

2024 AgeTech Advance: Healthy Aging Research Program (HARP) – Funded Projects

1. **Project Title:** Program to Accelerate Technologies for Homecare (PATH)
Project Lead: Dr. Atena Roshan Fekr, KITE Research Institute – UHN

One of the biggest challenges in aging well is helping seniors live independently at home despite the increasing prevalence of chronic diseases. Most people prefer to spend their later years at home rather than in health care institutions. Unfortunately, staying at home is often impractical due to inadequate or expensive home care services. This burden frequently falls on younger female relatives, who must balance caregiving with careers and child care.

This highlights the importance of remote monitoring for older adults living alone. However, existing remote monitoring systems face significant challenges, including sociological concerns and technical limitations. Our Program to Accelerate Technologies for Homecare (PATH) aims to tackle these challenges by co-creating systems with stakeholders and leveraging cutting-edge technology, (e.g., Artificial Intelligence), to enhance accuracy and reduce the false alarms. One of our knowledge users highlighted this issue, stating, *“I have used a wearable product in the past and one of the issues was it was always giving false alarms, because I would be bending over to clean or do yoga and it thought I fell!”*

In this project, we will focus on Activity Daily Living monitoring and fall detection which is the second leading cause of injury-related deaths. Our solutions will be based on diverse data from participants with different demographics, races, skin colors, and sexes. Data will be collected from four living labs across Canada and approximately 40 residential units from The Alexander in Ontario, Perley Health in Ottawa, Schlegel Villages in Waterloo, and The Brenda Strafford Foundation in Alberta.

2. **Project Title:** Refinement and Feasibility Testing of an Online Patient Navigation Platform for Enhancing Access to Geriatric and Mental Health Care for Seniors Living with HIV
Project Lead: Dr. Kristina Kokorelias, Sinai Health

By 2025, one in six Canadian adults living with HIV will be over 50 years old. Yet, access to specialized geriatric and mental health care remains a challenge, worsened by medical mistrust and misinformation. This project supports initiating a novel approach to address this gap by co-designing an online Patient Navigation Platform (PNP), made specifically for seniors living with HIV and seeking mental health and geriatric support. This initiative aims to integrate insights from seniors themselves, ensuring the platform meets their unique needs and enhances care accessibility.

Through qualitative interviews and usability testing, the team will gather input directly from seniors living with HIV in Ontario. These insights will inform the development of a prototype PNP, designed to help users navigate the complexities of health care with ease and efficacy. Collaborating with Citrus Suite, experts in digital health solutions, ensures the prototype's relevance and user-friendliness. Ultimately, this project seeks to empower seniors living with HIV by equipping them with a tool that enhances their ability to navigate and access essential health services. By leveraging technology and community engagement, this project aims to improve health outcomes and quality of life for this underserved population.

3. **Project Title:** Co-Designing Outreach Strategies and Educational Materials for Virtual Emergency Department Uptake by Older Adults

Project Leads: Drs. Justin Hall and Sander Hitzig, Sunnybrook Research Institute (SRI)

Older adults are frequent users of emergency departments (ED) and make up between 20 to 40% of patients visiting EDs. For ED providers, high volumes of patients can lead to heavy caseloads, while older adults may struggle to travel to the hospital, navigate the ED if they do not have a family member to support them, and experience long ED wait times. To minimize the risk of community spread, Sunnybrook Hospital opened a Virtual ED during the COVID-19 pandemic that was designed to provide care for urgent medical issues that are not life threatening. Some providers working with older adults in the community have identified the Virtual ED as a care option but there is a need to determine a way to optimize its access and delivery to this population who may face challenges using it (e.g., low digital literacy, hard of hearing, etc.). The aim of this project is to make the Virtual ED more accessible to older adults by undertaking interviews with providers who work with older adults and with older adults to learn what would help them access the Virtual ED. As well, we will undertake a chart review of older adults who have used the Virtual ED to obtain a better understanding of which older adults are accessing the Virtual ED and why. We will use these data to work with older adults, family members, and health care providers to co-design strategies and educational materials to make accessing the Virtual ED easier for older adults.

