AGE-WELL Annual Conference

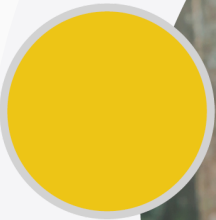## 2023

Poster Abstract Book

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Overcoming Apathy Among Community Dwelling Older Adults in Northern British Columbia: The Benefits of Engaging in a Kobo eReader Book Club (Poster #1)

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Displayed on October 25, 2023 from 1:30pm-3:00pm ET

Objectives: The objective of this study was to explore the impact of an eBook Club on older adults' self-reported apathy and well-being. Methods: A mixed method approach involved pre- and post-intervention surveys and interviews with participants. Participants were recruited from three communities in northern BC. All participants were provided with Kobo eReaders preloaded with books of interest and received a tutorial on how to use the eReader. Each Kobo eReader was also connected to the public library for easy access to more books. The eBook club took place once a week over a period of 4 to 6 weeks. Each session consisted of maximum of four participants and lasted for about 45 mins to 1 hour. Results: Twenty-eight older people participated in this project with age ranging between 60 and 86 years old. The majority were female (n=25). Prior to the start of the program, ten out of the 28 participants reported feelings of apathy and by the end of the program, more than half of them (6) expressed improvement in their feelings of apathy. In addition, some participants reported that their participation in the eBook club had impacted their mood positively, improved their social relationships with others, and kept them engaged in reading activities even when unable to attend the weekly group sessions.

Conclusion: The results showed that simple intervention such as the eBook club may improve apathy and contribute to overall well-being of older people living in the community. Although some participants reported that using the Kobo eReader was challenging initially, they were able to overcome this challenge through support and encouragement from others in the group. This highlights the importance of peer support in the adoption of technology.

Family Caregivers' Views on Artificial Intelligence-Enabled Technology for Older Adult Care: Cross-Sectional Survey (Poster #2)

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Displayed on October 25, 2023 from 10:30am-12:00pm ET

Objective: To understand family caregivers'(FCGs) intention and factors predicting their intention to use artificial intelligence (AI) in older adult care.

Method: A cross-sectional survey was developed based on the Unified Theory of Technology Acceptance and Use of Technology. The online survey was administered to middle-aged FCGs residing in the province of Quebec. The survey included 46 questions – 14 demographic questions and 32 measured intention to use AI and nine predictor variables: performance expectancy, effort expectancy, social influence, facilitating conditions, technology anxiety, perceived trust, perceived cost, confidence in the source of advice for care (healthcare professional vs AI-enabled technology) and confidence in healthcare professionals' advice for the use of AI-enabled technology. Analysis: Descriptive statistics and random forests employing regression trees. Results: Of the 201 completed surveys, 199 were eligible and analyzed. Majority of FCGs were accepting of AI if it is accessible (62%). The fitted random forest models explained between 56% to 83% of the variance in the intention to use AI. The random forest indicated that social influence had the highest relative importance in influencing intention. When comparing the full model to the reduced models, regardless of which variable was removed, the change in predicted intention score for most participants moved less than 0.12 points on the four-point item scale, suggesting that the nine-predictor variables showed an additive effect in predicting intention.

Conclusion: AI, healthcare, and government stakeholders should intervene to address all nine-predictor variables, notably social influence, to help facilitate AI adoption among FCGs providing older adult care.

Validation of a Novel Vision-Based Technology for Joint Angles Estimation (Poster #3)

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Objectives: Traditional rehabilitation therapies, while effective, often pose challenges for patients such as the need for frequent travel to clinics, long waiting times for appointments, and even a lack of access to specialized services in remote areas. Tele-rehabilitation (tele-rehab), could overcome these obstacles. The success of tele-rehab lies in precise, accurate systems. Thus, our study's objective is validating and calibrating a new marker-less tele-rehab system, benchmarked against the motion capture (MoCap) system. Method We recorded data from 14 participants performing upper-limb exercises at 2m, 2.5m, and 3.5m from a depth camera, with simultaneous MoCap recording. We used Cubemos and Mediapipe to track joints and estimate angles from our system. We evaluated ten different regression models, both linear and non-linear, to calibrate the system.

Results: As the distance from the camera increased, a rise in the error of joint angle estimation was observed. Therefore, the best results achieved when the camera was placed at the distance of 2m from the subject. Our system's joint angle estimates strongly correlated (>96%) with MoCap, with an MAE of less than 10°. Polynomial Regression was the best

calibration method, while Decision Tree suffered from overfitting. Other linear regression methods such as Ridge Regression showed similar performances.

Conclusions: Our study showed the effectiveness of a marker-less MoCap system for accurately tracking body joints and calculating upper-limb joint angles. The system's accuracy depends on how far the person is from the camera. The depth feature helped make the angle measurements more precise. The calibration of the system could reduce the measurement error to less than 4 degrees when the person was 2 meters away from the camera.

Enhancing High Repetition Stroke Rehabilitation Through a Novel Gamified System with Vision-Based Pose-Tracking Algorithms: A Usability Study (Poster #4)

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Stroke is a major global health issue, impacting about 15 million people yearly with long-term disabilities. Extensive research emphasizes the importance of repetitive, high-intensity training for effective rehabilitation. Active patient engagement and personalized therapy are critical for optimizing outcomes. We are currently in the process of developing a gamified exercise platform tailored for post-stroke rehabilitation. The platform incorporates a webcam and a vision-based pose-tracking deep neural network to monitor exercise performance. Real-time audio and visual feedback are provided to users to ensure proper posture during the exercises. To achieve this, a set of gamified upper limb exercises, aligned with the independent exercises prescribed by clinicians, has been designed. These exercises are intended for patients to perform autonomously between their therapy sessions. The platform offers detailed instructions to patients and provides feedback on their performance, enabling the tracking of progress over time. To assess the platform's effectiveness and user engagement, we are planning to conduct a usability study with both healthy older adults and post-stroke patients. The study aims to collect qualitative and quantitative data to evaluate the level of engagement during rehabilitation exercises. Currently the study is in the development phase. In testing phase, participants from both groups will be asked to report on their level of engagement with the rehabilitation platform, as well as their perception of its effectiveness in addressing their arm rehabilitation needs. Additionally, feedback will be collected regarding their willingness to continue training with the system even after the study concludes. Our research addresses challenges in adopting rehab platforms. We developed a customizable, engaging exercise system empowering patients to perform high repetition exercises independently. The platform provides optimal therapy with performance tracking, promoting patient engagement and autonomy without constant expert supervision.

COMPAs: An App to Break Social Isolation & Promote Person-Centered Communication Between People Living With Dementia and Their Caregivers in Long-Term Care Centers (Poster #5)

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Introduction: People living with dementia (PWD) experience communication deficits as soon as the early stages of the diseases, deficits which significantly increase over time. In the last stages, constant communication breakdowns lead to reduced exchanges with caregivers, resulting in the isolation of both communication partners. These difficulties have negative impacts on the quality of life of PWD and their caregivers, who themselves face increasing burden. While communication difficulties in PWD are a core issue in care, few interventions to address this issue have been developed. Aims: The present study focused on COMPAs, an app designed to sustain communication between PWD and their caregivers. COMPAS has been shown to trigger emotional communication during the short co-viewing of personalized audiovisual material. Method: This was a pre-post intervention study with COMPAs in 2 long-term care centers. Seventeen caregivers used COMPAs in the context of daily routines over eight weeks with 17 residents. Data collection included specific questionnaires and semi-structured interviews to measure effects on communication and caregiver burden. Data analyses combined quantitative and qualitative approaches.

Results: In caregivers, there was a significant improvement in personal achievement at work. Semi-structured interviews showed an improvement in communication in the dyad and a more empathetic approach to caregiving.

Discussion: These results indicate that the communication triggered by COMPAs breaks down communication barriers, by creating positive exchanges through personalized emotionally driven exchanges, while stimulating empathy and personalized interventions. Caregivers see COMPAs as an ecological tool to address communication barriers, while facilitating an empathetic caregiving relationship.

Exploring Mixed Reality (MR) Applications for Dementia and Mild Cognitive Impairment (MCI) Rehabilitation: A Scoping Review (Poster #6)

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Background: Mild cognitive impairment (MCI) and dementia among older adults lead to cognitive decline and reduced quality of life. Mixed reality (MR) systems combining virtual and real-world elements offer promising benefits for the

rehabilitation of individuals with cognitive impairment. However, there is limited research on their primary objectives and outcome measures in MCI and dementia rehabilitation. Purpose: This review, focusing on MCI and dementia rehabilitation, explores: (1) The variety and application of MR systems; (2) Their technological readiness level (TRL); (3) Their primary objectives; and (4) Outcome variables and measurement tools used in relevant studies. Methods: A systematic search in seven databases identified studies examining the MR systems' application in MCI and dementia rehabilitation. Results: Out of 2415 documents retrieved from the databases, the review included nine studies. All the included studies utilized only Augmented Reality (AR), a subtype of MR, through screens, mobile phones, or head-mounted displays equally. The participants' average age was 78.49±6.05 years with 49.45% having Alzheimer's disease. AR systems were in the developmental phase, (TRL 5 – 6). The primary goal of the AR systems was to improve cognitive functioning and daily activities. System usability and acceptance were the main outcome variables. Conclusion: AR systems are usable and accepted in MCI and dementia rehabilitation. However, the MR system's effectiveness in rehabilitation assessment and treatment is largely unknown. Future research should focus on applying the MR systems using experimental research methods and in real-world settings.

A Clustering-Based Approach to Evaluate Older Adults' Safety in Conditionally Automated Vehicles (Poster #7)

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This study aims to explore the safety of older adults with normal cognition taking over control of conditionally automated vehicles (CAVs). We proposed a clustering-based approach to investigate the safety of driving behavior under various conditions and compared it to a traditional manual-based method. A group of older adults drove in both manual and automated modes in various scenarios. Two key metrics, takeover reaction time and takeover quality, were calculated to assess driving performance. The clustering method categorized drivers as safe or risky based on their driving performance during the takeover phase, considering factors like reaction time, steering wheel angle changes, lane center distance, and longitudinal acceleration. The manual method used threshold values based on the drivers' manual driving performance. The study found that the clustering method effectively differentiated safe and risky drivers, revealing differences under varying conditions. Results showed that the safe driver cluster exhibited shorter reaction times and more stable driving behavior, demonstrating the ability of this approach to categorize drivers. Although the two methods agreed in some instances, a noticeable difference was observed on curvy roads, suggesting that the clustering approach could capture more complex and nuanced patterns of driving behavior during takeover control. The findings offer insights into driving safety using the clustering-based approach and have

implications for interventions to improve transition control in CAVs, potentially benefiting older adults' independence and mobility. As a future work, we will investigate the safety of performing driving takeovers in CAVs by older adults with cognitive impairments, compared to healthy older adults, characterized by the takeover time and quality.

Self-Supervised Learning for Human Activity Recognition of the Elderly in Smart Home (Poster #8)

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Human activity recognition (HAR) has provided significant opportunities for telemonitoring daily activities and improving the quality of life for elderly individuals in smart homes. Deep learning models have demonstrated competitive performance in HAR tasks in real-world environments. However, obtaining large amounts of annotated sensor data to extract robust features for deep learning models can be costly and time-consuming. We propose a novel model based on the self-supervised learning framework, SimCLR, for daily activity recognition using ambient sensor data from smart homes to overcome this challenge. This model consists of two main stages: pre-training and fine-tuning. During the pre-training stage, multiple features are generated by preprocessing raw ambient sensor data without annotations. Fine-tuning is performed on the preprocessed limited labeled ambient sensor data. The core component of our model is the encoder module, which includes two convolutional layers followed by a long short-term memory (LSTM) layer and one attention layer. This architecture allows the model to capture both spatial and temporal dependencies in the sensor data, enabling the extraction of informative features for downstream tasks. Extensive experiments were conducted on three CASAS smart home datasets (Aruba-1, Aruba-2, and Milan) to evaluate the effectiveness of our model. The results demonstrate the superior performance of our model in semi-supervised learning and transfer learning scenarios, outperforming state-of-the-art approaches. These experiments also show the high efficiency of self-supervised learning in extracting valuable information from unlabeled sensor data, reducing the reliance on costly annotation efforts for HAR real-world applications.

Determining What Patients With COPD Will Accept for Remote Clinical Monitoring: a Patient Engagement Study (Poster #9)

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Background: At-home monitoring of COPD symptoms may help patients and clinicians recognize deterioration early and pursue proactive care to reduce onset of severe exacerbations and need for hospitalization. This study aims to determine which technologies COPD patients admitted to hospital with an acute exacerbation are willing to use to monitor their disease post-discharge. It also describes barriers that must be addressed to make remote clinical monitoring more accessible. Methods: Eligible participants were identified at University Health Network with a recent acute exacerbation of COPD. Information regarding what patients would want to see in future COPD programs of care was collected via surveys in-person or over the phone. Patients were asked to indicate on a 5-point Likert scale how likely they would be to participate in various home monitoring activities.   Results: 4 patients were excluded. Of 26 eligible patients approached, 11 declined to participate, and 15 completed the survey (n=15). Home visits by nurses, virtual visits with respirologists, using an oximeter and inputting values twice daily into an app or website, and wearing a smartwatch to track certain vitals and activity signs were the highest-rated remote monitoring features with median values of 5 (Very Likely). Passive monitoring with infrared sensors to detect falls as well as passive audio recording to detect coughs were rated lower with median values of 1 and 2 (Very Unlikely and Unlikely), respectively.

Conclusion: Overall, patients are willing to use most forms of remote clinical monitoring but have concerns with passive audio and activity monitoring features. It is unclear if the high proportion of eligible patients declining participation is due to lack of interest in remote monitoring or participation in research studies.

Five Ways to Enable Persons Living With Dementia to Remain at Home or Existing Level of Care in Canada (Poster #10)

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Demand for home-based care for people living with dementia (PLWD) exceeds supply in Canada. Post-COVID-19, around 600,000 older adult Canadians with dementia and their caregivers experience disproportionate social, physical, and mental distress in trying to continue residing at home. The study analyzed how the government can support persons with dementia to age in place using resources and technologies. It employed a multimethod knowledge synthesis that integrated data from a consultative session with government stakeholders,

and 114 policy reports, project profiles, and evaluation reports from across Canada. Currently, few Canadian jurisdictions have a post-COVID-19 dementia strategy. Also, across all levels of care, PLWD and caregivers still experience stigma, ageist biases, limited rural resources, and a lack of electronic health records. These worsen the burden of keeping PLWD in the community. However, existing community resources include those provided through the Public Health Agency of Canada's Dementia Strategic Fund, National Awareness Campaign, and Dementia Community Investment. Also, community-partnerships through the Alzheimer's Disease Society of Canada's First Link program, the Canadian Institute of Health, AGE-WELL, and Baycrest have shown success. Successful approaches found include community-based dementia care programming (DCP), housing policies, research partnerships for technological advancements, electronic health records, and protective financial policies. Five policy recommendations include a rapid replication of the multidisciplinary DCPs and the development of a housing philosophy for PLWD. Also, increased government participation in strengthening collaborations for supportive technologies, including monitoring and security systems for PLWD, is necessary. Finally, electronic health records and clearly defined compensatory financial systems are vital.

Relationship Between Simulated Driving and Subjective Driving Ability (Poster #11)

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Driving collisions are a top cause of accidental death and older adults are overrepresented. Driving is especially challenging during cognitively demanding conditions, such as driving while listening to a passenger (dual-tasking). Driving and listening may each compete for shared cognitive resources, resulting in poorer performance on one or both tasks. Dual-tasking may be particularly challenging for older adults due to age-related changes to sensory and cognitive abilities. To accommodate, older adults often self-regulate their driving habits as they become aware of declines in abilities; however, they may not always be aware of changes to driving performance. The objective of this study is to examine whether subjective and objective dual-task driving abilities are consistent and whether dual-task driving performance is associated with individual factors (e.g., visual attention - Useful Field of View (UFOV)). Driving performance was measured during a driving-while-listening task (Connected Speech Test) in younger (aged 21-35 years) and older (aged 65+ years) adults using a high-fidelity driving simulator. Participants were asked to self-report "Yes/No" on their ability to carry on a conversation with another person while driving. Results found that all participants subjectively reported the ability to dual-task and there were no significant differences in objectively measured dual-task costs to driving performance between older and younger adults. Results also showed that older

adults performed more poorly on the UFOV compared to younger adults, but UFOV performance was not significantly correlated with driving performance. Findings demonstrate that, regardless of age, participants may not subjectively acknowledge potential objective dual-task costs.

Stakeholders' Perspectives on Remote Monitoring (Poster #12)

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Objective: With many seniors finding comfort and well-being in remaining in their own homes, remote monitoring systems have emerged as a promising innovation to facilitate self-management of chronic conditions, remote medical care, and improved safety. However, to enhance the effectiveness and adoption of these systems in seniors' private homes, it is essential to identify and address the current gaps and challenges in the technology. Through a comprehensive review of literature, this study aims to gain a deeper understanding of the attitudes, preferences, and concerns of seniors, as well as other stakeholders, towards remote monitoring systems.

Methods: A search strategy conducted across Google Scholar and Scopus was developed to identify relevant literature that investigates qualitative studies that explored the perspectives of stakeholders including seniors, caregivers, and healthcare professionals on remote monitoring.

Results: We identified a total of 73 papers published between 2003 and 2023 that met the inclusion criteria. Among these, include various stakeholders, with 49 involving seniors, 8 involving caregivers, and 15 involving healthcare professionals and/or policymakers as the main population.

Conclusion: Older adults' main areas of concern include privacy, reliability, ease of use, autonomy, safety and affordability. Additionally, caregivers have shed light on the pros and cons of reducing workload and replacement of care. Clinicians and healthcare professionals' perspectives investigated how personalization of products, supporting patient autonomy and safety is imperative for adapting to this growing preference for aging in place. Thus, these perspectives can implement optimization of smart home design and cater to the needs of older adults.

Advancing Stroke Rehabilitation in an Aging Population: Unveiling the Potential of Mixed Reality Technologies (Poster #13)

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Displayed on October 25, 2023 from 1:30pm-3:00pm ET

Background: Stroke affects an individual every ten minutes in Canada, a rate further impacted by an aging population. Stroke often results in physical, cognitive, and mental impairments, highlighting the importance of effective rehabilitation strategies. Mixed Reality (MR) technologies show promise for enhancing stroke rehabilitation outcomes, however, their application faces challenges such as methodological inconsistencies, varied clinical populations, and overstated efficacy claims. Objectives: 1) Review MR stroke rehabilitation among older adults, assessing ageing, clinical, and technological aspects. 2) Spotlight the ongoing MR research at the Glenrose Rehabilitation Hospital (Edmonton, Canada). Methods: A systematic review, adhering to the PRISMA guidelines, was conducted across seven databases. Two independent reviewers analyzed the data, focusing on clinical objectives and features, MR systems, levels of evidence, and technology readiness. 2) The poster will feature QR codes linking to videos showcasing ongoing research and development of MR-delivered stroke rehabilitation at the Glenrose Hospital.

Results: Twenty-six studies met inclusion criteria (n = 453; mean age: 60 ± 5.34 years). MR applications primarily targeted upper limb motor rehabilitation, with an overall low level of evidence and a median technology readiness level of 6 (prototypes tested in relevant environments). Conclusion: While the existing variability and technological challenges in the studies cannot be ignored, the promising results underscore the importance of continual research and innovation in MR systems, with Glenrose Rehabilitation Hospital serving as one such research hub.

Reflection on Co-researching Experiences with Patient and Family Partners in Implementing Telepresence Robots in Long-term Care (Poster #14)

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Objective: Although health research emphasizes the voices of people with lived experiences, there is a lack of reports showing how researchers involve patient and family partners in their research process effectively. The gap is especially noticeable in studies focused on technology for older adults.

Method: The study aims to explore the gap by addressing the research questions: 1) What were the challenges in the patient and family partners engagement processes? 2) How did the research team overcome these challenges? We collected data from the engagement evaluation

reports, monthly meeting minutes, and observations of team members' interactions in the meeting recordings. Our team, including our patient partner co-lead, a researcher, and trainees, had Zoom meetings to reflect on the data every six months and performed team thematic analysis.

Results: There are four challenges: 'How can the research team improve?', 'How can I (patient partner) help?', 'First time in the Zoom Era' and 'I (patient partner) am not interested in manuscript writing.' The strategies adopted during the research process are: 'Using tools for regular evaluations of engagement,' 'Avoid assumptions of team members' interests and abilities,' 'Clear tasks descriptions and progress sharing,' 'Respectful partnership and co-creation of engagement experiences,' and 'Intergenerational technical support and orientation to Zoom and robots.'

Conclusions: The meaningful engagement of people with lived experiences can encourage these individuals to be actively involved and contribute their valuable experiences to different studies. Ongoing team evaluation and improvements support sustainability and long-term partnerships with people with lived experiences in technology-related research.

