

The Feasibility, Reliability, and Validity of Using the Self-report Version of interRAI Check-Up
Among Community Dwelling Older Adults

by

Linda Ogechi Iheme

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

As the result of population aging around the world, the prevalence of chronic conditions is increasing. Early detection through constant monitoring is an effective strategy of minimizing the impact of chronic conditions on morbidity and mortality. However, clinician administered assessments are often not routinely completed nor done for the entire population because they require resources that may not be available. A self-report tool that can be administered by older adults and their caregivers could help achieve broader surveillance at minimal cost and contribute to enhancement of chronic disease management globally. In the meantime, as the population of cultural minorities in Canada is increasing, it will be important to examine the feasibility and acceptability of using self-report interRAI Check-Up (CU) assessment tool among older adults from different backgrounds. The study compared the experiences of older adults who electronically completed the assessment tool entirely by themselves with approaches involving the help of a lay interviewer or their informal caregiver. Also, this study evaluated the reliability and validity of data collected with self-report CU.

This study concluded that CU was optimally accepted by older adults in this study. Also, the internal consistency and validity of data collected with CU is comparable to data collected by trained health professionals in Ontario using the RAI-HC among home care population.

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Dedication

This thesis is dedicated to my nuclear and extended family. To my husband Jamie Pajoel, thanks for your patience and for relieving me of many house duties that enabled me to focus on my graduate studies. To my dad, Samuel Uzoma Iheme of blessed memory, I am happy to make you proud by completing my master's program. To my mum, Bridget Iheme, I am grateful for how you have always encouraged me to be the best student I can always be. To my elder brother, Dr. Barr. Williams Iheme, thanks for being a good example for me to model. To my other siblings, Teresa Iheme-Madumere, Luke Iheme, and Catherine Iheme, the thought of you is always the greatest push for me to be the best version of myself. To my uncles and aunties, I am lucky to have you active in my life. I wouldn't be where I am today without the support of my family.

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List of Abbreviations

ADLH	Activities of Daily Living Hierarchy
CPS	Cognitive Performance Scale
CU	Self-reported interRAI Check-Up
HCS	Health and Caregiving Survey
IADLCH	Independent Activities of Daily Living Capacity Hierarchy
LEO	Lambton Elderly Outreach
OR	Odd Ratio
sPAIN	Pain Scale
sMOOD	Self-reported Mood Scale
WHO	World Health Organisation

1. Introduction

The world's population is aging, and this is also true for Canada. Older adults have heterogeneous health status, with some being very healthy while others are either frail or sick (Lacas & Rockwood, 2012; Rougé Bugat, Cestac, Oustric, Vellas, & Nourhashemi, 2012). In 2018, the Canadian Institute for Health Information (www.cihi.ca) reported that based on data collected over a decade (from 2006 to 2016) in Canada, it costs an average of six times more to care for an older adult than younger individuals such that most health care spending is concentrated on those that are frail, sick or incapable of independent living. Since most of this spending is on the high-risk group of older adults for whom functional decline, loss of independence and institutionalization is a common route (Wagner, Bachmann, Boulton, Harari, Von Renteln-Kruse, et al., 2006), there is need for early identification of the high-risk group through early assessment to eliminate or reduce the rate of their health decline.

Health assessment usually involves a set of questions (in form of an assessment tool) answered by clients or other informants to provide information on their health status. The essence is to help the health team understand the health profile and health needs of their clients. The different types of health assessment could be categorised into two: assessor-rated and self-rated (self report) (Beauchet, Launay, Merjagnan, Kabeshova, & Annweiler, 2014). The assessor-rated assessments are done by appropriately trained members of the health care team (Smeeth et al., 2001). The interviewer adapts the flow of the questions to the interview circumstances and records the most correct answer judging from variety of information sources, including visual perceptions, client's health record and client's oral responses. Assessor rated instruments may include fixed narrative questions or open-ended unstructured

items to be asked by the assessor. Meanwhile, self report assessments can be self or lay interviewer administered (Smeeth et al., 2001). In either case, only the client's response is recorded in self report assessment and a clinician opinion is not required. Hence, it is easily affected by the literacy, fluency and culture of the client (Daltroy, Larson, Eaton, Phillips, & Liang, 1999; Koyama et al., 2014). Although assessor-rated assessments are said to provide more reliable health information compared to self report assessments (Hébert, Bravo, Korner-Bitensky, & Voyer, 1996), assessor-rated assessments are not feasible in all circumstances.

Self-report assessments may be a useful complement to assessor-rated assessment as it provides relevant clinical information that could help target the more expensive assessor-rated assessment (hábert, bravo, korner-bitensky, & voyer, 1996). They may be more cost-effective in predominantly healthy populations where assessor-rated tools may be too resource intensive as a first step for screening. For example, early research on the use of preventive home visits used a model that required clinicians to do comprehensive geriatric assessment (CGA) on all participants, but result from that study showed that CGA are best targeted at a subpopulation with poor self-rated health than with the broader population of community based older adults (van Rossum et al., 1993). Hence, assessing all older adults may waste resources because not everybody is sick. In addition, self reports can be helpful in patient education as it encourages respondents to reflect on their own health as they answer to questions (Andrews, Kemp, Sunderland, Von Korff, & Ustun, 2009; Beauchet et al., 2014). However, the population of older adults is characterised by individuals with diverse features, culture and clinical backgrounds. Therefore, any self report tool that is developed for the general population should be either robust to these diverse characteristics or should be

appropriately targeted to persons who can use the tool. Although some self-administered assessment tools currently exist, most of them are not multidimensional as they usually focus on assessing a limited aspect of health. Many are also used on demand, when the need for which they were created arises. For example, disease specific measures provide detailed examinations of persons with specific illnesses, but they are not used on the broader population of persons who do not have those conditions.

The purpose of this study is to identify the feasibility and acceptability of the interRAI Check-Up self-report assessment tool to determine whether it can be used to screen older adults in the general population. Secondly, this study will help evaluate the reliability and validity of interRAI Check-up tool (CU). The CU differs from other self-reported health measures in that it was designed to be compatible with interRAI assessor-led instruments, making its measures and response sets somewhat more complex in order to gain accuracy in screening. This complexity may come at the cost of usability in populations where English is not their preferred language, literacy levels are low, or cognition is impaired.

1.1 Aims and Objectives

1.1.1 Aims

The aim of this study is to investigate the feasibility and acceptability of self-reported assessment (Check-Up) among older adults from diverse clinical populations. Secondly, this study will evaluate the psychometric properties of the interRAI Check-Up tool.

1.1.2 Objectives

- (1) To identify differences in response patterns and acceptability between self-administered and lay interview administered self report assessment.
- (2) To identify questions in the assessment tool for possible deletion, modification, or addition.
- (3) To evaluate the validity of interRAI Self-report Check-up tool.
- (4) To evaluate the reliability of interRAI Self-report Check-up tool.

2. Literature Review

2.1 Population Aging

The world is advancing in many ways and health is not left behind. Advancement in health especially in public health services, health literacy, medication, and healthcare, has led to people living longer. Simultaneously, the fertility rate is dropping around the world (Stefanelli et al., 2016). Within the last 100 years, the global fertility rate has dropped from as high as 6 to less than 2 per woman (Stefanelli et al., 2016). This drop is not surprising because, within that same period, women's involvement in the workforce doubled (Stefanelli et al., 2016) and contraception methods have become more widely used. The complex relationship between extended life expectancy and decreased fertility rate is responsible for rise in the proportion of older adults in the general population, but many researchers and scientists think that the decreasing global fertility rate has a greater impact compared to the former (Kinsella, 2001; Kinsella, 2001; Kevin Kinsella & Velkoff, 2002). A nation whose older adults aged 65 years or above make up 10% or more its population is said to be aging. Many nations around the world are experiencing population aging. For example, in 2016 Canada was reported to have around 16% of its population aged 65 years or older (Statistics Canada, 2016), and about a quarter of Sri Lanka's population will become elderly by 2041 (Samaraweera & Maduwage, 2016). Around the world, there is recognition that health systems must prepare adequately for this aging population (Nikolich-Zugich et al., 2016).

2.2 Aging and Chronic Disease

Chronic diseases are rampant among older adults and this is true for many high income countries, as well as middle and low income countries. Nearly half the burden of disease in high income countries is attributable to older adults (Prince et al., 2015). For example, 92% of community dwelling older adults in US reported having one or more chronic diseases (Hung, Ross, Boockvar, & Siu, 2011). Low and middle income countries are not left out given that about 20% of the disease burden in these countries arises from older adults (Prince et al., 2015). Therefore, population aging may lead to increase prevalence of chronic disease in the population (Prince et al., 2015).

2.3 Aging and disability

Just like chronic diseases, disability has been linked with aging. The higher the number of chronic diseases the higher the odds of having disability (Waterhouse, van der Wielen, Banda, & Channon, 2017), meaning that chronic diseases and disability are related. Disability is also common among older adults. In the US, 1 in 4 older adults lives with disability (Hung et al., 2011; L Murray et al., 2012). Many studies concluded that disability is likely to progress if it is not discovered on time and disrupted by medical intervention (Gill, Robison, & Tinetti, 1998; Hardy & Gill, 2004; Lunney, Lynn, Foley, Lipson, & Guralnik, 2003; Romoren & Blekeseaune, 2003). Since disability in older adults is associated with increase resource utilization, increase healthcare expenditure and caregiver distress (Gill et al., 1998; Harrow, Tennstedt, & McKinlay, 1995; L Murray et al., 2012), researchers argue that focusing on alleviation of disability is more important than life extension in aging societies (Nikolich-Žugich et al., 2016; Olshansky, Goldman, Zheng, & Rowe, 2009). So,

there is need to screen for disability among older adults as important as the first step towards halting disability progression, in order to reduce its effect.

2.4 Aging and multi-morbidity.

Multi-morbidity generally refers to the presence of two or more chronic medical conditions in a person. Chronic conditions such as diabetes mellitus, liver disease, hypertension, stroke and other heart diseases tend to occur in clusters (Marengoni, Rizzuto, Wang, Winblad, & Fratiglioni, 2009). Again, multimorbidity increases with age (Global Burden of Disease Study 2013 Collaborators, 2015). This is of interest because the presence of multiple chronic conditions can multiply health care costs drastically (Schneider, O'Donnell, & Dean, 2009), producing a multiplicative rather than an additive effect on health care expenditure.

2.5 Aging and Health Care Cost

The shift from infectious disease to non-communicable diseases means more complexity, costs of care and difficulty in treatment. This is because, non-communicable diseases increases with age and are more likely to have long lasting consequences (Global Burden of Disease Study 2013 Collaborators, 2015). They are often progressive and may last for a lifetime. Research shows that older adults are 70% more likely to suffer disability when faced with chronic conditions (Lee, Oh, Lee, Song, & Lee, 2018), mainly because many older adults are frail and have diminished resilience to withstand these conditions. Hence, chronic conditions and the disability that result from them are the leading cause of disease burden. Managing these

conditions that are prevalent among older adults contributes to increased health care expenditures (Foy & Mandrola, 2018).

Health service use by older adults is the primary source of healthcare expenditure. In addition to the number of times an older adult uses health services, the intensity, length and type of services used also matter. For example, it is known that the likelihood of visiting the emergency department increases with age (Walker, Jamrozik, Wingfield, & Lawley, 2005). The cost of care at emergency department is expected to be higher than the cost of care at a regular general practice or cost of care at home. Therefore, there is need to develop strategies that will help achieve a shift in usage so that older adults use more of low-cost health services and less of high-cost health services.

2.6 Future Aging Trends

According to United Nations, it is predicted that 95% of population growth from 1980-2050 will occur in low and middle income countries (United Nations. Department of International Economic and Social Affairs. Population Division, 1982) and a more recent analysis of human population growth agrees with this projection (Bongaarts, 2009; Kevin Kinsella & Velkoff, 2002). These nations have a relatively young population now. With the expected improvement in health care, life expectancy will improve in these countries. However, the fertility rate which first started to decrease in developed countries is also beginning to decrease in low and middle income countries (Restrepo & Rozental, 1994; Stefanelli et al., 2016; United Nations. Department of International Economic and Social Affairs. Population Division, 1982). Currently, many countries are reporting population aging, this trend started in developed

countries like Japan and Canada, and it is projected to affect low and middle income countries, where population aging is expected to happen at a faster rate (Kevin Kinsella & Velkoff, 2002). Research from low and middle income countries like Greece (Tyrovolas et al., 2018) and South Africa (Gómez-Olivé, Thorogood, Clark, Kahn, & Tollman, 2013) already confirms this projection .

