Understanding and Responding to the Health Effects of Loneliness and Social Isolation in Ontario Home Care Community-Dwelling Older Adults

by

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Author's Declaration

This thesis consists of material all of which I authored or co-authored: see Statement of Contributions included in the 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.

Statement of Contributions

Emily Alexis Gorgenyi was the sole author for Chapters 1, 2, 4, 6, and 7 that were written under the supervision of Professor Dr. John Hirdes and were not written for publication prior to defense.

This dissertation consists of five manuscripts written for publication. Exceptions to sole authorship of material are as follows:

Research presented in Chapter 3

As the lead author, I conceptualized the study questions, design, and methodology with guidance from Professor Hirdes and previous work by Sandra Ochwat. I performed all data analyses guided by previous methodology by Sandra Ochwat, Professor Hirdes, and the committee members. I led the interpretation of findings and drafted the initial manuscript with guidance and contributions from Professor Hirdes.

Research presented in Chapter 5

As the lead author, I conceptualized the study questions, design, and methodology with guidance from Professor Hirdes. The original resource inventory was co-created with Suzanne Simpson of the Canadian Red Cross. I performed all revisions in 2026 as guided by Professor Hirdes and the committee members. I led the interpretation of findings and drafted the initial manuscript with guidance and contributions from Professor Hirdes.

Abstract

Social isolation and loneliness are distinct concepts that are often treated as interchangeable in the literature. Both have been linked to various health behaviours and outcomes that may increase the risk of mortality, especially in older adults. However, contradictory results are often reported with some studies finding no mediation from health behaviours in the connection between loneliness and health outcomes or mortality. Similarly, the associations reported between loneliness and mortality are not always statistically significant. Within the aging population, home care recipients can be exceptionally vulnerable to loneliness-related outcomes because of their complex health needs and social changes (e.g., widowhood) that may put them at a higher risk of isolation.

Social prescribing involves the implementation of social resources and programs to address biomedical concerns by connecting traditional clinical practices with community support services and activities. This upstream approach has been popularized to address and prevent loneliness, particularly after public health isolation measures implemented in COVID-19. However, the evidence base related to social prescribing, loneliness, social isolation, and health outcomes is limited. This dissertation involves a scoping review regarding social prescribing in community based older adults; development of a standardized index of social isolation; secondary analysis of the associations of loneliness and isolation with health behaviours and health outcomes; and description of a community engagement effort to codevelop targeting strategies and map resources that could be used to respond to loneliness and social isolation in one region of southern Ontario. The latter project exemplifies efforts by one region to identify and respond to loneliness and social isolation with available community resources. However, evaluation of the effectiveness of those services is not in scope for this dissertation.

Study 1 is a scoping review that investigates the use of social interventions to address loneliness and social isolation in community-dwelling older adults. It provides an overview of existing literature to examine the types of resources implemented in social prescribing, as well as how social isolation and loneliness were measured in each study. The review demonstrates an array of resources that were used to target social isolation and loneliness, with the majority of successful programs including a socialization aspect; however, results were unclear due to inconsistent terminology and measurement tools. This suggests the interest in prescribing social interventions is not matched by consistent empirical evidence in support of its implementation. To establish best practices in this area, terminology and measures need to be standardized for loneliness, social isolation, and for specific types of social prescribing interventions.

Study 2 involves the creation and validation of an Index of Social Isolation (ISI) based on data from the interRAI Home Care assessment. Candidate indicators were identified based on the literature. The ISI is intended to serve as an objective measure of isolation, whereas loneliness is considered to be a subjective experience in response, at least in part, to objective isolation. Four variants were created and tested, with the final ISI consisting of a count of six items. This index can be used as a continuous measure, but the analyses also identified meaningful cut-points based on the association with loneliness. Finally, the ISI was examined longitudinally to demonstrate sensitivity to contextual variables and external events. This new measure has strong potential for use within future interRAI data studies and for routine clinical practice in home and community care.

Study 3 is a two-part examination of the associations of loneliness and social isolation with health behaviours and health outcomes. First, a cross-sectional analysis was done to examine health behaviours among socially isolated and lonely community-dwelling older adults receiving

home care services. These may represent mediating variables linking social isolation to health outcomes. The three health behaviours considered (smoking, inadequate nutrition, medication non-adherence) reflect different mechanisms through which loneliness and isolation may be related to health.

This is followed by a longitudinal analysis of the onset of new health outcomes using transitions in three different indicators of health: self-rated health, pain scores, and self-reported mood disturbance. The findings provide further insights regarding the effects of social isolation and loneliness on health, including health effects that differ between social isolation and loneliness.

Study 4 is a retrospective cross-sectional needs assessment of community-dwelling older adults receiving home care services in the Huron-Perth region of Ontario, Canada. As part of a collaboration with local community partners, we compared the health needs of older adults in Huron-Perth to those in the rest of Ontario in order to identify opportunities to mobilize social resources in the community. Huron-Perth is overall a healthier region than the rest of Ontario; but important variations are evident within subregions. Loneliness and social isolation were of particular interest due to high prevalences in Huron-Perth.

Study 5 provides a resource inventory of all social resources that could be used to target social isolation and loneliness in community-dwelling older adults residing in Huron-Perth, Ontario. Our findings supplemented the needs assessment done in Study 4 by summarizing and understanding the capacity of each nonmedical community service in the Huron-Perth region. Further analysis examined how the resources correspond to those found to be effective in reducing social isolation and loneliness in older adults in the literature in Study 1.

The five studies captured in this dissertation provide a comprehensive examination of the complex relationships between loneliness, social isolation, health behaviour, and health outcomes in community-dwelling older adults. The included studies provide a strong foundation for future interRAI research on social isolation and loneliness while simultaneously providing key insights for the development and integration of social isolation and loneliness identification and targeting mechanisms. In conclusion, this dissertation strengthens knowledge on the identification and measurement of social isolation while providing important insights into the relationships of social isolation, loneliness, health behaviours, and health outcomes, as well as how to best implement nonmedical resources to intervene.

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I would like to thank the incredible support system that has made this journey possible. First, I am extremely grateful to my supervisor, Professor John Hirdes, whose mentorship guided me through the accelerated pathway of an MSc and PhD. Without your guidance and patience, this would have not been possible. Your impact is unmatched.

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Sandra Ochwat is owed all my gratitude for allowing us to build on your MSc research pertaining to social isolation in older adults. Your hard work and collaboration are invaluable and provided key insights for the construction of this dissertation.

I extend my gratitude for the Canadian Red Cross, especially Samina Talat and Suzanne Simpson for your collaboration in this dissertation. The findings of this dissertation would have not been possible without your support and investments into the Canadian Red Cross and interRAI Canada collaboration. Additionally, I'd like to thank community members and stakeholders that were members of the working group advisory committee. Your insightful feedback and community knowledge have guided this initiative and helped the communities of Huron-Perth.

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Dedication

I'd like to dedicate this dissertation to my friends and family. Your constant support and recognition have allowed me to pursue something I never thought possible. Thank you for forgiving my last-minute cancellations to continue running code, listening to my endless rambles and brainstorms, bringing me sweet treats and taking me for wellness walks, and for pushing me to continue when I didn't feel that I could.

Thank you to my parents, Melinda and Louis, for setting such strong examples of success and happiness; and to my brother, Tommy, for making me laugh in even the most stressful of times. I am so grateful to have a family that supports and enables me to make the difficult choices and strive for the highest level in all aspects of life. This gratitude extends to all my friends and my partner as well; this would have not been possible without your support. Also, thank you in advance for helping me navigate life without academics for the first time since I was five years old, I hope I find a hobby soon or I might get another degree.

Finally, I extend my gratitude to all my academic mentors that have guided me over the years. Dr. Coleman, for your guidance throughout my undergraduate degree and very first thesis, and Dr. Guthrie, for introducing me to the world of aging and health. Your influences pushed me to keep exploring and finding answers to my questions; thank you for your guidance and influence in shaping my future.

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List of Abbreviations

ADHD	Attention-Deficit/Hyperactivity Disorder
ADL	Activity of Daily Living
ADLH	Activities of Daily Living Hierarchy Scale
AOR	Adjusted Odds Ratio
C-CAP	Contextualize, Collect, Analyze, and Present Procedure
CAPs	Collaborative Action Plans
CHESS	Changes in Health, End-Stage Disease, Signs, and Symptoms Scale
CI	Confidence Interval
COR	Crude Odds Ratio
COVID-19	Coronavirus Disease of 2019
CPS	Cognitive Performance Scale
ERPZ	Elderly Persons in the Risk Zone
FSA	Forward Sortation Area
IADL	Instrumental Activities of Daily Living
IADLCH	Instrumental Activities of Daily Living Capacity Hierarchy Scale
interRAI HC	interRAI Home Care Assessment
ISI	Index of Social Isolation
MAPLe	Method for Assigning Priority Levels
MOS Social Support Scale	Medical Outcomes Study Social Support Scale
PAMC	Promoting Aging Migrants' Capabilities

RCT	Randomized Control Trial
ROC	Receiver Operating Characteristic
SD	Standard Deviation
SE	Standard Error
U.S.	United States
UCLA Loneliness Scale	University of California, Los Angeles Loneliness Scale

Chapter 1: Introduction

1.1 Loneliness and Social Isolation

Loneliness is the subjective emotional state of feeling isolated or alone (Holt-Lunstad et al., 2015; Peplau & Perlman, 1982). The associated distress can occur due to misalliance between one's actual and perceived social connections and relationships (Peplau & Perlman, 1982; Peplau & Perlman, 1979; Sermat, 1978). In Canada, an estimated 9.7% of adults aged 65 and older reported feeling lonely always or often in 2024, according to Statistics Canada (Statistics Canada, 2025). Loneliness can be precipitated by a variety of factors that alter social relationships and lead to lowered levels of achieved social interaction (Peplau & Perlman, 1979). These include the termination of a close emotional relationship (e.g., widowhood), and an increase in desired social connection without an increase in actual social connection (Peplau & Perlman, 1979). While some demographic characteristics have been linked to loneliness, the most common predictors of loneliness have been identified as living arrangements, characteristics of the social network, and marital status (Barjaková et al., 2023; Fokkema et al., 2012; Greenfield & Russell, 2011). As social needs and relationships change throughout the life course, it follows that one would experience variations in levels of loneliness (Peplau & Perlman, 1979). Although transient isolation may occur, persistent loneliness may become problematic and lead to long-term health outcomes when it becomes persistent (Cacioppo et al., 2006; Goossens et al., 2015; Young, 1982).

Increased levels of loneliness are reported to be linked with numerous health outcomes including, but not limited to: lower health status, increased risks of dementia, increased systolic blood pressure, depressive symptoms, functional limitations, and mortality (Akhter-Khan et al., 2021; Hawkley et al., 2010; Luo et al., 2012; Martín-María et al., 2020). Beller and Wagner (2020) found that loneliness predicted worsened health outcomes after eight years, across 14 European countries, emphasizing the potential long-term health effects. However, a recent survival analysis

of loneliness among home care clients in Finland, New Zealand, and Canada reported a lower hazard rate for mortality after adjusting for many intervening physical and mental health conditions (Egbujie et al., 2025).

While loneliness is the subjective feeling of being alone, social isolation is its objective counterpart (Holt-Lunstad et al., 2015; Peplau & Perlman, 1982). Social isolation is typically identified in individuals that live alone, have infrequent contact with family and friends, and do not belong to a social group (Singer, 2018). However, these conditions do not guarantee that one necessarily feels lonely. Some individuals may be objectively isolated but are content with limited social interaction and do not feel lonely (Holt-Lunstad et al., 2015). In contrast, others may feel lonely due to social isolation resulting from factors such as rural living, death of a loved one, or impaired mobility (Singer, 2018). Despite the differences in definitions, social isolation is often intertwined with loneliness and examined together in research as one concept, using either name interchangeably. Associations of social isolation and health outcomes and behaviours that may increase risk of mortality have been reported; however, little research has provided distinct results for social isolation and loneliness.

Social isolation has been demonstrated to be associated with loneliness, depressive symptoms, heart conditions including coronary heart disease and stroke, and chronic disease like type two diabetes (Christiansen et al., 2020; Valtorta, Kanaan, Gilbody, & Hanratty, 2016; Zhang et al., 2023). Further, both subjective loneliness and objective social isolation have been reported to lead to higher likelihood of mortality and have been connected to negative health behaviours such as poor sleep and physical inactivity (Cacioppo et al., 2002; Hawkley et al., 2009; Holt-Lunstad et al., 2015).

1.2 Loneliness and Social Isolation in Older Adults

The lifetime trajectory of loneliness is typically presented in a parabolic curve in which it peaks in adolescence, decreases during middle age, and peaks once again in later life, having the potential to affect anyone at any point (Barjaková et al., 2023; Qualter et al., 2015). The 2025 National Institute of Aging 'Ageing in Canada Survey' noted that of the surveyed Canadians aged 50 or older, 43% reported being at risk of social isolation, 57% reported feeling some degree of loneliness, and 18% reported being very lonely (Qureshi et al., 2026). This follows the results of a report by Leger (2020) in which 16% of respondents aged 65 and older reported feeling lonely frequently or every day during the fourth wave of the coronavirus pandemic. As older adults may be exposed to the precipitating factors of loneliness outlined by Peplau and Perlman (1979), they face the risk of loneliness and social isolation through age-related life changes such as bereavement, divorce, and retirement more frequently than their younger counterparts (Schafer et al., 2021). This can be especially true for those experiencing widowhood where elevated rates of loneliness have been described (Yang & Gu, 2021).