Digital Health Interventions for Chronic Disease Management Among Older Adults in Developed Countries: A Scoping Review (Poster #15)

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Background: Globally, around eighty percent of older adults aged 65 years and more at least have one, and sixty-eight percent have two or more chronic conditions. These older adults require greater accessible health care services. In this scoping review, we identify available evidence regarding digital health interventions to improve chronic disease management for older adults in developed countries. Methods: A Scoping review was conducted using Medline, JBI EBP Database, PsycINFO and Scopus. We included peer-reviewed journal articles describing original studies. Studies were eligible if they included (a) older adults (i.e., at least 65 years) (b) living with at least one chronic disease (e.g., cancer, cardiovascular disease, chronic obstructive pulmonary disease, diabetes) and (c) residing in at least one developed country (e.g., Australia, Canada). Moreover, studies needed to present evidence regarding digital health interventions (i.e., emails, text messages, voice messages, telephone calls, etc.) for chronic disease management. Results: Our search strategy resulted in a total of 9990 records. After screening at the title and abstract level, we identified a total 170 of records that were included following a full-text review. Most of the included studies highlighted the feasibility of using digital health intervention for chronic disease management among older adults, but limitations in their use were also discussed. These limitations need to be considered when designing digital health interventions for older adults living with chronic diseases. Conclusions: More evidence-based research is needed to better understand the feasibility and

limitations associated with the use of digital health interventions for this population.

Observations and Testing of the Tochtech Sleepsense Bed Sensor in a Retirement Community and Lab Setting (Poster #16)

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Background: Retirement community nursing staff are tasked with ensuring the safety of their residents. During the night, this presents a challenge as many dementia care residents experience episodes of wandering, while night staffing is typically reduced. The Tochtech Sleepsense device is an under-the-bed sensor, used to monitor residents and alert staff when s/he gets out of bed. While not part of this project, the Sleepsense sensor also offers additional features like real time heart and breathing rate, sleep quality data and pressure injury care management.

Method: Sleepsense was tested in the Carleton University SAM3 lab, in which bed exit scenarios were run with various weights on both hospital and residential beds to assess the sensor performance. Sleepsense was then tested in a retirement community with 15 residents.

The night staff carried a phone which received alerts when a resident got out of bed.

Results: Lab testing found the sensor performance was accurate across a range of weights and various exit scenarios. It was also noted that, while there is a large weight difference between the hospital and residential beds, the sensor performance was similar. Over 2 weeks of clinical testing, staff received 61 alerts. In 48 of these alerts, the residents were found out of bed by staff. For 13, out of bed notifications, the resident was in bed when observed by staff. A challenge of implementing technology in this care setting was that some residents removed the sensor.

Discussion/Conclusion: In over ¾ of cases, the alarm correctly identified that the resident was out of bed. This system facilitated the timely attendance to residents that are at risk of wandering or falling, possibly reducing the risk of morbidity. Additionally, staff efficiency could be improved as the need for frequent room checks is reduced.

Dual-Task Listening-While-Balancing Performance in Older Adults with Normal-Hearing and Hearing Aid Users (Poster #17)

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Age-related hearing loss is a significant, but underacknowledged risk factor for falls. While there are several hypothesized mechanisms, one is that hearing loss increases "cognitive load" because listening effort is increased. This listening load could take important cognitive resources away from behaviours used to support safe mobility (e.g., listening-while-balancing simultaneously). As such, reducing listening load through hearing aids could improve balance-related task performance. Therefore, we used virtual reality to simulate realistic "listening-while-balancing" conditions in which listening effort and balance were systematically challenged in 22 older adults with normal hearing and 22 older adults with hearing loss (while aided and unaided). Participants stood on a forceplate – which measured their postural sway – while facing a virtual street crossing where they identified digits spoken by multiple talkers (no digits, 2 digits, and 4 digits to manipulate listening load). Participants completed this task with their eyes open and eyes closed and while standing on firm and compliant surfaces to manipulate postural load. Postural stability was measured using posturography and listening performance was measured through digit identification accuracy. We found that the hearing loss group had lower listening accuracy and more dual-task costs (i.e., larger postural sway under harder listening conditions specifically when unaided compared to aided) compared to the normal hearing group. Taken together, this study may help provide support for whether hearing aid use is a recommended strategy for supporting balance in older adults with hearing loss and falls-risk mitigation through targeted interventions.

Co-creating Multisensory/Multimodal Financial Service Virtual Agents With Older Adults (Poster #19)

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Conversational virtual agents (chatbots or intelligent avatars) can support older adults in independently accessing the services they need in their daily lives, such as financial services. While during the recent pandemic, financial institutions were relying on virtual agents for customer support, existing virtual agents are not inclusive of older adults' needs. Overall, there are only a few examples of age-friendly virtual assistants that are developed in the healthcare domain. For instance, while most virtual agents focus on the visual or text representation of the information, delivering the services in a single sensory format can exclude some older adults since among these demographics, sensory impairments are more common than in other age groups. While there are bodies of research across different domains, including inclusive design, social aspects of ageing, and essential service design, there are still gaps in age-friendly actionable guides and solutions. There are knowledge gaps on ways to address barriers to older adults' participation. One avenue is the establishment of age-friendly digital service design frameworks. This project,

through collaboration with older adults, aims to discover ways to translate the needs in interaction with conversational virtual agents into practical solutions that also meaningfully incorporate older adults' input into such knowledge translation. We are considering co-designing an interactive experience that illustrates older adults' experiences when interacting with financial customer support virtual agents. The main outcome of the project will be a design framework for age-friendly financial virtual agents such as customer support chatbots, robo-advisors, and other forms of conversational virtual user interfaces. The framework will include a set of guiding principles, actionable steps, action plans, and specific examples.

Testing Tom: Creating an Accessible User Testing Experience (Poster #20)

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University of Ottawa

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Abstract: There is limited research exploring cognitive accessibility barriers in voice recognition systems, particularly those used for banking. Traditional user testing methods for technology often present accessibility challenges and may not equipped for persons with cognitive disabilities including older adults living with dementia due to a lack of training and information on inclusive methods. In the current project, we used an iterative user testing method for a voice payment system prototype, with testing materials adapted for cognitive accessibility. A comprehensive testing guide was developed in accessible language to collect data on user experience, including task completion and adapted learnability and workload scales. We recruited 30 Accessibility Advisors with cognitive disabilities for testing. Two rounds of prototype testing were completed, with rapid implementation of feedback to improve the prototype prior to the second round of testing. In a third meeting with each Advisor, a semi-structured interview was conducted to gather detailed qualitative information on the usability of the prototype and cognitive accessibility challenges experienced and anticipated by users. Findings include the diversity of Advisors who participated in the project due to accessibility adaptations and identification of additional accessibility challenges. A discussion of lessons learned and recommendations for improved cognitive accessibility in R&D projects are offered.

Enhancing Dementia Care in Rural Communities: Insights from AgeTech Implementation in Northern British Columbia (Poster #21)

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Objective: This study aimed to investigate the implementation of aging technologies (AgeTech) in a newly established dementia care facility within a rural and northern community in British Columbia, Canada. The AgeTech solutions included a hydroponic gardening wall, circadian lighting, and a virtual biking program, with a focus on improving the wellbeing and quality of life for clients living with dementia.

Methods: A process evaluation was conducted to assess the AgeTech implementation prior to client engagement with the AgeTech. The evaluation utilized the Theoretical Domains Framework (TDF) to explore contextual barriers and facilitators influencing the adoption of AgeTech. One-on-one, semi-structured interviews were conducted with key stakeholders, including facility staff, health systems leaders, representatives from the AgeTech companies, and implementation leads.

Results: The interviews, guided by the TDF, revealed key factors shaping the implementation of AgeTech solutions. Barriers included the challenges associated with the environmental context and resources in the rural and northern setting, concerns about the complexity of dementia symptoms and how the technology may impact client well-being, and beliefs regarding capabilities in technology use among older adults. Facilitators, such as establishing collaborative partnerships with AgeTech companies, fostering strong client motivation, and creating educational resources to support AgeTech understanding, and utilization were identified. Conclusions: The study's findings offer valuable insights that can inform planning and policy decisions for AgeTech implementation initiatives in rural settings. The results provide guidance for continuous innovation and effective AgeTech implementation, while underscoring the significance of collaboration between various stakeholders and community engagement to promote the successful integration of AgeTech in dementia care.

One Size Does Not Fit All: Variability in Device and Content Preferences of Persons Living With Dementia and Their Family Carers (Poster #22)

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Virtual reality (VR) and tablet-based technologies are increasingly being used for eliciting reminiscence and improving well-being in people living with dementia (PLwD). However, little is known about how these technologies facilitate communication between PLwD and their carers, which was the aim of our VRx@Home study. Twelve families participated by watching 360-degree videos for two weeks on VR (with a paired tablet), and two weeks on Tablet-only. Video themes included animals, travel, sports, and entertainment. Participants reported video preferences in weekly sessions after they watched four

preselected videos, and device and theme preferences in the final interview. Both PLwD and carers preferred entertainment videos followed by animals in weekly sessions. However, overall theme preference in the final interview varied with an equal number of PLwD choosing animals as their most and least favourite theme. Carers preferred travel videos, but their preferences also varied. We observed that the same videos evoke either positive or negative emotions across participants. For example, one PLwD loved our cat video, one PLwD disliked cats, and one carer felt bad about the cats staying in a facility. Similarly, whereas many liked travel videos, there was also a mention of feeling regret by one carer. Further, both VR and Tablet-only conditions elicited conversations; however, carers preferred VR while PLwD were split on their VR and Tablet-only preferences. Together, these results reveal that preferences for device and content vary greatly in this population and thus providing more options is important to allow for long-term adoption and keeping families engaged.

Engaging Young Dementia Caregivers in Co-Design to Improve Social Connection (Poster #23)

Authors & Affiliations:
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Background: Young dementia caregivers (YDCs) are individuals under the age of 25 years who provide unpaid, significant care to someone living with dementia. Our project builds on previous research that explored how YDCs experience social connection, defined as "how people relate to and connect with each other". It was found that YDCs experience unique barriers, facilitators, and caregiving-related mediators to social connection. Objectives: In the current project, our objectives were to: 1. Engage YDCs in co-design and acquire their feedback and insights on how to improve social connection. 2.Ideate tools or resources to improve social connection for YDCs in Ontario.

Methods: Using the Toronto Translational Framework (TTF) as a guiding methodology, our team aimed to engage YDCs in the process of co-design; to frame and understand the challenges of social connection and empower them to conceptualize potential solutions. 7 participants were invited to an online, co-design workshop in which they contributed their feedback, insights, and lived experiences into creative brainstorming and ideation activities to improve social connection. Workshop activities were facilitated via the online whiteboard platform tool Miro and were structured based on the three steps of co-design established by (Bird et al., 2021) in their framework for healthcare innovation.

Results: Participants identified 17 unique design requirements of an effective intervention to improve social connection, as well as ideated 23 specific manifestations of tools and resources that can be developed for this population.

Conclusions: YDCs are capable of effectively and meaningfully engaging in the processes of co-design, and generative design thinking. This hidden population brings unique perspectives, as well as creative ideas, to improve social

connection. Amplifying their voices through meaningful engagement can lead to innovative solutions for caregivers, thus leading to better care and quality of life for those affected by dementia.

Understanding Issues of Supporting Elderly Parents Aging in Place: A Topic-Guided Thematic Analysis of Two Reddit Communities (Poster #24)

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Pseudonymous online communities, e.g., those on Reddit, provide an outlet for people to discuss sensitive or stigmatized issues (e.g., [1, 2]). Indeed, prior research shows that poor communication and informal support with one's family are among foundational barriers to effective aging in place. In this work, we therefore study content posted by adult children of older adults on Reddit to understand the issues they face in supporting their parents who are aging in place. We focused our analysis on two subreddits: r/AgingParents and r/CaregiverSupport. These subreddits are a place for adult children (and sometimes grandchildren and other close relatives) of older adults to seek advice and support, as well as share their experience and knowledge with peers about helping parents aging in place. We performed a topic-guided thematic analysis using the Computational Analysis Toolkit [3]. Our findings reveal several challenges faced by the family of aging adults: coordinating support provided by siblings, dealing with expectations of regular visits and calls, managing care for older parents as well as one's own family, and loneliness and need for hobbies and social connections among older adults. These challenges in turn suggest areas suitable for technological interventions that can support communication and empathy between older adults and their children, e.g., an integrated application to coordinate caregiving tasks, allow grandparents to help by connecting with grandchildren, give older adults renewed purposes through local resources and social connections, and connecting adult children to a community of support. References:

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[3] Gauthier, R. P., & Wallace, J. R. (2022). The Computational Thematic Analysis Toolkit. Proceedings of the ACM on Human-Computer Interaction, 6(GROUP), 1-15.

Use of GuardIO, a Health Canada-licensed Mobile Application, and Machine Learning to Describe Mobility Patterns of

Persons Living With Dementia (Poster #25)

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The rising prevalence of dementia in Canada calls for strategies like GuardIO mobile app to address risks of getting lost and going missing while supporting the health and wellbeing of persons aging in place. The goal of this project is to examine the acceptance and usability of GuardIO - Family Care, mobile application, and the mobility patterns of participants with dementia. Method Using a mixed-method pre- and post-test design, this study uses 40 dyads of persons living with dementia and their care partners who have access to a smartphone and the internet. Thirty percent of the participants will be from one Indigenous community. The participants will assess the acceptance and usability of GuardIO using a questionnaire based on the Unified Theory of Acceptance and Use of Technology; this will be analyzed using a partial least square regression model. Machine learning-driven analytics describes the mobility patterns of participants with dementia. A focus group discussion with 20 dyads will help us understand user experiences, satisfaction and challenges, and barriers associated with using GuardIO. Significance This project provides insight into the use of mobile apps to enable persons with dementia and their care partners to receive timely care and develop risk mitigation strategies. Conclusion Usage behaviors and mobility patterns of participants with dementia and their care partners can inform decisions about personalized care and support services.

TRILL – Continuing Creative Connectivity in Care Homes – and Beyond (Poster #26)

Authors & Affiliations:
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Displayed on October 25, 2023 from 10:30am-12:00pm ET

A 2019 research project (Creech/Liu-Rosenbaum) showed that collaborative music-making with older adults experiencing cognitive and physical limitations can be achieved with digital assistive technology. Using the motion-sensitive Soundbeam System and Apple iPads running touch-sensitive applications, this project demonstrated that such devices can enable seniors to collaborate and improvise musically, creating their own melodies through hand gestures and touch. When COVID abruptly put an end to this project, a solution was urgently sought that could allow these activities to continue by marrying the same music-making technology to extreme portability and video conferencing, thus allowing facilitators to continue communicating and collaborating with seniors in supervised care during a lockdown. Lockdowns are not only pandemic-related. Common outbreaks of influenza

and gastroenteritis can result in entire floors quarantined and visits thus restricted. The TRILL system, however, currently in use at a care home in Quebec City, can be wheeled onto any floor and set up and operated by a single facilitator while communicating virtually with researchers as well as family and friends of care home residents. It has already been tested under quarantine conditions. This poster presentation will succinctly outline the PhD process, the development and impact of the TRILL prototype now in use, and the commercial and social potential of digital assistive music-making technology in supervised care, independent living, and aging-in-place environments.

Rural Older Patient Experiences of Health-seeking in Low- and Middle-Income Countries (LMICs): a Systematic Review and Thematic Synthesis of Qualitative Studies (Poster #27)

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Background: The global aged population are predicted to reach 2.1 billion by 2050, and about 30% of them will live in rural areas of low- and middle-income countries (LMICs). However, there has been no synthesis of qualitative evidence on their experiences and perceptions of health-seeking. This review aimed to synthesize the qualitative literature on older patients' experiences of health seeking in rural LMICs as well as explore the factors that influence their experiences. METHODS The review protocol was registered at PROSPERO (ID: CRD42022358813). We searched Embase, MEDLINE, PsycINFO, and CINAHL for studies published from January 1st, 2002 to July 12th, 2022. A thematic synthesis approach was used to analyse findings.

Results: A total of 19 studies involving 484 participants were included. We identified four primary analytic themes: (1) Individual: depicting the inner world of rural older patients, (2) Interpersonal: navigating the rural social network, (3) organizational: navigating the rural health care systems and (4) Community & Macrosystems: economic, society, and public policy in rural areas. Considering the weak formal institutions of healthcare in rural LMICs, the older villagers creatively used informal institutions such

as alternative health care and personal connections to navigate their health-seeking journey.

Conclusion: There is strong evidence that rural older patients in LMICs have experienced unique and multi-level barriers to seeking care. Public health strategies to improve elderly care in LMICs require a deeper understanding of the local preferences and values, as well as the multi-dimensional sociocultural disadvantaged conditions that rural older patients are facing.

Self-generated Motor Activity at Encoding Benefits Route Memory (Poster #28)

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Navigational devices limit the need for decision-making. We examined whether visual navigational guidance during initial exploration of a city hindered memory for routes travelled. In Experiment 1, participants (n = 50) explored 12 cities in virtual reality (VR) for 40s each, with the goal of finding a star. Navigation strategy was manipulated within-subjects, randomly, and required either actively self-initiating decision-making about the route of travel or following a visually guided route, both with volitional control of movements using VR paddles, or passively viewing a pre-selected route. Participants later re-entered each city and were asked to "re-trace" the exact route they had traveled. There was an effect of Navigation Strategy on route memory, such that self-directed and visually guided conditions similarly benefited performance significantly more than passive viewing ($\eta^2p = 0.10$). In Experiment 2 (n = 54) we implemented the same procedure using Desktop VR, with navigation via keyboard button press, rather than arm and body movement in Immersive VR. We found no effect of Navigation strategy ($\eta^2p = 0.01$). Together, results suggest motoric involvement, especially involving the integration of head, body, and arm movement during encoding, more so than decision-making, impacts route memory.

Protective Capacity of Head Gear Designed to Protect Older Adults Under Fall Conditions (Poster #29)

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Falls account for approximately 80% of traumatic brain injuries (TBI) in adults above the age of sixty-five. Head protection is available, however, with no

performance standards or certification testing requirements, the protective competency of head gear for older adults is unknown. This study evaluated the protective capacity of head gear designed to protect older adults against fall related TBI. Three head gear products (HG1, HG2, HG3) were chosen for comparison against an ice hockey, bike and prototype helmet containing rotational technology. A Hybrid III headform with unbiased neckform and monorail drop system was used to simulate all fall events at three locations (front, side, rear) and two velocities (3.5m/s, 5.0m/s) with both flat MEP and angled steel anvil. One-way ANOVAs comparing peak linear acceleration (LA) and rotational acceleration (RA) for each impact condition showed a significant difference ($p<0.05$) among head gear under all fall conditions, excluding LA from a 5.0m/s side impact onto the flat anvil. Under flat anvil conditions, HG2 consistently outperformed HG1 and HG3. Similar results were found for the prototype, excluding RA from the front impact. Under angled impact conditions, HG1 most often outperformed HG2 and HG3, with the hockey, bike and prototype helmet outperforming all three HG. The prototype produced similar or lower LA and RA in comparison to hockey and bike helmets. Using sporting equipment testing standards and similar helmet designs could be useful as a guide in creating a test standard and better protection for older adults to decrease the occurrence of fall related TBI.

Evaluating the Role of AI-falls Risk Predictive Algorithms in a Physiotherapist's Falls Risk Assessment (Poster #30)

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Objective: The role of AI-based falls prediction in clinical practice remains unclear. It is possible AI-falls risk predictive algorithms can facilitate early intervention and prevent falls in people with dementia, however, these technologies can also negatively influence a clinician's judgment and patient outcomes. My research will evaluate the role of an AI-falls risk predictive algorithm in a clinician's falls risk assessment of long-term residents with dementia.

Methods: 55 physiotherapists across Canada will participate in a virtual falls risk assessment experiment. Physiotherapists will predict the chance of long-term residents falling within four weeks on a continuous scale (0-100%) after watching residents' gait videos and reviewing their clinical information. Physiotherapists will then review the output of the AI-falls risk predictive algorithm for residents and will have the opportunity to revise their falls risk predictions based on this new information. We will compare the accuracy of falls risk predictions from the AI-algorithm to that of a physiotherapist and assess the impact of the AI-algorithm on the physiotherapist falls risk prediction.

Results: We hypothesize that the AI-falls risk predictive algorithm will be more

accurate than the physiotherapist falls risk prediction, and that physiotherapist's will be more accurate in their prediction when using the algorithm output in their decision-making.

Conclusions: We need to evaluate the role of AI in physiotherapist decision-making before translating it into practice because AI has the potential to directly impact how physiotherapists assess patient risk and plan treatments. Understanding how clinicians and AI systems interact is an important step towards its' safe deployment into clinical practice settings.

