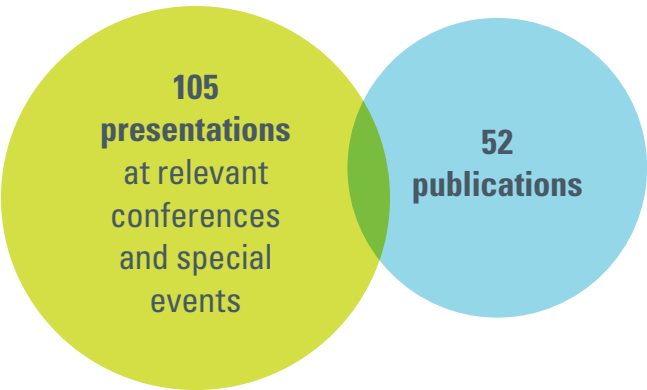
Key outcomes for MIRA include:



HQP development:



Research outputs:

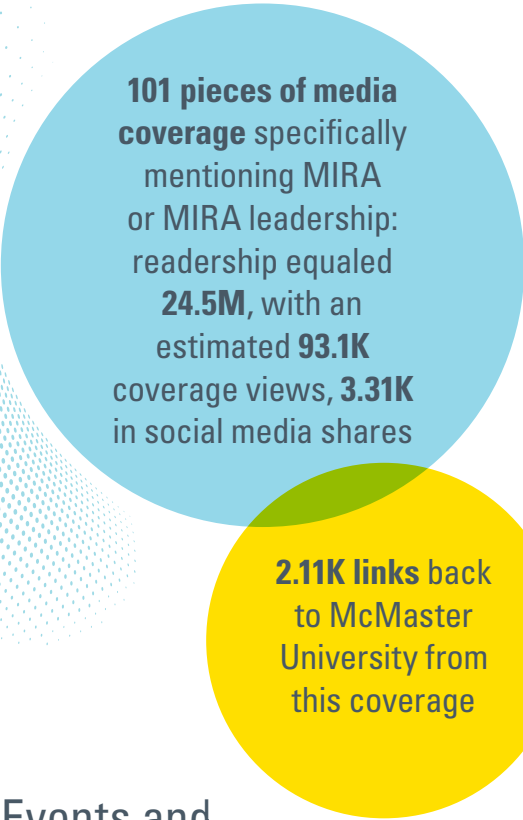


Partnerships:



Communications:

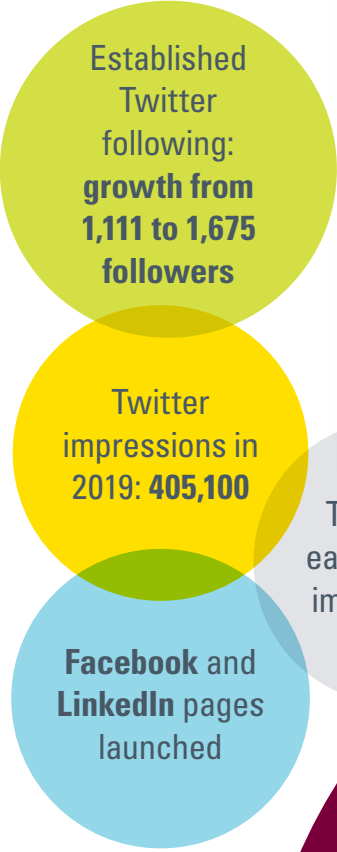
Traditional and new media:



Events and speaking engagements:



Social media:



Top tweet earned **10.3K** impressions

Newsletter:



"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



PART 4: Labarge Centre for Mobility in Aging: Research



The Labarge Centre for Mobility in Aging (LCMA) was created in 2016 to facilitate and amplify research initiatives that mitigate the risk and consequences of declining mobility with age. Situated within the McMaster Institute for Research on Aging (MIRA), and built on the groundwork supported by the **Labarge Optimal Aging Initiative** and the **Labarge Foundation**, the Centre fosters interdisciplinary research approaches to all aspects of mobility in aging, including:

- Biological and physiological contributors;
- Behavioural, cognitive and psychosocial influences;
- Biomedical, clinical and technological innovations;
- Availability of prevention, rehabilitation and management strategies for mobility challenges; and
- Environmental components, such as social, economic, policy and physical/structural factors.

Through the generosity of Suzanne Labarge, McMaster's strength in aging research has been magnified with the aim of developing evidence-based interventions that will impact the lives of today's aging population.