Loneliness has been correlated with a variety of health outcomes and behaviours that can result in reduced quality of life and increased risk of mortality in extreme cases for older adults (Holt-Lunstad et al., 2015; Luo et al., 2012). Home care recipients can be exceptionally vulnerable to loneliness-related outcomes because of their complex health needs and demographics that may put them at a higher risk of isolation as it is probable for them to live alone, be older, and experience more medical complications in comparison to their counterparts (Canadian Home Care Association, 2003; Luggen & Rini, 1995). In contrast, home care clients may also interact with others more frequently than the general population of community-dwelling older adults because they require more support to remain in the community. However, social aspects of home care

services have been substantially reduced due to increasing demand for home care services combined with financial constraints. This has resulted in a greater emphasis on post-acute medical care and limitation of services to personal care (Aronson & Neysmith, 1996, 2001). In part, the expectation is that socially oriented services (e.g., friendly visitors, Meals on Wheels) would be provided more by voluntary agencies or community support services.

32% of adults aged 65 and older living alone and with fair or poor self-rated health reported feeling lonely frequently or every day over the fourth wave of the coronavirus pandemic, and consistently reported higher rates of loneliness compared to the total representative sample over the four waves (Leger, 2020). Medically complex community-dwelling older adults, such as those seen in home care, are prone to health complications such as cognitive decline, falls, and disability (Clegg et al., 2013; Filderman et al., 2024; Manis et al., 2020). In turn, frailty, disability, and comorbid health conditions can result in declining social activity, which can further perpetuate declines in health (Kojima et al., 2022; McArthur et al., 2022; Ong et al., 2015).

1.3 Loneliness and Social Isolation and Health

1.3.1 Health Outcomes

Neurobiological mechanisms designed for short-term self-preservation are activated by feelings of isolation that may diminish health and well-being over the long term (Cacioppo & Cacioppo, 2014). Within the aging population, cardiovascular conditions such as impaired cardiovascular activation, cardiovascular disease, and increased blood pressure have been associated with loneliness (Cacioppo et al., 2002; Christiansen et al., 2020). For example, risk of incident coronary heart disease and stroke respectively increased by 29% and 32% for individuals with poor social connections (Valtorta, Kanaan, Gilbody, Ronzi, et al., 2016). Further research indicates that depressive symptoms, increases in functional limitations, poor sleep quality, lower

self-rated health, chronic disease such as type two diabetes, increased risk of inflammatory response and disease, decreased resistance to upper respiratory illness, worsened emotional and psychological well-being, cognitive decline, obesity, dementia, and Alzheimer's disease may also be observed in lonely and/or isolated individuals (Akhter-Khan et al., 2021; Cacioppo et al., 2002; Cacioppo et al., 2010; Christiansen et al., 2020; Cohen et al., 1997; Lauder et al., 2006; Luo et al., 2012; Steptoe et al., 2004; Stickley et al., 2013; Wilson et al., 2007). An elevated risk of metabolic syndrome, which is outlined as symptoms including central obesity, dyslipidemia, raised blood pressure, and dysglycemia, was also found to be associated with loneliness (Whisman, 2010). These symptoms can increase risk of incident cardiovascular complications, incident diabetes mellitus, incident stroke, and mortality (Ford et al., 2008; Galassi et al., 2006; Whisman, 2010). Therfore, loneliness is associated with lower health status across a variety of domains, each influencing a number of biological systems that are also related to frailty, potentially defining underlying mechanisms in which loneliness may manifest (Kojima et al., 2022; Martín-María et al., 2020).

1.3.2 Health Behaviours

Health behaviours commonly associated with loneliness include less physical activity, alcohol consumption, unhealthy diets, and smoking (Hawkley et al., 2009; Jensen et al., 2025; Ong et al., 2015; Stickley et al., 2013). It is postulated that these health behaviours may explain health outcomes seen in lonely and socially isolated individuals. Christiansen et al. (2020) noted that the relationship between type two diabetes and loneliness was completely explained by factors such as poor mental health and health behaviours, such as negative affect. This may be observed because of a lack of social networks that are able to influence behaviours through support of healthy habits and health-promoting behaviours. Further, mental health concerns may also result in loneliness

and/or social isolation and problematic health behaviours consequently. However, there is contradicting literature that found health behaviours do not mediate health outcomes or mortality associated with loneliness (Luo et al., 2012; Steptoe et al., 2004).

Older adults reporting chronic loneliness also reported significantly higher numbers of visits to doctors, hospitals, contact with community nurses, and hospitalizations (Gerst-Emerson & Jayawardhana, 2015; Wang et al., 2019; Zhang et al., 2018). In studies involving medically complex older adults, an elevated use of health services has been observed in lonely older adults (Rönneikkö et al., 2018; Taube et al., 2015). For instance, lonely home care clients in Finland were more likely to be hospitalized due to unspecified geriatric symptoms (Rönneikkö et al., 2018). Further, among older adults with heart failure, patients with loneliness or social isolation had more usage of outpatient services while also having a 57% and 68% increased risk of emergency department visits and hospitalization, respectively (Manemann et al., 2018). While it is plausible that lonely and isolated individuals experience a higher number and severity of health complications than their non-lonely and non-isolated counterparts, it may also be that the relationship between doctors and patients provides social support in addition to medical care (Gerst-Emerson & Jayawardhana, 2015). This observation may be especially pertinent in studies that report an increased association of loneliness with physicians visits and not hospitalizations as there may be a more personal relationship between an older adult and their primary care physician (Gerst-Emerson & Jayawardhana, 2015). Further, the higher frequency of visits with primary care physicians may provide explanations for the lower rates of mortality observed in lonely older adults in some studies due to the increase in medical attention received.

1.3.3 Mortality

Some studies provide evidence of an association of social isolation and loneliness with higher possibility of mortality. Both objective and subjective dimensions have been linked to this outcome, with a 26% increased risk for lonely individuals, a 29% increased risk for socially isolated individuals, and a 32% increased risk for living alone (Holt-Lunstad et al., 2015; Luo et al., 2012; Rico-Uribe et al., 2018). For example, perceived social isolation in older adults with heart failure is associated with an approximately 3.75 times increased risk of mortality in comparison to their counterparts with low perceived social isolation and heart failure (Manemann et al., 2018). A study of community-dwelling older adults living with frailty found those experiencing social isolation and loneliness were at a 77% and 83%, respectively, increased risk of mortality when compared to non-lonely and non-isolated counterparts spanning a 22-year duration (Hoogendijk et al., 2020). However, a cross-national population level study of one-year all-cause mortality in home care recipients in New Zealand, Finland, and Canada found *lower* mortality rates among lonely home care clients in comparison to non-lonely counterparts, contradicting other reports in the literature (Egbujie et al., 2025). This finding is consistent with another of older adults in the Canadian Community Health Survey in which there was no relationship between transition rates to death from various care settings and loneliness (Savage et al., 2025). Thus, it is possible that loneliness itself is not a risk factor for mortality but rather represents a point in a pathway through which multiple risk factors interact and influence health (Egbujie et al., 2025).

1.4 Protective/Buffering Effects

The stress buffering hypothesis suggests that the mitigation of stress and its effects that may occur is dependent on the degree of social support, measured by interpersonal resources that respond to stressful events (Cohen & Wills, 1985). Thus, the effects faced by individuals with little

to no social support will be minimized for those with comparably stronger support systems (Cohen & McKay, 2020). The positive outcomes of social support can include adaptive coping responses and access to instrumental supports that can assist individuals through difficult life challenges (Albrecht & Goldsmith, 2003; Glover & Parry, 2019). For example, shared social identities may be central to the initiation of new social relationships by bonding through shared experiences with others (Glover & Parry, 2008). These relationships are more likely to develop into deep friendships due to the investment in relationships using routine social contact, such as within leisure contexts like those found in community supports and activities (Glover & Parry, 2008; Grafanaki et al., 2005).

There are potential protective effects provided by social support for physical, psychosocial, and mental health (Lubben et al., 2006). Upstream approaches to social isolation can address more than individual risk factors (Barjaková et al., 2023). Social prescribing interventions aim to target biomedical concerns by connecting traditional clinical practices with community support services and activities (Drinkwater et al., 2019). The prescription of leisure activities promotes deep friendships through sociability, provides a sense of freedom, and promotes communication; therefore, serving as a key component for the development of social networks and access to required resources (Glover, 2016; Glover & Parry, 2019; Grafanaki et al., 2005). Leisure activities may therefore address loneliness and social isolation through the creation of social relationships which may resultantly prevent subsequent health outcomes and behaviours. While they may not be a remedy for complex health concerns such as end-stage disease or severe mental illness, nonmedical community resources have the potential to safely address loneliness and social isolation to prevent further health decline when conducted and evaluated properly (Drinkwater et al., 2019; Reinhardt et al., 2021).

1.5 Summary

Loneliness and social isolation may both influence health outcomes and behaviours, particularly in older adults. Both have been linked to cardiovascular conditions, depressive symptomology, poor self-rated health, functional limitations, poor sleep quality, chronic disease, inflammatory response and disease, decreased resistance to upper respiratory illness, worsened emotional and psychological well-being, cognitive decline, obesity, dementia, and metabolic syndrome (Akhter-Khan et al., 2021; Cacioppo et al., 2002; Cacioppo et al., 2010; Christiansen et al., 2020; Cohen et al., 1997; Ford et al., 2008; Galassi et al., 2006; Lauder et al., 2006; Luo et al., 2012; Steptoe et al., 2004; Stickley et al., 2013; Whisman, 2010; Wilson et al., 2007). These health outcomes may act as the avenues through which risk of mortality may be affected, although the evidence for loneliness and mortality in older adults is inconsistent (Egbujie et al., 2025; Luo et al., 2012). However, loneliness has been associated with a variety of health behaviours such as lower physical activity levels, increased alcohol consumption, unhealthy dietary choices, and increased rates of smoking (Hawkley et al., 2009; Jensen et al., 2025; Ong et al., 2015; Stickley et al., 2013). These health behaviours may affect health outcomes seen in lonely and socially isolated individuals; however, some studies have found no mediation from health behaviours in the connection between loneliness and health outcomes or mortality (Luo et al., 2012; Steptoe et al., 2004). Health services use such as doctors' visits, emergency department visits, and hospitalizations are also associated with loneliness and social isolation (Gerst-Emerson & Jayawardhana, 2015; Wang et al., 2019; Zhang et al., 2018). Physical and mental health outcomes, mortality risk, health behaviours, and health service utilization patterns may be exacerbated for those receiving home care services as they are more prone to medical complexities which may affect social relationships, further perpetuating a decline in health behaviours and status (Kojima et al., 2022; Ong et al., 2015).

Social prescribing interventions using social resources and programs may offer a reasonable upstream approach to addressing and preventing loneliness as they use non-medical resources to bolster one's support system (Barjaková et al., 2023). Further, social supports may improve physical and mental health outcomes through adaptive coping mechanisms, stress responses, positive health behaviours, positive affect, and strengthening one's sense of purpose (Albrecht & Goldsmith, 2003).

1.6 Study Rationale

Loneliness is highlighted as a major concern by the World Health Organization, being described as the "next epidemic" due to the consequences on public health and well-being (Goldman et al., 2024). Despite this, there are still notable gaps in the research that need to be addressed to gain a comprehensive understanding of loneliness and its risk factors, outcomes, correlates, and interventions.

Some gaps in literature may come from the interchanging of social isolation and loneliness, clouding true results. Additionally, few studies identify or control for intervening risk factors or behaviours in relation to health outcomes (Hajek et al., 2025). For example, in a meta-analysis and systematic review of chronic social isolation and loneliness in older adults by Hajek et al. (2025), only one study of 18 reported on the prevalence, antecedents, and consequences of social isolation, in comparison to 17 studies that reported on the same characteristics of loneliness. Thus, there is room for expansion in the identification of unique characteristics and outcomes of older adults that are both socially isolated and lonely compared to those that are only lonely.

Additionally, there is a paucity of research on loneliness and social isolation in home care populations. Home care clients differ from the general population with respect to health status, comorbidity, frailty, disability and mental health needs. Results from the general population may

not apply to the more clinically complex vulnerable population. For instance, Egbujie et al. (2025) found that there was a *protective effect* for loneliness regarding all-cause mortality within home care populations of three countries. The mixed results of effects of loneliness on mortality risk do not negate the importance of loneliness because it is a mental health concern in itself that may alter multiple levels of quality of life and health (Egbujie et al., 2025). In order to gain the fullest understanding of physical and mental health outcomes, both objective measures of social isolation and subjective measures of loneliness should be considered in risk assessments of health behaviours, health outcomes, and mortality (Holt-Lunstad et al., 2015).

Previous research by Ochwat (2022) examined characteristics increasing risk of loneliness in aged home care clients in Ontario. This dissertation builds upon this work to examine the cross-sectional and longitudinal associations of loneliness and social isolation with physical and mental health outcomes and behaviours in community-dwelling older adults receiving home care services in Ontario, Canada.