The YourCare+ Self-Referral Platform for Home and Community Support Services (Poster #31)

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Objectives: The YourCare+ Self-Referral Platform allows older adults, caregivers, and people living with supportive care needs to digitally navigate and self-refer to home and community services. This reduces the need for health professionals to conduct assessments in-person or over the phone.

Method: This platform is being piloted with service organizations in Southwestern Ontario. An interRAI Self-Reported Assessment is completed digitally on yourcareplus.ca by an individual or their caregiver(s). Algorithms prioritize service recommendations based on health needs. Ontario service directories are integrated to generate personalized lists of local services. Direct self-referral and booking are planned.

Results: This platform will streamline the process of connecting individuals to services. Anticipated outputs include the development of sophisticated service-linking algorithms. Our team has adapted assessments previously administered by clinicians into validated self-report versions that can be used by informal caregivers and older adults to self-assess care needs.

Conclusions: By harnessing algorithms that identify and prioritize services according to individual needs, our platform offers an automated mechanism for self-navigation. This technology will be an asset to healthcare navigation strategies on a provincial and national scale and will provide the ideal training ground for learning algorithm development that could be deployed to alternate scenarios.

Comparative Analysis of Usability Studies on PRIMS: Insights and Implications (Poster #33)

Authors & Affiliations:
Bronwyn Bridges
Jake Taylor (Presenter)

PragmaClin Research Inc.

Displayed on October 25, 2023 from 1:30pm – 3:00pm ET

Parkinson's Disease (PD) affects ten million people globally and requires objective remote monitoring systems for detailed patient condition tracking. PragmaClin developed the Parkinson's Remote Interactive Monitoring system (PRIMS) to track disease progression. This research presents an evaluation of PRIMS through an in-house usability study conducted in Summer 2022 and 2023. Data from the usability investigation was used to redesign the system. Bronwyn Bridges, a PhD candidate at Memorial University of Newfoundland and CEO of PragmaClin Research Inc., led the study, and co-authored the research paper with Jake Taylor, a research assistant with PragmaClin. Bronwyn was under the supervision of Dr. John Weber, professor at Memorial Universities School of Pharmacy. The study aimed to assess and compare PRIMS' functionality, usability, and user experience for patients with Parkinson's. Multiple methods, including interviews and field notes, were used for evaluation. The old PRIMS system had an average completion time of 67.66 mins, while the new system reduced it to 16.26 mins. The improved version resulted in fewer repeats, software bugs, and skipped tests. Thematic analysis of interview transcripts indicated a preference for video instructions and confusion with written instructions. Field notes analysis showed that the newer system reduced patient frustration and confusion. In conclusion, the updated PRIMS version addressed issues identified in initial usability testing, delivering a user-friendly product tailored to Parkinson's patients' needs. The investigation's data will serve as a valuable reference for future researchers and developers working with digital systems for individuals with Parkinson's.

Evaluating the Ability of a Predictive Vision-Based Machine Learning Model to Measure Changes in Gait in Response to Medication and DBS Within Individuals with Parkinson's Disease (Poster #34)

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Background: Gait impairments in Parkinson's disease (PD) are often treated with dopaminergic medication or deep-brain stimulation (DBS). Computer vision-based approaches have not been

evaluated for their ability to identify changes within individuals in response to treatment. This pilot study examines whether a vision-based model, trained on videos of parkinsonism, is able to detect improvement in parkinsonian gait in people with PD in response to medication and DBS use.

Methods: A machine learning model trained to predict MDS-UPDRS-gait scores in videos of older adults with drug-induced parkinsonism was used to predict MDS-UPDRS-gait scores on a dataset of 42 paired walks from 13 individuals with PD recorded while ON and OFF medication and DBS treatment during the same clinical visit. Statistical methods were used to evaluate model responsiveness to changes in gait in the ON and OFF states.

Results: The MDS-UPDRS-gait scores predicted by the model were lower on average (representing improved gait; $p = 0.017$, Cohen's d = 0.495) during the ON medication and DBS treatment conditions. The magnitude of the differences between ON and OFF state was significantly correlated between model predictions and clinician annotations ($p = 0.014$). However, the predicted scores were not significantly correlated with the clinician scores (Kendall's tau-b = 0.16, $p = 0.09$) and were distributed in a smaller range compared to the clinician scores.

Conclusion: A vision-based model trained on parkinsonian gait did not accurately predict MDS-UPDRS-gait scores in a different PD cohort, but detected proportional changes in response to medication and DBS use.

Designing an In-App Tutorial for a Smartphone-Based Memory Aid Using the Person-Based Approach (Poster #35)

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As our population ages, memory decline becomes more significant and prevalent. To address this, we designed a smartphone-based application called HippoCamera that leverages principles from cognitive neuroscience to help users improve memory for everyday events. However, the application currently requires users to be trained in a one-on-one setting, limiting its usability and wide adoption. The objective of this work was to design an in-app tutorial to teach users how to use HippoCamera independently. We followed the Person-Based Approach, which combines the rigor of traditional clinical research and iterative design methods. We analyzed data from a prior co-creation study with older adults using behaviour change frameworks (e.g., Behaviour Change Wheel, Theoretical Domains Framework) to identify a set of initial guiding principles for the tutorial design. Using these principles, we created a high-fidelity tutorial prototype in Figma. We then evaluated the tutorial using a mixed-methods research approach using think-aloud interviews and the mHealth App Usability Questionnaire to gather end-user feedback from older adults. This data was analyzed with the previously mentioned behaviour change frameworks to iterate and continuously improve upon the tutorial prototype. This robust design approach allows us to develop an

effective tutorial with an improved user experience that incorporates end-user feedback. More importantly, the designed tutorial will let users more easily use the HippoCamera application to help alleviate and prevent potential memory decline, ultimately making the application more widely adopted and scalable.

Validation of a Brief Scale to Measure Usability of Locator Device Products (Poster #36)

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Individuals with cognitive impairment are at risk of getting lost while walking alone and navigating in unfamiliar environments. Locator devices may mitigate these risks. Despite the potential of locator devices to mitigate the risk of getting lost among persons living with dementia, no standardized approach exists to assess their acceptance and usability. In previous phases of this study, we created two versions of an acceptance and usability of locator devices questionnaire: one for persons living with dementia and one for care partners. This present study aims to test the questionnaires' reliability and construct and criterion-related validity. Forty-five dyads of persons living with dementia and their care partners will be recruited. They will use SafeTracks Prime Mobile for three weeks. After the first and second weeks, each dyad member will rate the locator device using technology acceptance and usability and the System Usability questionnaires. Feedback will be collected through virtual "think-aloud interviews." Internal consistency will be assessed using Cronbach's alpha. Exploratory factor analysis will be conducted to evaluate construct validity. Criterion validity will be determined using the Spearman rank's correlation. Recruitment is currently open for this study. Our presentation will showcase the two questionnaires, and the findings will focus on reliability, construct and criterion-related validity. The acceptance and usability of the locator devices questionnaire is a tool that will support persons living with dementia and their care partners to identify a locator device that best suits their needs.

Kinematics Analysis of a Set of Static and Dynamic Functional Activities Amongst Elderly With and Without History of Fall, and Healthy Young People (Poster #37)

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Displayed on October 25, 2023 from 1:30pm – 3:00pm ET

Objectives: Fall is a common problem in growing population of elderly people that imposes a lot of costs on individuals, families and society. Identifying older people at risk of fall - to benefit from preventive methods - is a challenge for health areas. The purpose of this study was to introduce a model(s) to identify seniors at risk of fall.

Materials and Methods: 11 senior living community in the age range of 66 to 87 years and mean (±SD) 74.09(±6.25) years that fell two or more times in the past year , 34 senior living community in the age range of 65 to 86 years and the mean (± SD) 71.12(±5.09) years that had not any history of fall in the past year and 38 healthy young living in the community in the age range of 20 to 35 years and mean (±SD) 29.45(± 3.93) years were enrolled. Clinical tests of CTSIB, FICSIT-4, AST, STS-5, TUG, FGA and MDRT in all three groups were done and individual scores were recorded. Simultaneously, five Inertial- Magnetic sensors on head, trunk, right thigh, right shank and right foot recorded joint angles, angular velocity and linear acceleration of the respective segments.

Results: ANOVA results showed that almost - but not in all cases - static clinical tests and relevant kinematic data of the three study groups did not differ significantly. Relative reliability, ANOVA and Tukey test showed that joint angles were not good indicators for identifying elderly people at risk of fall. Binary Logistic regression results showed that segmental angular velocities and linear accelerations can differentiate between elderly people at risk of fall from those not at risk of fall.

Conclusion: The study showed that angular velocity and linear acceleration better than clinical tests can differentiate between elderly people at risk of fall from those not at risk of fall.

Measuring Kitchen Activity in Older Adults Through the Use of Videos (Poster #38)

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Displayed on October 25, 2023 from 10:30am – 12:00pm ET

Introduction: Analyzing function in a clinical setting may not accurately reflect how an individual functions when in their own home environment since being observed by a clinician or a lack of familiarity in the clinical environment can change behavior. Importantly, an accurate functional evaluation has therapeutic and diagnostic clinical implications. We were interested in determining functional kitchen activity of older adults with a range of cognitive impairment when performing in their own home. Smart home technologies including home security and video conferencing systems with cameras are increasingly common

and could be used for ongoing functional assessments.

Method: Best Buy Assured Living WellCam cameras were installed in the kitchens of 3 older adults who had moderate to severe cognitive impairment and who were living at home. Thirty-second video clips of activity were recorded during 2-hour periods of the day (lunch and dinner) and analysed offline. Functional activities (e.g., cleaning, organizing, meal prep), kitchen tools used (e.g., fridge, oven, coffee/tea kettle), and time spent in the kitchen alone/with caregiver were coded and analysed.

Results: Increasingly severe cognitive impairment resulted in fewer recordings where a functional task was performed (Moderate CI: 20% vs Severe CI: 9%) and fewer videos with tool use (Moderate CI: 15% vs Severe CI: 3% of all videos) by the person with cognitive impairment. Despite spending more time alone in the kitchen (Severe CI: 80% vs Moderate CI: 59%), the individuals with Severe CI were less active during these periods compared to individuals with moderate CI.

Discussion: Individuals with severe cognitive impairment continued to perform simple tasks that were less of a safety risk. Future development of AI algorithms to code specific tasks from video recordings may be able to provide early identification of functional change.

An Exploratory Investigation of the LOVOT Social Robot as a Companion for Older Adults in Long Term Care (Poster #39)

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Displayed on October 25, 2023 from 1:30pm – 3:00pm ET

Objective: This exploratory study aims to explore how older adults living in Canadian Long Term Care (LTC) homes experience and perceive LOVOT, a consumer home robot from Japan.

Methods: This is the extended arm of a mixed-methods, three-country study conducted in Singapore, Hong Kong, and Canada. The Canadian sample consists of 37 older adults, 7 family members, 23 interdisciplinary staff, and 4 leadership team members of a LTC home in Vancouver, British Columbia. The participants are invited to join four weekly sessions of interaction with LOVOT. We conducted conversational interviews with older adults and focus groups with the LTC staff and leadership. We use thematic analysis to guide our initial conceptual framework.

Results: This study will demonstrate (1) the experiences and perceptions of older adults and their family members in regards to interacting with the LOVOT robot, and (2) the LTC staff and leadership perceptions on having the LOVOT robot in LTC.

Implications: The study offers insights into the potential role of social robots in LTC homes across eastern and western countries.

Supporting Healthy Aging Through Community-Academic Partnerships, Research, and Personal Health Information Tracking (Poster #40)

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Objectives: To provide an overview of the Great Northern Peninsula Research Collective (GNP-RC); to review the development of a personal health data tracking software application; and to discuss how community-academic partnerships, research, and personal health information tracking can support healthy aging.

The GNP-RC was formed in 2019 as a community-academic partnership geographically centered on the Great Northern Peninsula in Newfoundland and Labrador (NL). The GNP-RC has met regularly since then to connect communities to researchers and has focused on community identified needs and priorities that can be supported with research. The GNP-RC has successfully worked together on a number of projects including the creation of a social enterprise led community health space, community kitchen initiatives, and local agriculture production. The latest community-led project has centered on personal health information and the creation of a software application that can be used to input and track health data. This health information can be visualized, trends can be reviewed, and the data can be used to increase awareness and inform healthy behaviour changes. The idea to track personal health information and to develop a software application that can be used by community members was conceptualized by a local community leader and health practitioner who has been working with communities to improve their health. Meetings with the GNP-RC led to revisions and refinements to the software with plans for implementation in 2024. Progress on the development of the software will be shared, along with our thoughts on how both community-academic partnerships, research, and personal health information tracking can support healthy aging.

Co-adaptation of Smart Technologies and Older Adults Aging in Place: A Scoping Literature Review (Poster #41)

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Objectives: This scoping review aims to comprehensively map the existing scientific literature on the co-adaptation of smart technologies and older adults over time. By examining the interaction between older adults and smart technologies, this study seeks to enhance the understanding of how older adults adapt to and interact with smart technologies, with the goal of improving their experience and the benefits derived from their use to support aging in place.

Methods: A scoping review methodology guided by PRISMA-P and PRISMA-ScR guidelines was employed. The study utilizes the Selection, Optimization, and Compensation (SOC) framework and the Sex- and Gender-Based Analysis Plus (SGBA+) theoretical framework to explore the co-adaptation process. A systematic search of databases was conducted, followed by a two-phase screening process. Data extraction covered study characteristics, participant characteristics, theoretical frameworks, findings, and limitations. A numerical overview and directed content analysis will be used for data presentation and analysis.

Results: Preliminary results identified patterns of selection, optimization, and compensation strategies employed by older adults and outcomes related to well-being, quality of life, and user experience. Further insights will be provided into the ways smart technologies can enhance independent living and inform the development of future user-centered technologies.

Conclusions: The findings will facilitate the development of more effective and sustainable AI-enabled technological solutions to support older adults in aging in place, while also identifying gaps and opportunities for future research.

Citation
Kokorelias, K., Grigorovich, A., Rehman, U., Harris, M., Denecke, K., Ritchie, L., Levy, A., McMurray J. (2023). Co-adaptation of Smart Technologies and Older Adults Aging in Place: A Scoping Literature Review. AGE-WELL Annual Conference, October 24-26th, Toronto, ON.

An Evidence and Gap Map of Studies on Digital Interventions to Reduce Social Isolation and Loneliness Among Older Adults (Poster #42)

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Objectives: This evidence and gap map identifies areas of evidence as well as any gaps in research related to using digital and remotely delivered interventions to mitigate social isolation and/or loneliness in older adults.

Method: We followed the Campbell Collaboration methods and based on the Masi framework, the interventions include interventions for enhancing social interactions; for enhancing social support; for improving social skills; and for social cognitive training.

Results: The EGM includes 103 primary studies and 97 systematic reviews, with most conducted in high-income countries and none in low-income countries. The most common interventions are digital interventions to enhance social interactions with family and friends and the community via videoconferencing and telephone calls. Digital interventions to enhance social support, particularly socially assistive robots, and virtual pets were also common. Most interventions focused on reducing loneliness and depression and improving the quality of life of older adults. Major gaps were identified in community level outcomes and process indicators. No included studies or reviews assessed affordability or digital divide.

Conclusions: Although the evidence is relatively large and recent, it is unevenly distributed and there is a need for more high-quality research. This map can guide researchers and funders to consider areas of major gaps as priorities for further research.

Enhancing Hospital Workflow Efficiency and Safety Through Novel Patient Transfer Device Implementation: A Pilot Study (Poster #43)

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Patient transfer and repositioning activities are labor intensive requiring multiple staff members. Transferring patients safely is challenging due to staffing shortages and injury risk. The cost of staff injury claims and return-to-work initiatives are significant. This pilot study introduces an innovative solution, the ALTA PlatformTM, a cutting-edge robotic patient transfer device developed by Able Innovations. The ALTA PlatformTM enables single staff transfers, while mitigating injury risks. The study was conducted at Bruyère Continuing Care across two units: a Low Intensity Rehabilitation Unit and a Complex Care Unit. The study comprised two phases: Phase 1 focused on current transfer practices using ceiling lifts, while Phase 2 was dedicated to ALTA use. Direct observation allowed to measure staff engagement, transfer duration, and staff wait times. Interviews and surveys captured staff and patient feedback on current transfer practices and the ALTA PlatformTM. The findings suggest that the ALTA PlatformTM, enabling single staff transfers, provides the hospital with operational efficiencies. In current practice, waiting for a second staff for transfers takes extra time (range of 0-16 minute, or average 2.2-4.2 minutes). Physical transfer times are comparable (average 1.5-2 min) between current practice and the ALTA PlatformTM for transfers between beds. As healthcare institutions strive to navigate challenges such as staff shortages, adopting innovative solutions like the ALTA PlatformTM has the potential to improve patient care quality and clinical staff well-being.

Adapting Exergaming Technology (MouvMat) for Older Adults Living in LTCHs (Poster #44)

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Objectives: MouvMat is an exergaming technology with an interactive digital gaming surface that was co-designed with a user-centered design approach for older adults (OA) living in long term care homes. As part of an ongoing trial to test the efficacy of the MouvMat when implemented in long-term care homes, we evaluated the acceptability of the technology and report on adaptations made to improve the technology based on feedback from OA participants.

Method: 33 OAs residing in long-term care homes used the MouvMat during 1-hour group sessions 3 times per week for 6 weeks. A research assistant facilitated use of the technology and recorded their feedback during sessions.

Results: Participant ratings indicated that the MouvMat was acceptable and OAs with a range of comorbid health conditions were able to attend sessions and engage with the intervention. Based on feedback from participants and observations about their physical abilities, the design of MouvMat was adapted from a floor model to a tabletop prototype to a micro version.

Conclusions: Future studies will continue to improve MouvMat's design and interface to ensure that the technology serves the needs of OAs living in long-term care.

What's Your Aging Story? How Digital Storytelling Can Change the Way We Look at Aging (Poster #45)

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Ageism has perpetuated negative stereotypes and misconceptions about aging, leading to discrimination and exclusion of older adults and a societal fear of aging. Research indicates that our perceptions of aging can impact our health and well-being as we grow older. Our objective is to showcase authentic experiences of aging through digital storytelling. The Age Collective is an online platform that we developed to share diverse stories of aging, encompassing both challenges and triumphs across different age groups. We recruited participants through word of mouth and conducted interviews using audio or video equipment. Interview questions were tailored to the participant to reveal their unique story. Participants were also photographed. These interviews were condensed into short stories or videos and published on the project's Instagram page (@theagecollective) and website (theagecollective.com).

Educational infographics on aging were also created and shared on Instagram. From Feb 2022 - Aug 2023, we have shared stories from 31 participants and created 19 educational infographics. We have 775 followers and received 2,612 likes on the Instagram page. The website, established in June 2023, has achieved a unique viewership of 1,053 in the past 30 days. In the digital age, initiatives like digital storytelling can reach global audiences, crossing cultural barriers and sparking international movements. By sharing personal aging stories, digital storytelling can humanize aging, dismantle stereotypes, and foster connections across generations.

Empowering Senior Care at Home: A Comprehensive Review of Indoor Localization Technologies (Poster #46)

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Objective: The main objective of this study is to conduct a comprehensive review of recent indoor localization technologies used in various applications such as monitoring seniors at home.

Method: We used Google Scholar initially to obtain a broader sample using general search terms. Subsequently, we used more specific search terms on Scopus, IEEExplore, MDPI, and Web of Science. In

total, 240 papers were found from which 177 papers were selected by filtering based on our inclusion criteria, and finally, 95 papers were reviewed for this state-of-the-art review. We primarily focused on literature from the past 10 years, with over half of the papers being published between 2019 and 2023.

Results: We classified indoor localization technologies into four groups: RF-based, Inertial-based, Vision-based, and Fusion technology. We compared their localization performance, coverage, time complexity, and cost. RF-based solutions, including mmWave radar, achieved precise centimeter-level localization in real-time by extracting point clouds from moving targets. In the RF-based technologies, Wi-Fi-based solutions provided broader coverage while maintaining acceptable localization performance. Some vision-based approaches also achieved centimeter-level accuracy but raised privacy concerns for in-home monitoring. Inertial-based wearables emerged as a cost-efficient solution for indoor localization, yet they faced challenges with accumulated errors over time and seniors' consistent usage. Overall, fusion approaches, integrating data from different sources, improved the localization performance.

Conclusions: Among the reviewed solutions, contactless approaches in combination with RF-based technologies are among the best for monitoring seniors in the home. These technologies can be leveraged with methods like machine learning and deep learning for additional tasks such as activity recognition.

Co-Designing Socio-Culturally-Appropriate Virtual Geriatric Care for Diverse Older Adults Living with HIV: A Community-Based Participatory, Intersectional Protocol (Poster #47)

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Objectives: To understand the perspectives of older persons living with HIV from equity-deserving groups on (1) The value and necessity of equitable and culturally-appropriate virtual interventions, such as email and video teleconferencing, for geriatric HIV care; (2) How best to engage older persons living with HIV in the future co-design of a virtual model of geriatric HIV care.