Why mobility?

Mobility is critical to healthy aging, and can affect social and economic independence, along with physical and mental health. 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, we will have the potential to optimize the well-being of Canadians, as well as reduce health and social costs.



Our approach

Through its positioning within MIRA, the Labarge Centre for Mobility in Aging can gain efficiencies through shared staff, space and governance structures. Within the Centre, several mechanisms to conduct research, support community engagement, and promote knowledge sharing are utilized, including:

- **Major Interdisciplinary Research Initiatives.**
- **Exploration Grants.** These grants are intended to stimulate new collaborations.
- **Catalyst Grants.** LCMA offers financial support to stimulate new collaborative and interdisciplinary research ideas.
- **Co-Funded initiatives.** LCMA has strengthened its interdisciplinary research strength through co-funding opportunities for research initiatives and trainees while leveraging LCMA funds.
- **Capacity building.** Through a number of activities, LCMA invests in the next generation of researchers in aging.
- **Stakeholder and Community Engagement.** LCMA hosts events and outreach to facilitate and enable research collaboration across disciplines and with stakeholders.

Together, the LCMA and MIRA are well-positioned to respond to opportunities and enhance the lives of today's aging population.

Major research initiatives

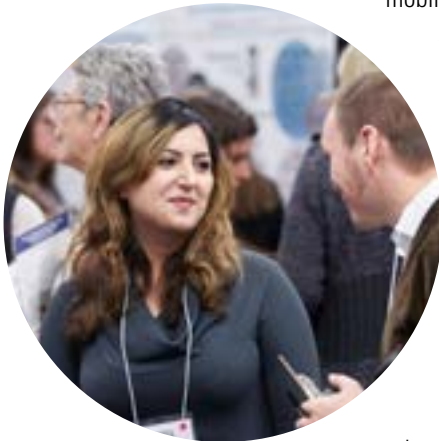
In 2017, MIRA and the LCMA launched a process to support interdisciplinary teams working towards the understanding, development and evaluation of critical issues in aging and mobility through two major research projects. The two broad fields identified as central themes were **Exercise, Nutrition and Mobility in Aging** and **Technology, Environment and Mobility in Aging**. 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. As this research is meant to involve and benefit the end users, the principles of design thinking have been embedded in the process of developing and evaluating the proposals. In 2019, a third research project, **A real-time mobility monitoring and assessment tool for preventing decline in older hospitalized medical patients**, was identified.

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 ‘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?” “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 questions while interacting with stakeholders from the City of Hamilton, Hamilton Public Libraries, the Hamilton Council on Aging, City Housing, IBM, public transit, local hospitals and health care providers, and older adults and their caregivers. Ultimately, the 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; while the TEM team, envisioning mobility at the “sixth vital sign”, sought 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.



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 research program that will measure the effects of an early mobilization program intended to prevent a decline in patient mobility levels associated with hospitalization. Through co-funding with the Faculty of Health Sciences and the LCMA, this project has been granted pilot funds. Proposals were submitted for review by MIRA’s International Scientific Advisory Committee (ISAC), as well as to external reviewers with relevant expertise, and were funding was granted in mid-2019. Each of these projects has been building capacity, applying for external funds, and conducting 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

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 recognised precursors to frailty, increased hospitalisations 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.



From left to right; Rebecca Ganann, Stuart Phillips, Marla Beauchamp and Bruce Newbold

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

“Funding from the Labarge initiative will help make important contributions to improve physical and community mobility of older adults, improve social participation, and facilitate connections to community programs in neighbourhoods with significant health inequities.”

Project team

“I believe involving older adult citizens in this research program is essential to ensure the voice of the community is heard and barriers are accordingly identified. On a personal level, being involved is important to me as we are all aging and need support systems in place.”

Citizen partner



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

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.

Investigators

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

“MIRA funding has enabled us to assemble a large cross-disciplinary team to tackle an important and pressing issue in aging research – how to identify mobility impairment in its earliest stages. Our project will use advanced wearable technologies to track everyday mobility in a large cohort of older Canadians, leading to the creation of the largest research platform of its kind devoted to studying late-life mobility limitation.”

Project team

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

Older adults hospitalized for acute medical problems are at risk of significant loss in muscle strength and decline in mobility from restricted physical activity (e.g., extensive bed rest) 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.



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

“The team is developing transformative technology that will help them better understand the relationship between physical activity during hospitalization with health and functional outcomes in older adults.”