2.7 Coping Strategies

A closer look at population trends and aging reveals that there are complex, interacting, and multidimensional factors that affect health and disability among older adults. This complexity of needs necessitates comprehensive assessment. There is need for any assessment tool for older adults to be holistic/comprehensive because older adults are more likely to have comorbidities and to be affected by other non-medical factors (e.g., psychosocial issues, environment, poverty) (Prince et al., 2015). So, in addition to assessment tools that are disease specific, broad based assessments tools are needed especially at the initial contact period.

More so, chronic disease often follows a known path characterised by functional decline which is also known as disability, followed by loss of independence, and eventually may result in institutionalization (Quinn, McArthur, Ellis, & Stott, 2011). Though some of the decline may be reversible, very few older adults are able to return to their original state of no disability, partly due to decreased health resilience. It is said that prevention is better than cure, so the focus should be placed on disrupting this chronic disease trajectory. This can be done through early detection and timely medical intervention to prevent further decline.

Further, as the world population ages, some researchers are beginning to turn their attention to older adults related research. One of the emerging findings is that many older adults have unmet needs and these needs include non-medical and medical needs (Samaraweera & Maduwage, 2016). This is despite the fact that a huge portion of healthcare spending is on older adults (Schneider et al., 2009). However, research reveals that only a few of the older adults account for the health care cost on older adults (Wodchis, Austin, & Henry, 2016). Effort should be geared towards identifying these few older adults that have medical needs or those that are at high risk of having medical needs (Lepeleire, Iliffe, Mann, & Degryse, 2009), to allow for targeted delivery of health care. Many researchers suggested a step wise protocol that entails an initial simple assessment to identify high risk older adults, followed by a more in-depth assessment for the identified at-risk individuals (J. De Lepeleire, Degryse, Illiffe, Mann, & Buntinx, 2008; Quinn et al., 2011).

2.8 Current Practices

Many nations are finding innovative ways to deal with large aging populations. One of the ways is population wide geriatric assessments. Most geriatric assessments are done by clinicians, and often done in clinical setting (Pialoux, Goyard, & Lesourd, 2012; Van Kan et al., 2008). Clinician-administered community assessment is rarely done for community dwelling older adults (Jan De Lepeleire et al., 2009; O’Caoimh, FitzGerald, et al., 2015). The implementation of population wide clinician-administered geriatric assessment has some limitations. First, they are expensive to implement especially because of the cost of paying the clinician or other members of the health care teams who administers the assessments. Given that communities are constantly faced with the challenge of resource scarcity, implementing a

population wide clinician administered initial geriatric assessment may not be feasible or sustainable due to cost. In addition, many health care practitioners are unwilling to implement comprehensive assessment for all older adults (Beauchet et al., 2014) because they consider it complex, time consuming, and costly (Haastregt, Diederiks, Rossum, Witte, & Crebolder, 2000; Rossum et al., 1993).

Again, the benefits of implementing population wide clinician-administered assessments is relevant to only a small part of the population- the subgroup that are at risk of having medical need (Sternberg, Schwartz, Karunanathan, Bergman, & Clarfield, 2011). Therefore, it does not justify the cost of the intervention to use comprehensive clinician led assessment on the broader general population of healthy older adults. Even in 1990 when the British National Health Service mandated the general practitioners to offer geriatric assessments and home visits to older adults in the country, the intervention did not have significant effect on the general population of older adults (Haastregt, Diederiks, Rossum, Witte, & Crebolder, 2000; Rossum et al., 1993).

A low-cost alternative to clinician-administered geriatric assessments has been explored too. This involves having individuals report on their own health either by themselves, or with the assistance of a caregiver or lay interviewer. Postal questionnaire is a common method where self-administered questionnaires are distributed by post, they are then filled by residents at their homes, and returned to the researchers by mail (Alessi et al., 2003; Bowns, Challis, & Tong, 1991; Hébert et al., 1996; Pathy, Bayer, Harding, & Dibble, 1992). However, the data collected in mailed surveys is biased toward people who have permanent home address as people who do not have a permanent address or who change address are often missed. In addition, postal surveys are paper based, a lot of effort is needed to extract the data from the

questionnaires and responding to those surveys can involve unnecessary time delays. This further limit the possibility of using postal surveys for population wide screening.

2.9 interRAI Assessments

The interRAI assessments have been developed to address the complex needs of vulnerable persons of different ages across care settings. Currently, there are interRAI assessment tools used for people receiving services from nursing home (Fries et al., 1997), home care (Morris et al., 1997), acute care (Carpenter et al., 2001), post acute care (Gindin et al., 2007), palliative care (Steel et al., 2003), assisted living (Maxwell et al., 2013) and mental health related facilities (Hirdes et al., n.d.; Hirdes et al., 2002). This allows for integration of client's information along the continuum of care (Gray et al., 2009; Hirdes et al., 1999). The early interRAI assessments tools existed as complimentary assessment tools that were used for different care setting, but from year 2000 to 2007 interRAI Fellows from 12 countries worked together to refine the existing interRAI assessment tools into an integrated system of instruments aimed at producing newer versions of existing instruments that now have well-matched assessment approaches used by different health care providers in different care settings (Hirdes et al., 2008; Gray et al., 2009). Apart from being used across care settings, interRAI assessment tools are used in countries located across the five inhabited continents of the world, providing opportunity for global benchmarking (Morris et al., 2018). This global usage is made possible because interRAI instruments can be locally adapted to meet local needs (Wellens et al., 2012).

Typically, interRAI assessments require that a health professional does the assessment. The questions in the assessment forms are usually standardized in a way as to promote precision in recorded responses, by including time frame (usually within the last three days except otherwise specified), intensity measures (for instance, the degree of disability), frequency measures and examples to both assessor and respondent. Each interRAI assessment instrument has a manual available to assessors (Hirdes et al., 2008). The manual contains detailed explanations on how to code each item on the assessment form. The assessor records the most correct answer based on the assessor's final clinical judgement after examining all sources of information that are relevant to that item, including the respondent's opinion, respondent's family and friends opinion, respondent's medical records, and what the assessor observes (Hirdes et al., 2008). In contrast, when coding the self-rated health questions, the assessor records only the respondent's opinion. So, the interRAI clinician assessments include, but go beyond self-assessment.

Further, the health professional administered assessments makes sense for persons with complex needs (severely mentally ill, persons with dementia, persons who are dying), but there may be some limitations to this approach: 1) It is not cost effective for large populations with light care needs; 2) It may be overly burdensome with low yield of "true positives" in early stages of transition to disability; 3) It may not be feasible in low resource nations where there are few health professionals. For the above reasons, interRAI has developed a self-report tool (interRAI Check-up self-report version) to complement the clinician administered assessments as an earlier stage screening tool; to screen large predominantly healthy populations; to serve as low cost solution for obtaining compatible data with the full suite in populations who can self-administer; and tool to use in settings where comprehensive

assessment is not typically done by health professionals (e.g., primary care, healthy seniors organizations, low resource nations). The Check-Up is a screening level assessment tool used to identify people that will benefit from more in-depth assessment by a clinician.

2.10 Assessments for older Adults

Stakeholders consultation revealed that development of screening and assessment tools for older adults needs to be prioritized (Tisminetzky et al., 2017). Assessment is as old as health care itself. People have always been assessed in some ways before they receive care. Most of these assessments were done by clinicians who also provided most of the care. As health sector evolved, allied health care professionals and para medicals became an important part of the health workforce. As such, they also began administering health assessments. On the other hand, the digitalisation of on-line health information has resulted in more health information been available to the general populations. Hence, even people who are not health professionals understand their health and are able to give their opinion on it. This led to the development of self-administered assessment tools. Clinician-administered and self-administered assessments are similar because they provide relevant information on the health status of the respondent.

Self-rated health has been named as one of the first tiers of measures for monitoring populations health (Chan, Saito, & Robine, 2016). Many studies have examined the use of self report assessment in older adult populations. Strong agreement has been found to exist between self reported and clinician reported assessment when the question is about matters that do not easily change (Hébert et al., 1996) such as, the marital status of the respondent. According to a study on older adults in the south region of the Netherlands, adults were most

likely to report worse health status when self administering an assessment compared to when interviewed (Rossum et al., 1993), though the researchers did not specify if the interview was done by a lay person or a clinician, and whether or not it was only the respondent's view that was recorded in both instances. However, weak agreement exists between the two types of assessment when the required response is subjective (Hebert et al., 1996). This is expected because different people are likely to produce different answers on a subject when the answer is subjective. More so, a clinician may have a different opinion from a lay person about a respondent's health status because of his/her medical background leading to the evaluation of health on a difference basis than the person uses in his/her subjective appraisal. Factors like educational background and language difficulty may pose a problem for a respondent and affect the comprehension of the assessment questions and the recorded response in a self reported assessment (Quinn et al., 2011). Therefore, self-administered assessment is not meant to replace clinician-administered assessments, but to rather compliment it.

2.11 Uses of Self-Report Measures

Health care needs are not equally distributed among older adults and only a few of the older adults account for the health care expenditure on older adults (Wodchis et al., 2016). Self-report assessment can serve as case finding tool to identify individuals with high risk medical needs. This allows the more expensive clinician-administered assessment to be targeted at the group of people that really need it. Regular self-administered screening led to reduced emergency visit and reduced the length of hospital stay (Rossum et al., 1993). Of course, one of the advantages of self-report health is that it encourages the respondents to reflect on their

health, which could prompt the respondent to seek early medical attention upon discovery of the existence of any health challenge.

Self-report assessment has also been used for prediction of health needs of respondents. Wagner et al. effectively used a self-administered questionnaire to predict health service use among older adults (Wagner, Bachmann, Boult, Harari, Renteln-Kruse, et al., 2006). For instance, characteristics of community-dwelling older adults has been used to predict institutionalization, hospitalization, or even death, among this population (Garner, Tanuseputro, Manuel, & Sanmartin, 2018; O’Caoimh, FitzGerald, et al., 2015). These predictions could inform health policy on how much health resources (e.g., the number of required health facilities) is needed to adequately plan for the aging population.

2.12 Limitations of Self-report Measures

Data from self-report health assessments usually have reduced clinical precision. Weak correlations among self-administered, interviewer-assessed and performance-based methods of assessing physical function have been reported (Reuben, Valle, Hays, & Siu, 1995). For example, only 56% of those who had hypertension self-reported that in a self-report survey and the researchers found that most of those who had hypertension but did not report it, did not know that they had hypertension since hypertension is often symptomless (Gómez-Olivé et al., 2013). This means that if the goal of an assessment requires clinical precision, self-report-measures may be contraindicated. Again, lack of insight towards different health conditions affect what respondents report in self-administered assessment. Unlike a clinician who has his clinical judgement as well as other sources of information (the respondent and respondent’s

health record) to draw from, lay individuals often rely on their experience with a health issue when reporting. For example, pain, depression, and activity limitations were found to predict self-rated health more strongly than the actual diseases that caused these features (Nützel et al., 2014).

In addition, bias toward minimization or exaggeration of health concerns may go unnoticed when using self-reported data. The response of a person may be influenced by a recent health challenge in such a way that for the same level of functional decline, the person whose decline happened recently may report a higher effect while the person whose decline happened a year is likely to record a lesser magnitude of decline compared to the exact level of decline. This is called response shift (Daltroy et al., 1999), which is an internal recalibration of what is normal based on how long ago the incident occurred. Also, culture may make people report less accurately on some culturally sensitive issues (Chiu, Amartey, Wang, & Kurdyak, 2018; Santos-Lozada, 2016; Schutt & Mejía, 2017). Though this is still present in clinician-administered assessment, the effect could be minimized as the clinician cross checks respondent's opinion with other sources of information. Therefore, the use of single source of information could increase the effect of biased responses in self-administered assessments.