Methods: This study employs qualitative methods to lay the groundwork for acquiring foundational knowledge from older persons living with HIV, thereby informing the co-development of a sociocultural-informed virtual geriatric care model. In Phase 1, older persons living with HIV will participate in focus groups and interviews to share virtual and geriatric HIV care experiences. In Phase 2, half-day co-design workshops will be held with older persons living with HIV, where participants will develop interventions for virtual geriatric HIV care. In Phase 3, participants will refine co-designed interventions to improve the ideal model of virtual geriatric HIV care.

Results: It is anticipated that older persons living with HIV participating in interviews, focus groups, and co-design workshops will contribute insight regarding the priorities of older persons living with HIV for virtual care, previous experiences receiving virtual HIV care, and how best to meet geriatric-HIV needs by developing a virtual model of care.

Conclusions: Older persons living with HIV have unique care needs related to aging and HIV, which geriatric specialists can effectively address. Co-designing with older persons living with HIV is critical to creating equitable and culturally-appropriate models of geriatric HIV care and interventions that address this group's unique aging and HIV-related care needs.

Reducing the Burdens of Professional Caregivers of Older Adults Using Assistive Technology: a Scoping Review (Poster #48)

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Objective: This scoping review aims to evaluate the effects of assistive technologies on the challenges faced by professional caregivers, focusing on personal support workers (PSWs). The study addresses the emotional and physical burdens experienced by PSWs, which contribute to low retention rates and reduced desirability for the profession. As the global aging population increases, the demand for professional caregivers to support older adults with complex health conditions in aging in place is also rising.

Method: The scoping review involved an extensive search of relevant literature to assess the impacts of assistive technologies designed to support professional caregivers. A comprehensive review and analysis of studies from academic databases were conducted to gather insights.

Results: Findings reveal that assistive technologies, including physical or mobility aids, sensor and monitoring technologies, and social robots, offer significant benefits to professional caregivers. These technologies have the potential to improve the quality of care for older adults, alleviate caregiver burdens, and enhance the caregiving experience. Additionally, they contribute to increased job satisfaction, which may improve retention rates among professional caregivers.

Conclusions: Assistive technologies hold promise as effective tools to provide quality care and reduce burdens for professional caregivers, particularly PSWs. Integrating these technologies into caregiving practices can enhance caregiver well-being. As a result, they can potentially increase the desirability of the caregiving profession and address the growing demand for professional caregivers. Continued research and development is crucial to maximize the potential of assistive technologies in supporting and empowering professional caregivers.

Evaluating Swidget Technology Across Six Aging Personas (Poster #49)

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Background: Home sensing technology can be used to support a variety of medical conditions, including persons living with dementia and their partners. Home sensors can be challenging to install and maintain, as they are often battery operated, and the onus to manage and change batteries is placed onto the care partner. Sensor technology that can plug into a home's wiring would address this challenge.

Method: Swidget technologies has developed modular sensors that integrate into house outlets and light switches, supported by cloud intelligence. These sensors will be configured in a lab testing space to evaluate their ability to support aging in place especially for persons living with dementia. Six personas will be created based on real situations observed by physicians with expertise in this area. The Swidget technology will be tested on their ability to support these personas.

Results: The results will demonstrate how the Swidget sensor system can be used to support aging in place and how this innovative sensor technology solution can be integrated and used within typical residential settings.

Discussion/Conclusion: As batteries do not need to be changed, certain user responsibilities are lifted, however, the integration of a sensor within a power socket presents challenges due to their fixed positions in a room. This work will present solutions to these challenges for each persona scenario being tested.

Initial Feasibility of a Blended Online Memory and Brain Health Promotion Intervention for Older Adults (Poster #50)

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Objectives: Cognitive interventions that teach memory strategies and ways to optimize brain health have established benefits for older adults. Offering these programs online can improve access to evidence-based cognitive interventions for older adults outside of major urban centres or with disabilities that create barriers for in-person attendance. We explored the initial feasibility of an online blended, flipped classroom version of the Memory and Aging Program, a cognitive intervention program for older adults. This program is well-validated in a face-to-face format and has a self-guided e-learning version that has recently been shown to be feasible and acceptable. We combined the asynchronous e-learning component with synchronous, online group discussions to provide peer support and guidance from a facilitator.

Method: Over a 5-week period, participants completed psychoeducation modules at home on their own devices and attended weekly one-hour videoconference sessions.

Results: In our first offering, 7 participants (Mage = 61 years) completed the program. Attendance was 94% at weekly meetings. During a focus group following completion, participants indicated a preference for the online format, for reasons including commuting time and comfort of completing activities at home with their own devices. They identified self-paced learning and accountability associated with meeting together as benefits of this format. Challenges included quality of Internet access, technical difficulties with online materials, and keeping program materials up to date.

Conclusions: Our preliminary results suggest that online offerings of programs that include peer support are liked by older adults and may serve different individuals than those interested in face-to-face programs.

Getting Serious About Serious VR Games for People with Dementia: A Scoping Review of Applications Designed to Date (Poster #51)

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There is increasing evidence of the effectiveness of game-based dementia treatments, with a growing investment in Virtual Reality (VR). To date, there are no guidelines for their design or use and the number of available apps remains unclear. A systematic environmental scan was conducted following PRISMA methodology. 255 apps designed to be used in a VR/AR headset by PwD were extracted from popular game-engines (e.g., Oculus, Steam), as well as peer-reviewed and grey literature (e.g., Google, Google Scholar), and were screened by three independent reviewers, resulting in 16 apps included for analysis. The included apps focused on wellbeing/relaxation/reminiscence (8/16), exercise (4/16), dementia diagnosis/detection (2/16), and cognition (2/16). Most (13/16) described dementia-specific features to support physical/cognitive limitations, social/emotional needs or safety (e.g., intuitive design, multi-modal instructions, familiar environments, remain seated). Three (3/16, for business) featured a "companion" tablet-app for a caregiver to select and monitor content. A minority (2/16) had cooperative capabilities enabling interaction between users in VR. None reported compliance with standard accessibility guidelines or medical device certification. The few available VR-apps for PwD are heterogeneous in purpose and yet do not meet their complex needs. Although the majority include dementia-specific features, are theory-based, and have undergone end-user engagement/testing, VR-apps for PwD are in early stages of design/validation, with over half described only in literature. Rigorous studies evaluating efficacy and safety are required before VR-apps can be widely recommended for PwD.

Hearing Aid-Integrated Assistive Listening for Live Music (Poster #52)

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Objectives: Live music creates a sense of connectedness in older adults (Hays & Minichiello, 2005), a majority of whom have hearing loss, but most hearing aid (HA) users are dissatisfied with the sound quality for live music (Greasley et al., 2020). Here, we tested an assistive listening system integrated into users' HAs during an orchestral concert.

Method: Participants with moderate-to-severe hearing loss were assigned to use Sonova-provided HAs with a telecoil (n = 20) or their own HAs (n = 8) without a telecoil during a performance by the Hamilton Philharmonic Orchestra. We

changed loop input to use microphones from the stage, balcony, or no feed every 5 minutes and collected associated sound quality and naturalness ratings.

Results: Repeated Measures ANOVA found no differences among the loop feed conditions for sound quality and naturalness $F(2, 56) = .92$ and $.78$, p's $> .4$, respectively.

Conclusions: Though hearing aid-integrated assistive listening systems are a promising option for improving live music for people with hearing loss, an assistive system does not seem to be crucial for orchestral music; additional work will focus on music with vocals.

A Qualitative Evaluation of Implementing New Technologies into Older Adult Care Settings (Poster #53)

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Displayed on October 25, 2023 from 1:30pm – 3:00pm ET

Objectives: The AGE-WELL AIR Program was designed to support the implementation of new technologies in long-term care and home care. This study evaluated the impact of the AIR Program and identified common implementation considerations of introducing new technologies into older adult living settings.

Method: This qualitative study used the Consolidated Framework for Implementation Research (CFIR) to explore the experiences of stakeholders (vendors=6; decision-makers=20; Implementation specialists=2; older adult residents=5) at different sites (n=6) across Canada. Interview transcripts were analyzed using a deductive thematic analysis approach.

Results: The technology's trialability and associated costs (CFIR – intervention characteristic) were key considerations in piloting a technology. End-users emphasized the need for collective buy-in across the organization (CFIR – Inner setting), which was facilitated through the technology's ability to address clients' needs (CFIR – outer setting). Staff responsible for overseeing the technology needed to feel confident in using it and have sufficient support (e.g., training; CFIR – characteristics of the individuals), which included having access to the AIR Program implementation specialists who helped with the roll-out of the technologies (CFIR –process).

Conclusions: Stakeholders viewed the AIR Program favorably and valued the implementation specialist's expertise in helping them to pilot new technologies. Our findings will help develop

implementation support tools to ensure successful adoption of technologies in older adult care settings.

Developing a User Interface to Provide Sensor Feedback to Care Partners of Those With Cognitive Impairment (Poster #54)

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Background: Home sensor technology has the potential to collect and return information related to activities of daily living. This feedback could provide useful information to care partners of people living with cognitive impairment. To ensure this information is useful, a method to view and interpret the data is required. In this study, a user interface visualizing sensor data was developed, and care partner opinions were collected.

Method: A preliminary user interface was designed to present care partners with daily and weekly metrics relating to their daily activity and engagement. In this study, participants accessed a 4-week simulated data set via the interface, which represented data that can be collected from home sensors. The goal was to collect information on the utility, ease of use and interpretability of the data. At study onset, participants completed usability testing tasks and the System Usability Scale and provided feedback on the interface at the end.

Results: Three female care partners (age range: 57-71, average: 64), of individuals with dementia living in the community (2 spousal, 1 child), used the interface for 4 weeks. Feedback consistent among all participants was used to modify the interface. Changes included: dashboard layout changes, personalization and added tooltips for clarity.

Discussion: An iterative design process was used to develop an interface presenting data from sensor technologies, with adjustments implemented based on participant feedback. Next steps include: 1) evaluating the modified interface to assess the usability of the changes and improve our application; 2) ensuring the new interface can provide real-time feedback on activities of daily living.

Evaluating Vision-Based Human Motion Encoders for Gait Analysis and Parkinsonism Severity Prediction in Clinical Settings (Poster #55)

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Gait analysis is vital for assessing human movement in healthcare. Computer

vision-based human pose estimation methods show promise for gait analysis, capturing joint positions and movements, making them suitable for motion-related tasks. However, their efficacy in real-world clinical settings remains uncertain due to the unique pathological gait patterns not captured in public datasets. This research investigates vision-based methods for clinical gait analysis and emphasizes the significance of robust human motion prior for understanding abnormal gait patterns. This study aims to evaluate various off-the-self human motion encoders using clinical gait data of older adults, to understand their efficacy in clinical settings and their potential in predicting parkinsonism severity in older adults with dementia. Microsoft Kinect is used to extract joint trajectories from 399 walking bouts of 14 older adults with dementia, annotated with parkinsonism severity scores using the MDS-UPDRS Part III gait subscore. Five open-source human motion encoders (PoseTransformers, MixSTE, PoseFormerV2, MotionBERT, and MoDi) are employed to transform motion data into a rich representation or motion prior. These representations were used to predict parkinsonism scores in natural walking bouts of unseen participants. To evaluate the effectiveness of each motion encoder, we compared the motion priors generated by these five methods and fine-tuned the models to optimize performance. The best model achieved macro-averaged F1-scores of 0.81 for UPDRS-gait prediction, demonstrating the potential of vision-based human pose estimation methods for predicting parkinsonism severity in clinical scenarios. The study highlights the importance of suitable human motion priors for clinical applications such as gait analysis and Parkinsonism score prediction. Using state-of-the-art motion encoders and real clinical data, it offers insights into the practical use of vision-based pose estimation in healthcare, promising improved diagnostics and personalized treatments for movement disorders.

How Vision Loss Affects Older Adults' Narrative Listening Experiences (Poster #56)

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Leisurely reading brings numerous psychosocial benefits to older adults, contributing to cognitive capacity, subjective wellbeing, and longevity. Age-related vision loss may hinder one's ability to read print, potentially limiting engagement with literature. Transitioning from reading to listening to stories offers an alternative way to stay connected with narrative media. However, little is currently known about how older adults engage with spoken narratives, and how vision loss impacts story-listening experiences. This qualitative case study represents an initial step in bridging this research gap. Interviews with older people above the age of 60 years (n = 21; nine living with vision loss) were conducted and analyzed using thematic analysis to identify patterns in responses. Findings show that audiobooks appear to offer low vision and blind individuals analogous engagement experiences as written materials do for their sighted counterparts. However, the onset of vision loss, age, self-perceived ability to access and use technology, device capability, and "reader identity" influence older adults' motivation to engage with

and enjoyment of audiobooks. This work identifies important factors that need to be addressed to respond to the leisure needs of older adults with vision loss and to facilitate optimal user experience and potential benefit for this population. Implications for the quality of life of older people with accessibility needs, such as vision loss, are discussed.

Frailty indicators as contributors to older persons' degree of active living (Poster #57)

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OPAL group

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Background: Frailty, a syndrome, or a classification, is a major concern in aging research. Frailty is a negative biological construct (something to avoid). Others have reframed frailty as intrinsic capacity, a positive biological construct (something to strive for) that is reflected in measures of functional ability.

Both constructs are affected by genetics as well as personal and health characteristics and by features of the environment. Intrinsic capacity, different from frailty, adopts a functioning-oriented approach, based on the World Health Organization's International Classification of Functioning, Disability and Health (ICF), and considers not only physical capacities but also cognitive, sensory, and psychological capacities. Intrinsic capacity/frailty indicators undoubtedly play a role in active living but how they do so is not known and this information would lead to ways of optimizing the capacities of older people to promote active living and of adapting programs to be inclusive. Objective: This study aims to identify the extent to which frailty (intrinsic capacity) indicators contribute to variations in active living among older people 65 years and above. Hypothesis: It is hypothesized that frailty indicators will have a negative effect on active living in a proportion of the population but will not be sufficient to prevent active living in all. Design & Methods: This study is an explanatory cross-sectional study design that will recruit participants from Canada, the U.S.A, the U.K., and the Netherlands via HostedinCanada, a well-known platform that allows for inter-country (online) recruitment. Participants $\geq$ 65 years (n = 210) will respond to several questionnaires in English, French, Spanish, or Dutch language regarding their functional status, Health-related quality of life, cognition, social support, apathetic symptoms and depressive symptoms. The outcome measure is active living (expressed as "ways of being") which will be assessed using the new HRQL-OPAL. Obtained data will be analyzed using descriptive statistics, Statistical Analytical System (SAS), R, and Mplus.

Significance/Expected contribution: The study's findings are expected to reveal the necessary and sufficient contributors to active living information that can serve as a guide for the development of inclusive active living programs to improve the well-being of all older adults. This is an important goal considering that 1.4 billion seniors are expected by 2030. As a physiotherapy leader and emerging African scholar committed to improving the circumstances of older adults, regardless of geographical location, I am well-positioned to conduct this research. I consider it my duty to use this learning

opportunity to inform the development of active living programs that support older adults in less industrialized countries like Nigeria, which has the highest number of older adults in Africa. It is both timely and warranted to understand the contributors of active living programs and use the insights to inform active living programs globally.

MotionAGFormer: A Versatile Two-Stream Model for Efficient and Accurate 3D Human Pose Estimation in Ambient Monitoring Systems (Poster #58)

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Leveraging 3D human body poses holds considerable potential for application in ambient monitoring systems such as fall detection, gait analysis, remote health monitoring, and physical rehabilitation. Currently, 3D pose estimation using transformer-based approaches has seen impressive progress. However, there are two main challenges: either demanding significant computational power for accurate results or leading to erroneous estimates. The computational complexity of transformers arises from their utilization of a self-attention module, which exhibits global dependencies by attending to the entire body structure while estimating a single joint. In this study, we develop a two-stream model. In one stream, we utilize transformers to capture global dependencies and overall patterns in the data. In the other stream, we introduce a novel module called "GCNFormer" (a combination of GCNs and Transformers). This module focuses on the relationships between neighboring body joints, enabling it to grasp more localized and specific dependencies. By merging the two streams, we propose MotionAGFormer, which demonstrates significant improvements over the current state-of-the-art method for 3D human estimation. It requires approximately 3.6 times less computation and fewer parameters while attaining a notable enhancement of approximately 0.8mm in MPJPE (Mean Per-Joint Position Error) on the challenging Human3.6m dataset. Furthermore, we introduce various versions of MotionAGFormer, each serving different purposes. Some models are designed for real-time performance, requiring 37 Million MACs/frame, while others are more complex but offer more accurate estimations. This versatility allows MotionAGFormer to be suitable for a wide range of ambient applications based on specific performance needs.

Two-Eyed Seeing: Co-creating culturally-safe and relevant diabetes care with urban/rural Indigenous Communities in British Columbia (Poster #59)

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Objectives: To improve access to culturally-safe and relevant diabetes and/or weight management care and related health outcomes, five urban/rural BC Interior Friendship and Métis Center communities together with one health authority and university aimed to co-create, implement, and evaluate: (1) a diabetes and weight management workshop for healthcare providers; (2) a culturally-safe telediabetes/weight management service and (3) an implementation toolkit.

Methods: Guided by Two-Eyed Seeing and Indigenous Community-based Participatory Methodologies, the research was conducted with and by Indigenous community leaders, Community Research Liaisons, Elders, Knowledge Keepers, Traditional Healers and community members. Information was gathered and shared through participant Talking Circles, post-clinic surveys, provider interviews, Community Advisory Teams, and, Community Gatherings. Analysis entailed descriptive statistcis and Indigenous-informed consensus-based approaches to thematic analysis.

Results: 10 providers completed a collaboratively-developed UBC-accredited diabetes and weight management training. All 7 respondents rated the workshops as above average or excellent. After six months all 6 respondents continued using this knowledge. 3 communities implemented telediabetes clinics serving 17 (14 female) participants over 36 appointments. Telehealth participants reported improved care and health ouctomes, including feeling safe to share, being heard and listened to by providers. Additional themes revealed the impotance of weight management, and need for Traditional healing and mental wellness supports. Additionally, a community-owned resource was co-developed, which stories communities' journey towards delivering culturally-safe tele-diabetes and weight managment clinics, as a how-to-guide for other communities.

Conclusions: Indigenous-led community-based telehealth clinics can provide improved access to culturally-safe and relevant diabetes/obesity care for Urban Indigenous Peoples.

Acquisition and Use of Assistive Technology from the Perspectives of Older Adults With Multiple Sclerosis Living in Ontario (Poster #60)

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Objectives: As part of a larger study on assistive technology (AT) acquisition, we gathered the AT-related experiences of older adults with MS living in Ontario, including acquisition processes, financial issues, usefulness for engaging in daily activities, and aging-in-place.

Methods: Photovoice plus two 60-minute, in-person, semi-structured interviews were used to gather data. Participants (n= 12) were instructed to take photographs of their AT between the two interviews. Photograph meaning and content drove the second interview discussion.

Results: Preliminary data analysis suggested that older adults with MS can age-in-place and had varying AT experiences. Participants generally felt that the AT they owned and used matched and supported their needs for engagement in daily activities. Participants varied in need for and use of financial aid to acquire AT, with most being privately purchased. Participants' financial restrictions or ineligibility for funding contributed to inability to acquire needed AT. Healthcare providers (OT, PT, neurologist) and non-medical caregivers assisted in accessing AT, with some being acquired second-hand. Photovoice data included photographs of equipment and adaptations to support mobility, self-care, and home management.

Conclusions: Preliminary conclusions suggest that older adults with MS can age-in-place in their homes and communities with the assistance of AT that matches and supports their needs for engagement in daily activities. There is, however, a need to follow-up with AT providers (OT, PT, retailers) and for a review of funding programs and insurance policies, to determine the gaps in the AT acquisition process for older adults with MS living in Ontario.

Streamlining Frailty Assessment Using a Fully Guided Smartphone/tablet Application: Validation of the Fit-Frailty App in a Geriatric Clinic (Poster #61)

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Background: The Fit-Frailty App is a comprehensive measure of frailty utilizing fully guided, interactive smartphone/tablet technology. It was designed to be easily completed with older adults in clinical/research settings in ~15 minutes. Scoring is based on the well-validated Rockwood Frailty Index method and considers disease-related, physical, cognitive, mood, psychosocial, nutritional, and functional aspects. The full assessment includes interactive cognitive screening and physical performance measures.

Objective: To conduct a validation study of the Fit-Frailty App in older adults attending a geriatric clinic.