Project team

Exploration grants

Exploration grants offer the opportunity to conduct collaborative and interdisciplinary research focused on mobility in aging. These grants are intended to stimulate new collaborations (planning grants) and allow researchers to collect preliminary data to support future proposals for full-scale studies (catalyst grants).

Planning events

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 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.



Emerging opportunities in mobility and aging research

June 7, 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.



Cannabis and aging research directions

Completed November 2019

MIRA, together with the Michael G. DeGroote Centre for Medicinal Cannabis Research (CMCR) held an exploratory workshop-style meeting to engage interested researchers with questions in the area of cannabis and aging. Researchers with interests in areas such as polypharmacy, deprescribing, addictions, pain, medicinal and recreational cannabis attended this kick off and shared their expertise, and suggested interdisciplinary research questions. MIRA and the CMCR are planning a follow-up workshop to facilitate the development of a research proposal to be considered for co-funding.



The future of aging

Completed July 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.



"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 and LCMA



"At McMaster, research into all aspects of aging is a priority that benefits from our culture of interdisciplinary collaboration. Developing technologies to ease the impact of aging and facilitate independent living requires interdisciplinary teams and will have a significant beneficial impact on society."

Jonathan Bramson
Vice-Dean, Research, Faculty of Health Sciences



"Researchers in our Physical Activity Centre of Excellence (PACE) have earned national and international recognition for their work in improving the health and well-being of older adults. Working with colleagues from across McMaster and with industry and community partners, the Faculty of Science is committed to rethinking and reimagining optimal aging. Together, we are creating innovative and practical solutions to meet the current and future needs of our aging population."

Maureen MacDonald
Dean, Faculty of Science



"McMaster Engineering has embraced the opportunity to collaborate with research partners across the university to use the latest technologies to offer innovative solutions to improve the quality of life of older adults. We look forward to working with our community partners on this important initiative."

John Preston
Associate Dean, Research and External Relations, Faculty of Engineering



Catalyst grants

Over the last three years, MIRA has awarded Catalyst grants to 19 ambitious, interdisciplinary research proposals that aim to improve mobility for older adults. Each collaborative project includes researchers from at least three of McMaster’s six faculties, and is supported by the Labarge Centre for Mobility in Aging.



Ayse Kuspinar

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

Investigators

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

The integration of technology into everyday life has resulted in unprecedented access to information. Given our aging population, health information is highly sought after by citizens and professionals. This desire for knowledge around maintaining and improving one’s physical, mental, and social health facilitates the need for a platform that provides current and trustworthy evidence on how to age optimally. The McMaster Optimal Aging Portal (the Portal) fills this need by providing older adults, caregivers, clinicians, policymakers, and public health professionals with the best available research evidence on optimal aging. Four distinct databases—McMaster PLUS™, Health Evidence™, Health Systems Evidence, and Social Systems Evidence—populate the Portal with this research. All of the research available on the Portal is quality rated, with the highest-quality evidence being translated into easy to understand consumer friendly language, and disseminated as brief summaries and blog posts. Ratings on the evidence-use, transparency, and usability of external online resources on the health and social aspects of aging are also available. In addition to being housed on the Portal, this content is also distributed through social media and email alerts.

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

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.



From left to right: **Manaf Zargoush, Maryam Ghasemaghahi and Reza Samavi**

Investigators

Maryam Ghasemaghahi
Manaf Zargoush
Stuart Phillips
Reza Samavi

“The findings of this study reveals that seniors’ use of wearable devices is a complex process that involves the interactions of social, psychological, and technological factors.”

Maryam Ghasemaghahi



Jamal Deen

Investigators

Jamal Deen
Khaled Hassanein
Tapas Mondal
David Cowan

“Funding from the Labarge Centre has helped to develop the wearable knee monitoring device as a tool for mobility monitoring and early diagnosis of mobility-related problems of older adults”

Jamal Deen



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

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.

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

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. The team developed a new method to measure nanoscale biomarkers for disease in osteoporosis using transmission electron microscopy. Their 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.

Investigators

Kathryn Grandfield
Henry Schwarcz
Jonathan Adachi
Justin De Beer
Janet Pritchard
Alex Papaioannou



Kathryn Grandfield

“The MIRA Catalyst grant provided us with the resources to hire a full-time student to begin our basic science work in aging. Funding for an interdisciplinary focused project such as this is not easy within existing federal funding agencies, and, therefore, MIRA filled an essential gap. Our work will be published shortly and we hope the preliminary findings supported with this funding enables us to apply for larger grants to continue this work.”