Also, the health literacy level of a respondent may affect how the question is understood because of unfamiliarity of lay populations with some terminology that is used in the assessment form. This could in turn affect the response that is recorded or may lead to non-response as respondents skip questions that they do not understand. Hence, self-administered assessment forms should be created with lay language as much as possible. In some populations especially in low income countries, many older adults may lack the ability to read.

This could lead to bias as only older adults who can read in low income nations (mostly the wealthy) get to do the self-administered assessment.

2.13 Gaps in Self-report measures

Many self-administered assessment tools are developed to focus on assessing one aspect of risk, for instance, screening for possibility of hospital admission (Boult, Boult, Pirie, & Pacala, 1994; Wagner, Bachmann, Boult, Harari, von Renteln-Kruse, et al., 2006) or risk of institutionalization (Slade, Fear, & Tennant, 2006). This means that to get a comprehensive understanding of various factors, older adults will have to take several surveys, and this can lead to increased assessment burden on older adults. There is need for a comprehensive assessment tool so that the data generated could be used for different purposes. A comprehensive assessment tool would also reduce the assessment burden on the respondent, their family and friends, and the clinicians. A randomized controlled trial of geriatric screening showed that detection of health problem increased by 38% when screening is comprehensive compared to when geriatric assessment is done on demand for a specific course (Tulloch & Moore, 1979).

Based on a literature search, all the self-administered assessments that were cited (Brody, Johnson, & Ried, 1997; Koyama et al., 2014; Nützel et al., 2014; Wagner, Bachmann, Boult, Harari, Von Renteln-Kruse, et al., 2006) were not routinely done on large populations. Many were done for the purpose of the research in which they were cited. To truly make a difference in terms of surveillance, self-administered assessments will need to be done routinely. This may be very difficult to implement if the assessment is done on paper and by mail, because it

will take a lot of paid time to extract the data, this will not only increase the cost of implementation, but the time interval between doing the assessment and having the data available for use may be excessive. Hence, there is need to leverage technology for screening a large population. Using a digitalized assessment tool will make data processing simplified and collection of real time health information possible. Digitalizing the assessment tool also makes it possible for intelligence to be built into the assessment tool, so that respondent could get personalized health information based on their health needs.

2.14 Summary

The world is experiencing population aging in high, middle, and low-income countries, though the intensity or rate of population aging is different in many nations. The similarities are that chronic disease, disability, multi-morbidity and health care expenditure are on the rise in many countries due to population aging. Clinician-administered assessment is mostly used for assessing health needs for older adults in the community, but population wide implementation is hindered by the huge cost associated with this type of assessment. Researchers have shown keen interest in testing self-administered assessment as a low-cost first level alternative assessment to help identify high-risk individuals who could benefit more from the expensive clinician-administered assessment. Most of the self-administered assessments are demand oriented. To better understand the health needs of older adults, there is need for routinely done self-administered comprehensive assessment.

2.15 Study Rationale

To respond to the gaps already identified in self-administered assessment, interRAI has developed a self-report assessment tool that is multidimensional, standardized and digitalized. The tool has items that capture respondent's information related to different aspects of health. It collects information beyond medical needs to include information on the broader wellbeing of the person, including demographics, mood, social issues, function, senses, clinical complications and health service use. When monitoring the health of older adults in the community or primary care, it is important to take a broader perspective because of the potential emergence of multimorbidity and frailty in this subpopulation. Earlier detection of problems related to multimorbidity and frailty may help to initiate interventions that could prevent or delay declines in health.

The interRAI Check-Up is designed to improve precision in the self-reported information that is collected by providing examples, including intensity and giving time frame to help respondents think more carefully about the response they are providing. Self-report as used in this study means that the assessment can be filled by the respondent alone or by the respondent with the help of a lay interview. In either case, only the respondent's opinion is recorded.

Sustainable health assessment for older adults requires at least a two-step process where the first involves a simple and quick assessment to identify high risk groups, followed by a second more in-depth assessment for the identified individuals at risk. To effectively accomplish the

two-step process, the first step should be done with a tool that is quick to use but comprehensive enough to avoid missing any individual who is at risk. Also, the assessment tool should be accessible to clients even before they meet the health team, since it is designed for screening the public and not only those older adults that present at primary care setting. Hence, the need for an online assessment tool. In addition, while many self report assessment tools exist, many are lacking in one or more factors highlighted above (O’Caoimh, Cornally, et al., 2015; Pialoux et al., 2012; Sternberg et al., 2011). Therefore, the CU addresses the need for a comprehensive, standardized and accessible initial assessment that can be administered electronically.

The interRAI Check-Up has two versions: the clinician administered version and the self-report version (CU). In South Africa, an interRAI pilot project that compared results from clinician administered check-up and those from self-report version. The study results showed that good agreement exist between both versions of the Check-Up (Geffen, 2019). In addition, another pilot test of most of the questions from the self-report Check-Up was conducted using telephone-based survey interviews. Result from that study informed the initial refinement of the questions that were added to the current self-report CU.

Building on the development of the self-report CU to date, this study focused on investigating the feasibility of using the self-report Check-Up in diverse populations. This study is focused on identifying factors that could hinder respondents from using the CU effectively, including: the impact of educational level, use of a lay interviewer, and language barriers. It also sought to identify difficult questions, bearing in mind that the wording of the questions in an assessment tool influences the quality of response that respondents provide. The result of this study will inform any necessary refinement on the self-report Check-Up to make it feasible for use in diverse populations. This is important because the general

population is usually heterogeneous, and any tool fashioned for the general population should be robust to the effects of diversity. The CU is designed so that the data generated from it could be used for multi purposes such as care planning for independent populations and case-finding of older adults requiring more comprehensive geriatric assessment. Also, the incorporation of the Check-Up into public-facing health information portals would assist in large data collection often required in survey research and evaluation study. Secondly, this study evaluated the psychometric performance of the self-report Check-Up in order to establish its reliability and validity.

3. Methodology

3.1 Design and Development of the interRAI Check-Up (CU).

The self-reported version of the interRAI Check-Up (CU) used in this study was developed by interRAI (Morris et al, 2018). interRAI is a not-for-profit corporation composed of international consortium of researchers, practitioners and policy makers in over 35 countries, working together to improve care for vulnerable populations. interRAI develops all of its assessment tools through rigorous research and it is customary for each instrument to undergo testing to establish its reliability, validity and feasibility of use in the target population (Carpenter & Hirdes, 2013).

The CU was developed through several research efforts. An independent housing study was done by supplementing a subset of questions from a previous interRAI assessment tool (interRAI HC- a comprehensive assessment tool for community-dwelling home care clients) with new set of questions that made it suitable for assessing the health characteristics and needs of adults that are living independently in the community, as well as those in primary care setting. Also, self-report interRAI items were tested in Ontario studies including surveys of informal caregivers and telephone-based interview surveys of the general population in the regional municipality of Waterloo, in southwestern Ontario, Canada. Although two versions of the CU exist, the assessor-rated and the self-reported versions, it is the self-reported version that is used in this study. A pilot study in South Africa tested the assessor-rated and self-report version of the Check-Up and the study showed that there is good agreement between the two approaches (Geffen, 2019).

The CU contains questions on various aspects of health including demographics, mood, social, function, senses, clinical complications and health service use. The questions are worded to provide respondents with precise response options. Each question is about a precise concept and usually includes clarifying statement, time frame and examples. Therefore, respondents are more informed about each question and can provide precise response in return.

3.2 Study Design

The study used a cross sectional design because the essence of the study is to get a snapshot of the experience of older adults with using the assessment tool. This study design is an exploratory first step to examining the potential for broad-based used of the tool in heterogeneous populations.

The proposed study design allows for data collection in topics that may not be directly related to the research question and these data can be used for secondary data analysis since most partner organisations often get involved in a research for outcomes that may be different from those of the researchers. Hence, it allows for both researchers' objectives and partner organisations' objectives to be satisfied with one data collection.

Although it is impossible to draw causal inferences from a cross sectional design, being able to make causal inferences is not the focus of the study. The focus of the study is to identify any differences in responses based on respondents' characteristics, as well as to identify

questions considered difficult by respondents, so that the assessment tool can be refined accordingly.

Participants were randomly assigned to one of three study groups: those who self-administered the assessment by themselves; those that did the assessment with the help of their informal caregiver; and those who did the assessment with the help of a lay interviewer whose role was to read the question to the participant and record the participant's response without interpreting the questions to the study participant. In all groups, only the participant's response is recorded, and no inferences are made by the interviewer. Randomization of participants happened in one of two ways. If participant was accompanied by an informal caregiver, they were randomly assigned to one of three groups (self-administered, interviewer administered, or caregiver administered). If they had no accompanying informal caregiver, participants were then assigned to one of two groups (self-administered or interviewer administered). The separation of participants into groups allowed for the evaluation of any differences that may exist in responses when participants had the assistance of a lay interviewer or informal caregiver, versus when participants answered the questions all by themselves.

3.3 Health and Caregiving Survey (HCS)

The Health and Caregiving Survey (HCS) was done in the regional municipality of Waterloo in southwestern Ontario, Canada within a period of 3 weeks (January 23rd – February 13, 2017). It was led by Professor John P. Hirdes in collaboration with University of Waterloo Survey Research Centre. The HCS was the first test of self-report questions that were later used in the CU, but it was administered as a telephone-based survey of the general

population, with oversampling of older adults. The ethics file number for this study is 21870. 200 older adults participated. Random digit dialing of telephone/cell phone number was used to enroll participants to the study.

The HCS results are of interest here because they allow for some comparisons of telephone-based interview results with those from in-person interviews and self-administered responses.

3.4 Ethics

For this study, all older adults that are aged 65 years and above who are affiliated with five adult community support centres in Toronto and Waterloo, Ontario, and Nova Scotia, Canada, were invited to participate in the study. Ethical approval was obtained from University of Waterloo Ethics Committee and other relevant health services before the study commenced (ORE# 40181).

3.5 Data Collection

3.5.1 Sample Organisations

Recruitment for this study happened in two phases, from March to June 2019. The first phase was the recruitment of partner organizations by the researchers. The second phase was the recruitment of study participants by partner organisations. The call for partner organisation was announced at both pan-Canadian research conferences as well as research conferences in Ontario (the biggest province in Canada). Eventually, five organizations in Canada indicated interest and agreed to participate in the study - four operate in Ontario and one organization operates in Nova Scotia.

The organisation with the largest number of participants in this study is Loft Community Services (n=90), which is an organization that provides housing support to youth, adults and seniors in the greater Toronto area of Ontario. Loft serves people with complex challenges including serious mental health challenges, dementia, substance abuse issues, physical health challenges and homelessness or the risk of becoming homeless. Another partner organization is Lambton Elderly Outreach (LEO), which is a non-profit agency servicing 1,900+ clients throughout Sarnia and Lambton County, Ontario, each year. LEO's mission is to provide support services including supportive housing, that enable clients to live with dignity and independence with a goal to help seniors and adults with disability remain fit, socially active and stay in their home longer. They do this by partnering with retirement homes to provide subsidized housing for older adults.

We also partnered with Reconnect Community Health Services, and the study was done at their Eglinton Hill Centre. This agency is an older adult centre located in Eglinton (northwest Toronto), which is an economically and culturally diverse neighbourhood. The centre's membership reflects the neighbourhood's diversity and includes several seniors from the Caribbean, Africa, South America, Portugal and Albania. Seniors come to the centre by bus, walking, wheel trans or using the organization transportation services. The centre runs with a drop-in model so members attend as often as they would like for as many programs as they would like. The centre targets older adults 55 + who live independently in the community. Also, Region of Waterloo partnered with us through its Sunnyside Wellness Centre. This is a centre primarily visited by independent seniors for recreational activities. We obtained the smallest number of study participants (n=14) from this centre, since it also served small number of older adults. Similarly, this study included Shannex Parkland Clayton Park (Shannex Incorporated) in Nova Scotia (n=30). Shannex incorporated provides housing support to both medically complexed and independent older adults in the Halifax area of Nova Scotia.