4. **Project Title:** Assessment of Social Connection using Real-Time Location Data in Aged Residential Care Homes

Project Lead: Dr. Andrea Iaboni, KITE Research Institute - UHN

Social connection is a term describing many aspects of how individuals connect to each other. In older adults, social connection is important for quality of life and physical and mental health. Social connection is also an indicator of the quality of care provided within retirement homes and long-term care homes.

This project brings together researchers in the areas of social connection and real-time location systems and established technology (Tenera Care) and aged residential care (Shannex) industry partners, with the aim of evaluating and implementing social connection analytics based on location data collected routinely from a nurse call system.

In a pilot study, we have demonstrated that the social behaviours of older adults on a dementia unit can be tracked over time using real-time location data from a nurse call system. We will expand on this pilot to three different units in a retirement home to confirm the validity of our findings across aged residential care settings and in people with and without dementia, using a new and well-validated social connection assessment tool, SONNET.

The outcome of this project will be the co-design and implementation of social connection analytics within an existing nurse call system dashboard. These new clinical analytics will have an important and direct impact on the ability of aged care providers to identify those older adults in need of support to improve their social connection. This project is also an important step in advancing the technology readiness of clinical analytics based on location data in aged residential care.

5. **Project Title:** A Just-In-Time Adaptive mHealth Intervention for Dementia Prevention

Project Lead: Dr. Jonathan Rush, University of Victoria

Dementia is the worldwide leading cause of disability, where 50 million people currently live with dementia globally, and this number is predicted to double in the next 20 years. There is a critical need for research that targets a reduction of risk for dementia in older adulthood. Physical activity can play a crucial role in the prevention of dementia, offering a promising avenue for mitigating this public health issue. However, a major obstacle remains: the need for scalable interventions that can effectively promote and sustain physical activity across diverse populations without over-taxing health care resources. Intervention effectiveness and engagement tend to be inconsistent due to a lack of personalization and support. Just-In-Time Adaptive Interventions (JITAI) use real-time smartphone and wearable sensors (e.g., activity, location, usage) along with smart algorithms to provide behavioural support that directly corresponds to a need in real time to ensure the ideal intervention material is delivered when most effective. This project will integrate mobile cognitive assessments into an existing PA JITAI intervention. This integration will enable the monitoring of cognitive function alongside physical activity, providing a comprehensive approach to dementia prevention. By leveraging mobile technology, we can offer scalable and accessible interventions that adapt to users' evolving needs, ultimately contributing to the reduction of dementia incidence in Canada.

6. **Project Title:** Supporting Connections through VR Storytelling in Acute Care Settings
Project Lead: Dr. Lillian Hung, University of British Columbia

By 2030, a million Canadians are projected to live with dementia. People with dementia are more likely to deteriorate during their hospital stay. Hospital environments often worsen anxiety, depression, and distress. Evidence shows that virtual reality can alleviate stress by offering immersive experiences, such as a calming outdoor environment, but it remains underutilized in hospitals. Technology adoption in Canadian hospitals to improve safety and quality of life for older patients is lacking. This is due to technology designs not aligning with the diverse needs of older adults and hospital staff. Implementation in clinical settings requires adaptation through real-world learning and collaboration. In the last two years, my team has co-designed a VR program with patients with dementia and staff at Vancouver General Hospital and established a protocol with practical implementation tools by applying Collaborative Action Research (CAR) principles. Our research shows that a user-centred VR program can provide feasible and inclusive opportunities for patients with dementia to connect to their interests, decreasing loneliness and feelings of stress and anxiety in the hospital. We have also identified a pressing need for culturally relevant resources to support Indigenous patients who often are isolated from families who live far away. Using our established protocol and field-tested tools, this project aims to partner with an Indigenous VR company to co-create Indigenous VR storytelling videos to meet the needs of Indigenous patients, a high-risk and equity-deserving group. Our Indigenous partners will lead the storytelling and filming of culturally significant materials for the project.