Kathryn Grandfield





From left to right:
Caitlin McArthur,
Adekunle Akinyemi,
Paula Gardner, Rong
Zheng and Stephen
Surlin

Investigators

Paula Gardner
Patricia Hewston
Alexandra
Papaioannou
Courtney Kennedy
Laurel Trainor
Rong Zheng

“Labarge funding has enabled me to create formidable transdisciplinary partnerships at McMaster with faculty from health and medical sciences in computer science. Through this transdisciplinary team work, we are innovating new ways of employing digital technology to engage older adults in both exercise and art to produce a range of exciting health benefits.”

Paula Gardner

This transdisciplinary research team is made up of artists, designers, computer scientists and medical and health professionals.

Arts-based therapies enabling longevity for geriatric outpatients

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 have 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 ABE (Arts-Based exercise enabling LongEvity). ABE 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.

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

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.

Investigators

Bruce Newbold
Darren Scott
Jim Dunn
Amanda Grenier
Kai Huang
Brenda Vrkljan



From left to right:
Bruce Newbold and
Brenda Vrkljan

The team explored how driving behaviours among older adults in rural and small urban areas change as they age through retirement and approach and complete driving cessation.

“Labarge/MIRA funding has shed insights into the barriers and concerns that older adults living in rural areas and small towns with limited transportation options face, and the impacts that driving cessation have on their ability to thrive.”

Bruce Newbold



Amanda Grenier



Meridith Griffin

"Labarge funding has allowed our team to overcome the traditional understandings and taken-for-granted assumptions on mobility by consulting with older adults as a means of better understanding their real-life experiences, challenges and successes of mobility while aging."

Equity Burke, Meridith Griffin and Amanda Grenier

Investigators

Amanda Grenier
Meridith Griffin
Gavin Andrews
Jim Dunn
Alexandra Papaioannou
Rob Wilton

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

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.

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

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.

"This funding has been crucial in instigating and cementing my work in the field of aging and adopting a lifespan perspective."

Andrea Gonzalez

Investigators

Andrea Gonzalez
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

"With Labarge/MIRA funding we are assembling a foundational knowledge base of intergenerational projects around the world and establishing important local community connections to launch our in Hamilton study. Ultimately this work will provide novel information related to the understanding of determinants and correlates of health, well-being and optimal functioning across the lifespan and generations."

Andrea Gonzalez



Andrea Gonzalez



David Harris Smith



Vickie Galea

“MIRA funding allows us to access and combine the expert knowledge of health care providers with state of the art simulation environments for improving clinician training outcomes in the critical area of understanding and managing acute pain in older adults.”

David Harris Smith

Investigators

David Harris Smith
Vickie Galea
Norm Buckley
Milena Head
Ada Tang
Matthew Woolhouse

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

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. 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).

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

There is increasing concern that Canadian older adults wait too long in hospitals after receiving the required care for which they have been hospitalized. Such patients, who are 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. Unfortunately, the 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 an indicator of healthcare system failure to address the issue, whereas, with the projected exponential growth in the populations of older adults across Canada, the number of ALC patients is 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.

Investigators

Manaf Zargoush
Alexandra Papaioannou
Reza Samavi



Manaf Zargoush

“The MIRA/Labarge funding will help healthcare planners and policymakers to better assess the leading factors impacting ALC and to evaluate feasible solutions. Therefore, the funding will help our older adults experience smoothed, coordinated, and integrated transitions, to their homes and community, more expeditiously.”

Manaf Zargoush



From left to right:
Brenda Vrkljan, Bruce Newbold, Saiedeh Razavi, Hany Hassan, and
Kassandra Byrne

Investigators

Saiedeh Razavi
Bruce Newbold
Brenda Vrkljan
Hany Hassan
Mark Ferguson

“Labarge/MIRA funding has helped provide considerable insight on older Canadians’ perceptions, preferences, and needs in driving or using other modes of transportation and emerging technologies.”

Saeideh Razavi

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

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.

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

The loss of skeletal muscle mass and strength with advancing age, collectively termed sarcopenia, is related to future mobility disability and frailty. This is especially true in women who, in comparison to men, experience greater incidence of mobility disability. In addition, women outlive men and are more likely to experience the deleterious 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 oftentimes incomplete, particularly in older women. Exciting pilot data from the teams’ laboratory 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 their 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) and 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.