Methods: A convenience sample of 75 patients over age 65 attending a geriatric clinic in Hamilton, ON were recruited between Feb-Dec 2021. A clinic nurse administered the App with the patient during their clinic appointment. A paper-based tool collecting similar items from the clinician's comprehensive geriatric exam (FI-CGA) was used as a comparator. To examine concurrent validity (i.e., agreement between App and FI-CGA), intraclass and Pearson correlation coefficients, and 95% confidence intervals were calculated (SAS version 9.4). Results: The sample was 53% female, mean age 79.2 (SD=7.03) and SMMSE 23.8 (SD=5.52). The mean App and FI-CGA scores (on a continuum of severity from 0-1) were 0.33 (SD=0.13), and 0.28 (SD=0.11) respectively, indicating frailty. The App presented comparable results (moderate to good validity; ICC=0.65, 95%CI=0.50-0.76) when compared to FI-CGA and there was strong association between the two measures (r=0.74, 95%CI=0.62-0.83).

Conclusions: The Fit-Frailty App was a valid measure of frailty in older adults attending a geriatric clinic. App assessment can assist healthcare teams in developing treatment plans and measuring change.

Real-time Recognition of Lower Limb Rehabilitation Exercises Using 3D Neural Networks (Poster #62)

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Objectives:
The main objective of this study is to propose a novel deep learning model to automatically identify different lower-limb rehabilitation exercises. This will facilitate real-time exercise monitoring for tele-rehabilitation platforms to be used at home.

Methods:
The dataset published by Wijekoon et al. was used in this study. This dataset consisted of depth and pressure video data from 30 healthy participants while performing 7 different lower-limb rehabilitation exercises. Each exercise was performed for up to 60 seconds. Depth videos had a resolution of 16x12, zero-padded to 16x16 pixels. Pressure videos were in 32x16, zero-padded to 32x32. Both data were recorded at 15Hz. Each video file was divided into 5-second segments with a 3-second overlap. A pre-trained 3D Convolutional Neural Network (CNN) model was used to identify the types of exercises.

Results:
The models were validated based on Leave Multiple Subjects Out (LMSO) cross-validation with 6 groups of 5 subjects. The proposed 3D-CNN achieved an F1-Score of 91.82% and 75.35% in identifying exercises using depth and pressure data, respectively.

Conclusion:

According to the results, the proposed model outperforms the previously proposed 1D- and 2D-CNN models by Wijekoon et al. These models use selected depth and pressure frames as the input, whereas the 3D-CNN can analyze data in both spatial and temporal dimensions. Results suggest that the integration of this method into tele-rehabilitation platforms could be effective since it is capable of monitoring exercises in real time with high accuracy.

Accessible Spaces in All the Right Places: Understanding Employers' Perspectives on Workers with Mild Cognitive Impairment or Dementia (MCI|EOD) (Poster #63)

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Objectives: The study aims to address the anticipated increase in employees identified with mild cognitive impairment or dementia (MCI|DEM) in an aging workforce. Despite this trend, minimal research explores the impact of these disabilities on operations, productivity, and necessary accommodations by employers.

Methods: Instrumental case studies were conducted with two Canadian employers (E1 and E2) to 1) Understand employers' perspectives on workers with MCI|DEM, 2) Identify organizational factors and externalities influencing accommodation, and 3) Assessing technology use for accommodating these workers. Eligible employees familiar with their organization's corporate culture and operations completed a demographic survey and an in-depth, semi-structured interview (~60-minutes). Thematic analysis using both inductive and deductive techniques informed by Sociotechnical Systems Theory was employed for qualitative data analysis. Results: E1 (N=56), federally regulated with over 40,000 employees, and E2 (N=31), provincially regulated with over 100,000 employees were studied. Both organizations employ workers across Canada. Analysis of 87 interviews revealed common themes such as corporate risk, technology and resource limitations, awareness training, stigma, trust, and disclosure. These factors influenced employer's readiness to support workers with MCI|DEM. Type of industry, policy environment, legal precedent and technology innovation also shape priorities.

Conclusions: The study underscores the importance of workplace preparedness for an aging workforce and the importance of proactive measures to accommodate workers with MCI|DEM who wish to remain productive in the workforce.

Preliminary findings for a scoping review of reviews on assistive technology to

support dementia management (Poster #64)

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Objective: Assistive technology (AT) plays a vital role in dementia management at home. In Canada, more than 60% of persons living with dementia (PLWD) reside in their own homes, and over 25% rely heavily on their care partners (i.e., family or friends) for daily activities. PLWD and their care partners often require multiple types of AT to maintain dignity and autonomy. Wheelchairs, medication reminders, appliance monitors, wayfinding devices and mobile applications for navigation assistance may be considered AT, involving access to the product and assessment, training, maintenance and follow-up. AT for dementia management is rapidly developing with an abundance of published literature, which can be challenging to navigate and extract valuable insights. Our scoping review aims to synthesize review-level evidence, map AT types and characteristics, and identify research gaps on AT to support dementia management.

Methods: Our review will follow the Joanna Briggs Institute's methodological framework for conducting scoping reviews. Six electronic databases were searched from inception to July 2023. Three reviewers will independently screen citations at the title and abstract level, followed by full-text screening. Results will be charted, collated, and summarized in tabular and narrative format. The authors and project advisory committee, which include PLWD, care partners, researchers, and representatives of partner organizations, will contribute to knowledge exchange.

Results: A total of 10,978 unique citations were identified. The following data will be extracted: (1) article characteristics and information, (2) Types of AT products, services, and characteristics (3) setting and population characteristics, and (4) challenges and strategies for implementation, adoption, and engagement with AT. We plan to complete our review by July 2024.

Conclusions: Our review will provide a comprehensive documentation of AT for dementia management. The mapping of AT types and characteristics will allow for navigation and extraction of valuable insights for policymaking and personal decision making.

Impact of Dementia TV videos, Tailored for People Living with Moderate to Severe Dementia in Care Settings (Poster #65)

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Objectives This study evaluated how smart TV videos tailored for people with moderate to severe dementia can support the psychosocial needs of this population in care settings.

Method: Zinnia TV videos (tailored for dementia care) were implemented at two care sites, a long-term care home and an in-patient geriatric unit. We used the Kitwood model of psychosocial needs (comfort, attachment, inclusion, occupation, and identity) as our study's guiding framework to inform data collection and analysis. We conducted audio interviews with seven family members and 18 interdisciplinary staff, and video interviews with 16 residents engaging with the TV videos. We asked interviewees whether the videos brought changes to residents/them, and if so, what the changes were. We performed a thematic analysis using a mix of inductive and deductive approaches.   Results We found the TV videos supported the psychosocial needs of patients and residents, creating a calming and relaxing atmosphere, initiating authentic engagement between staff and residents/patients, allowing staff and residents to become more familiar with one another as individuals, allowing residents to build relationships with another in group settings, keeping residents engaged, and promoting inclusion of residents living with diverse cognitive abilities. To summarize, we found that the videos addressed the psychosocial needs of a highly marginalized population.

Conclusions The videos were found to have a positive impact on the psychosocial needs of residents with moderate to severe dementia in care settings. Future research should further explore innovative strategies to overcome implementation barriers of dementia TV in care settings.

A Systematic Review of Voice Payment Systems for Users with Cognitive Disabilities: Usability, Accessibility, and Design Recommendations (Poster #66)

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Objectives: Persons with cognitive disabilities use Information and communication technologies (ICT) for their mainstream use, but also as assistive tools for daily living, including for facilitating health and time management, or social interactions. It's reported that people with cognitive disabilities, particularly intellectual disability, prefer the use of voice interfaces over typing when engaging with information and communication technology (ICT). However, this preference raises data privacy and security risks, especially for sensitive banking information. This paper presents findings from a scientific

literature review on user preferences and challenges associated with conversational interfaces for users with cognitive disabilities. It also provides technical design recommendations for conversational interfaces, in general and in relation to voice payment systems. Methods: A search strategy was developed for a critical review of evidence in the area of voice payment systems and cognitive accessibility. Databases were selected to reflect a multidisciplinary approach (e.g., computer engineering, cognitive psychology, human-computer interactions). Articles were screened according to a set of inclusion criteria and data was extracted based on the following themes: user's journey; cognitive accessibility barriers; technical aspects. Results: We classified identified barriers and important considerations for the cognitive accessibility of voice payment systems into the following themes: Language and speech recognition, complexity and problem-solving, access to training and support, impact of external factors on voice recognition and security and privacy.

Conclusions: Persons with cognitive disabilities often report barriers to accessibility for conversational interfaces and voice-activated intelligent personal assistants. Despite potential barriers, persons with cognitive disabilities expressed basic interest and motivation to use novel technical solutions.

Estimation of Outdoor Street Crossings Safety and Usability for Pedestrians Using YOLOv7 and DeepSORT Algorithms (Poster #67)

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Abstract: Pedestrians (including wheeled mobility device users) can face safety and usability challenges at street crossings because of the inherent risks associated with environmental conditions and by interactions with other road users (e.g., bicycles, vehicles). Each of these external factors have both physical and psychological influences on the perceived safety and risk of fall and injury, which can be heightened for individuals with mobility limitations. As a result, many older adults and persons with disabilities choose to reduce their outdoor activity levels and become more isolated in their homes, restricting their daily mobility, and potentially triggering a downward spiral of deconditioning, frailty, and physical decline. To date, pedestrian usability challenges at street crossings have been primarily understood through manual observational methods, which would be considerably improved by using more empirical analyses. The objective of this project is to automate the assessment of pedestrian behaviour at street crossings in urban environments to help understand the challenges faced by pedestrians, particularly individuals with the greatest safety or usability concerns. Computer vision approaches including YOLOv7 and DeepSORT will be used automate the detection and measurement of pedestrian

walking speed and trajectory, as well as the classification of conflicts between pedestrians and other road users. The preliminary results of this project show potential to provide new automated observation tools for evaluating the safety and usability of street crossings so that the complex relationship between pedestrians and the built environment can be better understood and limitations in current infrastructure design and/or maintenance can be addressed to make safer and more accessible for all individuals.

GARDEN Framework for Rehabilitation Game Design: Interdisciplinary Refinement for Framework Implementation (Poster #68)

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Objective: To support design of rehabilitation games for older adults as both effective therapy and compelling experience, co-creation of the GAmes for Rehabilitation DEsign Nexus (GARDEN) Framework conceptually integrates these goals. This study refines the initial framework using a diverse group of experts.

Methods: A 3-round modified online Delphi process incorporated rehabilitation experts (n=11), game developers (n=8), and end-users who play games for health (n = 14). Participants reviewed the framework conceptual diagram, text and video explaining each component, and feedback and revision summaries. In each round, participants rated the framework on representativeness, logical consistency, comprehensibility, and conciseness using 5-point Likert scales. Additional open-ended items gathered explanations and suggestions. Likert responses were collated, with no further revision needed when components achieved consensus (≥ 80% neutral/agree/strongly agree). Content analysis of open comments informed framework revisions between rounds.

Results: The consensus process produced a finalized GARDEN Framework including four design layers (end-user, rehabilitation game structure, dynamic interaction incorporating therapeutic activity, and emotional experience) and three relational components (end-user

alignment, interface, and motivation). Content analyses identified limitations in representation and logical consistency of relational components. Relational components of the conceptual diagram were revised to be more explicit and clear. Textual documents were revised with more thorough examples. Additional concepts were included to improve representativeness.

Conclusions: The finalized GARDEN Framework is ready for application as both a design tool, for integrating rehabilitation and game design perspectives among interdisciplinary development teams, and an evaluation tool for measurement and reporting in rehabilitation games research. Future work will explore development of a community of practice around the framework. Framework documents will be further developed into toolkits for knowledge mobilization. Lessons learned from future framework application may reveal opportunities for further improvements.

Factors That Influence the Usability of the Telecare App for Older Adults who are Aging in Place (Poster #69)

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Displayed on October 26, 2023 from 12:30pm – 1:30pm ET

Introduction: Access to telecare technologies is vital to guaranteeing aging in place with safety and quality of life. It is a fundamental requirement that telecare technologies adapt to the needs of older adults, the context of the culture, and their expectations and concerns. Therefore, it is interesting to investigate the device's usability to know to what extent the technology can be used by specific users and in a particular context.

Objective: Determine what factors influence the usability of the telecare App for older adults who age in the place.

Method: In this qualitative study, we recruited 30 aging-in-place older adults between the ages of 65 and 85, having the same ratio of women to men. Each participant downloaded the "MeCuido" telecare application on their mobile phone and was invited to carry out preset usability tasks of the App for 60 minutes. The participants participated in an individual interview when the usability tasks were finished. The interviews were recorded, transcribed, and analyzed using the NVivo 11.0 Pro software.

Results: Three generic categories that influence the usability of the telecare App by older adults who age in the place were identified: Personal characteristics of the older adults: economic situation, educational level, functional difficulties such as limitation in fine motor skills and low vision. ; Emotional aspects of older adults: motivation and initiative to use, perceived usefulness and emotion of use; App design features: Importance of font size and color in the App, App terminology, Help messages, and App system security.

Conclusions: The results of this study can help health professionals and technology designers to understand the expectations and factors that influence the usability of older adults with telecare Apps. Usability studies are crucial to determine the

acceptability of technology for older adults.

Perceptions of a Community Delivered Stroke Intervention Using a Smart Mirror (Poster #70)

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Objectives: The effectiveness of virtual rehabilitation may be limited due to suboptimal delivery using existing technologies, such as small screen sizes, limited camera view, and a limited feeling of presence in the environment. A smart mirror is a two-way mirror with an inbuilt display behind the glass and may potentially improve virtual rehabilitation experiences. In this study, we: 1. Assess the unmet needs of virtual rehabilitation in older adults with stroke after participating in existing virtual rehabilitation and 2. Examine how unmet needs might be addressed using a smart mirror.

Method: This qualitative study used semi-structured interviews with 15 participants who previously experienced virtual rehabilitation and 9 Physical Therapists who delivered virtual rehabilitation.

Results: Our analyses identified three categories: 1) challenges and desires for virtual rehabilitation, 2) feedback on a current virtual rehabilitation intervention, and 3) expectations and concerns for a smart mirror. A smart mirror is perceived to combat challenges with current hardware, offer more flexibility to address personal health goals, and be more engaging. The usability and affordability of a smart mirror for older adults post-stroke are perceived as potential challenges.

Conclusion: Services will benefit from this project by gaining valuable new knowledge about a smart mirror and its potential benefits to the health system (e.g., as virtual rehabilitation hardware).

Exploring the Association Between Driving Space, Age, and Preclinical Alzheimer's Disease in Cognitively Normal Older Adults (Poster #71)

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Objectives: Driving is one of the most common forms of transportation and mobility in older adults and has been shown to differ between individuals with and without biological markers of preclinical Alzheimer's disease (AD). This study specifically aimed to investigate the association between driving space and age in cognitively normal older adults with and without preclinical AD.

Methods: As part of a longitudinal study on driving and preclinical AD at Washington University School of Medicine, temporospatial driving

behaviours were collected from 2015-2020 from 150 cognitively normal older adults aged over 65. Amyloid biomarkers derived from cerebral spinal fluid were used to identify early biological changes associated with AD. The home location of each participant was estimated as the most-visited location, and the maximum distance driven from home was measured. An analysis of covariance model was used to explore the relationship between driving space and age for individuals with and without preclinical AD. Results: The analysis revealed a significant decline in the maximum distance travelled from home with increasing age for participants with early signs of AD compared to participants without preclinical AD.

Conclusions: Our findings indicate that cognitively normal older adults displaying early signs of AD experience reduced mobility and driving space as they age. Identifying these differences in driving behaviours can assist in identifying at-risk individuals and contribute to a better understanding of how preclinical AD impacts behaviours on the roads. These insights can play a crucial role in enhancing road safety and developing appropriate measures to support older adults with preclinical AD in maintaining safe mobility.

Cloud Native Remote Monitoring Data Ecosystem for Aging Population based on Commercial AAL Sensors (Poster #72)

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In the recent years, Active Assisted Living (AAL) technologies used for autonomous tracking and activity recognition have started to play major roles in geriatric care. From fall detection to remotely monitoring behavioral patterns, vital functions and collection of air quality data, AAL has become pervasive in the modern era of independent living for the elderly section of the population. However, even with the current rate of progress, data access and data reliability has become a major hurdle especially when such data is intended to be used in new age modelling approaches such as those using machine learning. This poster presents a comprehensive data ecosystem comprising remote monitoring AAL sensors along with extensive focus on cloud-native system architecture, secured and confidential access to data with easy data sharing. Results from a validation study illustrate the feasibility of using this system for remote healthcare surveillance. The proposed system shows great promise in multiple fields from various AAL studies to development of data driven policies by local governments in promoting healthy lifestyles for the elderly alongside a common data repository that can be beneficial to other research communities worldwide.

In Bed Body Posture Monitoring for Pressure Injury Prevention Among Seniors with Frailty: A Pilot Study (Poster #73)

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The prevalence of Pressure Injuries (PIs) is highest among seniors with frailty due to factors such as muscle loss, fatigue, and reduced physical activity, leading to a decline in their ability to preserve tissue integrity. The most common method for preventing PIs is to redistribute the body pressure through frequent repositioning. The primary objective of this project is to present an innovative solution for remotely monitoring seniors' body positions in bed. This system can notify the care partner/care givers to reposition the body only if required. This will help to minimize sleep disruption and will also decrease the workload of the care providers. Data from 10 participants was collected using a pressure mat in four common in bed body postures – supine, prone, right-side, and left-side. The pressure data was utilized to train a Convolutional Neural Network (CNN) for classifying the four postures. The study compared the results of participants using a pillow and blanket with those of participants lying down on an empty bed. Using a leave-one-subject-out cross validation technique, we achieved an accuracy of 88.87% ± 12.80% and 89.88% ± 13.47% with and without a pillow and blanket, respectively. The results showed that the addition of common sleeping devices, such as pillows and blankets, did not have significant impact on the body posture classification performance. This algorithm can provide a basis to determine how long the senior is lying in one position and prompt family members or caregivers to repositions them to prevent the possibility of PI development.

The Experiences and Challenges of Family Caregivers Using Telepresence Robot with Residents with Dementia at Long-Term Care Homes (Poster #74)

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Family caregivers of residents with dementia living at Long-term care (LTC) homes face multiple challenges, including role transition, mental health (e.g. anxiety and burnout) and competing commitments (e.g. work and social life). There are growing research focus on families using technology to navigate their care delivery. However, limited studies explored the positive experiences and challenges of family caregivers using telepresence robot affected in their online communication with residents with dementia living in LTC homes. Our study

implemented 20 telepresence robots at five LTC homes in BC. The team conducted observation and semi-structured interviews with family caregivers, staff and operation leaders. Thematic analysis was performed and four themes were identified: The telepresence robot helps to 1) relief the mental burden of family caregivers; 2) enhance the trust and transparency in the partnership between staff and family; 3) uphold the dignity of residents in a technology-facilitated connection and improve the autonomy in family relationship; and 4) support family caregivers to better manage their competing commitments and render more creative and joyous virtual visitations. Challenges identified are 1) complexity in the family relationships: the robot has limited impact on solving existing challenges between family members; 2) complexity in the environment: implementation of robots requires seamless and ongoing coordination between the staff, residents and family caregivers. Our findings further challenged our assumptions about the view from family caregivers and residents towards privacy. Future studies should investigate how telepresence robots address unmet needs of family caregivers under various care settings and situations, and how robots enhance the well-being of residents with dementia in LTC homes and family caregivers.

Human-computer Interactions and Compassionate Healthcare: A Wizard of Oz Study Using a Self-administered AI-assigned Cognitive Assessment (Poster #76)

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Objectives: Artificial intelligence (AI) is increasingly being used in medical assessments, including those related to cognition. We have previously developed a platform, CANARY, leveraging machine learning (ML) mediated analysis of speech and eye movements to classify individuals with Alzheimer's disease versus healthy controls. A remote AI-assisted automated version of this assessment, which engages users in a series of reading and descriptive tasks, has been recently developed. In determining strategies to maintain compassionate care while incorporating automated cognitive assessments for ageing individuals, we investigated the experiences of various stakeholders (patients, caregivers, healthcare providers) with the remote AI-assisted CANARY platform.

Method: We used the Wizard of Oz technique in human-computer interaction research, a method in which a user interacts with a simulated AI manned by a human who controls the system responses. Twenty-four participants (6 patients, 6 healthy controls, 6 caregivers, and 6 healthcare providers) were assessed at home while the assessor joined remotely. All participants completed a survey on their experiences. Sixteen participants joined focus groups, and the

conversations were recorded and transcribed using thematic analysis.

Results: Due to the small sample size, we examined effect sizes only. Trust scores were slightly lower (8.09) compared to Compassion scores (8.72), with strong effect size. Participants who used the simulated chatbot during assessment scored lower on Usability (7.33) than those who didn't (9.20), with a strong effect size. Themes that emerged from the focus group discussions included (1) skepticism of the capacity of AI for genuine empathy, (2) benefits and challenges of incorporating AI into cognitive assessments while delivering compassionate care, and (3) the importance of striking a balance between AI-related automation and human interaction.