1.7 Methodology

1.7.1 Purpose

The purpose of this dissertation is to perform an in-depth examination of the health outcomes and behaviours associated with loneliness and social isolation through exploration of the following proposed research questions:

1. How can social isolation and loneliness be identified in home care clients?
2. Aside from mortality, what are the physical and mental health effects of loneliness in community-based older adults?
3. What social resources are available in community-based settings for older adults?

4. What are the physical and mental health outcomes of loneliness and social isolation in home care clients?

1.7.2 Objectives

To answer the proposed research questions, five studies were conducted with unique research questions and aims. Study 1 was a scoping review examining existing literature to understand what social resources are available for community-dwelling older adults targeting social isolation and loneliness. Study 2 was focussed on development of an analytical scale to identify social isolation among older adults using the interRAI Home Care assessment. Study 3 was a two-part cross-sectional and longitudinal analysis to determine the main and interactive effects of social isolation and loneliness on health behaviours and outcomes of older adults in home care settings. Study 4 was a community needs assessment of older adults within Huron-Perth receiving home care services. Finally, Study 5 involved development of a resource inventory of social resources available to community-dwelling older adults within the Huron-Perth region that can be used to target social isolation and loneliness.

Due to the subjective nature of loneliness, severe cognitive impairment may alter how an individual perceives and reports loneliness. Therefore, Studies 2, 3, and 4 each excluded individuals with Cognitive Performance Scale (CPS) scores greater than three to reduce the potential effects of cognitive impairment on functional status and decision-making capacity (Morris et al., 2013).

1.8 Methodological Summaries of Studies

1.8.1 Study 1

1.8.1.1 Research Questions

1. Within the literature, what social resources, programs, and interventions targeting loneliness or social isolation are available to community-dwelling older adults?

2. What social resources, programs, and interventions are effective in reducing loneliness or social isolation in community-dwelling older adults?

1.8.1.2 Methods and Framework

This study followed the Joanna Briggs Institute's Manual for Scoping Reviews to analyze existing literature on social prescribing mechanisms targeting social isolation and loneliness in community-dwelling older adults (Peters et al., 2020). It summarizes global evidence on different types of social resources used in targeted social prescribing mechanisms in older adults.

1.8.2 Study 2

1.8.2.1 Research Aims

The aim of this study is to develop a new interRAI measure for objective social isolation as a counterpart to the measure of subjective loneliness. This research draws on available literature for candidate items and validates that measure against a subjective measure of loneliness as an outcome variable.

1.8.2.2 Methods

In this study, a retrospective analysis of Ontario home care clients was used to create a social isolation scale with validation against measures of subjective loneliness. The scale performance was then assessed in three time periods to provide independent replications using more recent data.

1.8.3 Study 3

1.8.3.1 Research Questions

1. What are the main effects and interactive effects of social isolation and loneliness on selected health behaviours of community-dwelling older adults receiving home care services in the province of Ontario, Canada?

2. What are the main effects and interactive effects of social isolation and loneliness on selected health outcomes of community-dwelling older adults receiving home care services in the province of Ontario, Canada?
3. How do the health effects of loneliness differ from social isolation in community-dwelling older adults receiving home care services?

1.8.3.2 Methods

A cross-sectional analysis was conducted to examine smoking, malnutrition, and medication non-adherence as binary health behaviours in Ontario home care recipients. Then, a longitudinal study was conducted to examine the onset of new health problems using transitions in self-rated health, pain scale scores, and self-reported mood scale scores.

1.8.4 Study 4

1.8.4.1 Research Questions

1. What are the health and social needs of community-dwelling older adults in the Huron-Perth region compared with the rest of Ontario, Canada?
2. How do the health behaviours and health needs of lonely and socially isolation home care clients in Huron Perth differ compared with other clients in that region?

1.8.4.2 Methods

A cross-sectional analysis was done of home care recipients between January 1, 2018, to January 1, 2022, in Huron-Perth compared to their counterparts in the rest of Ontario. This study identified the needs of community-dwelling older adults in the Huron-Perth region that could be targeted using social resources.

1.8.5 Study 5

1.8.5.1 Research Questions

1. What services and social resources are available to older adults in the Huron and Perth regions of Ontario?
2. How do the services available in Huron-Perth compare with those found to be effective in reducing social isolation and loneliness in study two?

1.8.5.2 Methods

A resource inventory was created to supplement the needs assessment by summarizing nonmedical community services in the Huron-Perth region. This was done to understand the full capacity of each community service available to the Huron-Perth region and examine how the available resources correspond to those deemed effective in reducing social isolation and loneliness in older adults in the literature.

Chapter 2: Social Interventions Addressing Social Isolation and Loneliness in Community-Dwelling Older Adults: A Scoping Review

2.1 Introduction

Loneliness is the subjective emotional state of feeling isolated or alone that has been identified as a global public health concern by the World Health Organization (2021). Dramatic claims have been made that loneliness is associated with increased risk of mortality at levels comparable to smoking (Holt-Lunstad et al., 2015; Peplau & Perlman, 1982); however, there is conflicting evidence regarding the specific nature of the relationship between loneliness and mortality (Egbujie et al., 2025; Holt-Lunstad et al., 2015; Luo et al., 2012).

Beller and Wagner (2020) reported that loneliness was associated with increased risk of health measures other than mortality in 14 European countries. The association of loneliness with worsened health status is consistent across a variety of physical and mental health domains (Kojima et al., 2022; Martín-María et al., 2020; Paquet et al., 2023; Park & Zhu, 2024).

Social isolation is the objective counterpart to loneliness, often operationalized with indicators like living alone, having infrequent contact with family and friends, and lack of social group membership (Holt-Lunstad et al., 2015; Peplau & Perlman, 1982). Although they are operationally distinct, analyses by Beller and Wagner (2018) showed that social isolation and loneliness can have interactive effects, so they should both be considered in statistical models of health outcomes. Moreover, they should not be treated as interchangeable indicators of one underlying concept (Cacioppo et al., 2002; Hawkley et al., 2009; Holt-Lunstad et al., 2015; Valtorta, Kanaan, Gilbody, & Hanratty, 2016; Zhang et al., 2023). Indeed, the underlying mechanisms linking loneliness and social isolation to diverse health outcomes may differ. For example, loneliness may operate through mental health factors (e.g., depression) whereas social isolation may affect access to instrumental supports (e.g., transportation, meal preparation). On the other hand, both may affect health behaviours (e.g., personal care, preparing nutritious meals,

monitoring and responding to symptoms). Some health outcomes and behaviours can have a snowball effect; for example, loneliness can lead to alcohol consumption which may further lead to negative health outcomes, greater social isolation, and worsened feelings of loneliness (Stickley et al., 2013). While there are many plausible pathways where loneliness and social isolation can lead to adverse health outcomes, primary care providers are not always prepared for or able to respond to these social determinants of health. Consequently, partnerships with community support services are essential for supporting preventive approaches to care that addresses these issues (Brandling & House, 2009).

Social prescribing has been popularized as a term for services that connect medical and social services to respond to social factors affecting health. One Canadian organization describes social prescribing as an approach that "bridges the gap between clinical and social care by referring patients to local, non-clinical services that are chosen according to the client's interests, goals, and gifts" (Alliance for Healthier Communities). For example, this can include connecting individuals with accessible recreation programs, social groups, creative activities, or exercise groups to create social opportunities for primary care patients (Brandling & House, 2009). The Canadian Coalition for Seniors' Mental Health (2024) recommends the implementation of social prescribing as an effort to alleviate or manage social isolation and loneliness through connection of patients with community resources, further strengthening its recent rise in popularity.

A formal, internationally accepted definition of social prescribing was not evident in early studies (Kimberlee, 2015; Morse et al., 2022); however, Muhl and colleagues engaged an expert panel from 26 countries in a Delphi process to establish a common conceptual and operational definition (Muhl et al., 2023). The proposed Common Understanding of Social Prescribing defines it as

> a means for trusted individuals in clinical and community settings to identify that a person has non-medical, health-related social needs and to subsequently connect them to non-clinical supports and services within the community by co-producing a social prescription—a non-medical prescription, to improve health and well-being and to strengthen community connections (Muhl et al., 2023).

The social needs considered include issues related to housing, economic status, food security, and social support. This framework implies the presence of an "identifier" of the need who is typically situated in primary care and a community-based "connector" who makes referrals to activity programs and social services. It is also purported to include co-creation of the social prescription by the clinical and non-clinical partners in the process.

Non-medical interventions are used to address social determinants of health while enhancing community well-being, social inclusion, improving their health behaviours, and managing health conditions (Chatterjee et al., 2018; Drinkwater et al., 2019). A review by Chatterjee et al. (2018) revealed numerous benefits reported by individuals directly engaged in social prescribing, such as improvements in self-esteem, empowerment, mental and physical well-being, social connections, motivation, as well as a reduction in use of primary and secondary care services, social isolation, and loneliness. This has allowed social prescribing to become a popular method of preventing or reducing levels of both social isolation and loneliness in individuals (Husk et al., 2019).

Social prescribing with a purposeful focus on activity and social support has been reported to build resilience in individuals and communities through strengthening of mental well-being and capital (Chatterjee et al., 2018). However, the underlying mechanisms of social factors affecting health may vary between social issues, and the appropriate interventions needed to prevent adverse health outcomes may differ. Even closely related concepts like loneliness and social isolation may

require distinct preventive approaches or remedial solutions to yield beneficial health outcomes. For example, interventions for loneliness may have a greater emphasis on social engagement to support mental health, whereas those for social isolation may aim to provide health monitoring or instrumental supports. When both loneliness and social isolation are evident, the urgency and severity of the persons health needs may be greater to mitigate both physical and mental health risks (Beller & Wagner, 2018).

The popularity of the social prescribing movement has outpaced the availability of evidence about the nature, mode of delivery, duration, and intensity of specific social interventions that are effective in yielding positive health outcomes (Bickerdike et al., 2017). This scoping review summarizes evidence pertaining to specific social interventions for lonely or socially isolated older adults in the community to inform decisions and policies guiding social prescribing practices.

2.2 Materials and Methods

We conducted a scoping review following the Joanna Briggs Institute's Manual for Scoping Reviews with the following steps: identification of the research question; identification of relevant studies; study selection; data charting; and gathering, summarizing, and reporting final results (Peters et al., 2020).

2.2.1 Research Question

The purpose of this study is to assess the literature on social interventions to identify successful interventions that can be implemented in social prescribing.

This review aims to answer the following questions:

1. Within the literature, what social resources, programs, and interventions targeting loneliness or social isolation are available to community-dwelling older adults?

2. What social resources, programs, and interventions are effective in reducing loneliness or social isolation in community-dwelling older adults?

2.2.2 Identification of Relevant Studies

The comprehensive search strategy in Table 2.1 was developed in consultation with the health sciences librarian at the University of Waterloo to be used with the following databases: PubMed, Scopus, and Google Scholar. PubMed and Scopus were used to search for academic journals, while Google Scholar was used to supplement the search with a larger interdisciplinary scope, including grey literature. A variety of search terms, with synonyms and related terms, were selected to ensure the results captured the characteristics of the population, the interventions, and the outcomes of interest. Synonyms and reference lists from other reviews were also considered. Hand searches of reviews and meta-analyses found during the primary literature search were conducted to identify additional sources on social interventions that may match the inclusion criteria. All search results were imported into Covidence (Veritas Health Innovation, 2024) for screening by reviewers. Results retrieved from Google Scholar were exported using Publish or Perish (Harzing, 2007), a program that exports results from Google Scholar into Covidence for citation consolidation due to the large retrieval of potential literature. This was done to prevent reviewers from hand searching all Google Scholar search results while also maintaining a consistent screening process with the search results from PubMed and Scopus.

Table 2.1 Key Concepts and Terms

Concepts	Older Adults OR Frailty	Community-Dwelling OR Home Care	Loneliness OR Social Isolation	Intervention
Keywords	Older adults Elderly Geriatric Gerontology "Old age" Seniors Mature adult Older person Older people Older man, woman	Living at home Community-dwelling Community-based Home-based Aging in place Telehealth Home care Home nursing Home not home based	Loneliness Social isolation Social inclusion Social connectedness Social connect* Lonely Solitude Social engagement Social network? Social support?	Intervention Program Resource Trial* Treatment or therapy?

2.2.3 Study Selection

Studies were selected and screened based on their adherence to the inclusion criteria: (1) participants living in the community; (2) aged 65 years or older; (3) evaluated a social resource/program/intervention; (4) targeting loneliness or social isolation as a target outcome; and (5) using exclusively quantitative results and measures to analyze social isolation and loneliness as outcomes. Studies involving older adults with any degree of frailty or receiving home care

services were also included. International studies were included if the full article was available in English. Studies were excluded if they met any of the exclusion criteria: (1) older adults residing in care homes or assisted living of any type; (2) reported on mixed methods or qualitative results on social isolation or loneliness; (3) meta-analysis, or a scoping, systematic, or umbrella review (4) health care-based or pharmacological interventions; or (5) did not have measurable quantitative outcomes and results to report. Due to the focus on intervention effectiveness, literature with no definitive results, such as published protocols for studies not yet conducted or that are in progress, and letters to the editor, were omitted.

There were 4,111 studies evaluated by both reviewers, first by title and abstract then by full text, at each stage of the screening process to improve consistency of the results. Any conflicts were resolved through additional discussions between reviewers and reviewed by a third reviewer if no agreement could be made by the first and second reviewers.