Stuart Phillips

Investigators

Stuart Phillips
Thomas Hawke
Michael Noseworthy
Tanya Holloway
Chris McGlory

“Labarge/MIRA funding will help to identify the efficacy of omega-3 polyunsaturated fatty acid supplementation on skeletal muscle health during a period of muscle disuse, in healthy, older women.”

Stuart Phillips



From left to right:
Daniel Cursio, James Gillett, Manaf Zargoush, Maryam Ghasemaghaei, and Nancy Bouchier

Investigators

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

The knowledge from this research may ultimately facilitate the improved mobility of older adults in environments that are designed to be meaningful, enjoyable and to enhance well-being.

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

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 area 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 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.

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

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. The 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.

Investigators

Victor Kuperman
James Gillett
Ranil Sonnadara
Aki-Juhani Kyrolainen



Victor Kuperman

Kuperman's team aims to first identify older adults who are at risk of social isolation, then provide opportunities to increase social interactions.

"Labarge/MIRA funding will contribute to a better understanding of how social isolation and loneliness are reflected in language use and how we can develop non-invasive methods to identify at-risk older adults and promote their social engagement."

Victor Kuperman



Michel Grignon

Investigators

Michel Grignon
Niko Yiannakoulis
Emmanuel Guindon
Tara Marshall
Jean-Eric Tarride
Mohamed Hussein

“Labarge/MIRA funding will provide considerable insight on the evidence we need to measure the effectiveness of interventions designed to calm traffic and make our streets safer for seniors.”

Michel Grignon

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

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

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.



Janie Wilson

Investigators

Janie Wilson
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

“The catalyst funding provided by Labarge/MIRA has been instrumental in our ability to come together as a multidisciplinary team and to begin to incorporate our technology into the orthopaedic clinic environment. We are already installing an optoelectronic motion capture system into the orthopaedic assessment clinic at the Juravinski Hospital, and writing protocols and CIHR grants for bigger initiatives that will improve the quality of life for the many Canadians with total joint replacements.”

Janie Wilson



P. Ravi
Selvaganapathy

“The Labarge Catalyst grant funding has enabled development of new brain models that will allow researchers to probe biological mechanisms of neurodegenerative diseases and develop new drugs or treatment for them.”

P. Ravi Selvaganapathy

Investigators

P. Ravi Selvaganapathy
Margaret Fahnestock
Aimee Nelson
Christopher Patterson

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

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.

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

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 involving 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.

The team has developed a test of dynamic motor response involving integration between auditory sensory input and movement.

Investigators

Laurel Trainor
Dobromir Dotov
Marla Beauchamp
Tara Packham
Janie Wilson
Qiyin Fang
Matthew Woolhouse



Laurel Trainor

“I am thankful to the Labarge/MIRA funding that is enabling us to better understand and measure the ability of older adults to successfully interact in real world dynamic environments, and my hope is that this will lead to better identification of those most at risk for falling so that interventions can help them to stay healthy.”

Laurel Trainor



Benson Honig

Investigators

Benson Honig
Bruce Newbold
Byron Spencer
James Gillett

“With the support of Labarge/MIRA funding, our project will unveil the interplay of specific economic, social, and health indicators that, in turn, enable us to form insights and suggest recommendations to policymakers, NGO’s and key stakeholders regarding what the best policies and practices may be to promote success in entrepreneurship in aging.”

Benson Honig

Through this project, the team is exploring self-employment as a possible avenue influencing optimal aging.

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

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.

Co-funded projects and initiatives

Through the establishment of collaborations with various stakeholders, MIRA has strengthened its interdisciplinary research strength through co-funding opportunities for research initiatives and trainees while leveraging LCMA funds. This has resulted in a greater reach in nurturing and deepening interdisciplinary connections across a wide range of stakeholders.

1. MIRA’s partnership with the **Canadian Frailty Network** includes co-funding research projects for trainees through their CFN Interdisciplinary Fellowship Program and 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.
2. MIRA continues its partnership with **AGE-WELL**. This partnership allows MIRA to expand its network and co-fund both research projects and trainees whose interests align with both organizations. This year the following grants were supported:

however, these markers are also among the most challenging to quantitatively measure and accurately document, and oncologists are often not aware of changing conditions and medication compliance. An interdisciplinary team of clinicians and researchers will develop low-cost, non-intrusive sensing technologies to monitor a patient’s indoor location and track when and what medications are taken. Such a study is enabled by intelligent, multimodality sensor technologies capable of continuous monitoring and analysis of physiological conditions and physical activities. Integration of these technologies with wearable sensors will allow round-the-clock monitoring of the physical location and physiological state of a person, which may promote better care and prevent unnecessary use of unplanned and resource-intensive services. The successful outcome of the study will also lead to strategies towards optimal design and usage protocol of continuous monitoring technologies in a home setting for older adults living with chronic diseases.