Following the identification of these five partner organizations, the researchers worked with the initial contact person from each partner organization to identify a project lead. Then, each project lead was trained via teleconference meeting on the research protocol by the researcher. The project leads then identified volunteer lay interviewers from within their organizations to work with.

3.5.2 Sample Participants

A total of 157 older adults participated in this study. Older adults that were aged 65 years and above and affiliated with any of these five adult community support centres in Toronto and Waterloo, Ontario, as well as Nova Scotia, Canada, were invited to participate in the study. Inclusion criteria include that respondent must be aged 65 years or older and resides in the community. Older adults who were younger than 65 years, hospitalized or institutionalised were excluded. The recruitment script was either emailed to potential participants or verbally read to them. Then information letter was provided to those who voluntarily indicated interest in the study. If the individual decided to participate in the study, then a written consent was obtained from them.

Participants were randomly assigned to one of three groups. Group 1 self-administered the assessment alone, group 2 had the self report assessment administer to them by a lay interviewer and group 3 did the assessment with their caregiver only. The goal was to have a minimum of 30 respondents per group to allow statistical comparison between groups. However, group 2 and group 3 were merged to form one group during analysis (group 2) because group 3 had only 6 entries at the end of data collection.

A computer-based method was used for data collection. The assessment tool was set up to work on the Qualtrics platform, which is software for hosting survey tools online. The assessment was done on a tablet to make sure the print size was large enough for older adults. Responses were recorded electronically by clicking on preferred responses while scrolling through the questions. Skip patterns were built into the electronic assessment tool. Thus, based on a participant's response, questions that will not apply to that participant are skipped.

This skip logic helps to save time during data collection and prevent CU from being redundant to respondents. The CU was be filled entirely by the older adult whose health status was assessed or with assistance from a caregiver or lay interviewer depending on the study group. However, the response recorded must be a representation of only the view of the person for whom the assessment is done.

All collected data were downloaded to a secure server. Entries that were uncompleted were deleted and the rest of the data were stored as an encrypted file on the interRAI server hosted by University of Waterloo from where they were accessed for analysis.

3.6 Data Analysis

3.6.1 Scales

This section is on some of the summary scales embedded in self-report Check-Up. These scales give insight about each person assessed with CU. The cut-off point used for these scales were taken from other published papers (Hirdes et al., 2011; Hogeveen et al. 2017) where these scales were used in recent past as of the time of this study.

Activities of daily living Hierarchy Scale (ADLH) - this is a summary scale that measures the ability of clients to perform activities of daily living like bathing, dressing one's self, etc. Its score ranges from 0 to 6 (no physical disability to very severe physical disability). A score of 3 or more signifies physical disability. (Hirdes et al., 2011; Hogeveen et al. 2017)

Independent Activities of Daily Living Capacity Hierarchy Scale (IADLCH)- this is a summary scale that measures the real or potential client's difficulty with meal preparation, ordinary housework like shopping, and phone use. Its score ranges from 0 to 6 (no difficulty to severe difficulty). A score of 3 or more moderate to severe difficulty. (Hirdes et al., 2011; Hogeveen et al. 2017)

Cognitive Performance Scale (CPS)- this is a summary scale that measures the cognitive status of clients. Its score ranges from 0 to 6 (cognitively intact to very severe cognitive impairment). A score of 3 or more signifies cognitive impairment. (Hirdes et al., 2011; Hogeveen et al. 2017)

Self-reported Mood Scale (MOOD)- this is a summary scale that measures the self-reported mood of clients. Its score ranges from 0 to 9 (no mood problem to very severe mood disturbance). A score of 3 or more signifies mood disturbance. (Hirdes, J.P. 2019)

Pain Scale (PAIN) - this is a scale that measures the pain experience of clients. It considers the frequency and intensity of the pain. Its score ranges from 0 to 5 (no pain to severe excruciating pain). A score of 2 or more signifies daily pain of any intensity. (Hirdes et al., 2011; Hogeveen et al. 2017)

3.6.2 Descriptive Analysis

Descriptive statistics of the older adults in CU study were computed to identify characteristics of the study sample. Mean and frequencies were computed to answer these key questions below:

- 1) How long did it take respondents to complete the survey?
- 2) How difficult was it for respondents to complete the survey?
- 3) What top questions did respondents find most difficult to answer?
- 4) What top questions were respondents most uncomfortable answering?
- 5) How well did this survey cover respondents' health needs?
- 6) What health concerns that are important to respondents were not considered in this survey?

- 7) What top questions would respondents drop from the survey?
- 8) What could be done to improve the usefulness of this survey for respondents?
- 9) What language do respondents speak at home?
- 10) What is the mean age of respondents?
- 11) What is the gender of respondents?
- 12) How long have respondents lived in Canada?
- 13) What are respondents' highest level of education?

T-Test and cross-tabulations with chi-square were used to test for any difference in the assessment completion time between self-administered group and lay interviewer-administered group.

3.6.3 Multivariate Logistic Regression

Statistical Analysis Software (SAS) 9.4 was used for analysis. Because of the small sample size, a significance level of $P < .10$ was used for first level analysis. Two multivariate logistic models were constructed with two different outcome variables. The first outcome variable is the level of difficulty experienced while doing the assessment. Though participants had 4 options to select from during the assessment (no difficulty, mild difficulty, moderate difficulty, and severe difficulty), the level of assessment difficulty was measured in binary format where no difficulty was classified as “not difficult” and mild difficulty or moderate difficulty was classified as “difficult”. Note that no participant recorded that the assessment

was severely difficult. Factors that have been shown by literature to affect assessment such as the use of a lay interviewer or caregiver, level of education, language preference, age and sex of respondent were first tested using a bivariate analysis. Only independent variables that were significant at the bivariate analysis level (when independent variable is modeled singularly with the outcome variable) were included in the final model.

The second outcome variable was how long it took participants to complete the assessment. Again, this was dichotomised into those that completed the assessment below and above the mean completion time of 28.3 minutes. Again, in addition to age and sex, relevant independent variables that were identified by the researchers to possibly affect assessment completion time were tested at bivariate analysis for addition to the final model if they emerged significant.

3.6.4 Psychometric Testing

The convergent validity of the Self-report Check-Up was tested by examining patterns of association in the data. Reliability was assessed using Cronbach's Alpha. This involved separately using items from 3 different scales generated from the tool: self-report mood scale; activities of daily living hierarchy scale (ADL); and independent activities of daily living scale (IADL). There are different ways to evaluate consistency of data obtained with an assessment tool including intra rater, inter rater, and internal consistency (Vet, Mokkink, Mosmuller, & Terwee, 2017). To measure intra rater consistency, the rater carries out an assessment twice or more and the result of these assessments are evaluated for consistency. Meanwhile, inter rater consistency requires two or more raters to assess the same client and

results obtained are compared for level of similarities. For this study, another type of consistency measure was used, i.e., internal consistency (Bland & Altman, 1997; Vet et al., 2017). Internal consistency measures the patterns of association between variables that are known to be related. The researchers decided to use internal consistency to evaluate reliability instead of other methods like intra or inter-rater consistency because the day to day implementation of CU assessment would require clients who are neither trained nor calibrated to use the CU and each client would assess their own health. In that case, measuring the internal consistency of an assessment is closer to reality than doing intra or inter-rated measurements that do not reflect how CU is meant to be used.

The disadvantage of using Cronbach's alpha is that missing data may hinder the ability to use the test because it depends on "listwise" completion of correlations where cases with any missing values are excluded. Looking at the data from this study, there was a very low level of no response as only a few items had missing values for a maximum of 2 clients. In addition, the study by Hogeveen et al. (2017) was used as a benchmark for RAI-HC statistical estimates to compare against the Check-Up's performance.

More so, inter-group convergent validity was tested for the self-report Check-Up by comparing the correlations of selected pairs of items in three different groups. Group A are all the participants that were assessed with CU, group B are study participants that only self-administered the CU, and group C are respondents who did the CU assessment with the help of a lay interviewer. These paired items include activities of daily living scale and cognitive performance scale, instrumental activities of daily living scale and cognitive performance

scale, pain scale and mood scale, pain scale and depression rating scale, self-rated health and mood scale, and lastly, pain scale and self-rated health.

3.6.5 Comparative Analysis Between CU, HCS, and RAI-HC

Where possible, Check-Up (CU) data was compared with data from Health and Caregiving Survey (HCS)- a telephone-based survey interview from Waterloo region involving 200 older adults, as well as RAI-HC data from Ontario. Sociodemographic characteristics, clinical characteristics, internal consistency of scales, and patterns of association between pairs of variables were compared between CU and HSC data. In the case of RAI-HC, its reliability (alpha score) and validity (r value) results that were reported by Hogeveen et al. were compared with those from CU. Cross tabulation and Chi-square were done to identify any differences in distribution of sociodemographic and clinical characteristics of CU and HSC participants.

4.Results

Analyses of the sociodemographic characteristics of older adults who participated in the CU study show that more females participated in this study and the average age of all participants was 76 years. The gender distribution of respondents in the interRAI Check-up project were like that of those that were selected by random dialing of older adults in Waterloo, Ontario, during the telephone-based survey. In comparison with HSC, CU participants are significantly older. Most CU participants have lived in Canada for more than 5 years and the majority have at least high school level of education. See Table 1.

Table 1: Sociodemographic Characteristics among Community Dwelling Older Adults for Check-Up (2019) and Health & Caregiving Survey (2017) (N=353)

		CU Sample N=157	HCS Sample N=200	P value for CU/HCS Chi-square Test
Items	Sub-categories	%(n)	%(n)	
Age	65-74 years	49.7(76)	60.6(123)	0.009*
	75-84 years	26.8(41)	28.6(58)	
	85+ years	23.5(36)	10.8(19)	
Gender	Female	61.1(96)	64.0(128)	0.58
Married		16.6(26)	55.5(111)	<0.0001*
Living Alone		63.1(99)	N/A	
Participants with at least High School Degree		76.4(120)	N/A	
Participants who Speak English at Home		87.9(138)	N/A	
Participants who Lived in Canada all their life.		55.4(87)	N/A	

Abbreviations: CU = Check-Up, HCS = Health and Caregiving Survey

Clinically, daily pain, cognitive impairment, IADL impairment, and mood disturbances were common among CU participants with 40.8 % of older adults reporting poor health. At 33.8%, CU participants report comparable level of daily pain with those of general public from HCS survey. CU participants are less healthy compared to the general public (HCS data) because more older adults from CU study reported poor health (see Table 2). They were also more likely to have problems with self-reported mood.

Table 2: Clinical Characteristics among Community Dwelling Older Adults for Check-Up (2019) and Health & Caregiving Survey (2017) (N=357)			
	CU Sample N=157	HCS Sample N=200	P value for CU/HCS Chi-square Test
	%(n)	%(n)	
Poor Self-rated health	40.8(64)	24.0(48)	0.0008*
Daily Pain	33.8(53)	32.9(67)	0.16
sMOOD ≥ 3	39.3(63)	24.0(48)	<0.0001*
ADLH ≥ 3	17.2(27)	N/A	N/A
IADLCH ≥ 3	41.1(65)	N/A	N/A
CPS ≥ 3	98.7(153)	N/A	N/A
Abbreviations: Abbreviations: CU=Check-Up, HSC=Health and Caregiving Survey, sMOOD ≥ 3 = Self-reported Mood Scale score of 3 or more, ADLH ≥ 3 = Activities of Daily Living Hierarchy Scale (Long Form) score of 3 or more, IADLCH ≥ 3 =Instrumental Activities of Daily Living Capacity score of 3 or more			

An overview of assessment characteristics shows that on the average, it took less than half an hour to complete the Check-Up assessment. Table 3 shows that the average completion time for the assessment was 28 minutes (SD=13.4). A T-Test to check for differences in the average assessment completion time between self-administered and interviewer-administered showed that there was no significant difference between the two.