7. **Project Title:** Strengthening the Evidence Base for a Technology-Assisted Therapeutic Walking Program: Walk-BEST
Project Lead: Dr. Nancy Mayo, McGill University

Many older people cannot walk well enough to reap the health and quality of life benefits of walking owing to the effect of aging and the accumulation of chronic illnesses on gait pattern. Poor gait leads

to poor balance, weak muscles, and is a leading cause of falls. People who do not walk well soon find walking fatiguing, uncomfortable, unsafe, and eventually adopt a sedentary lifestyle contributing to further gait deterioration. Physiotherapy can improve gait and prevent falls, but effects dissipate without constant training, feedback and practice. Additionally, one-on-one therapy is expensive and not easily accessible in the public health system. Physio Biometrics Inc, a McGill spin-off company, has developed a technology-assisted therapeutic walking program that breaks the vicious cycle that starts with poor gait. The Walk-BEST program (BETter, faster, longer, STRonger) has been developed and refined through previous AGE-WELL funding. Over 100 Walk-BEST sessions have been carried out in a seniors' residence with great appreciation by the participants. However, its impact has not been formally documented, which is a barrier to widespread implementation. The purpose of this project is to estimate, for ambulatory older persons, the extent to which gait pattern, functional walking capacity, everyday walking activities, and brain health outcomes change following 8 sessions of the Walk-BEST program offered over a period of 4 weeks followed by 4 weeks of home practice assisted with the Heel2Toe™ sensor, a Health Canada approved medical device that provides auditory feedback for a good step, and harnesses the power of the brain.

8. **Project Title:** Designing and Evaluating a Voice-Based AI Banking Tool for/with Older Adults
Project Lead: Dr. Joanna McGrenere, University of British Columbia

With increasing online banking and declining cash use, financial technology (fintech) must support barrier free participation in everyday economic activities. For older adults experiencing varying cognitive concerns, artificial intelligence (AI) assistance in online transactions could enhance autonomous financial participation, but these applications must maintain privacy and security. Through a recent partnership with the Bank of Canada, we have researched the potential viability of increased AI support (notably, voice assistants), but considerable work is needed to actualize AI assistance in online banking.

To advance AI support in the context of fintech and aging, this ongoing project addresses the research question: *How can a voice-based AI tool support older adults in online banking tasks?* We identify the design requirements of voice-based AI assistance in online banking. We then design and evaluate an interactive proof-of concept prototype of an online banking voice assistant to advance AI-assisted fintech support in aging.

We adopt user-centered design methodology from human-computer interaction (HCI), integrating input from key stakeholders, including:

- older adults with/without cognitive impairment and their family members;
- domain experts in senior/dementia care, fintech, AI, HCI, and software engineering.

Our project includes interviews, focus groups, design sessions, and user studies.

This project will extend older adults' autonomous use of fintech by developing: 1) an interactive proof-of-concept prototype of voice assistance for online banking support, 2) design implications for AI assistance in aging contexts to better inform researchers/practitioners, and 3) considerations for fintech policies, services, and products to better support older adults.

9. **Project Title:** Advancing GPS-enriched Wearable Technology for Monitoring Mobility: Development of an Open-Source Data Processing Pipeline and Personalized Behavioural Feedback Reports for Improving Healthy Aging

Project Lead: Dr. Marla Beauchamp, McMaster University

Wearable technology, including smartwatches, is becoming popular for use among older people interested in managing their mobility as part of their health and wellness. The challenge is that many of these devices and the information they generate have not been designed or tested for older people. Another issue is that currently available technology focuses on a narrow set of movement parameters, like number of steps or physical activity intensity, that ignore information about where and how people travel and move in their communities. This information enriches our understanding of a person's mobility and can be obtained via GPS sensors. Our team has developed innovative technology that incorporates GPS with other movement sensors to securely and comprehensively monitor mobility in older people. This project proposes to build on our major research study involving 1500 older people whose real-world movement activities are being tracked every 4 months for 2 years using our custom wearable technology. In this project, our team will develop new techniques for analyzing and integrating the rich movement information gained from the wearable GPS technology in older adults with data from conventional movement sensors. These techniques will be made openly and freely available to other researchers and health care providers who want to use this kind of information to impact healthy aging. We will also, in collaboration with our older adult and stakeholder partners, design the tools needed to provide relevant and impactful feedback for older people and their caregivers to better manage their mobility as part of their health.