2.2.4 Data Charting

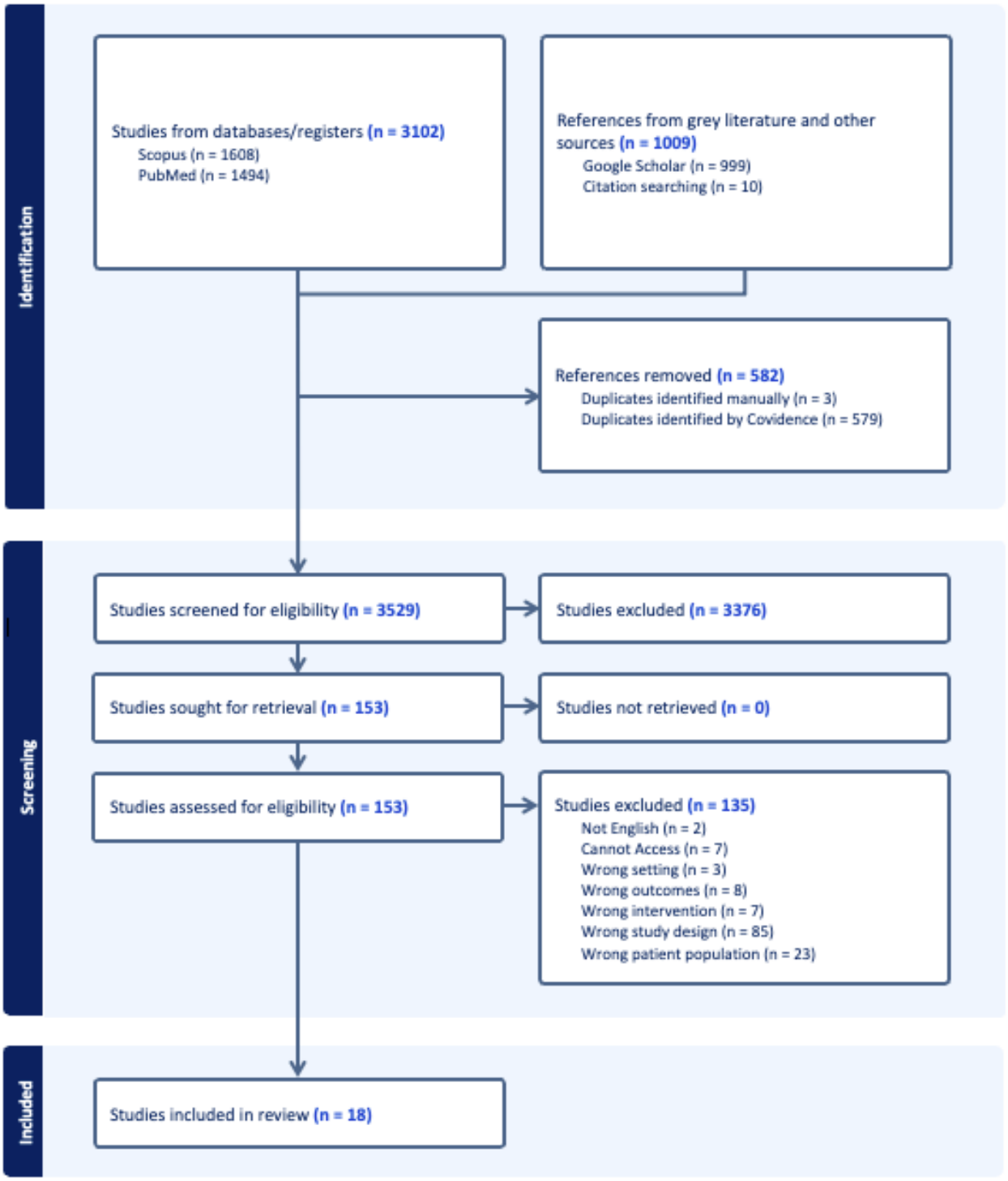
Data were extracted from the included studies using a standardized charting format developed by the author. The extracted data included author(s) and year, geographic location, study population and size, study design, outcomes of interest and outcome measures pertaining to social isolation and loneliness, intervention implemented, length of intervention, results, and study limitations. The quality of included studies was not reported as the objective was to map existing literature and interventions.

2.3 Results

Of the 4,111 studies gathered from the three sources, 582 duplicates were removed, and 3,529 studies were screened by the primary and secondary reviewer. Of the remainder, 3,376 were excluded after title and abstract review, leaving 153 to be assessed for eligibility using full-text

reviews from both reviewers. 135 studies were further excluded, leaving 18 studies for the final data extraction (Figure 2.1).

Figure 2.1 PRISMA Diagram for Study Selection

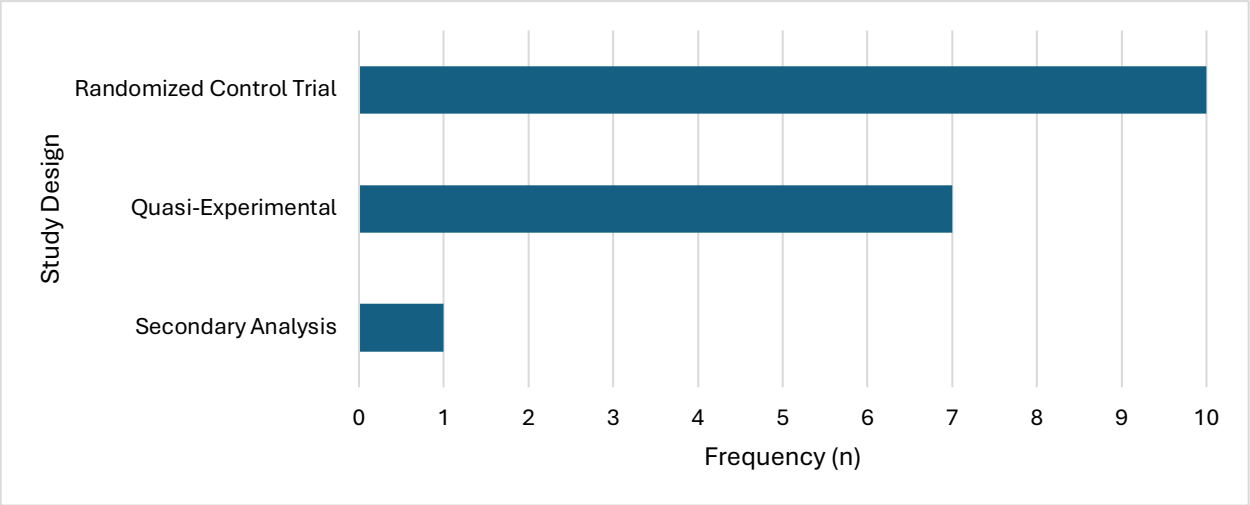


2.3.1 Study Characteristics

Most studies were randomized controlled trials (n=10, 55.6%) (Ae-Ri et al., 2023; Aydın & Kutlu, 2021; Heller et al., 1991; Hernández-Ascanio et al., 2023; Ollonqvist et al., 2008; Pynnönen et al., 2018; Rodríguez-Romero et al., 2021; Saito et al., 2012; Theeke et al., 2016; Thomas et al., 2016), followed by quasi-experimental design (n=7, 38.9%) (Chen & Tsai, 2022; Gonyea & Burnes, 2013; Honigh-de Vlaming et al., 2013; Lim, 2023; Mouriño-Ruiz et al., 2024; Nicholson & Shellman, 2013; Zhu et al., 2023). Additionally, one study involving secondary analysis of two randomized controlled trials (n=1, 5.6%) (Gustafsson et al., 2017) was included (Figure 2.2).

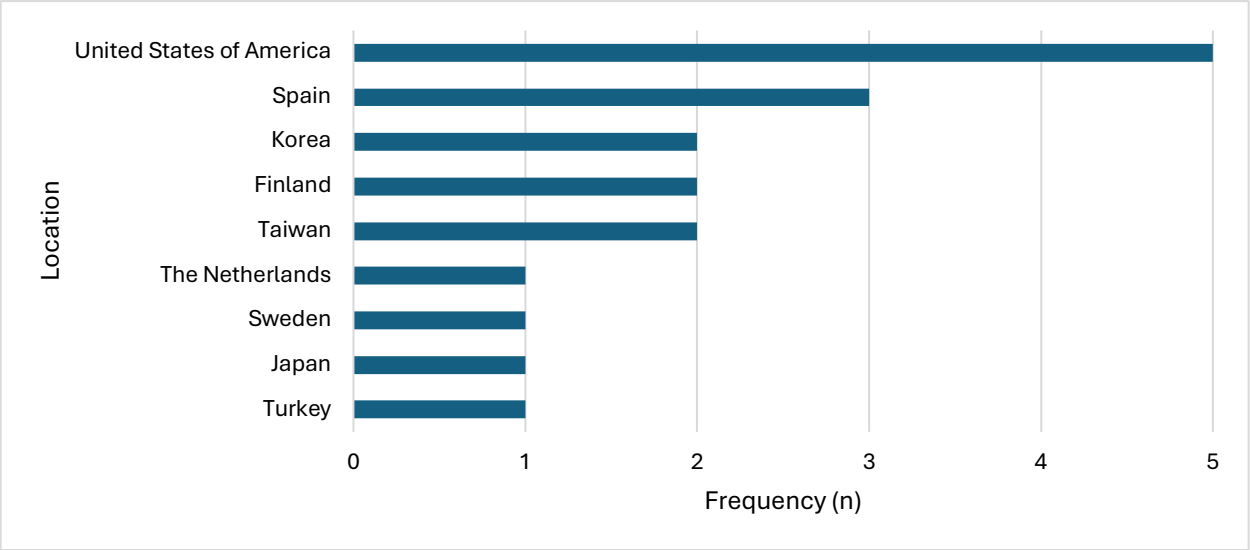
Sample sizes varied across the included studies (mean=206.5, median=80, range=831), with the smallest sample being 27 participants (Theeke et al., 2016) and the largest being 858 (Honigh-de Vlaming et al., 2013). Two studies reported on older adults receiving home care services or living with cognitive or physical frailty (Ollonqvist et al., 2008; Zhu et al., 2023), while the rest excluded individuals with impaired cognitive or physical function. Although there was no publication date limit, most included studies were not dated earlier than 2008, apart from one published in 1991 (Heller et al., 1991).

Figure 2.2 Study Designs of Included Studies



Most studies were conducted in the United States (n=5, 27.8%) (Gonyea & Burnes, 2013; Heller et al., 1991; Nicholson & Shellman, 2013; Theeke et al., 2016; Thomas et al., 2016), followed by Spain (n=3, 16.7%) (Hernández-Ascanio et al., 2023; Mouriño-Ruiz et al., 2024; Rodríguez-Romero et al., 2021) and Korea (n=2, 11.1%) (Ae-Ri et al., 2023; Lim, 2023), then Finland (n=2, 11.1%) (Ollonqvist et al., 2008; Pynnönen et al., 2018), and Taiwan (n=2, 11.1%) (Chen & Tsai, 2022; Zhu et al., 2023). The Netherlands (n=1, 5.6%) (Honigh-de Vlaming et al., 2013), Sweden (n=1, 5.6%) (Gustafsson et al., 2017), Japan (n=1, 5.6%) (Saito et al., 2012), and Turkey (n=1, 5.6%) (Aydın & Kutlu, 2021) each hold the lowest number of studies (Figure 2.3). None of the retained studies were done in Canada.