Table 03: Mean Assessment Completion Time for Check-Up Assessment			
	All Check-Up Assessments (N =157)	Self-administered Check-Up Assessments (n = 67)	Interviewer-administered Check-Up Assessments (n = 90)
	Minutes (SD)	Minutes (SD)	Minutes (SD)
Mean Assessment Completion Time	28.3 (13.40)	28.6 (12.97)	28.0 (13.81)
Abbreviations: SD = Standard Deviation			

There was no significant difference on how participants reported their health status when they self administered the Check-Up compared to when the assessment was interviewer administered. See Table 4 for details.

Table 4: Comparison of Clinical Characteristics of Community Dwelling Older Adults Reported on Check-Up by mode of assessment administration (2019) (N=157)			
	Self-administered Check-Up Sample (n= 67)	interviewer-administered Check-Up Sample (n = 90)	P value of Chi-square Test
	%(n)	%(n)	
Poor Self-rated health	41.8(28)	40.0(36)	0.82
Daily Pain	35.8(24)	32.2(29)	0.65
sMOOD \geq 3	31.3(21)	46.7(42)	0.05
ADLH \geq 3	7.5(5)	24.4(22)	0.07
IADLCH \geq 3	31.4(21)	48.3(43)	0.23
CPS \geq 3	100(65)	100(90)	0.16
Bladder Incontinence	25.4(17)	34.4(31)	0.22
Bowel Incontinence	13.4(9)	22.2(20)	0.16
Unstable Health	38.8(26)	40.5(36)	0.84
Survey Covered Health Needs	59.7(40)	63.3(57)	0.64
Abbreviations: Abbreviations: CU=Check-Up, HSC=Health and Caregiving Survey, sMOOD \geq 3 = Mood Scale score of 3 or more, ADLH \geq 3 = Activities of Daily Living Hierarchy Scale (Long Form) score of 3 or more, IADLCH \geq 3 =Instrumental Activities of Daily Living Capacity score of 3 or more			

The degree of missingness of response to assessment questions was also used as a test of feasibility. To determine this, questions that were voted as embarrassing by participants were analyzed for degree of missingness in response recorded. All 5 questions that were voted as most embarrassing by 3 % of CU participants had 100% response rate with no missing values (see Table 5). In Table 5, all the items that had missing values were compiled. Questions on falls had the highest missing items. Among 157 responders, there were 18 missing responses for question on falls within the last 90 days, 11 missing responses for falls with the last 180 days and 8 missing items for falls with the last 30 days. Eight other questions have 1 or 2 missing responses.

Table 05: Voted Most Embarrassing Questions for Participants and Percentage of Missingness		
Embarrassing questions	No of Votes (N=157) %(n)	Missing Response %(n)
Dressing Lower body	0.6(1)	0(0)
Bathing	0.6(1)	0(0)
Bladder Incontinence	0.6(1)	0(0)
Bowel Incontinence	0.6(1)	0(0)
Cannabis Product Use	0.6(1)	0(0)

Table 06: Check-Up Assessment Questions with Missing Responses and Percentage of Missingness (N=157)	
	Missing Responses
	%(n)
Falls in the last 90 Days	11.5(18)
Falls in the last 180 Days	7.0(11)
Falls in the last 30 Days	5.1(8)
How well participant understood others	1.3(2)
Financial Trade-offs	1.3(2)
Experienced Major life stressor	1.3(2)
Felt Anxious	0.6(1)
Felt Depressed	0.6(1)
Had Flu Shot	0.6(1)
Had Wound Care	0.6(1)
Experienced 5% Weight Loss	0.6(1)

Participants were given the opportunity to provide written feedback of what questions should be deleted, reworded or added to the assessment tool. Any question suggested by 5 % or more of the respondent was considered noteworthy.

Table 7 shows the table of questions described by some participants as being difficult. About 48% percent of participants did not provide any response, 14 % of participant voted that no question was difficult. Of the questions mentioned to be difficult by some participants, none met the 5% cut off point. Hence, no question from the interRAI Check-up was notably difficult for participants.

Again, the opinion of participants was sorted on what questions should be removed from the assessment tool. About two thirds of participants did not respond to this question, 18% of participants felt that no question was irrelevant or should be removed and though few other questions were suggested by participants for removal. No question met the 5% set point (see Table 8).

Table 7: Most Difficult Questions in the Check-Up for Study Participants (N=157)	
	Frequency %(n)
No response	36.3(57)
None	10.8(17)
Felt little interest or pleasure in things	2.5(4)
Health conditions or symptoms	1.9(3)
pain	1.9(3)
Shortness of breath	1.9(3)
Bladder incontinence	1.9(3)
Hours of exercise/ physical activities	1.9(3)
ADL questions	1.9(3)
Urinating	1.3(2)
Participated less in social activities	1.3(2)
Eat only one or fewer meals	1.3(2)
Self reported health	1.3(2)
Limited funds/ trade-off	1.3(2)
Felt anxious, restless, or uneasy	1.3(2)
Felt sad depressed or hopeless	1.3(2)
Life stressor	1.3(2)

Hospital stay (found it difficult to remember how many times they went to hospital)	1.3(2)
Self rated health	0.6(1)
Health conditions	0.6(1)
mobility	0.6(1)
stroke	0.6(1)
balance	0.6(1)
Participated Social activities of long-standing interest	0.6(1)
Abbreviations: ADL=Activities of daily living	

Table 8: Questions to drop from Check-Up Tool as suggested by participants. (N=157)	
	Frequency %(n)
No response	40.4(65)
None	11.5(18)
Marital Problem	1.3(2)
Diarrhea	0.6(1)
Difficulty in chewing	0.6(1)
Doctor visit	0.6(1)
Marijuana	0.6(1)
Diabetes	0.6(1)
Phone use	0.6(1)
Hours of physical activities	0.6(1)

On the other hand, among questions suggested by participants to be added to self-report interRAI Check-Up, 3 met the 5% cut off. The first is question on Arthritis which was suggested by 7% of study participants. Addition of a question on hypertension (blood pressure) and question on mental health which were both suggested by 5% of study participants each. No other suggested question met the 5% cut off point for significance. See Table 9. Table 10 provides a list of responses from study participants when they were asked to provide suggest that researchers could make to improve the usefulness of the interRAI Check-Up.

Table 9: Suggested Questions for Addition to Check-Up Tool by Study Participants (N=157)	
	Frequency %(n)
No Response	33.1(52)
Nothing	9.6(15)
Arthritis	7.1(11)
More Mental Health	5.1(8)
Hypertension	5.1(8)
sight	1.3(2)
weight	1.3(2)
Sleep	1.3(2)
Parkinson's disease	1.3(2)
Assistive devices	1.3(2)
Schizophrenia	1.3(2)
Caregiver welfare (when respondent is a caregiver)	1.3(2)
Oxygen	0.6(1)
PTSD	0.6(1)
Other health services used	0.6(1)
Home care	0.6(1)
Thyroid	0.6(1)

Medication	0.6(1)
Infections	0.6(1)
Sinusitis	0.6(1)
Allergies	0.6(1)
More Stress question	0.6(1)

Table 10: Suggestions from Participants on How to Improve Usefulness of Check-Up Assessment (N=157)	
	Frequency %(n)
Make it shorter	1.9(3)
Conduct follow up assessments	1.9(2)
Make it a regular assessment	1.3(2)
Add more questions on mental health	1.3(2)
Provide assessment in participants language (Spanish)	1.3(2)
Provide Paper-based version of assessment	1.3(2)
Make the letters larger and make selection button bigger.	1.3(2)
Have someone else do it	0.6(1)
Add more relevant health conditions	0.6(1)
Make this assessment public	0.6(1)

To evaluate the quality of the data collected with the self-report interRAI Check-up, reliability of the scales from the assessment tool were measured using Cronbach’s alpha. The alpha score for mood scale, activities of daily living scale (ADLH) and instrumental activities of daily living scale (IADLCH) were 0.79, 0.87, and 0.87 respectively (see Table 11). These alpha figures are comparable to alpha scores that were reported for RAI-HC by Hogeveen et al (2017) where

depression rating scale (DRS), activities of daily living scale (ADLH) and instrumental activities of daily living scale (IADLCH) had 0.73, 0.93, and 0.87 respectively.

Table 11: Assessment of Internal Consistency for Scales from Check-Up, RAI-HC, and HSC using Cronbach's Alpha.			
	CU (N=157 assessments) Alpha Score	RAI-HC (N=2,626,133 assessments) Alpha Score	HSC (N=200 assessments) Alpha Score
sMOOD	0.79	N/A	0.66
DRS	N/A	0.73	N/A
ADLH	0.87	0.93	N/A
IADLCH	0.87	0.87	N/A

Abbreviations: CU=Check-Up, HSC=Health and Caregiving Survey, RAI-HC = Resident Assessment Instrument for Home Care, sMOOD = Self-reported Mood Scale, DRS=Depression Rating Scale, ADLH= Activities of Daily Living Hierarchy Scale (Long Form), IADLCH=Instrumental Activities of Daily Living- Hierarchy.

The convergent validity of variables that are known to be related were tested using Pearson's r correlation. Positive weak to moderate correlations were seen for the examined group of

variables. Moderate correlation 0.45 was seen between activities of daily living and cognition when data from all study participants were considered together. This is very similar to r value of 0.44 that was reported by Hogeveen et. al.2017) using data by trained health professionals with RAI-HC in Ontario. This moderate correlation was also seen in the association between instrumental activities of daily living and cognition, both in the CU study sample and as reported by Hogeveen et al. (2017) for RAI-HC.

A weak correlation was shown in the general study sample among various pairs of variables (pain and mood, pain and self-rated health, mood and self-rated health) ranging from 0.10 to 0.34. There is no direct comparison with data from RAI-HC because these pairs were not reported in Hogeveen et al. (2017). However, the closest pair of variables to compare are pain and mood in the interRAI Check-up ($r=0.18$), and pain and DRS (depression rating scale) in RAI-HC ($r=0.16$). This weak correlation between pain and how a client feels (measured as DRS in RAI-HC and Mood scale in self-report Check-Up) is similar in both data from different subpopulations.

Interestingly, when the general data from Check-Up was grouped by mode of administration of the assessment (self-administered vs interviewer-administered), self-rated health and pain had higher correlation in the self-administered group ($r=0.45$) compared to the interviewer-administered group($r=0.10$). This is also true for the association between self-rated health and mood in the self-administered group ($r=0.44$) vs interviewer-administered group ($r=0.26$) see Table 12).

Table 12: Convergent Validity for known related pairs of variables in the CU, Self-administered CU, interviewer-administered CU, RAI-HC, and HSC, using Pearson's correlation.

	CU (N=157 Assessments)	Self- Administered CU (N= 67)	interviewer- Administered CU (N=90)	RAI-HC (N=2,626,133 assessments)	HSC (N=200 assessments)
	r value	r value	r value	r value	r value
sADLH & CPS	0.45	0.44	0.45	0.44	N/A
sIADLCH & CPS	0.44	0.38	0.47	0.43	N/A
sPAIN & sMOOD	0.18	0.22	0.17	N/A	0.25
sPAIN & DRS	N/A	N/A	N/A	0.16	N/A
Self-Rated Health & sMOOD	0.34	0.42	0.26	N/A	0.27

sPAIN & Self-Rated Health	0.27	0.45	0.10	N/A	0.32
<p>Abbreviations: CU=Check-Up, HSC=Health and Caregiving Survey, RAI-HC = Resident Assessment Instrument for Home Care, sPAIN=Pain Scale, sMOOD = Mood Scale, DRS=Depression Rating Scale, ADLH= Activities of Daily Living Hierarchy Scale (Long Form), IADLCH=Instrumental Activities of Daily Living- Hierarchy, CPS=Cognitive Performance Scale.</p>					

Only about one third of respondents found it little or moderately difficult to complete the assessment. Note that no participant felt like it was very difficult to complete the interRAI check-up assessment.