Conclusions: Our study highlights the need for further exploration of careful design and implementation of AI in cognitive assessments while maintaining compassionate care.

Identifying a Built Environment Framework and the Effects of Different Built Environment Measures on Driving Behaviours of Cognitively Intact Older Adults (Poster #77)

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Driving is an important factor for preserving independence as we age, and it remains the prevailing mode of transportation among older adults aged 65 or older in North America. Age-related changes can affect driving ability due to cognitive and physical factors. Driving has multiple dimensions, including experience, cognitive abilities, physical health, and the built environment in which individuals live all of which influence road safety. In this study, we will evaluate the extent to which passively collected driving GPS data along with GIS (Geographic Information System) methods can enhance the evaluation of driving behaviours among older adults. The specific aims are to (1) develop and validate a comprehensive framework to identify and measure different dimensions of the built environment and (2) determine the effects of each built environment measure on older adults' driving behaviour.

To effectively analyze the driving behaviour of older adults, we propose a comprehensive set of indicators that characterize different dimensions of the built environment including land use mix, public transit density, and road network intersection density. The driving indicators capturing geospatial aspects of trips encompass total driving distance, the ratio of trips ending within 1.6 km to the total number of trips over the study period. To analyze the data, we employed Gradient Boosting Machine (GBM). GBM models were trained for each driving measure. The relative importance of each built environment variable was determined, highlighting their impact on driving behaviour.

The results indicate that public transit density is the most influential factor in the total driving distance model with a relative importance of 0.41, followed by land use mix (0.36). In the ratio of trips ending within 1.6 km to the total number

of trips, public transit density has the highest relative importance (0.55), and land use mix is the next important feature (0.24) followed by intersection density (0.21).

Older Adults' Naturalistic Driving Behaviours: Navigational and Maneuvering Driving Patterns (Poster #78)

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Background: Driving is the primary mode of transportation for older adults, enabling independence and social engagement. Personalized driving aids and assessments tailored to individual capabilities are essential for maintaining their overall well-being and road safety simultaneously.

Objective: This research aims to develop algorithmic tools to study and analyze the navigational choices and driving maneuvers of older adults in real-world settings using advanced mobile technologies. The primary objective is to create a toolkit that identifies crucial driving maneuvers for older adults, characterizes various maneuver types, and analyzes driving patterns. By applying this framework to a dataset of naturalistic driving data, the study seeks to uncover specific driving behaviours that may challenge older adults and develop effective strategies to mitigate these challenges.

Methods: Data collected over a month from one participant includes a video dataset with GPS chips, cameras, inertial sensors, and the Controller Area Network (CAN) bus. Advanced algorithms employing hashing and clustering techniques identify the most common path for the participant, while map-matching and GPS turn angle analysis detect occurrences of merges and turns. Personalized outliers during critical maneuvers, such as variations in speed, accelerometer readings, and wheel angles, are also taken into account.

Results: Insights extracted from the data help identify patterns and trends in navigational and maneuvering driving behaviours, such as variations in route choices and risk scores while taking the most common path. This enables the design of effective interventions and aids aimed at enhancing the safety of older drivers.

Conclusion: In conclusion, this research presents a comprehensive algorithmic analysis of older adults' driving behaviours using cutting-edge technologies. The developed toolkit provides valuable insights into challenging driving behaviours, guiding the formulation of targeted strategies to improve older adults' road safety while preserving their mobility and social engagement.

"Whose Ethics Inform That Code?" An Analysis of International Social Robotics Policy in Consultation with the Aging and Dementia Community (Poster #79)

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Objectives: Social robots are a promising assistive technology to support older adults in home and healthcare environments. We capture the current social robotics policy landscape, identify misalignments between policies and end-user needs, and create evidence-based policy recommendations for implementation of social robots for aging.

Method: A content analysis of n = 47 international policies on social robotics was carried out and findings were synthesized. Semi-structured interviews were conducted with lived experience experts within the dementia and care partnership community (n = 11) and professional experts in the field of aging and dementia (n = 7) to explore perspectives on the current state of the social robot policy.

Results: Interviewees viewed social robots as potentially helpful assistive technologies and agreed with existing recommendations around needs for respect for human rights and dignity, clear, consistent regulation, and public engagement processes. Participants recommended that policies prioritize cost and accessibility considerations and that they center issues of aging and dementia. They reported that the responsibility for social robot policy development should lie with governments and the healthcare sector and called for increased consultation with end-users and medical professionals.

Conclusions: We identify misalignments between the priorities of aging and dementia community members and the existing social robot policy landscape. Potential harms and challenges to adoption of social robots are considered, including discrimination, bias, and deception. We discuss recent developments in artificial intelligence for social robotics and make recommendations based on identified gaps in policy.

Hearing Aid Accelerometry Can be Used to Document Clinical Assessment Scores (Poster #80)

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Introduction: Measures of physical performance and physical activity provide

indications of health, functioning and overall activity. Quantitative clinical assessments specifically document fall risk and frailty yet require patients to complete face-to-face or virtual assessments. Many aging adults require hearing aids (HA) and these devices now include accelerometers that could be used to document postural transitions and stepping activity.

Methodology: We determined whether accelerometry data from hearing aids could be used to document scores on four clinical assessments: five time sit-to-stand (5xSTS), 2 and 6 minute walk, timed up and go (TUG). HA results were compared to scores from clinical evaluations.

Results: Sit-to-stand transitions and stepping behaviour are evident in the vertical accelerometer data for both 5xSTS and TUG data. Preliminary data show that step count results from left and right HAs are consistent. Additional improvements to the accelerometer algorithms are being implemented in order to maximize accuracy, sensitivity and specificity.

Discussion: Although hearing aids take some time to get used to, they help users hear better and feel connected to others. Using HAs as wearable technologies for mobility and function extends their value to the user. Pedometry assessment through hearing aid-based accelerometers is feasible for healthy adults. Further development of the algorithms will be completed on datasets from older adults with mobility impairments.

Determination of an Optimal Cut off Score for Pain Detection by an Automated Computer Vision System Designed to Monitor Pain Behaviour in Older Adults with and without Dementia (Poster #81)

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Regular use of standardized observational tools utilizing nonverbal behaviours in pain assessments result in improved pain care for older adults with severe dementia and limited ability to communicate. While frequent monitoring of pain behaviours in long-term care is constrained by resource limitations, computer vision technology has the potential to mitigate these challenges. An algorithm designed to assess facial pain expressions in older adults with and without dementia was recently developed and validated against videos of older adults displaying pain (Rezaei et al., 2021). We conducted the first live and real-time evaluation of the algorithm in the laboratory with a sample of community-dwelling older adults. Three safely-administered thermal pain tasks were completed while a computerized system, that incorporated the algorithm, automatically processed facial pain activity. Pain detection occurred when system generated pain scores based on facial pain activity exceeded a predetermined threshold score based on prior analysis. Our aim was to determine an optimal threshold score in identifying pain. Receiver Operating Characteristic (ROC) curves were used to establish the pain threshold score. Gender differences

were explored. Results for various cut offs will be presented. While average pain scores remained homogenous between genders, results from ROC curve analyses suggest that the system achieved a greater area under the curve (AUC) value for women compared to men when examining potential pain threshold scores, suggesting that the algorithm performs better at discriminating pain from non-pain for women. These findings will be used to further refine the system prior to field testing in long-term care.

Integrating Daily Rituals into the Design of Assistive Technologies for People with Dementia – A Scoping Review (Poster #82)

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The study presents the findings of a scoping review that aims to investigate the role of integrating daily rituals into assistive prompting technologies for people living with dementia (PwD). The scoping review involved a systematic search of electronic databases which yielded 19 articles. Thematic analysis was used to find recurring patterns and themes across the literature. Three main themes emerged from the analysis. First, multimodal, personalized, and context-specific prompts which are tailored to the unique needs, preferences, and abilities of PwD improve engagement, autonomy, and independence. This is especially true when these prompts also integrate cultural, personal, and social aspects of daily rituals. Second, when components of daily rituals like routines and habits are supported by assistive technologies, it creates familiarity, structure, and a sense of continuity. This has a positive impact on emotional wellbeing and in some cases, improves cognitive functioning. Lastly, daily rituals facilitate the development of relationships between PwD and their caregivers as well as their environment. This promotes a sense of belonging and leads a more supportive care environment. The integration of daily rituals also leads to better habituation and adoption of assistive prompting technologies. Insights from this review are helpful for considering how daily rituals can be integrated in the design of assistive technologies for people with dementia.

Promoting Engagement in Social Robot Research: Lessons from the DISRUPT Workshops (Poster #83)

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Objectives: Developing technologies to support healthy aging requires effective engagement with end-users. In social robot (SR) research, engaging with experts

by discipline and/or life experience is critical to ensure outcomes are person-centered and meaningful. The present case study for research engagement outlines the opportunities, challenges, and successes of using collaborative workshops in the AGE-WELL DISRUPT project.

Method: We conducted 3 brainstorming workshops with 15 participants representing academia, industry, healthcare, and an older adult advisory group. Activities included presentations, facilitated discussions, and unstructured robot interactions, followed by an asynchronous post-workshop review activity.

Results: Presentations showcased academic and industry research, and the advisory group chair delivered a powerful presentation of real-world SR use, and reflections on experiences as a research partner. In-person interactions with SRs offered tangible experiences of SR functionalities in individual and social contexts. Hybrid activities provided diverse opportunities for engagement with all participants, and complemented knowledge exchange. Trainees maximised opportunities to hear from experts and learn about end-user centered research. Challenges included resource allocation, availability and time commitment, and location. The need to measure and evaluate the impact of SRs for older adults in real-world settings emerged as a theme for future research.

Conclusions: Workshops are an effective method for engagement in SR research and honour the core ethical principles of participation: mutual respect, equitable participation, reciprocity, and integrity (CIHR, 2020). Activities facilitate reflection, knowledge sharing, relationship building, and forward planning. Future activities within the DISRUPT suite of projects will build on the collaborative ties and the thematic outcomes established during the workshops.

Indicators of Successful Implementation of Digital Technologies for Older Adults (Poster #84)

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The critical importance of technological innovation in home care for older adults is indisputable. Less well understood is the question of how to measure its performance and impact on the delivery of health care to older adults who are living with chronic illness and disability. Knowing how well digital technologies, such as smartphones, tablets, wearable devices, and Ambient Assisted Living Technologies (AAL) systems "work" should certainly include assessing their impact on older adults' health and ability to function in daily living but that will not guarantee that it will necessarily be adopted by the user or implemented by a healthcare facility or the healthcare system. Technology implementation is a process of planned and guided activities to launch, introduce and support technologies in a certain context to innovate or improve healthcare, which delivers the evidence for adoption and upscaling a technology in healthcare practices. Factors in addition to user acceptance and clinical effectiveness require investigation. Failure to appreciate these factors can result in

increased likelihood of technology rejection or protracted procurement decision at the 'adoption decision' stage or delayed or incomplete implementation or discontinuance (following initial adoption) during implementation. The aim of our research to analyze the research available to address the question, "What are the indicators of successful implementation of digital technologies for older adults?" We reviewed studies of the effectiveness of these technologies and examined the relevance of their findings for successful implementation in appropriate settings. In our analysis, we looked for evidence that researchers considered well-documented implementation factors in their studies. We found common problems with the conceptualization, design, and methodology in studies of digital technology that have contributed to the slow pace of implementation in home care and long-term care. We propose a framework for improving the quality of research in this critical area.

In-Home Classification of In-Home Activities with Ultra-Wideband Localization (Poster #85)

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Introduction: Monitoring and classifying ADLs in the home can aid with detecting physical and cognitive decline in older adults. Currently, in-home monitoring devices lack the resolution and real-time feedback to provide information on functional activities in the home. This research aims to develop machine learning models to identify in-home activities from position data from a wrist worn ultra-wide band (UWB) localization system combined with inertia measurement unit (IMU) data.

Methods: A UWB localization system was installed in a simulated condo at the Glenrose Rehabilitation Hospital. Position and acceleration data was collected from a young healthy 21-year old male participant. Seven different activities were completed including walking, resting, transfers, eating, mopping, wiping and doing dishes. Data was used as training and testing data to develop machine learning models including linear and polynomial support vector machines (SVM), random forests, decision-trees and K-nearest neighbor models. Features were developed from the data over a 1-4 second time compared with a video recording as the gold standard. The five machine learning models were tested to determine the which method yielded the highest classification accuracy.

Results: The model with the highest accuracy was a linear support vector machine with a 3-second window at 96.4%. The most successful classifications were eating and dishwasher usage (100% and 99.7% respectively) while transfers from sit-to-stand or stand-to-sit and mopping were least successful (65.6% and 94.6% respectively). Transfers had lower classification accuracy likely due to the short duration of each transfer.

Conclusions: A machine learning model successfully used UWB and IMU data to classify activities for one participant. Next stages of this project include expanding the number of activities and evaluating the device on a larger range of participants, specifically with older adults.

Wearable Bioelectronic Balance Restoration in Older Adults (Poster #86)

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Objectives: Although many factors influence balance decline in older adults, a primary contributor is age-related changes in the vestibular balance system, which trigger accompanying dysfunction and adaptive plasticity in sensory, motor, and cognitive performance. This poster will present results from successful pilot deployments of NEURVESTA, the first wearable bioelectronic device that provides both quantitative assessments and neuroplastic restoration of degraded balance.

Methods: Pilot deployments were carried out at the University of Calgary Human Performance Lab and 2 residential senior living organizations in Calgary. Fifty adults aged 50-90 with no clinically diagnosed balance impairments were recruited and randomly assigned to therapeutic stimulation and sham stimulation groups. Both groups received three 20-minute stimulation sessions per week over a 6-week period, underwent instrumented balance, gait, and fall-risk assessments before and after each session, and completed ambulatory confidence and physical activity questionnaires before and after the 6-week intervention. The therapeutic treatment utilized low level electrical vestibular stimulation (EVS), a safe and well-tolerated form of non-invasive transcranial electric stimulation that has previously been investigated to mitigate the "accelerated balance aging" suffered by astronauts exposed to microgravity. The NEURVESTA device uses a proprietary wideband stochastic EVS stimulus developed in a collaboration between Neursantys, Inc. and the University of Calgary Human Performance Lab with funding from Mitacs and the Canadian Space Agency.

Results/Conclusions: No significant changes were observed in the sham stimulation group. The therapeutic stimulation group demonstrated significant enhancements in balance, gait, and self-reported ambulatory confidence, and significant reductions in fall risk. The magnitude of these enhancements was proportional to the initial degree of impairment. Follow-up testing indicates persistence for 6-12 months or longer, making NEURVESTA an effective tool for balance restoration in older adults.

Able Innovations ALTA™ – Research on New Features (Poster #87)

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Displayed on October 25, 2023 from 10:30am – 12:00pm ET

Background: Project partner "Able Innovations" has developed a new patient transfer system, the ALTATM, that is designed to replace the sling transfers that are currently used in hospitals and care homes utilizing mechatronics to safely perform lateral patient transfers. Aim 1: Due to the weight of the ALTATM, motor assists will help staff move and position the ALTATM. Application of sensors to the existing ALTATM handles to control motor assist will be intuitive for care staff to use. Aim 2: The full scale ALTATM will be validated to assess the forces applied to patients being transferred to ensure they are within safe limits.

Methods: Aim 1: Sensors are applied to the 4 push handles located at each corner of the bed. The system will be tested for 8 bed movements: forward/backward going straight/left/right and lateral left/right. Aim 2: The ALTATM is tested with a patient manikin and sensors to measure shear and normal forces experienced during transfer for various patient position and body masses.

Results: Aim 1: Machine Learning models are applied to the sensor measures showing a classification accuracy of >88%. Aim 2: The results will show the levels of normal and shear forces applied to the subjects and demonstrate that they are within safe levels and well below the forces applied during sling transfers.

Conclusion: This work demonstrates contributions to the ALTATM by the AGE-WELL SAM3 NIH supporting better comfort for those needing transfer and reducing injury risk for care staff.

Using RTLS to Assess and Predict Motor Agitation Events (Poster #88)

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Displayed on October 26, 2023 from 10:30am-12:00pm ET

Real-time location systems (RTLS) allow tracking of people over time and space with minimal obstruction to their daily lives. In long-term care settings, this data can then be used to analyze people's motion, walking trajectory and dynamics, how residents interact with their environment, and with each other. When used in conjunction with clinical metrics, including medication history, records of motor agitation events, falls, this data can provide insights and potentially predictive capabilities for various clinically relevant outcomes. In the case of people living with dementia (PwD), an RTLS platform could help describe correlations between the movement patterns of residents when agitated, where they spend their time, how often they socialize with others, and what medications or dosages preceded motor agitation events. In this study, we collected RTLS data from a specialized dementia unit caring for PwD's behavioral and psychological symptoms of dementia and explored patterns in their motion to help train machine learning algorithms to classify motor agitation events. This

analysis was conducted using solely RTLS-based motion dynamics features such as motion speed, trajectory, non-linearity, to establish a baseline for predicting motor agitation events. Next, the same predictive modeling was carried out using purely clinical features (medication history, fall events, NPI scores, and use of mobility aids to establish a second prediction baseline. Lastly, predictive models were built using both clinical and RTLS data Our results showed that combining both trajectory metrics and clinical measures improves the predictability of motor agitation above both individual baselines. We also present comments on the efficacy, strengths, and weaknesses of predicting acute clinical events versus chronic events using RTLS features, to inform future avenues of research.

Virtual GERAS DANCE for Older Adults: Facilitators and Barriers to Successful Implementation Across Diverse Settings in Canada (Poster #89)

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Displayed on October 26, 2023 from 12:30pm – 1:30pm ET

Objective: Given the increasing significance of technology in healthcare, this study focused on exploring strategies for optimal implementation of a virtual adaptation of GERAS DANCE, a specialized evidence-based program shown to target brain health and mobility in older adults, across diverse settings in Canada.

Methods: Utilizing the Consolidated Framework for Implementation Research (CFIR) we conducted surveys and semi-structured interviews. A total of 12 sites were enrolled into the study across five diverse practice settings which included community support services (n=3), long-term care (n=3), recreation centres (n=2), adult day centres (n=2), and hospital wards (n=2). Group-based sessions were livestreamed from the YMCA of HBB using a collaborative, community approach with an on-site staff member facilitating at each site twice weekly (1-hour sessions) for 6-weeks. Feedback was obtained from 22 healthcare professionals and staff. Across all sites, virtual GERAS DANCE was delivered to 135 older adults. Key CFIR constructs explored included innovation characteristics, outer setting, inner setting, individual characteristics, and process. Constructs that most strongly influence implementation were identified through across-case comparison of ratings.

Results: Implementation was most influenced by innovation characteristics (enjoyable music, socialization, exercise, and evidence-based design) and inner setting factors within participating organizations (cost-effective implementation, experienced staff in virtual programs, high demand for virtual options). Barriers included engaging older adults with cognitive impairment and technical limitations in rural areas with limited broadband Wi-Fi capacity.

Conclusions: This study offers novel insights into influential constructs for optimal implementation of virtual adaptation of GERAS DANCE for older adults. Virtual GERAS DANCE shows promise in promoting brain health, mobility, and social connections, making it a viable intervention in most urban and rural settings across Canada.

Using Real-Time Location Systems Data to Identify Clusters of Rest-Activity Rhythms in People Living with Dementia (Poster #90)

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Displayed on October 26, 2023 from 10:30am – 12:00pm ET

Disruption to circadian rhythm is a hallmark of dementia, which manifests in the rest-activity rhythms of people living with dementia. Their sleep-wake cycles are fragmented, leading to reduced daily activity and potential day-night reversal. These disruptions accelerate the need for residential care, where the rhythm is further disturbed. Sleep disturbances may also worsen neurodegeneration. Identifying disrupted rest-activity rhythms and intervening appropriately could reduce agitation, delay institutionalization, and slow dementia progression. This project aims to measure people living with dementia's rest-activity rhythms and explore longitudinal clinical correlations using Real-Time Locations Systems Data (RTLS) collected from the Specialized Dementia Unit in Toronto Rehabilitation Institute, Canada. RTLS technology is often utilized in healthcare for patient and asset tracking. It uses radio frequency communication between a (wearable) transmitter and receiver, offering longer battery life and spatiotemporal data that is more interpretable to study rest-activity rhythms in comparison to accelerometer's motion data. Rest-activity features will be extracted from the RTLS data, followed by clustering algorithms (e.g., K-Means) to group the rhythms. Correlations to clinical assessments (e.g., Neuropsychiatric Inventory and Mini-Mental State Exam) and their changes over time will be analyzed using mixed-effect models. Preliminary results show a significant correlation ($p < 0.05$) between the cumulative Neuropsychiatric Inventory sleep score and night-time activity. This research seeks to extend RTLS technology beyond patient and asset tracking to provide rest-activity assessment. Identifying the nature of the rhythm disruption can aid personalized therapies and allow monitoring of the effectiveness of interventions.