Figure 2.3 Geographic Locations of Included Studies

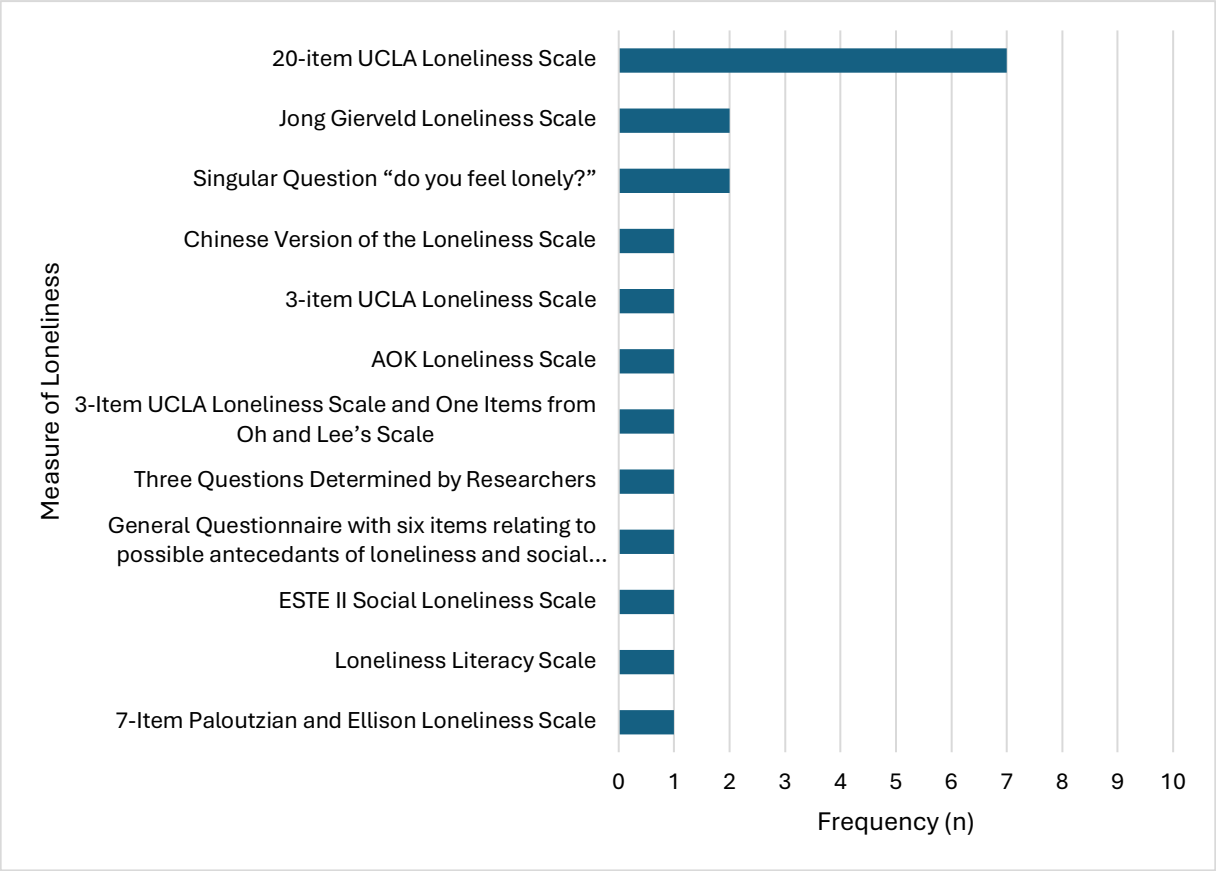


Outcomes of interest varied between studies, with seven investigating only loneliness (Ae-Ri et al., 2023; Aydın & Kutlu, 2021; Gonyea & Burnes, 2013; Lim, 2023; Mouriño-Ruiz et al., 2024; Thomas et al., 2016; Zhu et al., 2023), 11 investigating both social isolation and loneliness (Chen & Tsai, 2022; Gustafsson et al., 2017; Heller et al., 1991; Hernández-Ascanio et al., 2023; Honigh-de Vlaming et al., 2013; Nicholson & Shellman, 2013; Ollonqvist et al., 2008; Pynnönen et al., 2018; Rodríguez-Romero et al., 2021; Saito et al., 2012; Theeke et al., 2016), and none investigating social isolation without loneliness. Loneliness was measured with various scales pertaining to emotional, subjective, and perceived loneliness, as well as one measure of loneliness literacy (Figure 2.4). The most commonly used measure of loneliness was the 20-item UCLA Loneliness Scale (n=7, 38.9%) (Ae-Ri et al., 2023; Aydın & Kutlu, 2021; Chen & Tsai, 2022; Gonyea & Burnes, 2013; Lim, 2023; Rodríguez-Romero et al., 2021; Theeke et al., 2016), followed by the de Jong Gierveld Loneliness Scale (n=2, 11.1%) (Hernández-Ascanio et al., 2023; Honigh-de Vlaming et al., 2013), and a singular question of ‘do you feel lonely?’ (n=2, 11.1%) (Gustafsson et al., 2017; Pynnönen et al., 2018). The remaining loneliness measures were all

included in only one study each, with one study implementing the de Jong Gierveld Loneliness Scale to evaluate loneliness in addition to a measure of loneliness literacy (Honigh-de Vlaming et al., 2013).

Compared with measures of loneliness, there was much more variation in measures of social isolation, with each study using a different form of measurement. Additionally, social isolation was often operationalized vaguely and with differing terms such as social provision, social network, social support, or interpersonal relationships. The measures included the MOS Social Support Scale (Theeke et al., 2016), the Duke-UNC-11 Functional Social Support Questionnaire (Rodríguez-Romero et al., 2021), the Social Provisions Scale (Pynnönen et al., 2018), questions determined by the researchers regarding social network (Ollonqvist et al., 2008), general questionnaire with six items pertaining to possible antecedents of loneliness and social isolation in combination with the Lubben Social Network Scale (Nicholson & Shellman, 2013), the Social Support List Interactions (Honigh-de Vlaming et al., 2013), the Duke-UNC Functional Social Support Questionnaire (Hernández-Ascanio et al., 2023), the Perceived Social Support Scale (Heller et al., 1991), five unique questions about social support developed by the researchers (Gustafsson et al., 2017), six unique questions about social network developed by the researchers (Saito et al., 2012), the Interpersonal Relationships Scale (Chen & Tsai, 2022), and the Interpersonal Communication Scale (Chen & Tsai, 2022).

Figure 2.4 Measures of Loneliness Used in Included Studies



2.3.2 Summary of Findings

The identified studies explored a range of social interventions provided to community-dwelling older adults (Table 2.2). Each study contained a unique intervention with the intention of addressing social isolation or loneliness with four involving group meetings or lectures aimed at older adults (Gustafsson et al., 2017; Rodríguez-Romero et al., 2021; Saito et al., 2012; Theeke et al., 2016), three technology-based interventions (Ae-Ri et al., 2023; Lim, 2023; Zhu et al., 2023), two versions of the CARELINK program (Hernández-Ascanio et al., 2023; Nicholson & Shellman, 2013), two mixed interventions that combine different resources to target social isolation and loneliness (Honigh-de Vlaming et al., 2013; Ollonqvist et al., 2008), one intervention that allowed participants to choose from a selection of pre-determined activities including physical activity,

social activity, or personal counselling (Pynnönen et al., 2018), and a variety of other interventions including clay-based art therapy (Aydın & Kutlu, 2021), a board game (Chen & Tsai, 2022), a neighbourhood village model (Gonyea & Burnes, 2013), friendly phone calls (Heller et al., 1991), museum visits (Mouriño-Ruiz et al., 2024), and meal delivery (Thomas et al., 2016).

The included studies differed in their intervention designs with different time periods, implementation structures, and content (Table 2.2). Ten interventions used a group intervention (Aydın & Kutlu, 2021; Chen & Tsai, 2022; Gustafsson et al., 2017; Lim, 2023; Mouriño-Ruiz et al., 2024; Ollonqvist et al., 2008; Rodríguez-Romero et al., 2021; Saito et al., 2012; Theeke et al., 2016; Zhu et al., 2023), four used an individual intervention (Ae-Ri et al., 2023; Hernández-Ascanio et al., 2023; Nicholson & Shellman, 2013; Thomas et al., 2016), and four offered a combination or a choice of group or individual interventions (Gonyea & Burnes, 2013; Heller et al., 1991; Honigh-de Vlaming et al., 2013; Pynnönen et al., 2018). Interventions also varied with duration and frequency, with lengths ranging from four weeks (Chen & Tsai, 2022) to two years (Honigh-de Vlaming et al., 2013), and some interventions occurring as often as the participants needed (Gonyea & Burnes, 2013), up to biweekly (Nicholson & Shellman, 2013; Saito et al., 2012).

Table 2.2 Social Interventions Assessed in the Included Studies

Author(s)	Year	Sample Size	Study Design	Intervention Name	Intervention Description	Intervention Results
Ae-Ri et al.	2023	40	Single-Blinded RCT	Loneliness Alleviation Program	Information and Communications Technology-based intervention using digital technology to deliver content related to alleviating physical, psychological, and social loneliness through 20-minute YouTube videos (Ae-Ri et al., 2023)	Statistically significant decrease in loneliness
Aydin and Kutlu	2021	60	Non-Blinded RCT	N/A	Structured and semi-structured activities of clay-based group art therapy (Aydın & Kutlu, 2021)	Statistically significant decrease in loneliness
Chen and Tsai	2022	91	Quasi-experimental	“Four Themes of Life”	Board game designed to educate participants about incorporating themes of thanks, sorry, love, and farewell into their lives through group sessions with other participants, friends, or family (Chen & Tsai, 2022)	Statistically significant decrease in loneliness
Gonyea and Burnes	2013	33	Quasi-experimental	Aging Well At Home	Village model based on international ‘naturally occurring retirement communities’ including community liaison, activities in neighbours’ homes, and community forums in	No significant improvement in the outcome(s) of interest

					addition to existing resources (Gonyea & Burnes, 2013)	
Gustafsson et al.	2017	416	Secondary analysis of two RCTs	Evaluation of two programs of older adult meetings: (1) EPRZ (2) PAMC	(1) Preventative home visits and meetings for older adults (Gustafsson et al., 2017) (2) Meetings for older adults (Gustafsson et al., 2017) Group meetings discussed topics such as the process of aging, health outcomes, and problem-solving strategies for problems that may arise in their homes (Gustafsson et al., 2017)	No significant improvement in the outcome(s) of interest
Heller et al.	1991	265	RCT	Friendly Phone Calls	Friendly telephone conversations about participant's health and well-being, weekly events, and topics raised by either respondent or volunteer (Heller et al., 1991)	Statistically significant decrease in loneliness
Hernández-Ascanio et al.	2023	92	Cluster RCT	CARELINK	Informal guided relationship-building using a clinical sociology approach to stimulate social integration (Hernández-Ascanio et al., 2023)	Statistically significant decrease in social isolation
Honigh-de Vlaming et al.	2013	858	Quasi-experimental	Healthy Ageing	Intervention involving : (1) mass media campaign; (2) informational meetings; (3)	No significant improvement in the

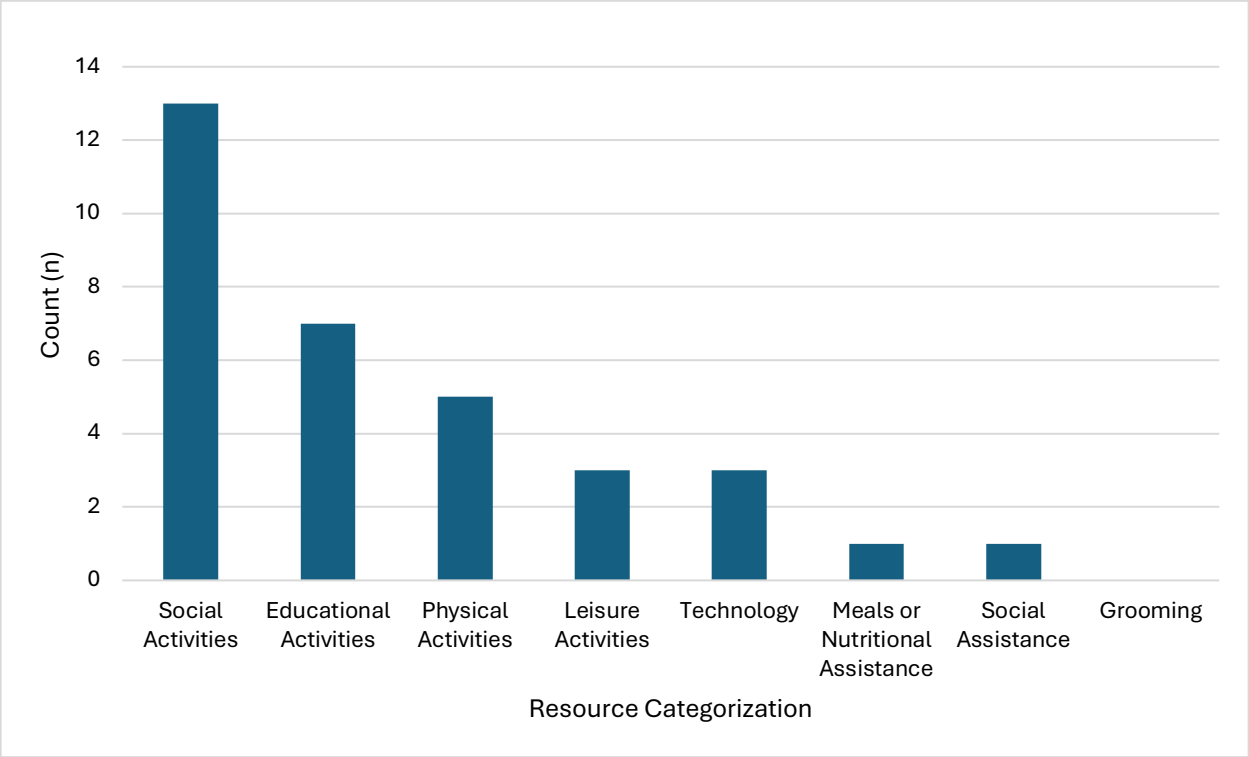
					psychosocial group courses for individuals with chronic disease or cognitive impairment; (4) social activation by the 'Neighbours Connected' program; and (5) training of volunteers, home care nurses, and municipal advisors (Honigh-de Vlaming et al., 2013)	outcome(s) of interest
Lim	2023	64	Quasi-experimental	PIO	A parrot-shaped robot that expresses emotions through a display and implements structured conversations and movements. Storytelling about hatching from an egg and growing into an adult robot while incorporating physical activity (Lim, 2023)	Statistically significant decrease in loneliness
Mouriño-Ruiz et al.	2024	138	Quasi-experimental	ArtGran	Participants engaged in a session based on visual thinking strategies led by cultural mediators at a museum with group discussions (Mouriño-Ruiz et al., 2024)	Statistically significant decrease in loneliness
Nicholson and Shellman	2013	56	Quasi-experimental	CARELINK	Nursing students paired with participants use relationship-building techniques through discussions involving reminiscence, exercise-talk, goal-oriented social engagement-directed topics,	Statistically significant decrease in social isolation

					coaching, and modelling (Nicholson & Shellman, 2013)	
Ollonqvist et al.	2008	708	Single-blinded RCT	N/A	Rehabilitation program of group activities such as physical exercise, group discussions, group lectures, and individual counselling when needed (Ollonqvist et al., 2008)	Statistically significant decrease in loneliness
Pynnönen et al.	2018	223	Single-blinded RCT	GoodMood	Participants chose between supervised exercise, social activity, or personal counselling (Pynnönen et al., 2018)	No significant improvement in the outcome(s) of interest
Rodríguez-Romero et al.	2021	55	Non-blinded RCT	N/A	Health promotion, disease prevention, and neighbourhood resource information sessions using activities to improve well-being, quality of life, create a social network, and create a common participative space (Rodríguez-Romero et al., 2021)	Statistically significant decrease in loneliness and a decrease in social isolation through increased social support
Saito et al.	2012	63	Non-blinded RCT	N/A	Creating connections between participants and community services through networking with other participants and community gatekeepers in educational, cognitive, and social support programs (Saito et al., 2012)	Statistically significant decrease in loneliness and a decrease in social isolation through increased social support