A multivariate logistic regression model was built to identify factors that are associated with assessment difficulty. First, the researchers performed bivariate analysis of many items with assessment difficulty, phone use, poor self-rated health, independent activities of daily living and cognitive status were significant at bivariate level. When these listed items were added to a model, only phone use and poor self rated health became significant. The most parsimonious model was built with those items that were significant at multivariate level. Phone use capacity (Odd Ratio = 3.40, poor self-rated health (Odd Ratio = 2.75), and age (Odd Ratio= 1.04 for 1-year increment) of older adults was added to the model regardless of its significance level at bivariate level (see Table 13). The C-statistic for this model was 0.67.

Table 13: Multivariate Logistic Model to determine factors associated with Check-Up assessment-difficulty.

Independent Variables	Unadjusted OR (95% CL)	Adjusted OR (95% CL)
Phone use	3.80(1.30, 11.11)	3.40(1.06, 10.86) *
Poor self-rated health	2.38(1.21, 4.69)	2.75(1.30, 5.80) *
Female	1.37(0.69, 2.73)	N/A
sMOOD	1.09(0.97, 1.23)	N/A
Age	1.00(0.97, 1.03)	1.04 (1.00, 1.08) *
ADLH	1.17(0.93, 1.46)	N/A
IADLCH	1.20(1.02, 1.41)	N/A
Interviewer Administered	0.96(0.50, 1.86)	N/A
Less Than High School Educational Level	1.98(0.93, 4.22)	N/A
Presence of embarrassing questions	0.40(0.05, 3.52)	N/A
Experienced Major Life Stressor in 90 Days	0.70(0.31, 1.58)	N/A
Client made financial trade-off within last 30 Days	2.57(0.97, 6.81)	N/A
CPS	1.57(1.15, 2.07)	N/A
Impaired Vision	3.01(0.91,10.00)	N/A

Primarily English Speaker	1.50(0.57, 4.00)	N/A
Lived in Canada since Birth	1.65(0.85, 3.22)	N/A
<p>Abbreviations: (*) = means that the odd ratio is significant, sMOOD = Mood Scale, DRS=Depression Rating Scale, ADLH= Activities of Daily Living Hierarchy Scale (Long Form), IADLCH=Instrumental Activities of Daily Living- Hierarchy.</p>		

There was an attempt to build a binary logistic model to identify independent variables are associated with completing the assessment above the mean assessment duration (28 minutes) compared to completing the assessment below the mean assessment duration. However, Table 14 shows that no independent variable was significant at the bivariate analysis level, so no model was constructed.

Table 14: Bivariate Logistic Model to Determine Factors Associated with Increased Check-Up Assessment Completion Time.

Independent variables	Unadjusted OR (95% CL)
Gender (Female)	1.35 (0.68, 2.69)
Age	1.04 (1.00, 1.07)
Impaired Vision	1.11 (0.33, 3.66)
Impaired Memory	0.76 (0.07, 8.61)
Mood of Older Adult	0.78 (0.39, 1.54)
Poor Self Rated Health	0.76 (0.39, 1.50)
Non-Native English Speaking	0.43 (0.13, 1.40)
Had Assessment Difficulty	1.90 (0.95, 3.85)
Encountered Embarrassing Questions	0.73 (0.13, 4.13)
Less Than High School Educational Level	0.43 (0.18, 1.05)
Sub-optimal Phone Use Capacity	0.51 (0.16, 1.74)
Assessment was Interviewer-Administered	0.73 (0.38, 1.41)

Abbreviations: (*) means result is significant,
OR=Odd Ratio, 95%CL=95% confidence
limits.

5. Discussion

5.1 Assessment Overview

This Check-Up pilot was done with the intended population for which the assessment tool is designed, because the study population characteristics were comparable to those of telephone-based survey participants who were randomly selected via random telephone digit dialing in Waterloo, Ontario. However, the CU participants were older and more likely to report poor health as would be expected, because CU participants were drawn from older adult receiving services from organizations that work to promote health and well-being of older adults. It is expected that such older adults in the community are most likely to need the services any of these organizations compared to the healthiest older adults in the community.

Although the self-report Check-Up is used by older adults with light care needs, pain is a major problem among this population. In this study, about one third of the participants reported having daily pain, ranging from mild to severe in intensity. Also, mood disturbances are common. Even though the Self-report Check-Up has three questions on emotional well-being, some study participants wanted more questions on emotional well being. Many participants also rated their health poor. These three main prevailing concerns of older adults are connected. Certainly, it is not surprising that someone in pain is likely to feel in poor health. It is known that how an older adult feels, affects how her/his overall health will be self-rated (Nützel et al., 2014) .

CU participants have some similarities and differences with the Health and Caregiving Survey (HCS) participants, which were drawn from general population in Waterloo region. Both populations had more females and one third of them reported daily pain. Considering all samples

are made up of older adult 65 years or older, the CU participants were significantly older, with 61 % of them living alone and only 16% were married. Meanwhile, The HCS participants were much younger and have over 60% of them married.

5.2 Check-Up Feasibility of Use

The large goal of this study was to evaluate the feasibility, reliability, and validity of interRAI Check-Up use among older adults from diverse clinical and socioeconomic background. Hence the researchers discussed the different facets of this study in details starting with feasibility. Any new tool that is created needs to prove that is usable by the intended users, and the feasibility of self-report InterRAI Check-Up (CU) was evaluated in three ways: 1) length of time to complete the assessment; 2) level of difficulty experienced by users in completing the assessment; 3) magnitude of response missingness for selected variables.

On the average, older adults completed the CU assessment in 28 minutes. i.e., less than half an hour. When the assessment completion time was grouped by the mode of assessment (e.g., whether the assessment was self-administered or interviewer-administered), a t-test showed that there was no significant difference in completion time between the two groups. About 61% of the study participants said that the CU covered their health need and an assessment tool that assesses both health and well-being of an older adult in half an hour or less is optimal.

Again, 66% of study participants had no difficulty using the assessment tool and this was same for both those that self-administered the assessment and those that had the assistance of a lay interviewer. No study participant reported to have severe difficulty with using the CU though

that option was included as a possible response to the question on level of difficulty. However, about one third of participants that had little to moderate difficulty with doing the assessment. Hence the researchers brainstormed of 16 possible reasons why an older adult may have difficulty with using the CU. The analysis showed that poor phone use capacity (odd ratio = 3.40) and the poor overall health of the older adult (odd ratio = 2.75) were the two major factors associated with participants having difficulty during the assessment. There was also a modest effect of greater difficulty with older age. When compared to today's younger generation, older adults are less savvy with using technological gadgets. Hence, an assessment like the CU that is done online through phone, tablet or desktop computers, it is reasonable that some older adults will experience some challenges due to their inability to effectively use any of these gadgets. Also, older adults in poor general health had 2.75 times greater odds of difficulty compared to those participants in good health. Many of the questions in CU require participants to think or remember past events, and this may be stressful for anyone in poor health. Therefore, this group of older adults would benefit from other kinds of assessment where the client is not required to compulsorily provide all the needed responses. This is especially true where the trained health professional could fill the assessment with more information from other sources, like client's health record, client's caregivers, or from assessor's judgement.

The third parameter that was used to evaluate the feasibility of using CU by older adults is the magnitude of response missingness on five questions that were voted by participants as most embarrassing questions. These were questions on bathing, dressing the lower body, bowel and bladder incontinence, and cannabis product use. Study result showed that all these five questions had 100% response rate each. So, though some participants found the above question

embarrassing, it was not embarrassing enough to prevent participants that voted these questions from providing their responses to these questions.

Beyond figures, participants were also asked for written feedbacks to three close ended questions and one open ended question to generate responses that the researcher may not have thought of. The closed-ended questions include: 1) what question was the most difficult to answer. 2) what question should be removed from CU. 3) what question should be added to CU. The open-ended question asked for participant's suggestion on how researchers could improve the usefulness of the CU. Using 5% as cut-off, no question was suggested as the most difficult question or as question to drop from the tool since none reached a 5% consensus level from study participants. Instead, a few participants suggested adding questions on hypertension, arthritis, and mental health. This means that though two participants suggest under the open-ended question that CU should be made shorter, more participants voted for including more questions to the current CU as opposed to removing any question from it. By including open-ended questions, older adults were given the opportunity to co-create the CU assessment tool that is meant for monitoring their health.

Self-reported Check-Up can be used for different purposes. It can be used as a stand-alone web application that is electronically accessible to older adults for them to regularly take the assessment for monitoring of their health. Another application for Check-Up is to use it in primary care and community health centres as a screening tool to identify older adults that need a more in-depth geriatric assessment administered by a clinician. In addition, because Check-Up collects data on different aspects of health and well-being, it is a tool that can be used in

specialist clinician office as a broad-based assessment that is complemented by specialty specific assessment. This is because older adults often have more than one chronic disease at a time and most specialty specific assessments hardly include questions that are not directly linked to that specialty. For example, a cardiologist will hardly collect data on a patient's cognition. Hence, collecting data on other aspects of health of that older adult will help the clinician to provide holistic care to seniors, including referring them when need be.

5.3 Self-report InterRAI Check-up Internal Consistency and Convergent Validity

Cronbach's alpha was used to measure the internal consistency of the variables in the scales that are generated from self-report Check-Up. Judging from categories of Cronbach's alpha value (Bland & Altman, 1997; Rodakowska, Mierzyńska, Bagińska, & Jamiołkowski, 2014) where 0.70 to 0.79 is considered acceptable scale reliability, and greater or equal to .80 is considered excellent scale reliability, the 3 scales examined had acceptable to excellent scale reliability. These values are comparable to alpha values from RAI-HC data (Hogeveen et al., 2017) collected by trained health professionals in Ontario.

Nevertheless, the convergent validity of associated variables in the CU showed positive weak to moderate association judging from the Pearson's correlation r value. When CU r values were benchmarked with r value for same pair of variables in the RAI-HC, the figures were approximately the same. This shows that in general, CU is comparable to RAI-HC in terms of convergent validity. However, stratification of CU data by mode of administration showed that

pairs like “pain and self rated health” and “mood and self rated health” had positive moderate correlation when the assessment is self administered, but this strength of association diminishes to weak and positive when the assessment is interviewer administered. In particular, the convergent validity for pain and self-rated health were notably different for self-administered ($r=0.45$) and lay interviewer based ($r=0.10$) results. These differences could be as a result of differences in how older adults report pain and self rated health or mood to a lay interviewer compared to how they report any of these pairs of items when doing an assessment all by themselves. For example, an older adult who is in pain may feel better when someone takes time to chat with them about their health and this enhanced mood at the time of the assessment may influence the report they give about their overall health or about their mood. Meanwhile, if they were doing the assessment all by themselves, they would report on their health without the mood enhancement influence of a lay interviewer.

Alternatively, the differences in convergent validity noted in the previous paragraph could be due to chance. This statistical analysis was done with a p-value of 0.05, which means that in 5% of times, a statistical result could be gotten due to chance. Therefore, further research should be done to investigate possible explanations for these observed differences in convergent validity of pain and self-rated health or mood depending on mode of assessment.

5.4 Study Strengths & Limitations

This is an important study because it builds up on the telephone-based survey study that was initially done to test the questions that were eventually included in the CU. First, it is the first study to test the CU using data from Canada (Ontario and Nova Scotia). This provided bases for comparing the result of this study with results from studies that used data collected with other

interRAI assessment tools in Canada. Second, researchers recognised older adults as co-creators of CU by collecting written feedback to closed and open-ended questions whose answers will help the researchers to refine the tool. Study participants who are also the intended users of the final CU had the opportunity to make suggestions for improvement of CU that the researchers may not have considered. Hence, intended users of this CU became co-creators of the assessment tool. Thirdly, this study has set the stage for self-report CU implementation as a screening level assessment tool for older adults from diverse clinical and socioeconomical background.

The study does have some limitations. Sample size for this study is modest with 157 participants from five organizations (four from Ontario and one from Nova Scotia) and this is not representative of older adults in Ontario, Nova Scotia, or Canada at large. Hence, this study has limited external validity. Also, using reported results on RAI-HC from Hogeveen et al, 2017, as benchmark for comparing internal consistency and validity of data collected with CU means that any error from the published paper will go undetected. To reduce error, researcher used the same cut-off used by Hogeveen et al to dichotomizes categorical variables that were benchmarked.