AGEWELL SIP

MIRA has partnered with AGE-WELL to fund this interdisciplinary project, led by Qiyin Fang (Engineering) to develop cancer and multimorbidity care tools for older adult patients. MIRA’s contribution of \$20,000 is matched by \$20,000 from AGE-WELL and \$30,000 of in-kind support from industry partnerships. This research program endeavours to develop predictive management for older cancer patients based on longitudinal multimodality data. The majority of cancer patients aged 55 years or older are living with other chronic diseases. Patients’ mobility, daily activities, and medication adherence are important markers for cancer prognosis,



Qiyin Fang

AGE-WELL/MIRA Postdoctoral Fellow

MIRA and AGE-WELL have partnered to co-fund an interdisciplinary postdoctoral fellow conducting user-centered research in the application of technology to challenges in aging. The recipient of this award, Rasmi Kokash (Supervisor Benson Honig, Faculty of Business) receives \$25,000 from AGE-WELL and \$25,000 from LCMA for a one year fellowship to conduct a research project focusing on older adults’ entrepreneurship and related technology adoption. This exploratory study seeks to

understand barriers and facilitators relating to entrepreneurship and technology adoption among older adults. This project, will study specific economic, social, and educational factors that influence the digital inequality among older adults that may influence decisions around self-employment in later life. Evidence shows that individuals who work have better psychological and health outcomes and are more satisfied than those who do not. Conversely, some individuals experience declines in health and well-being post-retirement. This project will investigate 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 the team 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.

- 3. MIRA recently announced a new partnership with the **Canadian Longitudinal Study on Aging (CLSA)**, **Metabolon** and the **Canadian Frailty Network** to develop a \$4 million 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 the frailty and mobility biomarkers in CLSA samples will allow researchers to identify metabolites that will help to improve not only early prediction of frailty, but also lead to further research on treatments addressing specific aspects of frailty and mobility.
- 4. MIRA supported a catalyst grant in collaboration with the **Institute for Pain Research and Care (IPRC)**.

IPRC Catalyst Grant: A user-centered approach to develop a pre-surgical rehabilitation program for patients with lumbar spinal stenosis

Lumbar spinal stenosis is highly prevalent in older adults and is the primary diagnosis associated with lumbar surgery in those over 65 year of age. Lumbar spinal stenosis is associated with high levels of back and leg pain, substantially diminished walking capacity and poor health related quality of life. Although there is no clear treatment pathway for the condition, surgery is usually recommended for those with intolerable pain and functional limitations for whom conservative management has failed. In Canada, patients can wait up to two years for surgery. This means that this vulnerable group of older adults is usually severely deconditioned at the time of surgery which increases the risk for poor outcomes. Evidence from other orthopedic surgical procedures suggest that pre surgical rehabilitation (Prehab) has the potential to promote improved post-surgical outcomes (i.e. pain, function), decreased post-surgery opioid use and decreased short and long term health care costs (e.g. length of hospital stay, readmissions). The long term goal is to develop a prehab program for patients with lumbar spinal stenosis using a user-centered mixed method approach. Thus, the aim of this project is to investigate expectation, satisfaction and lived experiences of surgical patients with lumbar spinal stenosis; and identify modifiable predictors of postsurgical outcomes. The results of this project will be used to inform future perioperative care for the condition with a focus on developing a comprehensive and sustainable prehab program. The team hopes that the findings will improve the lives of older adults living with lumbar spinal stenosis.



Investigators

- Luciana Macedo
- Lisa Carlesso
- James Gillett
- Liz Hassan
- Janie Astephen-Wilson
- Brian Drew
- Douglas Gross
- Raja Rampersaud

“The MIRA/IPRC catalyst grant will help provide insight into predictors of outcomes post lumbar spinal stenosis surgery, as well as expectation and lived experiences of lumbar spinal stenosis surgery.”

Luciana Macedo

“Mobility is critical to aging well. Addressing the influence of pain on the mobility of older adults is an important direction that MIRA is excited to take with the IPRC.”