Theeke et al.	2016	27	Prospective RCT	LISTEN	Group meetings with content focussed on belonging, relationships, roles in community, loneliness as a health challenge, meaning of loneliness (Theeke et al., 2016)	Statistically significant decrease in loneliness and a decrease in social isolation through increased social support
Thomas et al.	2016	459	Three-arm fixed RCT	Meals on Wheels	Participants were provided either weekly frozen meal deliveries or daily delivery of hot meals by program staff or volunteers (Thomas et al., 2016)	Statistically significant decrease in loneliness
Zhu et al.	2023	69	Quasi-experimental	Exergaming	Participants interacted with projected images and complete activities involving upper limb movement, lower limb movement, and simulated ADLs that incorporated cognitive function-based tasks with each week having a theme relating to cultural characteristics about the participants' daily activities and festivals (Zhu et al., 2023)	No significant improvement in the outcome(s) of interest

To further comprehend the resources outlined in Table 2.2, resources were categorized to align with the 2024 Canadian Clinical Guidelines on Social Isolation and Loneliness in Older Adults (Canadian Coalition for Seniors' Mental Health, 2024). Resultantly, Figure 2.5 provides a different form of categorization in which social activities, physical activities, animal therapies and ownership, leisure skill development, leisure activities, and technology were included while psychological and pharmacological therapies were excluded (Canadian Coalition for Seniors' Mental Health, 2024). Figure 2.5 demonstrates that social activities were the most prevalent, with nearly double the value of educational activities. Further, meals and social assistance were each identified once, with no grooming services.

Figure 2.5 Categorization of Services Provided Within the Resources in Included Studies



Many studies reported a statistically significant decrease in loneliness (Ae-Ri et al., 2023; Aydın & Kutlu, 2021; Chen & Tsai, 2022; Heller et al., 1991; Lim, 2023; Mouriño-Ruiz et al., 2024; Ollonqvist et al., 2008; Rodríguez-Romero et al., 2021; Saito et al., 2012; Theeke et al., 2016; Thomas et al., 2016). Of the studies that saw a decrease in loneliness, three reported that they decreased social isolation through increased social support (Rodríguez-Romero et al., 2021; Saito et al., 2012; Theeke et al., 2016). Other studies reported only a statistically significant decrease in social isolation (Hernández-Ascanio et al., 2023; Nicholson & Shellman, 2013), or no significant improvement in the intervention group's outcome(s) of interest whether it was loneliness, social isolation, or both (Gonyea & Burnes, 2013; Gustafsson et al., 2017; Honigh-de Vlaming et al., 2013; Pynnönen et al., 2018; Zhu et al., 2023). One study reported a decrease in social isolation at data collection time points during intervention implementation, but not at the end of the follow-up period (Hernández-Ascanio et al., 2023).

Despite the variety of interventions and number of positive outcomes, the included studies had a variety of limitations. The most common problems were small sample size (Ae-Ri et al., 2023; Hernández-Ascanio et al., 2023; Mouriño-Ruiz et al., 2024; Nicholson & Shellman, 2013; Saito et al., 2012; Theeke et al., 2016; Zhu et al., 2023) and lack of generalizability (Ae-Ri et al., 2023; Aydın & Kutlu, 2021; Chen & Tsai, 2022; Gonyea & Burnes, 2013; Nicholson & Shellman, 2013; Ollonqvist et al., 2008; Saito et al., 2012; Theeke et al., 2016; Thomas et al., 2016); skewed results due to drop-out rates, attrition, or familiarity and excitement pertaining to the intervention (Honigh-de Vlaming et al., 2013; Thomas et al., 2016); and self-reported data (Ae-Ri et al., 2023; Aydın & Kutlu, 2021; Thomas et al., 2016) or subjective measurements for outcomes of interest (Mouriño-Ruiz et al., 2024; Ollonqvist et al., 2008; Thomas et al., 2016) which may have limited the reliability of the studies by introducing biases and narrowing the scope.

Other limitations arose from study designs such as short duration (Gonyea & Burnes, 2013; Honigh-de Vlaming et al., 2013; Zhu et al., 2023), lack of control group (Gonyea & Burnes, 2013), lack of randomization (Honigh-de Vlaming et al., 2013), inaccuracies in group blinding or no blinding (Ae-Ri et al., 2023; Nicholson & Shellman, 2013; Saito et al., 2012; Zhu et al., 2023), and lack of specificity of exclusion criteria (Chen & Tsai, 2022; Rodríguez-Romero et al., 2021). Further, sampling methods (Mouriño-Ruiz et al., 2024; Nicholson & Shellman, 2013; Saito et al., 2012), data collection methods (Thomas et al., 2016) such as the lack of sensitivity in outcome measures or predictor variables (Heller et al., 1991), lack of follow-up measurements (Lim, 2023), no question directly measuring an outcome such as social loneliness (Thomas et al., 2016), measurement of an outcome using one question (Pynnönen et al., 2018; Thomas et al., 2016), and lack of screening for potential confounders (Theeke et al., 2016; Zhu et al., 2023) were listed as limitations potentially affecting generalizability of results. Study generalizability was also limited by being conducted during COVID-19 (Lim, 2023), experiencing difficulty in recruiting lonely participants for group activities (Rodríguez-Romero et al., 2021), study design not accounting for unknown or untested baseline differences (Nicholson & Shellman, 2013), differences between intervention groups (Gustafsson et al., 2017; Thomas et al., 2016), unadjusted baseline differences (Gustafsson et al., 2017), and undetermined effects on groups of varying baseline characteristics (Heller et al., 1991; Hernández-Ascanio et al., 2023).

Studies also saw limitations due to intervention design (Hernández-Ascanio et al., 2023; Ollonqvist et al., 2008; Zhu et al., 2023) such as insufficient intervention strength or the wrong intervention for the chosen population (Heller et al., 1991). Cultural differences (Hernández-Ascanio et al., 2023), variations in participation (Rodríguez-Romero et al., 2021), and performance

under observation leading to the Hawthorne effect (Hernández-Ascanio et al., 2023; Pynnönen et al., 2018; Zhu et al., 2023) contributed as well.

It is also noted that some studies did not measure the effects of their interventions on outcomes past the intervention end-date (Ae-Ri et al., 2023; Aydın & Kutlu, 2021; Chen & Tsai, 2022; Mouriño-Ruiz et al., 2024; Rodríguez-Romero et al., 2021). Thus, it is difficult to infer if the results were long-term or diminished after the study period had concluded. Further, without knowing if the participants continued with the intervention implemented in each study, it is difficult to assess attrition and long-term results. The limitations arising from study design and data collection prevent proper analysis of the trajectories of loneliness and social isolation, particularly if the study does not take measurements past the intervention end-date (National Academies of Sciences, 2020).

2.4 Discussion

This scoping review identified 18 studies evaluating the effectiveness of social interventions on social isolation and/or loneliness in community-dwelling older adults. The studies included considered a variety of measurement tools for outcomes, including both subjective and objective measures of loneliness with both self-report and non-self-report data. Studies that used measurement tools with more questions were able to complete comparatively more detailed assessments of loneliness in their participants than studies using shorter instruments or a single question to determine levels of loneliness despite all measures preceding a summary score within their respective studies. Further, social isolation is measured less consistently than loneliness in that there is no standardized measurement instrument nor consistency in terminology. This makes it difficult to compare results between studies as loneliness and social isolation are both defined and measured inconsistently.

Social isolation was measured with terms such as interpersonal communication, interpersonal relationships, social support, functional social support, and dimension of perceived togetherness. A lack of standardized definition of social isolation has created confusion in literature where it is often referred to using various terms, further complicating the interpretation of results within studies and their comparisons. No studies evaluated social isolation without loneliness; however, seven studies evaluated loneliness without social isolation (Ae-Ri et al., 2023; Aydın & Kutlu, 2021; Gonyea & Burnes, 2013; Lim, 2023; Mouriño-Ruiz et al., 2024; Thomas et al., 2016; Zhu et al., 2023) and the other 11 investigating both social isolation and loneliness (Chen & Tsai, 2022; Gustafsson et al., 2017; Heller et al., 1991; Hernández-Ascanio et al., 2023; Honigh-de Vlaming et al., 2013; Nicholson & Shellman, 2013; Ollonqvist et al., 2008; Pynnönen et al., 2018; Rodríguez-Romero et al., 2021; Saito et al., 2012; Theeke et al., 2016).

Statistically significant reductions in levels of loneliness were reported in more than half the studies (Ae-Ri et al., 2023; Aydın & Kutlu, 2021; Chen & Tsai, 2022; Heller et al., 1991; Lim, 2023; Mouriño-Ruiz et al., 2024; Ollonqvist et al., 2008; Rodríguez-Romero et al., 2021; Saito et al., 2012; Theeke et al., 2016; Thomas et al., 2016). This suggests that loneliness is addressable and modifiable using social interventions. However, similar conclusions were could not be drawn regarding social isolation despite the research focus and aims of each study. Additionally, due to the different definitions and measurements of loneliness and social isolation, it may be deduced that they require different interventions to address them individually or in unison. These inconsistencies indicate a lack of a high-quality standard in measurement, presenting challenges in social interventions research and implementation through increased difficulty in identification and interpretation of studies and their results. This is consistent with other reviews as the lack of a standardized measurement tool and terminology for loneliness and social isolation has been

pervasive in the research and clinical communities (Canadian Coalition for Seniors' Mental Health, 2024; National Academies of Sciences, 2020; Valtorta et al., 2016).

Although reported as a limitation, loneliness is an inherently subjective concept and a primary outcome of interest for all studies reporting this (Mouriño-Ruiz et al., 2024; Ollonqvist et al., 2008; Thomas et al., 2016). However, this inaccurately outlines a limitation for these studies, rather indicating the need for an objective measurement to counteract the subjective nature of the results. A consistent definition and standardized measurement tool of social isolation to provide the objective side of loneliness would strengthen these studies while simultaneously eliminating this limitation.

The results observed from this scoping review indicate that loneliness and social isolation cannot be reduced in a time-limited manner but rather require ongoing maintenance, assessment, and regular intervention. Assessing participants should continue after the intervention implementation period has concluded, to evaluate the long-term effects on loneliness and social isolation with continued participation. Further, evaluation studies may be required to assess the efficacy and effectiveness of each intervention and its characteristics such as duration, location, frequency, and group size to determine the best method of social prescribing within each context. Comprehensive and in-depth assessments of interventions would allow for further analyses and comparisons that may provide insights on why all but seven of the included studies observed decreases in loneliness and/or social isolation, and how that may impact social prescribing implementation moving forward.

The included studies varied notably in their characteristics such as locations, time, and sample size. Thus, it is difficult to yield direct comparisons and conclude which specific form of social intervention offers the most promising results that can be further implemented as a social

prescribing initiative. Half of the mixed interventions observed no decrease in loneliness (Honigh-de Vlaming et al., 2013), suggesting that the combination of various forms of social prescribing at once may not be as effective as a singular intervention at a time. Mixed interventions may be overwhelming for participants, especially if going from no programming to extensive programming all at once. Interventions are most likely effective if they are broad and offer activities that most individuals enjoy. The majority of interventions that saw a statistically significant decrease in loneliness and social isolation were variations of socialization, including networking and group meetings (Aydın & Kutlu, 2021; Chen & Tsai, 2022; Heller et al., 1991; Hernández-Ascanio et al., 2023; Mouriño-Ruiz et al., 2024; Nicholson & Shellman, 2013; Ollonqvist et al., 2008; Saito et al., 2012; Theeke et al., 2016). It is postulated that this is due to direct targeting of social isolation and loneliness using socialization techniques that incorporate exposure to pre-existing programs that may appeal to the participants. These may also be effective if tailored to an individual's interests, such as art or history, demonstrating secondary effects on loneliness and social isolation as they are not directly targeted at their reduction. Interventions utilizing group meetings or conversing with others in their community may also be beneficial in exposing older adults to established programs that cater to their interests.

Some modern programs that involve technology-based interventions have recently been introduced to target loneliness and social isolation through the replacement of human interaction. Two of the three programs technology-based programs included in this study saw a statistically significant decrease in loneliness (Ae-Ri et al., 2023; Gonyea & Burnes, 2013) while one saw no statistically significant change in outcomes of interest (Zhu et al., 2023). Future studies should more directly test such interventions compared with, or in combination with, human

companionship before inferences are made about their potential replacement for human connection.