Nevertheless, limited by sample size, the researchers did not assess impact of mental health problems on feasibility of completing the Check-Up, as well as the characteristics of the following Check-Up participants:

- Indigenous Canadians
- Language/culture subgroups
- Other priority subgroups such as LGBTQ+, recent immigrants, rural/urban

6. Conclusion

interRAI Check-Up is a feasible and reliable instrument for collecting data on the health and well-being of older adults residing in the community. In addition, the convergent validity of the scales in the self-report interRAI Check-Up are satisfactory and comparable to those from RAI-HC whose data are collected by trained health professionals.

However, result from this study also shows that older adult in poor health would find it more difficult to do a self-administered assessment. In that case, the assistance of an interviewer would be preferred and therefore the clinician-administered Check-Up should be used instead. In addition, result from this study may not be generalizable due to small sample size.

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Appendices

Appendix A: interRAI Check-Up (CU) Assessment Form —Self-Reported Version

Section A: Identification information

A2 What is your gender?

Male

Female

Other (Specify) _____

A3 What is the year and month of birth? (Do not include the day)

_____ Year

_____ Month

A4 What is your marital status?

Never married

Married

Partner / significant other

Widowed

Separated

Divorced

A5 What is your Check-Up Number? [Request for this number from the research coordinator]

A6 Is this the first time you have completed this assessment at this site?

No

Yes

A7 What is today's date?

_____ Year

_____ Month

_____ Day

A8 Where do you live now? [Example — Canada]

- Private home / apartment / rented room
- Board and care home
- Assisted living or semi-independent living
- Mental health residence — e.g., psychiatric group home
- Group home for persons with physical disability
- Setting for persons with intellectual disability
- Psychiatric hospital or unit
- Homeless (with or without shelter)
- Long-term care facility (i.e., nursing home)
- Rehabilitation hospital / unit
- Hospice facility / palliative care unit
- Acute care hospital
- Correctional facility

Other (Specify) _____

A9 Who do you live with now?

Alone

With spouse / partner only

With spouse / partner and other(s)

With child (not spouse / partner)

With parent(s) or guardian(s)

With sibling(s)

With other relative(s)

With nonrelative(s)

B1 How well do you make decisions about daily tasks (for example, when to get up or have meals, which activities to do, when to take medications)?

- No problem
- I have some difficulty in new situations
- I have difficulty in specific repeating situations
- I need help at all times
- Others make all decisions for me

B2 How often is memory a problem for you (for example, forget appointments, get lost, repeat yourself)?

- Never
- Rarely
- Sometimes
- Most of the time
- Always

B3 How has your ability to make decisions about daily tasks changed in the last 90 days?

- Improved
- No change
- Worsened

B4 How well do you make yourself understood verbally or nonverbally?

- I can express ideas without difficulty
- I have difficulty finding words or finishing thoughts, BUT I am understood if given time
- I have difficulty finding words or finishing thoughts AND I usually need prompting
- I can only make simple requests
- I am rarely or never understood

B5 How well do you understand others (with hearing aid, if you normally use one)?

- I have no difficulty understanding others
- I miss some part or meaning BUT understand most conversation
- I miss some part or meaning BUT often understand conversation with repetition or explanation
- I can only respond to simple conversation
- I rarely or never understand others

B6 How well do you see in adequate light (with glasses or a vision aid, if you use one)?

- I can see regular print in newspapers or books
- I can see large print but not regular print in newspapers or books
- I cannot see newspaper headlines, but I can identify objects
- I can only see light, colors, or shapes. I can track movement but cannot identify objects.
- I have no vision

B7 How well do you hear (with hearing aid, if you use one)?

- I have no difficulty in normal conversation, social interaction, listening to TV
- I have difficulty in some settings (for example, when person speaks softly or is more than 6 feet [2 meters] away)
- I have problems hearing normal conversation. I need a quiet setting to hear well.
- I have difficulty in all situations (for example, others have to talk loudly or speak very slowly; all speech is mumbled)
- I have no hearing

C1 In the last 3 days, how often have you felt little interest or pleasure in things you normally enjoy?

- Not in last 3 days
- Not in last 3 days, but often feel this way
- In 1–2 of last 3 days
- Daily in last 3 days

C2 In the last 3 days, how often have you felt anxious, restless, or uneasy?

- Not in last 3 days
- Not in last 3 days, but often feel this way
- In 1–2 of last 3 days
- Daily in last 3 days

C3 In the last 3 days, how often have you felt sad, depressed, or hopeless?

- Not in last 3 days
- Not in last 3 days, but often feel this way
- In 1–2 of last 3 days
- Daily in last 3 days

C4 When was the last time you participated in social activities that are of long-standing interest to you?

- Never
- More than 30 days ago
- 8–30 days ago
- 4–7 days ago
- In last 3 days

C5 How often do you feel lonely?

- I do not feel lonely
- I only feel lonely in specific situations or events (for example, anniversary of my spouse's death)
- I feel lonely occasionally, but less than weekly
- I feel lonely frequently, but less than daily
- I feel lonely every day

C6 Do you have a close friend in the community?

No

Yes

C7 In the last 3 days, how many hours in total did family members, friends, or neighbors help you with tasks of daily life like dressing, bathing, shopping, or housework? (Enter "0" if none.)

_____ Hours

C8 In the last 3 days, have your family members or friends felt overwhelmed by your condition?

No

Yes

C9 In the last 90 days, have you participated less in social, religious, work, or other preferred activities? IF YES, were you distressed by this?

No less participation

Participated less, but I was not distressed

Participated less, but I was distressed

Activities for independent living.

These questions deal with a variety of activities that go along with living independently. Think about your ABILITY to do these tasks in the last 3 days even if someone else normally does the task in your home

D1a.

	I could do it all by myself without needing someone to keep an eye on me	I would need some help from others	Others must always do this for me
Meal preparation — In the last 3 days, if you had to do this by yourself, how capable would you be in preparing your meals? Examples include planning meals, assembling ingredients, cooking, setting out food and utensils.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Which of the following statements best describes how much help you need to prepare meals?

- I could do it by myself, but others set up the things I use
- I could do it by myself, but someone has to be nearby to keep an eye on me
- I could do it by myself, but sometimes I need help
- I could do at least half of it by myself, but I always need help
- I could do less than half of it by myself and I always need help

D1b.

I could do it all by

myself without
needing someone to
keep an eye on me

I would need some
help from others

Others must always
do this for me

Ordinary housework

— In the last 3 days,
if you had to do this
by yourself, how
capable would you be
in doing ordinary
work around the
house? Examples
include doing dishes,
dusting, making bed,
tidying up, laundry.



Which of the following statements best describes how much help you need to do ordinary housework?

- I could do it by myself, but others set up the things I use
- I could do it by myself, but someone has to be nearby to keep an eye on me
- I could do it by myself, but sometimes I need help
- I could do at least half of it by myself, but I always need help
- I could do less than half of it by myself and I always need help

D1c.

	I could do it all by myself without needing someone to keep an eye on me	I would need some help from others	Others must always do this for me
Managing finances — In the last 3 days, if you had to do this by yourself, how capable would you be in managing your finances? Examples include paying bills, balancing your checkbook, budgeting household expenses, monitoring your credit card.		<input type="radio"/>	<input type="radio"/>

Which of the following statements best describes how much help you need to manage your finances?

- I could do it by myself, but others set up the things I use
- I could do it by myself, but someone has to be nearby to keep an eye on me
- I could do it by myself, but sometimes I need help
- I could do at least half of it by myself, but I always need help
- I could do less than half of it by myself and I always need help

D1d.

	I could do it all by myself without needing someone to keep an eye on me	I would need some help from others	Others must always do this for me
<p>Managing medications — In the last 3 days, if you had to do this by yourself, how capable would you be in managing your medications? Examples include remembering to take medications, opening bottles, taking correct drug dosages, giving injections, applying ointments.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Which of the following statements best describes how much help you need to manage your medications?

- I could do it by myself, but others set up the things I use
- I could do it by myself, but someone has to be nearby to keep an eye on me
- I could do it by myself, but sometimes I need help
- I could do at least half of it by myself, but I always need help
- I could do less than half of it by myself and I always need help

D1e.

	I could do it all by myself without needing someone to keep an eye on me	I would need some help from others	Others must always do this for me
Phone use — In the last 3 days, if you had to do this by yourself, how capable would you be in making or receiving telephone calls (with assistive devices such as large numbers on telephone, volume controls as needed)?		<input type="radio"/>	<input type="radio"/>

Which of the following statements best describes how much help you need to use the phone?

- I could do it by myself, but others set up the things I use
- I could do it by myself, but someone has to be nearby to keep an eye on me
- I could do it by myself, but sometimes I need help
- I could do at least half of it by myself, but I always need help
- I could do less than half of it by myself and I always need help

D1f.

	I could do it all by myself without needing someone to keep an eye on me	I would need some help from others	Others must always do this for me
Stairs — In the last 3 days, if you had to do this by yourself, how capable would you be in going up and down a full flight of stairs (12–14 stairs)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Which of the following statements best describes how much help you need to go up and down a full flight of stairs (12–14 stairs)?

- I could do it by myself, but others set up the things I use
- I could do it by myself, but someone has to be nearby to keep an eye on me
- I could do it by myself, but sometimes I need help
- I could do at least half of it by myself, but I always need help
- I could do less than half of it by myself and I always need help

D1g.

	I could do it all by myself without needing someone to keep an eye on me	I would need some help from others	Others must always do this for me
Shopping — In the last 3 days, if you had to do this by yourself, how capable would you be in shopping for food and household items (exclude transportation to and from shopping)? Examples include selecting items, paying money.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Which of the following statements best describes how much help you need to shop for food and household items?

- I could do it by myself, but others set up the things I use
- I could do it by myself, but someone has to be nearby to keep an eye on me
- I could do it by myself, but sometimes I need help
- I could do at least half of it by myself, but I always need help
- I could do less than half of it by myself and I always need help

D1h.

	I could do it all by myself without needing someone to keep an eye on me	I would need some help from others	Others must always do this for me
Transportation — In the last 3 days, if you had to do this by yourself, how capable would you be in traveling by public transportation (navigating system, paying fare) or driving (including getting out of the house and into and out of vehicles)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Which of the following statements best describes how much help you need with transportation?

- I could do it by myself, but others set up the things I use
- I could do it by myself, but someone has to be nearby to keep an
- I could do it by myself, but sometimes I need help
- I could do at least half of it by myself, but I always need help
- I could do less than half of it by myself and I always need help

Basic activities of daily living.

Now think about the more basic activities you do each day like dressing, moving around, bathing, and eating. Think about how you did each of these activities and the MOST help you received from others in the last 3 days.

D2a.

	I did it all by myself without needing someone to keep an eye on me.	Others helped me	I did not bathe or shower in the last 3 days
Bathing — In the last 3 days, what was the most help you usually received to bathe or shower? Examples include getting into and out of the tub or shower, washing your body.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Which of the following statements best describes how much others helped you to bathe or shower?

- I could do it by myself, but others set up the things I use
- I could do it by myself, but someone has to be nearby to keep an eye on me
- I could do it by myself, but sometimes I need help
- I could do at least half of it by myself, but I always need help
- I could do less than half of it by myself and I always need help
- Others did all of this for me

D2b.

	I did it all by myself without needing someone to keep an eye on me	Others helped me	I did not manage my personal hygiene in the last 3 days
Personal hygiene — In the last 3 days, what was the most help you usually received to manage your personal hygiene? Examples include combing hair, brushing teeth, shaving, applying makeup, washing face or hands.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Which of the following statements best describes how much others helped you to manage your personal hygiene?

- I could do it by myself, but others set up the things I use
- I could do it by myself, but someone has to be nearby to keep an eye on me
- I could do it by myself, but sometimes I need help
- I could do at least half of it by myself, but I always need help
- I could do less than half of it by myself and I always need help
- Others did all of this for me

D2c.