The Challenges Associated with Recruitment of Participants Living With Dementia for Smart Tech Research in a Hospital Transitional Unit During COVID (Poster #91)

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Displayed on October 26, 2023 from 12:30pm – 1:30pm ET

Objectives: Night staff working on transitional care units in hospitals are responsible for safety of patients affected by cognitive / mobility impairments. Supportive Smart Home (SSH) technology systems can provide insights into the nightly activities of residents and support care staff. This poster reviews the challenges of implementing experimental technology on a dementia care unit in a hospital during COVID.

Methods: Steering and implementation committees were formed, research ethics approval was obtained, and front-line staff were met. Technology was installed on a locked unit for patients living with dementia at the Greystone Transitional Care facility. Ottawa start-up, Esprit-ai, provided motion and bed pressure sensors that were installed into patient rooms. Upon patient bed exit during the night, these cloud-connected sensors sent text message alerts to a cell phone carried by the staff.

Results: There are 25 beds on the unit where this project took place and there were about 125 admissions over the period Dec 2021 to May 2023. Eight patients were recruited for the study. Barriers to recruitment included the COVID pandemic, hospital staff turn-over, the overall fragile state of the patients and the resulting stress on family members, patient turnover, and patient 'interest' in the sensors. Recruitment efforts included: a poster on the unit, asking management to notify re: new admissions, involving bedside staff, and monthly visits to the unit.

Conclusion: Implementing technology research in hospital settings is a challenge, particularly during exceptional circumstances like COVID, but the nature of transitional care is also important.

Detecting Alzheimer's Disease in the Preclinical Stage from Life Space Maps (Poster #92)

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Displayed on October 26, 2023 from 10:30am – 12:00pm ET

More than 400,000 Canadian seniors are living with dementia, most commonly Alzheimer's Disease (AD). Although no definitive cure exists, early intervention has been shown to slow AD progression. This study investigates a novel AD detection method that uses life space maps to visualize both the spatiotemporal and semantic dimensions of people's outdoor mobility, along with convolutional neural networks (CNN) to classify between preclinical and non-preclinical AD. A total of 116 cognitively normal individuals, aged 65 years or older, both with and without biomarkers linked to AD, participated in the study. They drove with a GPS device installed in their vehicles for up to 5 years. An algorithm was designed to infer activity types from four months of GPS data, allocating one month to each season to capture seasonal changes in driving. The monthly routes and destinations were colour-coded based on activity type, mapped, and then converted into images for subsequent deep learning analysis. Due to the high resolution of the images and the complexity of the patterns distinguishing the two classes, a patch-based

classification method was implemented. Various CNNs were trained on the image data using the Area Under the Curve (AUC) score as the selected metric. Life space maps were demonstrated to be a helpful visual aid for exploring older adults' spatiotemporal and semantic environments. By integrating life space maps with CNNs, this study offers a potential early detection method for preclinical AD. This method may enable timely interventions that could positively impact the progression of the disease.

Social Media use in Dementia Prevention Research: Community and Professional Experts Talk Ethics (Poster #93)

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Background: Social media can complement current recruitment channels in dementia prevention research to facilitate greater public involvement. Ethical social media use underpins effective online engagement in research. Existing social media guidelines for researchers are broad and lack empirical justification reflecting the values and priorities of the dementia community, and the considerations specific to prevention research.

Objective: With community and professional experts, we sought to identify the ethical considerations, motivators, and barriers influencing engagement of dementia prevention research on social media.

Methods: We conducted semi-structured, qualitative interviews with experts with lived experience (n=14; e.g., people living with dementia, care partners) and professional experts working in dementia research (n=15; e.g., researchers, coordinators). Experts were from Canada, the USA, the UK, and Chile. We analyzed interview transcripts using thematic qualitative analysis methods.

Results: Experts by experience valued the educational benefits of social media but risks such as diminished online privacy, dementia-related stigma, being targeted for predatory practices, and misinformation were major ethical concerns. Having a family history of dementia was a motivator for using social media to access resources on dementia prevention research. Professional experts revealed a need for social media guidelines for prevention research, relying on informal sources to supplement ethics board approval. They sought methods of strategic communication for public dialogue (e.g., misinformation, criticism). Various digital inequities (e.g., socioeconomic status, literacy, English fluency) reportedly dampen social media's reach to diverse publics. Participants in both expert groups acknowledged that younger aging populations are more likely to have digital fluency and may benefit from social media research engagement.

Conclusions: Diverse experts identified ethical and contextual factors surrounding social media engagement for dementia prevention, and a need for more guidance. Our results are currently informing the co-creation of contextually

relevant ethical guidelines for brain health research.

Effectiveness of a Game-based Cognitive Intervention on Older Adults' Cognition and Health-related Outcomes (Poster #94)

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Objectives: This project aims to investigate the effects of technology interventions using five serious computer games we have developed on the cognitive skills of older adults with Mild Cognitive Impairments or dementia. Our project also aims to explore the transfer effect of this game-based intervention on occupational performance, health conditions, and behaviour.

Methods: A feasibility Randomized Controlled Trial (RCT) is being conducted with residents of long-term care facilities in Alberta. Residents are randomly assigned to the intervention or control group. The intervention group receives a game-based cognitive intervention consisting of playing our games for 30 minutes twice per week for 12 weeks.

Cognitive and occupational performance measures (The Alzheimer's Disease Assessment Scale - ADAS Cog and the Canadian Occupational Performance Measure (COMP) and information from charts (health conditions and behaviour) are collected on weeks 0, 12 and 16 (follow-up).

Results: Seven older adults have been enrolled in the trial, and four of them have been allocated to the intervention group. On average, the intervention group had 6.25 sessions with the games. A memory game has been the most played one (in 42% of sessions). Participants with higher cognitive skills have shown less engagement with the game sessions. More participants from other facilities will be enrolled in the coming weeks.

Conclusions: The trial design seems feasible, although some adjustments in the inclusion criteria were found necessary during the data collection. Presenters will share with the audience the challenges of conducting a RCT under the pressures imposed by the COVID-19 pandemic and how these have been addressed. Outcome measures are being analyzed, and partial results will be presented at the conference. Results from this trial contribute to building on the evidence of game-based cognitive intervention for older adults.

AGE-WELL SAM3 Collaborative Projects with NRC Aging-in-Place Program (Poster #95)

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Displayed on October 26, 2023 from
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Background:
The AGE-WELL SAM3 NIH has established extensive collaborations with the National Research Council Aging-in-Place program.
Proj #1 Understanding well-being through ambient sensors and smart systems within the home.
Proj #2 Creating a computer-based tool for assessment of cognitive change based on combined speech assessment and eye tracking.
Proj #3 Understanding changes in driving behaviours to support ongoing safe driving.
Proj #4 Advancing SME solutions to support aging through SAM3 expertise and skills.

Methods:
#1 Methods for acoustic sound analysis to assess coughs and activity and video analysis to assess respiration and heart rate.
#2 Methods to analyze eye movements and speech using a laptop-based test scenario
#3 Methods to analyze changes in driving behaviours through in-car sensor systems.
#4 Focused projects with SMEs to progress their solutions to better serve the needs of older adults though multi-disciplinary collaboration projects.

Results:
#1 Results will show the ability to assess well-being through noncontact analysis of sound and video.
#2 Results will show how a combination of eye tracking and speech analysis can be used to assess cognitive change.
#3 Results will show the knowledge related to safe driving behaviours that can be determined from longitudinal in-car driving data.
#4 The services to accelerate SME product development and validation will be demonstrated.

Conclusion:
The collaboration with the NRC has enabled SAM3 to put in place an extensive set of projects to explore novels ways to support and enable independence and to engage with companies focused on the supporting aging and independence.

The Future of AgeTech: Future Directions in Technology to Support the Health, Independence and Wellbeing of Older Adults (Poster #96)

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Simon Fraser University

Displayed on October 26, 2023 from 10:30am – 12:00pm ET

Objectives: Canada is a world leader in AgeTech, but AgeTech must be seen in the context of global-level technological, social and economic trends. The Science Technology and Research (STAR) Institute at Simon Fraser University aims to support community-engaged research in the field of technology and aging. This poster highlights the ongoing efforts of the STAR Institute to advance AgeTech research and innovation.

Methods: Through seven years of extensive research conducted at the STAR Institute, employing collaborative and inclusive methodologies involving key stakeholders in the AgeTech field and older individuals, we have gained a comprehensive understanding of the current landscape, challenges, and opportunities in AgeTech.

Results: Key areas for future directions in the field of AgeTech research and innovation identified include (1) the development of a global agenda, (2) exploring the intersection between climate change and AgeTech, (3) promoting healthy lifestyles and wellness, (4) fostering ethical design thinking in AgeTech design and innovation and (5) addressing the absence of robust theoretical or conceptual frameworks for aging technologies.

Conclusion: To ensure the advancement of AgeTech, it is critical to connect with wider initiatives such as the United Nations Strategic Development Goals and the Decade of Healthy Ageing. Additionally, AgeTech needs to respond to megatrends like population growth, rapid urbanization, international migration, climate change, and the ongoing

marginalization of the Global South. This program of work undertaken by the STAR Institute will contribute to pushing the boundaries of AgeTech research and innovation.

Social Robots Autonomously Facilitating Dance in Long-term Care (Poster #97)

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Displayed on October 26, 2023 from 12:30pm – 1:30pm ET

Objectives: Dance therapy provides significant health benefits to older adults. To successfully integrate social robots to help facilitate dance therapy sessions in long-term care homes, we conducted a preliminary study to investigate acceptance and attitudes towards robot-facilitated dance sessions of residents and staff in a long-term care home.

Methods: Fifty-four caregivers and twenty-seven residents participated in robot facilitated dance sessions in small groups. For each session, the social robot first greeted the participants and then invited them to dance along with it for 3 songs. After each session, residents and staff completed a questionnaire based on their experiences.

Results and Conclusions: The results showed that both staff and residents had positive attitudes towards the robot-facilitated dance activity. Residents had

higher ratings on perceived ease of use, safety, and enjoyment than the staff. However, the staff had a statistically significant higher rating for willingness to use the robots. Differences in results with respect to gender were also found. Men within the resident group found the robot more useful with facilitating leisure activities compared to women in the resident group.

Medication Adherence Technologies: A Classification Taxonomy Based on Features (Poster #98)

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Displayed on October 26, 2023 from 10:30am – 12:00pm ET

Objective: To develop a classification system for medication adherence technologies based on an inventory of characteristics and features of existing technology.

Method: To conduct this study, we used the Taxonomy Development Method. A research team of five members defined the users of the taxonomy and medication adherence technologies while determining meta-characteristics and ending conditions. Both empirical-to-conceptual and conceptual-to-empirical approaches were utilized. To identify common characteristics of medication adherence devices, a subset of 23 devices was examined. The characteristics were categorized into dimensions and subdimensions. To attain consensus on the proposed taxonomy, a Delphi consensus survey was conducted with a larger team of 13 members, aiming for an agreement level of over 70%.

Results: Seven dimensions, 23 sub-dimensions, and 96 characteristics were initially identified. After the first Delphi consensus survey, 4 sub-dimensions did not achieve the desired 70% consensus and new sub-dimensions such as non-slip features, screen size, and privacy were introduced. Moreover, sub-dimensions of connectivity, power source, and data collection methods were modified. In the second round of Delphi consensus, all sub-dimensions achieved over 70% agreement, leading to the final taxonomy comprising 7 dimensions, 24 sub-dimensions, and 105 characteristics.

Conclusion: The taxonomy, developed through an assessment of existing technology's characteristics and features, distinguishes and categorizes medication adherence technologies available on the market. By enabling a detailed comparison, this taxonomy facilitates an examination of product usability for patients with various functional limitations. Healthcare professionals and patients can leverage this classification system to make informed decisions in selecting appropriate medication adherence technologies.

Developing an Intervention to Slow Down and/or Prevent the Progression of Frailty (Poster #99)

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University of Victoria

Displayed on October 26, 2023 from 12:30pm – 1:30pm ET

Objectives
The objectives were to develop an effective three-month weekly telephone peer-coaching program to assist older adults manage their chronic conditions and to slow down and/or prevent progression of frailty.

Methods
The first study involved 115 persons with type 2 diabetes. Participants were paired with peer coaches who engaged them in weekly 30-45 minute telephone calls over three months. The second study involved 170 older adults with chronic health conditions
where one group also received three assistive devices, namely: a watch; a scale; and a sleep pad. The third RCT, started in 2023 involves 120 older adults and is examining effectiveness in slowing down and/or preventing progression of frailty in older adults. In this study, the intervention includes teaching participants to use self-management support strategies and ways to incorporate the AVOID Strategies of the Canadian Frailty Network into their lives.

Results
The first two studies found that participants had made significant improvements in key outcomes and participants who also were given assistive

devices had twice as many improvements. This group reported that using the devices gave them greater control over their behaviour and health. Covariates of sex, education level, and number of chronic conditions did not influence the results. Data analysis of outcome measures for the frailty study will commence in December 2023.

Conclusions
A pragmatic low-cost peer coaching intervention assisted persons with chronic conditions engage in healthy behaviours and manage their health.
The group that received the assistive devices had several additional positive and higher outcomes, particularly with self-efficacy.

Pilot Implementation of An Assistive Technology (ARMM) in a Long-Term Care Setting (Poster #100)

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Objectives: To pilot the Ambulation, Mobility, Retraining and Mobility Mechanism (ARMM) technology during physiotherapy sessions in a long-term care (LTC) home, assess the technology's impacts on workflow, and evaluate its feasibility and acceptability by residents

and physiotherapists/physiotherapy assistants' (PTs/PTAs).

Methods: Using a pre-post design, direct observations on key events in residents' physiotherapy care journey were mapped. A survey ([1-5] Likert scale) assessing PTs/PTAs' (n=9) and residents' (n=27) attitudes and influencing factors towards this AT use was conducted pre/10-week post technology use. Challenges and areas of improvement were assessed (open-ended questions).

Results: Pre-implementation, 17 observations of physiotherapy sessions were recorded over 7 weeks; residents participated in six exercise types (median=15 min). The surveyed PTs/PTAs and residents indicated high intention to use this assistive technology in physiotherapy and residents were not apprehensive of the device use. Challenges (pre-implementation) included: need for additional staff; residents' difficulty following instructions, fatigue and lack of exercise motivation/interest; high risk of falls/injury; difficulty walking and transferring; residents' fear of falling; and need to improve balance. The ARMM use improved residents' confidence when ambulating but added session time (median=20.5 min) and complexity to the workflow.

Conclusions: Acceptability and willingness to use the ARMM device significantly declined post-implementation. Improvement opportunities with the ARMM were identified. The results can inform future AT implementation/impacts research and serve as a benchmark for LTC homes.

New Brunswick's AgeTech Innovation Environment: An Overview of the Policy Landscape, Challenges, and Opportunities (Poster #101)

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Older adults in New Brunswick prefer to reside in their homes for as long as possible. New technology can help older adults stay in their homes longer, but innovators have identified obstacles to introduction of market-ready products. We present an environmental scan of the policy context for technology development and adoption in New Brunswick, as it applies to home-based care or older adults managing their health at home. The scan applied an ecological lens to a review of policies, strategies, programs, and initiatives related to health technology innovation in New Brunswick. Analysis identified three interlinked policy ecosystems, each with a set of organizations and programs that influence innovation. In the research and development ecosystem, a variety of programs provide innovators with resources. The commercialization ecosystem includes regulatory agencies, as well as programs that support market development and capacity expansion. The adoption and maintenance ecosystem is complex, with several pathways for new technology to reach end users. Each pathway includes a combination of government and private sector actors, and the supports applicable to innovations

depend on how they are incorporated into home care services. While programs in New Brunswick support health technology innovators, there are opportunities to address ongoing challenges. Establishment of a central data repository and "living lab" communities could generate performance data to improve planning and procurement decisions. Continued engagement with stakeholders would help guide support for technology integration, and focusing new programs on technology adoption would encourage end users to implement innovations in older adults' homes.

Voice Payment System Authentication: Exploring User Preferences and Accessibility Needs of Users with Cognitive Disabilities (Poster #102)

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Authentication is a vital process for verifying an entity's identity and mitigating data privacy and security risks in financial transactions. Strong authentication practices are essential to uphold transaction legitimacy and payment method credibility. This systematic literature review explores user preferences for authentication in voice payment systems, with a focus on addressing accessibility needs for individuals with cognitive disabilities. Additionally, it investigates the challenges associated with authentication and provides technical design recommendations for voice systems. Through a comprehensive analysis of 23 relevant papers, valuable insights were gained, particularly in accommodating cognitive disabilities, balancing security and usability, and implementing effective authentication mechanisms. The study underscores the significance of accessibility design patterns, ensuring inclusivity and user-friendliness in voice-based services. These findings hold relevance for researchers, designers, and developers working in voice-based authentication and financial transactions, promoting enhanced user experiences and system integrity.

Keywords: Voice payment system, Authentication, User preferences, Accessibility, Cognitive disabilities.

In-home Seniors' Activity of Daily Living Monitoring: A Review of the Literature (Poster #103)

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Objective: With the aging population on the rise, monitoring technologies for Activities of Daily Living (ADL) can play a vital role in supporting independent aging in place. This study categorizes and describes smart home technologies used to monitor older adults at home.

Method: We conducted a comprehensive search on four scientific databases: IEEE, Web of Science, Scopus, and Google Scholar following the Preferred Reporting Items for Systematic Reviews (PRISMA) guidelines. We included articles aiming to monitor ADLs in home environments and excluded others such as sports and industry. Different characteristics including subjects' demographic information, types of ADLs and monitoring technologies, classification model, and performance were extracted from each paper.

Result: The search yielded 278 papers published between 2013 and 2023, out of which 57 were ultimately included in the final analysis. We identified three types of technologies: ambient sensors (N=32), wearable devices (N=18), and fusion approaches (N=7). Among machine learning models, the Support Vector Machine was the most commonly used classification algorithm (N=23). Due to the strong predictive capabilities of Recurrent Neural Networks when working with temporal features, the Long Short-Term Memory model has attracted much interest after 2020 (N=6).

Conclusion: Despite recent advancements in ADL monitoring, further research is required to address specific gaps. For example, monitoring technologies, particularly those involving cameras (such as ambient sensors), may raise privacy concerns among seniors. Additionally, there is limited information on ADL monitoring in multi-resident settings. Furthermore, high costs associated with some monitoring solutions hinder accessibility for a significant portion of the senior population.

Validation of ARIA index to assess the quality of mobile apps for patients living with chronic health conditions (Poster #104)

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Today, mHealth is becoming a ubiquitous term thanks to apps like Calm, Aura, and WebMD. mHealth, short for mobile health, refers to mobile devices or apps that educate, support, or manage health conditions. However, mHealth apps are not regulated and thus their quality and efficacy is unknown. The Alberta Rating Index of Apps (ARIA) was developed to help app users evaluate the quality of apps, with a paper-based version validated in a previous study. In the current study, the online version of ARIA was evaluated by persons living with health conditions (n=64), caregivers (n=14), and health practitioners (n=7) who trialled two mHealth apps, Calm and Breathe2Relax. Our poster presentation will feature the preliminary findings pertaining to descriptive participant statistics and questionnaire results, given that one caregiver and 8 health practitioners are still being recruited. Diverse perspectives from all three participant groups will cumulate into an online index for the quality and efficacy of mHealth apps available for consumers today. An established and usable index for mHealth apps could educate and empower users who are considering

adopting an app, ultimately enhancing their health management journey.

Activity Classification on Healthy Individual Using Acceleration Data and Machine Learning (Poster #105)

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Displayed on October 26, 2023 from 12:30pm – 1:30pm ET

Background: Age-related diseases such as knee osteoarthritis can cause limitations in the gait of individuals when performing everyday activities. To aid in disease prevention or recovery, a machine learning algorithm could be used to predict the activities being performed and measure changes in range of motion. The first step of this project is to build a data collection system, validate its data, and predict activities being performed by healthy individuals.

Objective: Activity classification using a feed-forward neural network, based on activity data collected from a healthy individual using a custom data collection system and validated against a reference optoelectronic motion capture system.

Method: The leg-mounted data collection system was built and programmed from scratch, using off-the-shelf components and sensors. Simple activities were performed multiple times by a healthy individual, such as walking, running, squatting, sitting-to-standing, and lunging.

Data were collected simultaneously with both the custom system and motion capture system. These activities were then labelled, and their XYZ acceleration data was fed to a neural network, to perform supervised classification.

Results: The network can classify these activities with an accuracy of greater than 90%. Validation of the custom system against the reference system is still in progress.

Conclusions: Early results suggest a simple network and only XYZ acceleration data is sufficient to classify simple activities performed by an individual with unrestricted gait. System validation work is ongoing. Further work must be done to learn if the model can predict activities performed by an individual with a restricted gait.