While each study evaluated an intervention, only one study aimed to evaluate multiple interventions at once using consistent instruments (Gustafsson et al., 2017). Future research would benefit from exploration of comparative studies that provide insight on the most effective social prescribing interventions within a selection or target population. Additionally, studies must focus on improving consistency in terms and outcome measures for loneliness and social isolation by establishing a reliable and consistent measurement for each.

To our knowledge, this scoping review is one of the first to evaluate quantitative studies pertaining to social interventions for community-dwelling older adults. We have thoroughly searched for complete publications with no year limitation; however, it is possible that some studies were missed due to alterations in search criteria after the initial screening. The initial screening criteria involved only older adults receiving home care services or older adults that were living with frailty. This yielded too few results to complete a proper scoping review, so the criteria were expanded to include studies pertaining to community-dwelling older adults while excluding any care homes or assisted living facilities. Despite this, the studies that were included demonstrate consistently positive results in the effectiveness of targeting loneliness and social isolation in community-dwelling older adults. Many of the studies did not evaluate or report on long-term effects, thus, it is difficult to determine the true effectiveness beyond the scope of active participation. Therefore, we cannot conclude any lasting effects; however, the use of social interventions presents promising short-term outcomes in loneliness and social isolation levels experienced in community-dwelling older adults that may be implemented as social prescribing interventions.

Despite the strengths of this review, some limitations exist as well. Primarily, we included only studies available in English and that were completely available to us. This may have excluded studies conducted internationally that have not yet been translated or published on domains we cannot access, potentially omitting significant findings from our search. Second, the exclusion criteria for individuals aged less than 65 excluded studies with social resources that may have proven beneficial to the population of interest as older adults may have a different definition internationally or in especially vulnerable communities. Finally, this study included only papers reporting exclusively quantitative results, excluding any qualitative findings. This exclusion may have hindered our search by narrowing the scope of this review and eliminating potential social resources and noteworthy findings.

2.5 Conclusion

Evidence about the health effects of social isolation and loneliness among older adults raises questions about the prescribing of social interventions to alleviate those concerns. However, the widespread interest in prescribing social interventions is not matched by consistent empirical evidence in support of its implementation. In order to provide best practices moving forward, terminology and measures need to be standardized. The current evidence provides only an ambiguous foundation to specification of interventions likely to succeed in reducing social isolation and loneliness in community-dwelling older adults.

Chapter 3: Creation and Validation of an Index of Social Isolation within the interRAI Home Care Assessment

3.1 Background

Social isolation describes the lack of a sense of social belonging and engagement, social contacts, and fulfilling and high-quality relationships (Nicholson, 2009). Isolation is associated with loneliness, depressive symptoms, heart conditions including coronary heart disease and stroke, and chronic disease like type two diabetes (Christiansen et al., 2020; Valtorta et al., 2016; Zhang et al., 2023). Although often intertwined in research, loneliness differs conceptually as it is the subjective emotional state of feeling isolated or alone (Holt-Lunstad et al., 2015; Peplau & Perlman, 1982). Both loneliness and social isolation are associated with higher likelihood of mortality and have been connected to negative health behaviours, such as poor sleep and physical inactivity (Cacioppo et al., 2002; Hawkley et al., 2009; Holt-Lunstad et al., 2015). Despite this evidence, few papers examine social isolation as an independent concept of loneliness, and most use inconsistent or unreliable measurement tools to assess social isolation (Beller & Wagner, 2018).

Older adults may be especially vulnerable to social isolation with approximately 26% of community-dwelling older adults globally being identified as socially isolated (Teo et al., 2023). This population faces the risk of loneliness and lack of access to social supports as a result of age-related changes such as bereavement, divorce, and retirement more frequently than their younger counterparts (Schafer et al., 2021). Home care recipients are a sub-category of older adults that can be exceptionally vulnerable to loneliness and other isolation-related outcomes because of advanced age resulting in loss of important family/friendship ties (e.g., widowhood) and complex medical, cognitive, functional, or mobility impairments that constrain family and community engagement (Canadian Home Care Association, 2003; Luggen & Rini, 1995). Health complications such as cognitive decline, sensory impairment, falls, and disability may resultantly

lead to declining social activity, further perpetuating declines in health (Clegg et al., 2013; Filderman et al., 2024; Kojima et al., 2022; Manis et al., 2020; McArthur et al., 2022; Ong et al., 2015).

The coronavirus pandemic has been reported to have played a major role in the exacerbation of social isolation, especially in older adults (Hwang et al., 2020). Social withdrawal and decline were particularly heightened among persons with dementia, those living alone, and the oldest-old home care clients (McArthur et al., 2022). Social isolation has been operationalized in many ways. However, the lack of a common standardized measure of social isolation has limited the ability to examine associated health behaviours and their outcomes during or outside of the pandemic period, as determined by the scoping review conducted in Chapter 2.

The interRAI suite of comprehensive assessment instruments provides compatible measures to comprise an integrated health information system to be used in home care settings and across the continuum of care (Fries et al., 2026; Gray et al., 2009; Hirdes, Ljunggren, et al., 2008). These assessments provide high-quality, valid and reliable data spanning diverse care settings and populations (Foebel et al., 2013; Hirdes, Ljunggren, et al., 2008; Hogeveen et al., 2017; Kim et al., 2015; Landi et al., 2000).

The interRAI suite of assessments contains a broad range of variables that are linkable throughout different care settings; however, none have been used to date to formalize a standard measure of objective social isolation. The aim of this study is to develop a new interRAI measure for objective social isolation that draws on the available literature for candidate items and validates that measure against a subjective measure of loneliness as an outcome variable. Our focus is on development of an index for the interRAI Home Care assessment (interRAI HC); however, this index could also be employed as a common measure in other interRAI assessments that include

the validated social isolation item set. For settings using interRAI assessments, this provides a consistent operational definition and measure of social isolation which can be used to identify cross-sectional differences and longitudinal changes in social isolation.

3.2 Methods

3.2.1 Data Source

Populations of Ontario home care clients assessed with the interRAI HC were examined at three unique time periods. The first period spans September 1, 2018 to December 31, 2019 to represent the pre-COVID-19 period, the second period is January 1, 2020 to December 31, 2022 to capture the COVID-19 time period data, and the final period is January 1, 2023 to December 31, 2024 to capture the post-COVID-19 assessments when public health restrictions were reduced. This study consists of three cross-sectional analyses of these populations to develop, test, refine, and validate a new measure of social isolation for the interRAI suite of assessments. In addition, the measure is applied longitudinally to demonstrate seasonal variations in social isolation. The University of Waterloo's Office of Research Ethics (#30173) provided ethics approval for the study.

The interRAI HC is used in routine practice to accumulate information on home care patients expected to receive services for more than two months (McArthur et al., 2022). This assessment is first conducted within seven days of the individual being categorized as eligible for long-term home care services (Canadian Institute for Health Information, 2025). Assessments are then completed every six to twelve months following the initial intake assessment, or earlier if prompted by a noteworthy change in health status (McArthur et al., 2022). The person-centered information collected within this comprehensive assessment pertains to categories such as

cognition, mood, activities of daily living, falls, behaviour, and a range of health diagnoses, symptoms, and behaviours (Hirdes, Ljunggren, et al., 2008).

3.2.2 Inclusion and Exclusion Criteria

Individuals were included in the sample if they met the following inclusion criteria: (1) aged 18 years or older; (2) receiving long-stay home care services within Ontario; and (3) living in community settings. Individuals were excluded if they were assessed in congregate settings, including hospitals, or had a cognitive performance scale score greater than three at any time. These exclusion criteria were implemented to avoid mediating effects from living situations and exclude any confounding effects of moderate to severe cognitive impairment. Given that loneliness is an inherently subjective experience, the restriction to moderate or less cognitive impairment was needed for validation purpose in which loneliness was used as a reference value (Morris et al., 2018; Morris et al., 1994). However, the proposed index could certainly be used in the future to measure objective isolation among those with more severe impairment as it is intended to track changes in status rather than provide clinical diagnoses. The first assessment of each unique individual within each of the three pre-determined time periods was used in these analyses.

3.2.3 Statistical Analysis – Index Construction

The index was constructed using the pre-COVID-19 period with a list of potential indicators within the interRAI HC assessment in reference to significant predictors and indicators within the literature (Table 3.1) (Adams et al., 1989; Bu, Steptoe, et al., 2020; Cheung et al., 2019; Cornwell & Waite, 2009; De Koning et al., 2017; Fiori et al., 2006; Havens et al., 2004; Keefe et al., 2006; Kobayashi et al., 2009; Lee et al., 2019; Nicholson, 2009; Ochwat, 2022; Paúl & Ribeiro, 2009; Shiovitz-Ezra & Leitsch, 2010; Sinha & Bleakney, 2014; Theeke, 2010; Visser & El Fakiri, 2016; Wister & McPherson, 2014). Further, conceptual domains from the Lubben Social Network

Scale, Berkman-Syme Social Network Index, and Cohen Social Network Index that could be measured in the interRAI HC were also considered (Berkman & Syme, 1979; Cohen et al., 1997; Lubben, 1988).

Table 3.1 Potential Indicators, Use in Other Measures of Social Isolation, and Corresponding interRAI HC Variables Used as Final Isolation Scale Items

interRAI HC Items Considered for Index of Social Isolation	Indicator of Isolation	Isolation Scale Use
Marital status	Single	Cohen Social Network Index
Living arrangement	Lives alone	Cohen Social Network Index
Participation in activities of interest	Withdrawal from activities of interest	Lubben Social Network Scale Berkman-Syme Social Network Index
Levels of social interaction	Reduced social interaction	Lubben Social Network Scale
Participation in social activities of long-standing interest	Participated in social activities of long-standing interest never or more than 30 days ago	Lubben Social Network Scale Berkman-Syme Social Network Index
Visit with long-standing social relation or family member	Visit with long-standing social relation or family member never or more than 30 days ago	Lubben Social Network Scale Cohen Social Network Index
Other interaction with long-standing social relation or family member	Other interaction with long-standing social relation or family member never or more than 30 days ago	Lubben Social Network Scale Cohen Social Network Index
Change in social activities in the last 90 days	Decline in social activities in the last 90 days	Berkman-Syme Social Network Index
Length of time alone during the day	Alone for eight or more hours in the day	N/A
Days of informal care in the last seven days	Less than four days (non-lonely cut point) of informal care within the last seven days	Berkman-Syme Social Network Index
Presence of first informal helper	No first informal helper	Berkman-Syme Social Network Index
Presence of second informal helper	No second informal helper	Berkman-Syme Social Network Index
Hours of informal care in the last three days	Less than nine hours (non-lonely cut point) of informal care within the last three days	Berkman-Syme Social Network Index
Relationship with family	Unsupportive family	Lubben Social Network Scale Berkman-Syme Social Network Index
Participation in social activities of long-standing interest and visits with long-standing social relation or family member	No participation and no visits ever or in the last 30 days	Lubben Social Network Scale

All variables were formatted into binary variables through the collapsing of categorical variables and creation of cut points for continuous variables determined using the median value for non-lonely individuals. This cut point was then used to create a binary variable which was used to then produce a summative index in which higher scores indicate higher levels of social isolation.

Crude odds ratios were used to explore the independent relationships between the preliminary variables (Table 3.1) and loneliness in the pre-COVID-19 period to generate chi-square statistics and the associated p-values using bivariate analyses. Chi-square statistics with a p-value less than 0.05 and confidence interval not including 1.0 were considered significant. To ensure meaningful contribution and exclude measures with weak effects, variables with insignificant odds ratios or values within 0.83 to 1.2 were eliminated from the final index (Supplementary Table A). The remaining variables were used to create four summative index variants after assessing for collinearity, index complexity, and computing compatibility with interRAI assessments, Collaborative Action Plans (CAPs), and scales. Logistic regression was then used to determine the ability of each index variant to predict loneliness. A Receiver Operating Characteristic (ROC) curve analysis was then used to determine an appropriate cut-point (Unal, 2017). All statistical analyses conducted were secondary analyses of interRAI HC assessments using SAS Studio (SAS Institute, 2023).

3.2.4 Statistical Analysis – Validity

To assess validity of the Index of Social Isolation, we used interRAI HC data to determine presence of loneliness as an indicator of convergent validity. While loneliness and social isolation are two distinct concepts that do not always align perfectly, they are inter-related in a way that makes assessment of their association a good test of convergence validity (Singer, 2018; Zhu et al., 2025).

The new Index of Social Isolation derived from the pre-COVID-19 period was then tested in the COVID-19 and post-COVID-19 periods to provide independent replications of the index using more recent data. These validations include ROC curve analyses for the different time periods, odds ratios for single point increments, and c-statistics compared to those of pre-COVID-19 to demonstrate COVID-19 variations in social isolation. Finally, quarterly social isolation prevalences from September 1, 2018 to December 31, 2024 were used to assess seasonal variations.

3.3 Results

The three periods involved 796, 655 assessments, the majority of which were done with persons aged 80 years or older (Table 3.2). The three periods had similar distributions of sex, loneliness, marital status, and cognitive performance, presenting a representative sample of Ontario home care populations that is consistent in age and sex distributions with Canadian home care recipients (Sinha & Bleakney, 2014). These differences were statistically significant due the large sample sizes; however, the absolute differences were not substantial over time. Loneliness, advanced age, and moderate cognitive impairment showed modest trends of increasing over the three time periods.