	I did it all by myself without needing someone to keep an eye on me	Others helped me	I did not dress or undress from the waist down in the last 3 days
<p>Dressing lower body — In the last 3 days, what was the most help you usually received to dress and undress yourself from the waist down? Examples include street clothes, underwear, prostheses, orthotics, belts, pants, skirt, socks, shoes.</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Which of the following statements best describes how much others helped you to dress and undress from the waist down?

- I could do it by myself, but others set up the things I use
- I could do it by myself, but someone has to be nearby to keep an eye on me
- I could do it by myself, but sometimes I need help
- I could do at least half of it by myself, but I always need help
- I could do less than half of it by myself and I always need help
- Others did all of this for me

D2d.

	I did it all by myself without needing someone to keep an eye on me	Others helped me	I did not walk in the last 3 days
Walking — In the last 3 days, what was the most help you usually received to walk between locations on the same floor?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Which of the following statements best describes how much others helped you to walk between locations on the same floor?

- I did it by myself, but others set up the things I used
- I did it by myself, but someone was nearby to keep an eye on me
- I did it by myself, but sometimes I needed help
- I did at least half of it by myself, but I always need help
- I did less than half of it by myself and I always need help
- Others did all of this for me

D2e.

	I did it all by myself without needing someone to keep an eye on me	Others helped me	I did not move around indoors in the last 3 days
Moving around inside of home — In the last 3 days, what was the most help you usually received to move between locations on the same floor (walking or wheeling)? Note: If you are in a wheelchair, how much help did you need once you were in your chair?		<input type="radio"/>	<input type="radio"/>

Which of the following statements best describes how much others helped you to move between locations on the same floor?

- I did it by myself, but others set up the things I used
- I did it by myself, but someone was nearby to keep an eye on me
- I did it by myself, but sometimes I needed help
- I did at least half of it by myself, but I always need help
- I did less than half of it by myself and I always need help
- Others did all of this for me

D2f.

	I did it all by myself without needing someone to keep an eye on me	Others helped me	I did not move around outdoors in the last 3 days
<p>Moving around outside of home — In the last 3 days, what was the most help you usually received to move between locations outside of your home (walking or wheeling)? Note: If you are in a wheelchair, how much help did you need once you were in your chair?</p>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Which of the following statements best describes how much others helped you to move outside?

- I did it by myself, but others set up the things I used
- I did it by myself, but someone was nearby to keep an eye on me
- I did it by myself, but sometimes I needed help
- I did at least half of it by myself, but I always need help
- I did less than half of it by myself and I always need help
- Others did all of this for me

D2g.

	I did it all by myself without needing someone to keep an eye on me	Others helped me	I did not move onto or off of a toilet in the last 3 days
Transfer toilet — In the last 3 days, what was the most help you usually received to move onto and off of a toilet or commode?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Which of the following statements best describes how much others helped you to move onto and off of a toilet or commode?

- I did it by myself, but others set up the things I used
- I did it by myself, but someone was nearby to keep an eye on me
- I did it by myself, but sometimes I needed help
- I did at least half of it by myself, but I always need help
- I did less than half of it by myself and I always need help
- Others did all of this for me

D2h.

	I did it all by myself without needing someone to keep an eye on me	Others helped me	I did not use a toilet, commode, bedpan, or urinal in the last 3 days
Toilet use — In the last 3 days, what was the most help you usually received to use a toilet, commode, bedpan, or urinal (excluding moving onto and off of a toilet or commode)? This includes cleaning yourself after toilet use or incontinent episodes, changing pads, managing ostomy or catheter, and adjusting clothes.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Which of the following statements best describes how much others helped you to use a toilet, commode, bedpan, or urinal?

- I did it by myself, but others set up the things I used
- I did it by myself, but someone was nearby to keep an eye on me
- I did it by myself, but sometimes I needed help
- I did at least half of it by myself, but I always need help
- I did less than half of it by myself and I always need help
- Others did all of this for me

D2i.

	I did it all by myself without needing someone to keep an eye on me	Others helped me	I did not move around in bed in the last 3 days
Bed mobility — In the last 3 days, what was the most help you usually received to move around in bed? Examples include moving to and from a lying position, turning from side to side, positioning your body while in bed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Which of the following statements best describes how much others helped you to move around in bed?

- I did it by myself, but others set up the things I used
- I did it by myself, but someone was nearby to keep an eye on me
- I did it by myself, but sometimes I needed help
- I did at least half of it by myself, but I always need help
- I did less than half of it by myself and I always need help
- Others did all of this for me

D2j.

	I did it all by myself without needing someone to keep an eye on me	Others helped me	I did not eat in the last 3 days
Eating — In the last 3 days, what was the most help you usually received to eat and drink? Examples include cutting food, opening containers, taking in food by any method (including tube feeding and total parenteral nutrition).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Which of the following statements best describes how much others helped you to eat?

- I did it by myself, but others set up the things I used
- I did it by myself, but someone was nearby to keep an eye on me
- I did it by myself, but sometimes I needed help
- I did at least half of it by myself, but I always need help
- I did less than half of it by myself and I always need help
- Others did all of this for me

Functional Activities

D3a What is your main way of moving around indoors?

- Walking without an assistive device
- Walking with an assistive device (for example, cane, walker, crutches, pushing wheelchair)
- Manual wheelchair
- Motorized wheelchair or scooter
- I am confined to bed

D3b. In the last 3 days, what was your total number of hours of physical activity (for example, gardening, walking) or exercise?

_____ Hours

D3c. In the last 3 days, how many days did you go out of the house or building in which you live, no matter how short the period?

- Did not go out in last 3 days
- Did not go out in last 3 days, but usually go out over a 3-day period
- In 1–2 days of last 3 days
- Daily in last 3 days

D3d. How has your ability to perform basic activities of daily living (for example, bathing, managing personal hygiene, dressing, or moving around) changed compared to 90 days ago?

- Improved
 - No change
 - Worsened
-

D3e. In the last 90 days, have you driven a car?

No

Yes

Health Conditions

E1 Which of the following statements best describes your ability to control your bladder in the last 3 days?

- I had complete control and did not use any type of catheter or other urinary collection device
 - I managed with a catheter or other urinary collection device
 - I did not lose bladder control over last 3 days but do have episodes of doing so
 - I lost bladder control on 1–2 of last 3 days
 - I lost bladder control daily in last 3 days
 - I had no control over my bladder
 - I had no urine output from my bladder in last 3 days
-

E2 Which of the following statements best describes your ability to control your bowels in the last 3 days?

- I had complete control and did not use any type of ostomy device
- I managed with an ostomy device
- I did not lose bowel control over last 3 days but do have episodes of doing so
- I lost bowel control on 1–2 of last 3 days
- I lost bowel control daily in last 3 days
- I had no control over my bowels
- I had no bowel movement in last 3 days

E3 Have you fallen or unexpectedly ended up on the floor, ground, or other lower surface?

(Enter the number of falls in each time period.)

	No falls	One fall	Two or more falls
In last 30 days	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
31–90 days ago	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
91–180 days ago	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

E4 In the last 3 days, how often have you had the following health conditions or symptoms?

	Not in last 3 days	Not in last 3 days, but often have this problem	On 1 of last 3 days	On 2 of last 3 days	Daily in last 3 days
Dizziness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unsteady when walking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chest pain	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aphasia (difficulty speaking or understanding speech because of brain injury)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Constipation
(for example,
no bowel
movement in
3 days,
difficult
passage of
hard stool)

Diarrhea

Vomiting

Difficulty
falling asleep
or staying
asleep;
waking up
too early;
restlessness;
non-restful
sleep

Peripheral edema (swelling of arms or legs)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dehydration	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

E5 In the last 3 days, did you have shortness of breath?

- I had no shortness of breath at any time
 - I had shortness of breath when doing moderate activities (for example, climbing two flights of stairs)
 - I had shortness of breath when doing normal day-to-day activities (for example, getting dressed or doing housework)
 - I had shortness of breath when I was resting
-

E6 In the last 3 days, have you felt fatigued (diminished energy)?

- No
- Yes, but I was able to complete day-to-day activities
- Yes, I was unable to finish normal day-to-day activities
- Yes, I was unable to start some normal day-to-day activities
- Yes, I was unable to start any normal day-to-day activities

E7 In the last 3 days, how often have you had pain?

- No pain
 - Not in last 3 days, but often have pain
 - In 1–2 of last 3 days
 - Daily in last 3 days
-

E8 In the last 3 days, what was the most intense level of pain that you experienced?

- No pain
- Mild pain
- Moderate pain
- Severe pain
- Horrible or excruciating pain

E9 Do you have any conditions or diseases that make your health, mood, behavior, or ability to function unstable?

- No
- Yes

E10 Are you experiencing any acute problems or flare-ups of a recurrent or chronic problem?

- No
- Yes

E11 In general, how would you rate your health?

Excellent

Good

Fair

Poor

E12 Do you smoke tobacco daily?

No

Not in last 3 days but usually a daily smoker

Yes

E13 In the last 14 days, what is the highest number of alcoholic drinks you had in a “single sitting”?

None

1

2-4

5 or more

Disease Diagnoses

F1 For each disease, indicate which statement is true.

	Disease not present	Disease present BUT not being treated or monitored	Disease present AND being treated or monitored
Alzheimer's disease	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other dementia, or dementia of unknown origin	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stroke	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Coronary heart disease	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Chronic obstructive pulmonary disease	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Congestive heart failure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cancer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Diabetes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Nutrition

G1 Have you lost 5% or more of your weight in the last 30 days or 10% or more in the last 6 months?

No

Yes

G2 Did you eat only one or fewer meals in AT LEAST 2 of the LAST 3 DAYS?

No

Yes

G3 In the last 3 days, have you decreased the amount of food or fluid you usually consume?

No

Yes

Procedures / Treatments

H1 In the last 90 days, how many times did you use the following health care services? (Enter “0” for no visits.)

_____ Inpatient hospital with overnight stay

_____ Emergency room visit (not counting an overnight stay)

_____ Visits with a doctor or nurse-practitioner

H2 In the last year, have you had a flu shot?

No

Yes

H3 In the last 3 days, have you had an order for or received wound care?

Not received and not ordered

Ordered, but not received

Received on 1–2 of last 3 days

Received daily in last 3 days

Finances and Stressors

I1. Because of limited funds, during the last 30 days have you made trade-offs among purchasing any of the following: adequate food, shelter, clothing, prescribed medications, sufficient home heat or cooling, or necessary health care or home care?

No

Yes

I2. In the last 90 days, have you experienced any major life stressors (for example, episode of severe personal illness, death or severe illness of close family member or friend, loss of home, victim of crime)?

No

Yes

Completion of interRAI Check-Up

J1 Who answered the questions on this form?

- I answered all questions myself
 - Others answered some questions for me
 - Others answered all questions for me
-

Appendix B: Z Series Question Added to Actual Check-Up Questions to Capture Participants' Experience with The Check-Up.

Z1 What is your highest level of education?

- I have no formal education
- Grade 1-8
- High School
- Post-secondary

Z2 What language do you speak at home?

- English
- French
- Other (Please mention) _____

Z3 How long have you lived in Canada?

- All my life
- More than 5 years

- 1 - 4 years
- Less than 1 year
- I do not live in Canada

Z4 Do you identify as an indigenous person?

- No
- Yes

Z5 How difficult was it to complete the questionnaire?

- Not difficult
 - Slightly difficult
 - Moderately difficult
 - Very difficult
-

Z6 What question was the most difficult for you to answer?

Z7 Did you find any question embarrassing or offensive?

No

Yes (Mention the question?) _____

Z8 How well does this survey cover your health needs?

Poorly

Moderately well

Excellently well

Z9 What health concerns that are important to you were not covered in this survey?

Z10 What questions will you drop from this survey?

Z11 What could be done to improve the usefulness of this survey to you?

Z12 How long did it take you to complete this survey?

_____ Minutes

Z13 Do you have difficulty in chewing? (Test Question)

No

Yes

Z14 In the last one year, have you used any type of Cannabis product? (Test Question)

No

Yes

Z15 What is your research group [if in doubt, confirm from the research coordinator

Group 1: I am doing this assessment all by myself

Group 2: I am doing this assessment with an interviewer

Group 3: I am doing this assessment with my caregiver, family member, or friend.