Parminder Raina





PART 5: Labarge Centre for Mobility in Aging: **Capacity Building**

The Labarge Centre for Mobility in Aging is 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.

Trainee Network

The MIRA/LCMA 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;
- Meet My Method, a knowledge translation and networking event for developing interdisciplinary collaborations in aging.



"Labarge funding has invigorated my passion for studying human aging and the efficacy of nutritional/exercise countermeasures for preventing muscle loss that occurs in the elderly population. It is my desire to continue working with the elderly population, although I wish to shift my focus towards studying nutritional compounds (like milk proteins) that have the potential to offset accelerated muscle loss that occurs in elderly adults subjected to muscle disuse (i.e. via limb-immobilization and/or step reduction)."

Tanner Stokes





"The Labarge Scholarship has provided me the opportunity to advance my knowledge in mobility-related research in aging. Through the scholarship, I have been able to create networks that will help me in my future research plans in the field of aging and mobility."

Michael Kalu

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 McPherson 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.

2017 Labarge Mobility Scholarships



Sydney Valentino
Department of Kinesiology

"My ongoing involvement with the MIRA Trainee Network has enhanced my knowledge translation skills, led me to new collaborations with many aging researchers at McMaster, and influenced me to continue to find ways to include aging as a component of my research as I begin a PhD. I am extremely grateful for the wide-range of opportunities and continued support MIRA provides to their network of funded applicants."

Michael Kalu
School of Rehabilitation Sciences



"Funding from Labarge Center for Mobility in Aging has helped me to establish global networks of mentors for developing leadership skills and qualities that would enhance my ability to have an impact on the ageing research in the future."

Mobility enhancement comprehensive care model

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 (financial); 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 modified Delphi process.

Stair Climbing Outcomes in cardiac Rehabilitation Exercise (SCORE) trial

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 high intensity interval 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.



"Funding from the Labarge Post-doctoral Fellowship in Mobility in Aging has provided me with a unique learning opportunity to integrate mentors from across three faculties from McMaster University (Health Sciences; Science; Social Sciences) across six disciplines (rehabilitation; medicine; epidemiology; biostatistics; kinesiology; social gerontology). This program of research funded by the Labarge Post-Doctoral Fellowship for Mobility in Aging, will enable an in-depth biomechanical investigation of the relationship between dance, gait and falls-risk in older adults."

Patricia Hewston



2018 Labarge Mobility Scholarships



Stephanie Chauvin
School of Rehabilitation
Science

“Labarge funding has helped increase the knowledge surrounding balance screening for fall risk in older adults with COPD, as well as how to better implement home balance exercise programs.”

Tanner Stokes
Department of Kinesiology



“Labarge Funding has helped to provide insight into the potential sparing effects that dairy proteins have on skeletal muscle mass in older women.”

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

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 3) 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.

Technology for promoting exercise adherence and mobility in older adults

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 cut-off 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.

2019 Labarge Mobility Scholarships



Giulia Coletta
Department of Kinesiology

“Labarge funding will help to build on existing best practices and local supports to promote health and mobility through physical activity among Hamiltonians 55 years of age and older who are facing barriers of opportunity to engage in programs to enhance mobility.”

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.

Erynne Rowe
Department of Biomedical
Engineering



“Labarge funding will help to provide an improved understanding of walking gait coordination strategies during aging and provide knowledge for targeted strategies to improve mobility longevity for older adults.”

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 joint-level 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.

Labarge Post-Doctoral Fellowship in Mobility

Patricia Hewston

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. Dance is a fun mind-body activity that involves precise integration of rhythm and whole-body coordination. Patricia's team hypothesizes dancing can improve gait parameters (rhythm and whole-body coordination) and ultimately reduce falls-risk in older adults. This program of research funded by the Labarge Post-Doctoral Fellowship for Mobility in Aging will enable an in-depth biomechanical investigation to determine if dance reduces fall-risk in older adults.



"Finding fun and enjoyable ways for older adults to engage in exercise has been my research focus at the GERAS Centre for Aging Research. This project will provide insight if dance is an effective therapeutic intervention to reduce falls-risk in older adults."

Patricia Hewston



PART 6: Labarge Centre for Mobility in Aging: 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, and participating in activities related to that shared 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.

Educational programming

MIRA and the LCMA are leading an initiative focused on supporting educational programming on aging for students and members of the community. In 2018, MIRA partnered with the McMaster Centre for Continuing Education (CCE) to develop a course for caregivers that is currently being 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 Seven 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 for those caring for family members with dementia.