An exploratory trial to assess the effects of a music-based digital therapeutic on anxiety and agitation in people with mild and moderate cognitive impairment (Poster #106)

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LUCID Therapeutics

Displayed on October 26, 2023 from 10:30am – 12:00pm ET

The rise in dementia-related healthcare costs and caregiver burden presents an urgent need for scalable interventions to alleviate agitation and support caregiver well-being. Drawing on the established benefits of music interventions, LUCID has developed a novel digital therapeutic,

LUC-101, which employs reinforcement learning and biometrics to deliver personalized music interventions with integrated auditory beat stimulation. The objectives of this trial were to assess the acceptability of regular usage and to gather preliminary efficacy data. Over a 2-week timeframe, 48 participants with mild to moderate dementia were randomly assigned to use LUC-101 or a selection of audiobooks (control) 4 times/week for 30 minutes.   The intervention demonstrated a high level of adherence and caregiver satisfaction. Efficacy results focused on changes from baseline obtained at the level of session or study. At the session level, greater reductions in acute agitation were observed in the LUC-101 group compared to the control group (PANSS-EC, p < 0.05). At the study level, positive but non-significant trends were observed with greater agitation reduction (CMAI) and mood improvement (PANAS) in the LUC-101 group.   The exploratory trial demonstrated successful engagement of dementia patients and caregivers through remote recruitment and support, highlighting the potential of digital therapeutics in this context. This trial also revealed significant effects in reducing agitation at the session level and encouraging trends for both agitation mood at the study level. It is anticipated that more of the trends observed at the study level would have yielded significance in a trial lasting longer than two weeks. Ultimately, this study paves the way for a promising avenue to address the challenges associated with dementia-related agitation and enhance the quality of life for both patients and caregivers.

Pose2Gait: Extracting Gait Features from Monocular Video of Individuals with Dementia (Poster #107)

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Video-based ambient monitoring of gait for older adults with dementia can potentially be used to identify adverse health developments and allow early intervention by clinicians and caregivers to avoid falls or hospitalizations. This study aims to employ joint locations derived from video data using computer vision-based pose tracking models to optimize gait analysis in the context of older adults or clinical populations.   Gait data of individuals with dementia is captured at two sites using a wall-mounted Microsoft Kinect system to collect video and depth parameters as participants walk down a hallway towards a camera. Publicly available models are used to extract two-dimensional pose sequences from video, which comprise the datasets used for training and evaluating our Pose2Gait model. We train a deep neural network to translate the

two-dimensional pose sequences into a set of three-dimensional spatiotemporal gait features, averaged over the duration of the walking sequence. Our model is capable of extracting velocity and step length metrics from video that correlate with the gait features from the Kinect depth camera, with respective Spearman's correlation coefficients 0.81 and 0.60. Overall, this result shows the viability of extracting three-dimensional spatiotemporal features from monocular video. Further performance improvements on prediction of other features, such as step time and step width, would allow this methodology to be applied in a clinical setting for detection and prediction of changes in individuals' gait and short-term health risks during long-term ambient monitoring.

Privacy-Preserving Smart Activity Sensor for Senior Care (Poster #108)

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Displayed on October 26, 2023 from 10:30am – 12:00pm ET

In this poster, we will introduce the Sentinare smart activity sensor that AltumView has developed since 2018 for senior care and remote patient monitoring. The sensor uses AI technology to monitor the activity of people, collect activity statistics, detect emergencies such as falls, and notify caregivers when emergencies such as falls are detected. To protect privacy, it only displays people as stick figures and never transmits videos, allowing it to be used in bedrooms and bathrooms. It also has API for third-party

integration. The sensor can help seniors aging at home, independent/assisted living, or long-term care centers. The sensor received CES 2021 Innovation Award Honoree, and is one of only three fall detection devices selected by Amazon for its Alexa Together emergency service. In addition to Canada and US, it has also been adopted by customers in other main markets, including Japan, China, and Australia.

Understanding Perspectives of Wayfinding Technology Use by People with Disabilities (Poster #109)

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Objectives: The objectives of this study are to understand: 1) What technology Canadian adults with disabilities use for wayfinding? 2) What tools and features of these technologies facilitate the wayfinding of Canadian adults with disabilities? 3) What are the barriers experienced with the currently available wayfinding technologies?

Method: A qualitative survey using REDCap was disseminated to understand user experiences and perspectives with the use of wayfinding technology. To be included, participants had to self-identify as having a disability and live in Canada. Survey included open-ended questions about general experiences with wayfinding and barriers using various technologies. Frequencies of each

facilitator code were obtained for each type of technology, so that the top tools and features could be determined. An interactive coding guide was created and used for analysis of open-ended barrier-experience responses by two team members.

Results: A total of 282 eligible survey respondents participated. Participants were an average age of 47.9 years old and the sample represented a diverse group of people with disabilities, although the primary disabilities represented were those related to mobility/flexibility/dexterity and vision. The majority of respondents use mobile apps and websites for wayfinding. Common barriers across public and personal wayfinding tech, fall under the themes of information provision, compatibility, and requiring demands on personal resources. Categories of common facilitators across tech types included auditory/tactile prompts, interactability, information storage and transferability, and custonmization.

Conclusions: This project aimed to develop considerations for the inclusion of various elements of wayfinding technologies within national accessibility standards. Considering the barriers and facilitators to wayfinding technology use, considerations for the accessibility, standardization, and usability of wayfinding technology are subdivided into those that: Support decision-making processes for individuals; Support the organization and communication of information; Support use in real-world public settings; and Provide broader support for the use and implementation.

Technology for Supporting People with Dementia in the Workplace: A Scoping Review Protocol (Poster #110)

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Displayed on October 26, 2023 from 10:30am – 12:00pm ET

Background/Objectives: Dementia, a prevalent health concern globally, is often associated with impaired memory, reasoning, and communication skills. Young-onset dementia (YOD) and mild cognitive impairment (MCI) affect individuals below 65 years of age. While existing literature reviews have examined the experiences of individuals with YOD/MCI in the workplace, there is a need to explore the role of technology in supporting individuals living with dementia in the workplace. This scoping review aims to provide an overview of the current design and implementation of technologies for individuals with dementia in the workplace and identify gaps for future research.

Methods: A six-stage scoping review approach will be employed, following the methodology proposed by Arksey and O'Malley. A comprehensive search strategy will be developed and executed in multiple electronic databases. The screening process will occur in two phases, with two reviewers independently assessing eligibility based on predetermined criteria. Data extraction will be performed using a standardized form, and a narrative synthesis of the results will be conducted.

Results: The review will include studies that report on technologies designed for and/or used by individuals living with dementia in the workplace. The study characteristics, including geographic distribution and study designs, will be summarized quantitatively. The results will be presented in a narrative synthesis, providing insights into the nature and extent of research on technology use in the workplace for individuals with dementia.

Conclusion: This scoping review will contribute to the understanding of the current state of research on technology for individuals living with dementia in the workplace. The findings will inform future research and practice guidelines, highlighting the potential of technology to support individuals with YOD/MCI in sustaining employment. The results will be disseminated through publications and conference presentations, targeting healthcare professionals and researchers.

Enhancing Quality of Life in Senior Canadians with Frailty: A Human-Centered Study on Fear of Falling and its Impact on Instrumental Activities of Daily Living (Poster #111)

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Displayed on October 26, 2023 from 12:30pm – 1:30pm ET

This research project's objective is to investigate factors that contribute to falls and fear of falling (FoF) in older adults of the Jane and Finch community in Toronto in order to understand how these factors influence the everyday lives of seniors. We studied 15 older adults aged 55 and above in the Jane and Finch community. Participants were fitted with eye-tracking glasses, physiological sensors, and video cameras and were interviewed while walking alongside with the interviewer. The participants were then observed both in their homes and community performing these daily activities. Demographic information, Frailty Phenotype Criteria, Frailty Index Assessment, and the Falls Efficacy Scale International (FES-I) were collected for further analysis. Ongoing analysis yields preliminary findings concerning the factors contributing to fear of falling (FoF) among older adults. These findings suggest that FoF arises from a combination of environmental conditions, economic factors, and delayed response to previous falls, leading to chronic health issues. Inadequate attention to health needs, including neglecting exercises for balance and strength, hinders their living conditions. Environmental aspects, such as failure to clear snow/ice from pavements during winters, and insufficient spatial support for older adults, also play a role in this ongoing fear. Economic factors, particularly those limiting access to nutritious food, contribute to the development of chronic illnesses in this population. Themes emerging from the data include increased apprehension of the outdoors due to changing weather conditions, heightened feelings of isolation due to fear of injuries, and the significance of preserving a sense of independence among seniors. Further analysis will be conducted to explore these findings and to inform potential interventions for promoting senior well-being and reducing FoF prevalence. The findings will benefit not only older adults but various stakeholders involved in care services, industry, and policymaking.

Using digital memory augmentation to improve autobiographical episodic memory and quality of life in older adults with transient epileptic amnesia (Poster #112)

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Autobiographical episodic memory loss following brain damage in epilepsy can diminish one's autonomy, self-identity, and quality of life. Transient epileptic amnesia (TEA), a subtype of temporal lobe epilepsy that affects older adults, features brief seizures, yet memory problems including accelerated long-term forgetting of recent events are long-lasting. Digital Memory Augmentation (DMA) is a promising approach that harnesses portable technology to mitigate memory loss. We developed ''HippoCamera'', a unique DMA platform that encourages users to record and replay high-fidelity cues of life events using neurocognitive principles known to improve memory. We showed that using HippoCamera led to robust gains in memory for events in healthy older adults. Here, we validate and disseminate our digital memory prosthetic to aging individuals with more severe memory impairment. We conducted the first autobiographical memory intervention in TEA to enhance (i) episodic recollection, (ii) cognitive functioning, and (iii) psychosocial wellbeing. A sample of TEA patients and healthy controls from The Impairment of Memory in Epilepsy database completed a 5½-week intervention, where they recorded two events per day for 3 weeks and replayed cues twice per day for the entire study. Recorded cues were interleaved to be replayed or hidden (never replayed). We assessed (i) episodic recollection for replayed versus hidden events using a modified Autobiographical Interview, (ii) transfer of memory benefits to other cognitive abilities (distinguishing similar object stimuli) using the Mnemonic Similarity Task, and (iii) changes in wellbeing, life satisfaction, mood, and self-concept. Preliminary results in these three domains and behavioural differences between patients and controls will be presented. Our findings elucidate how our memory-enhancing technology can alleviate memory deficits and serve as positive reminiscence for age-related brain changes.

Mapping the context of sedentary behaviour (MAPS-B) in older adults who are frail: A feasibility and longitudinal study (Poster #113)

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There is increasing concern about the amount of time older adults spend in prolonged sedentary behaviours. Understanding context (posture, location, purpose, social environment) may provide insight into effective interventions. Our primary objective was to determine the feasibility of assessing context of sedentary behaviour in older adults with pre-frailty/frailty. Context was assessed over three days in winter and spring using wearable sensors for posture, indoor positioning system (IPS) for location within the home, and electronic/hard-copy diary for purpose and social context. We defined "feasibility process" using recruitment (20 participants within two-months), retention (85%), and refusal (20%) rates, and "feasibility resource" if the measures capture context and are all participants willing to use the measures. We approached 80 potential individuals, and 58 expressed interest. Of the 58 individuals, 37 did not enroll due to lack of interest or medical mistrust (64% refusal). We recruited 21 older adults (72±7.3 years, 13 females, 13 frail) within two months and experienced two dropouts (90% retention). The wearable sensor, IPS, and electronic diary captured its intended domain of context, but the hard copy was not completed with enough detail making it challenging to link it to the other devices. Twenty participants used the wearable sensor and ten used the electronic diary during winter and spring. Thirteen used the IPS in winter but only nine in spring. Using wearable sensors, IPS, and electronic diaries may be feasible in some cohorts, but future studies will need to determine other methods to assess the context, especially in diverse older adults.

Designing a real-time medication intake and adherence dashboard: Features, functionality, and data display to meet the needs of patients, care partners and clinicians (Poster #114)

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Objective: To determine the key features, and functionalities of a dashboard that key stakeholders can use to monitor and improve medication non-adherence.

Methods: Patients (PT), care-partners (CP) and clinicians (HCP) participated in multiple rounds of focus groups to inform the iterative development of a dashboard. Participants were invited to express their opinions about existing examples of dashboards. Transcripts of the focus groups were transcribed verbatim and analysed qualitatively to build a paper prototype. In a subsequent round, participants provided feedback on the paper prototype for further development

of the prototype and a dashboard framework.

Results: Sixteen HCP, 5 CP and 4 PT participated in the first round and 13 HCP, 2 PT and 4 CP in the second round of focus group meetings. Key features desired for the dashboard were organized under adherence metrics, data display, reporting and export capabilities, clinical, educational, social engagement and accessibility features, system integration, communication, data security and privacy. Subsequently, two paper prototype dashboards were developed, a clinician dashboard, and patient dashboard with similar functionalities, including medication-specific details and adherence graphs. The data analysis from both rounds led to the development of a framework detailing six components: patient information, communication, settings & display, data customization, data security and privacy, and medication adherence metrics.

Conclusion: This research offers a comprehensive framework for a real-time medication intake and adherence dashboard, catering to patients, care partners, and clinicians. It guides the development of a user-friendly dashboard with essential features, ensuring accurate medication intake tracking and improved medication adherence outcomes.

Creative, slow research with older adults: Techniques to enhance recruitment of diverse older adults in the MacM3 project (Poster #116)

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Objectives: The MacM3 prospective cohort study aims to recruit 1,500 older adults to identify early changes in mobility over a 2-year period. We seek a diverse cohort to understand how differences across race, class, ethnicity, etc. articulate to age to impact mobility changes. The lack of diverse aging data is an ongoing issue across aging research.

Method: To obtain greater diversity we used the following techniques. Our team: created recruitment flyers detailing our intent to correct the underrepresentation of diverse older adults in research; embedded a MacM3 researcher at Dixon Hall, a neighbourhood service center and engaged their staff and peer leaders in snowball recruitment; and highlighted attention to safety and security; engaged in in-person research, provided diverse benefits for participants; and engaged trainees speaking Mandarin. Data collection began in May 2022 at McMaster Innovation Park (MIP) and in March 2023 at Dixon Hall (DH). We conducted preliminary analyses on the first 870 participants. Frequencies of various characteristics were compared between groups using one-sided tests of proportions in STATA version 14.2 (College Station, TX). Statistical significance was set at $p<0.05$.

Results: The poster details significant increases in diversity among Dixon Hall participants including those: born outside Canada, racially non-white, unmarried,

lower income, and speaking English as a Second Language.

Conclusions: Because diverse older adults have experienced bias and/or hostility in research environments, it is crucial in recruitment efforts, that researchers are transparent, note efforts to avoid discrimination, and build a sense of trust, respect, and collaboration—anti-oppressive and "slow" research strategies. While these efforts take more time and resources, they are necessary to ensure research reflects the varied experiences of diverse older adults in Canada.

Navigating Ethical Considerations in Real-Time Locating Systems Implementation for People Living with Dementia in Residential Care: A Person-Centered Perspective (Poster #118)

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Objectives: Real-time locating systems (RTLS) are rapidly gaining traction within health and residential care settings to track patients' movements and enhance care provision. The primary objective of this study is to examine the ethical implications of RTLS deployment in a long-stay hospital unit or residential dementia care setting.

Methods: Drawing from recent implementation cases and relevant research, we comprehensively analyze ethical challenges related to adoption and clinical use of RTLS. Analyzing these issues through a person-centred care (PCC) lens that prioritizes humanistic approaches to care that embraces collaborative decision-making and purposeful living and contributes to understanding the ethical landscape of RTLS use.

Results: Implementing RTLS in dementia care demands careful consideration of relational ethics and values of choice and self-determination, dignity, and respect. We found ethical tensions between efficient care delivery and supporting residents' rights, particularly in relation to the balance between ensuring physical safety and preserving privacy. Respecting assent and dissent and striving for collaborative decision-making which prioritizes tangible benefits to persons living with dementia, is crucial for maintaining a PCC philosophy.

Conclusions: This research underscores the importance of incorporating ethical considerations into RTLS implementation strategies for residents with dementia. By prioritizing residents' personhood, healthcare organizations can ensure that RTLS technology aligns with their commitment to PCC. We offer recommendations for the ethical implementation of RTLS in residential care settings, and advocate for a deliberate approach that aligns with broader culture change initiatives aimed at improving the quality of dementia care, while harnessing the advantages of technological advancements.

Continuous Acoustic Monitoring of COPD in the Wild (Poster #120)

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Objective: We aim to understand the potential of audio collected from smartwatches in predicting the daily symptom severity of older COPD patients at home.

Method: We conducted a study with 8 COPD patients recruited from three hospitals in Toronto, Canada, for an average of 164 ± 92 days. We collected continuous audio using a Samsung Galaxy Watch and recorded daily COPD symptom severity through the London COPD Cohort Daily Symptom Questionnaire. The aggregated daily symptom scores were binarized into "low" or "high" based on a threshold of 3. We developed a speech processing pipeline that combines voice activity detection and speaker verification to isolate audio segments from smartwatch recordings that are suitable for assessing the pulmonary condition of a patient. These speech segments are then transformed into a sequence of informative features, which is fed into a Convolutional Neural Network (CNN) for classifying and predicting the clinically important daily COPD symptom severity level (low vs. high) up to 4 days in advance.

Results: Our system achieved an average sensitivity of 0.79 ± 0.03 and a specificity of 0.83 ± 0.05 per patient when classifying their same-day symptom severity. It also predicted the severity level up to 4 days in advance with an average sensitivity of 0.75 ± 0.02 and a specificity of 0.74 ± 0.07.

Conclusions: We demonstrate that audio collected from a smartwatch worn by COPD patients in everyday life can be used to classify their current symptom severity and predict it up to 4 days in advance. This offers a non-invasive and convenient way to continuously monitor COPD, enabling timely interventions to reduce exacerbations and hospitalizations.

mHealth apps for Dementia and Alzheimer's (Poster #122)

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This study describes the state of available mHealth apps related to dementia-prevention and risk factors, highlighting gaps and proposing pathways for future applications. Following PRISMA guidelines, a systematic search was conducted from Oct 19- Nov 2, 2022. A total of 1044 dementia-related apps were retrieved across a comprehensive array of sources, from mobile app stores including iOS

store, Google Store, Samsung Store, and Microsoft Store, peer-reviewed literature (including meta analyses and scoping reviews on dementia-prevention), and dementia/Alzheimer's/advocacy websites such as Alzheimer's Society of Canada. After screening and duplicate removal, 152 apps met inclusion criteria. Two independent reviewers coded the apps using an extraction framework which included elements such as evidence basis and expert credibility, lifestyle element(s), privacy/security, and an adapted Silberg scale. Among the 152 apps, 57.9% addressed a modifiable lifestyle behaviour linked to reducing dementia risk, however only 13% targeted multiple behaviours simultaneously, which research suggests is most impactful. Fifty-five percent of apps scored 2 out of 9 on the Silberg scale, indicating room for improving accountability. Apps had limited disclosure of expert consultation (79.0%), and author credentials (96.1%), and in 82.2% of apps there was no indication of utilising evidence-based information, demonstrating significant gaps in transparency. Furthermore, 69.2% of apps did not disclose data privacy/security practices. Opportunities exist for mHealth apps to support dementia-prevention by targeting lifestyle behaviours, however developing guidelines to address gaps in transparency, and credibility is necessary for apps to be effective and scale successfully.

Testing of a technology readiness tool prior to installing Best Buy Health Canada's technology bundles for older adults (Poster #124)

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Objectives: Not all older adults (OA) have equal access to or knowledge about technology to facilitate aging in place. Numerous conditions have been identified that could facilitate this. Currently no tools exist that occupational therapists or family members could use for the purpose of evaluating technology readiness for OAs. Our group designed an OA technology readiness tool, and the objective of this project was to test it prior to the implementation of technology bundles in Ottawa, Canada.

Methods: The tool includes background sections on hearing/vision, type of housing, and Wi-Fi/Internet infrastructure. It assesses current technology use of the OAs such as use of smart devices, use specifically for instrumental activities of daily living, and likelihood of technology use. Six OA residents of a Bruyère Village volunteered to have the tool tested on them. Two research assistants collected the data and identified the participant who could most benefit from the installation of two smart displays, a Wi-Fi security camera, and smart lighting.

Results: It took approximately 30 minutes to complete each questionnaire. It was felt that 5 of 6 participants could benefit from the bundles. The client selected for

the install was a 79-year-old female living by herself. The tech bundles were installed two days later. The client benefited from Best Buy Canada's Geek Squad support, used the technology on a regular basis, and was happy with its functionality.

Conclusions: The technology readiness tool was helpful in selecting an OA who could benefit from these home tech bundles.