MIRA continues to support increased 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 this year and is currently being 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 certificate 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 include 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.

Finally, MIRA's Training and Capacity Working group is continuing to discuss new ways to encourage student interest in research on aging and to ensure that students at McMaster are able to access available learning opportunities about aging.



PART 7: Other initiatives supported by Labarge funds



From left to right:
Nick Kates, Principal Investigator for McMaster,
Suzanne Labarge, and
Tarek Rajji, Principal Investigator at CAMH

Investigators

Tarek Rajji
Nick Kates
Karen Saperson
Carrie McAiney
Pallavi Dham

CAMH-McMaster collaborative care initiative for mental health risk factors in dementia

Many older Canadians experience episodes of depression and anxiety as well as showing signs of early cognitive impairment, all of which can affect their well-being and functioning. These problems frequently go unrecognized, although most seniors will have fairly regular contact with their family physician. This project aims to increase the skills of primary care providers in recognizing and treating depression, anxiety and mild cognitive impairment in older adults by introducing a treatment pathway into their practices and reorganizing the way care is delivered to seniors to increase the likelihood that problems will be recognized. Working with four very different primary care practices, the project is integrating an evidence-informed treatment pathway for all seniors born in two specific years, using a control group born in a different year. The hope is that early detection will both change the course of these conditions and reduce their impact and, ultimately, lead to improvements in functioning and an increase in community activities. Over the last year, the team has begun to identify the benefits that family physicians see from incorporating this program in their offices and also some of the challenges they face. This is particularly important as the team looks at ways in which this model – or its core element – can be spread to other similar practices. The team is now embarking upon the chart review to get relevant background history for the individuals who the team is seeing in this study and the controls. Enrollment is complete and we look forward to beginning to analyze and publish data from the program over the coming year.

This project aims to increase the skills of primary care providers in recognizing and treating depression, anxiety and mild cognitive impairment in older adults.

“Participating practices are recognising the importance of earlier detection of individuals with depression, anxiety or mild cognitive deficits and are looking at new ways to integrate some of these core concepts of the project, into their daily practice once the project ends.”

Nick Kates

Raymond and Margaret Labarge Chair in Research and Knowledge Application for Optimal Aging

Dr. Parminder Raina, Scientific Director of the McMaster Institute for Research on Aging and the Labarge Centre for Mobility in Aging, was reappointed as the Raymond and Margaret Labarge Chair in Research and Knowledge Application for Optimal Aging at McMaster University on April 20, 2018. He is the inaugural chair holder and has held the Chair for 13 years.

Named in tribute to her parents, McMaster alumna Suzanne Labarge established the Chair in 2006 to direct an interdisciplinary program of research aimed at finding ways to support the health of older adults as well as their engagement in their daily lives. The Chair has been established as a collaboration between the Faculties of Social and Health Sciences.

Dr. Raina is the Lead Principal Investigator of the Canadian Longitudinal Study on Aging (CLSA). The CLSA is one of the largest and most comprehensive cohorts on aging in the world, with data from 50,000 Canadians being collected over the next 20 years. He is also a professor in the Department of Health Research Methods, Evidence and Impact, and specializes in the epidemiology of aging with emphasis on developing the field of geroscience to understand the processes of aging from cell to society. He holds a Canada Research Chair in Geroscience, was appointed to the National Seniors Council in 2018 and this September was elected to the Canadian Academy of Health Sciences, which is considered one of the highest honours for members of the country’s health sciences community.

In the past year, Dr. Raina has been invited to 12 speaking engagements with community members and government stakeholders, joined the *WHO Consortium on Metrics and Evidence for Healthy Ageing* as a research collaborator, and published 12 papers in areas such as memory and cognition, sarcopenia, multimorbidity, ageism and oral health among older individuals in high impact peer-reviewed journals such as *CMAJ*, *the International Journal of Epidemiology*, *the Journals of Gerontology* and *the Clinical Neuropsychologist*, among others. His appointment as Chairholder is effective through June 30, 2023.

“The goal of modern science isn’t to reverse aging but to discover new ways to live as healthy as possible as we age. It’s not about living longer. It’s about living well.”

Parminder Raina
Scientific Director, MIRA and LCMA



Parminder Raina





Labarge Centre for Mobility in Aging and Labarge Optimal Aging Initiative

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