Table 3.2 Demographic Characteristics of Ontario Home Care Clients by Pandemic Period

Sample Characteristics	**N (%)**			**Chi-Square**
	Pre-COVID-19 (n=219,646)	**COVID-19 (n=300,393)**	**Post-COVID-19 (n=276,616)**	
Age				< 0.0001
18 – 29	0.7 (1569)	0.6 (1777)	0.6 (1695)	
30 – 39	1.0 (2159)	0.9 (2814)	1.0 (2752)	
40 – 49	2.0 (4448)	1.9 (5545)	1.9 (5132)	
50 – 59	5.7 (12,451)	5.3 (15,780)	4.7 (12,885)	
60 – 69	11.9 (26,189)	12.1 (36,306)	11.9 (32,947)	
70 – 79	22.7 (49,816)	23.8 (71,436)	24.5 (67,696)	
80+	56.0 (123,014)	55.5 (166,735)	55.5 (153,509)	
Sex				< 0.0001
Female	62.3 (136,790)	61.0 (183,265)	61.1 (169,096)	
Not Female	37.7 (82,856)	39.0 (117,128)	38.9 (107,520)	
Loneliness Status				< 0.0001
Yes Lonely	20.0 (43,961)	22.2 (66,532)	23.3 (64,447)	
Not Lonely	80.0 (175,685)	77.9 (233,861)	76.7 (212,169)	
Marital Status				< 0.0001
Single	61.8 (135,658)	60.7 (182,432)	61.3 (169,469)	
Married/Partner	38.2 (83,988)	39.3 (117,961)	38.7 (107,147)	
Cognitive Performance Scale				< 0.0001
0	22.5 (49,506)	21.8 (65,599)	21.0 (58,072)	
1-2	66.5 (146,086)	65.9 (197,926)	66.4 (183,533)	
3	11.0 (24,054)	12.3 (36,868)	12.7 (35.011)	

Using the indicators of social isolation identified in Table 3.1, four index variants were created with unique combinations of potential items considered for the Index of Social Isolation.

1) The original variant considered marital status, living arrangement, participation in activities of interest, levels of social interaction, participation in social activities of long-standing interest, visits with long-standing social relation or family member, change in social activities in the last 90 days, length of time alone during the day,

relationship with family, presence of first and second informal helpers, and hours of informal care in the last three days.

2) The second variant contained marital status, living arrangement, participation in activities of interest, levels of social interaction, length of time alone during the day, change in social activities in the last 90 days, relationship with family, presence of first informal helper, and a combination of participation in social activities of long-standing interest and visits with long-standing social relation or family member.
3) The third variant contained marital status, living arrangement, participation in activities of interest, levels of social interaction, length of time alone during the day, change in social activities in the last 90 days, relationship with family, and presence of first informal helper.
4) The fourth variant contained marital status, living arrangement, length of time alone during the day, change in social activities in the last 90 days, relationship with family, and presence of first informal helper.

Table 3.3 demonstrates the four scale variants created from previously established predictors, showing that each variant had comparable c-statistics. Variant four was chosen in order to ensure the greatest interoperability across different interRAI assessments, lowest complexity, and maintenance of a c-statistic near 0.69 (Table 3.3), as determined by Ochwat (2022). Cronbach's alpha values were not calculated due to the heterogenous constructs of the index as not all test items measure the same latent trait. Rather, this measure can be considered to be an index measuring the count of events or attributes related to isolation rather than a scale measuring intensity of a concept (Tavakol & Dennick, 2011).

Table 3.3 Strength of Association of Index Variants with Loneliness Among Ontario Home Care Clients in the Pre-COVID-19 Period (n=219,646)

Index Variant	**Number of Included Variables**	**C-Statistic with Loneliness**
1	12	0.688
2	9	0.696
3	8	0.698
4	6	0.680

Table 3.4 demonstrates the unadjusted odds ratios and 95% confidence limits between the Index of Social Isolation and a positive identification of loneliness during the three time periods of interest. For all time periods, the odds ratio of loneliness being present increased by 1.58-1.61 for every one-point increment of the Index of Social Isolation (ISI). Additionally, the c-statistic remained relatively consistent, ranging from 0.68 to 0.69 between the three time periods.

Table 3.4 Unadjusted Odds Ratios (95% CI) for Loneliness Among Ontario Home Care Clients by Single Point Increments of Index of Social Isolation Variant Four in Three Time Periods

	Pre-COVID-19 (n=219,646)	**COVID-19 (n=300,393)**	**Post-COVID-19 (n=276,616)**
Crude Odds Ratio (95% CI)	1.58 (1.57, 1.59)	1.61 (1.60, 1.62)	1.60 (1.59, 1.61)
C-Statistic	0.68	0.69	0.69

Figure 3.1 and Table 3.5 demonstrate the optimal cut points for the index of social isolation using ROC curve analysis during the pre-COVID-19 period. Previous analyses on the pre-COVID-19 data by Ochwat (2022) recommended 2 as the optimal cut point for this index of social isolation. The Youden Index is a preferred measure because it balances sensitivity and specificity. Based on

that Youden value (Table 3.5) and the ROC curve analysis presented in Figure 1, a cut point of 2 was determined to be optimal.

When comparing the three time periods' odds ratios and c-statistics for one-point increments in the index, each increment had comparable odds ratios and c-statistics associated with the presence of loneliness. Using loneliness as an indicator for the optimal cut point, an alternative value could be 3 or higher. However, a cut point of 2 allows for a somewhat more sensitive threshold for action. Therefore, individuals scoring a 2 or higher on the Index of Social Isolation are categorized as socially isolated, while those scoring less than 2 are not.

Figure 3.1 ROC Curve Analyses for the Associations of the Index of Social Isolation and Loneliness Among Ontario Home Care Clients in Three Time Periods

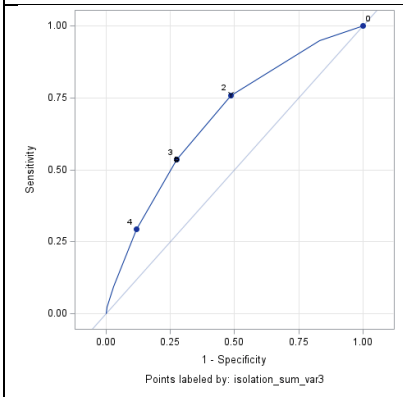
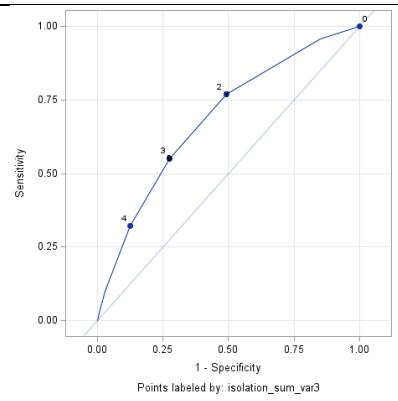
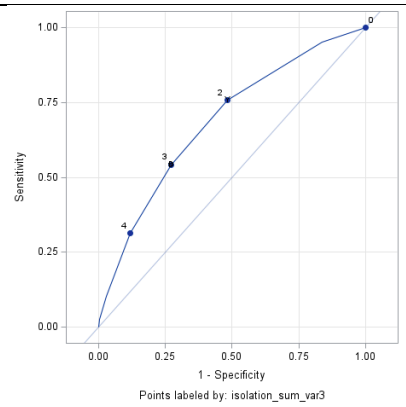
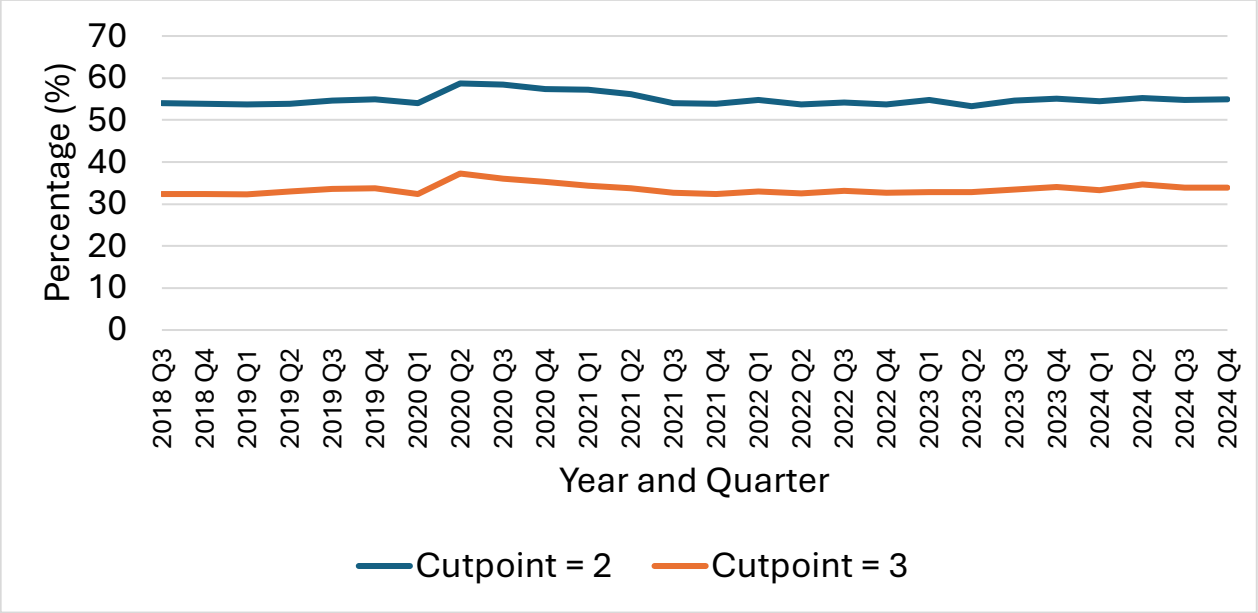
Pre-COVID-19 (n=219,646)	**COVID-19 (n=300,393)**	**Post-COVID-19 (n=276,616)**
		

Table 3.5 Optimal Cut Points Using ROC Curve Analysis for the Associations of the Index of Social Isolation and Loneliness Among Ontario Home Care Clients (Figure 3.1)

Criterion	Cut Point	Label	Value
Pre-COVID-19 (n=219,646)			
Distance to 0,1	0.26657	3	0.53996
Sensitivity-Specificity	0.26657	3	0.18870
Youden	0.18721	2	0.272421
COVID-19 (n=300,393)			
Distance to 0,1	0.29034	3	0.52646
Sensitivity-Specificity	0.29034	3	0.17318
Youden	0.20308	2	0.27624
Post-COVID-19 (n=276,616)			
Distance to 0,1	0.30692	3	0.53240
Sensitivity-Specificity	0.30692	3	0.18465
Youden	0.21642	2	0.27521

Finally, Figure 3.2 shows the temporal variation in social isolation over the three time periods. While there may be modest seasonal variations, the rates of social isolation tended to remain steady around 55% over the six-year timeframe. However, there is a notable spike to 60% occurred during the second quarter of 2020, which corresponds to the onset of the COVID-19 pandemic in Ontario. Lockdowns and quarantine interventions were enacted following the March 23 declaration of a state of emergency (Canadian Institute for Health Information, 2022).

Figure 3.2 Rates of Social Isolation Among Ontario Home Care Clients Across All Periods Using Cut Points of 2 and 3, by Calendar Quarter



3.4 Discussion

Nicholson (2009) suggested that the number of one's contacts, feelings of belonging, fulfilling relationships, engagement with others and quality of network members should be used to measure social isolation. The findings of this study support this notion. The new Index of Social Isolation for interRAI Home Care was created using variables of this type, with focus placed on objective variables. Of the fourteen original predictors considered, the final six items retained were: single, lives alone, experienced a change in social activities in the last 90 days, spends eight or more hours in the day alone, has an unsupportive friend and family network, and does not have a primary informal caregiver (Table 3.1). This makes up a list of objective measures to supplement the subjective measure of loneliness as all items included in the Index of Social Isolation can be determined without the addition or acknowledgement of the feelings attached to each objective state. A parsimonious index was chosen to allow maximal interoperability across different interRAI assessments (e.g., for community mental health, palliative care, community support

services) (Mofina et al., 2026). The Index of Social Isolation developed and tested in this study incorporates key concepts included in other measurement tools but established a standard that can be used with the interRAI suite of assessments. In countries like Canada, where interRAI systems are used on almost a national basis, this provides an opportunity to have real time, standardized, valid and actionable measures of social isolation as interRAI assessments are completed in routine clinical practice.

Our results provide reasonable validity for use as a standard for adults within the interRAI HC assessment using three time periods to demonstrate consistency. Reliability of interRAI HC assessments have been established elsewhere, and the current results demonstrate evidence of convergent validity (Hirdes, Ljunggren, et al., 2008; Hogeveen et al., 2017; Kim et al., 2015). Currently, this index can be used on any individual over 18 with a complete interRAI HC assessment and used cautiously in individuals with cognitive impairment. Figure 3.4 presents the variation in social isolation among Ontario adults from September 2018 to December 2024. The observed variations in social isolation levels pre-, during, and post-COVID-19 demonstrate the index's sensitivity to contextual variables and external events, with the largest spike aligning with the Canadian quarantine measures.

The findings of this study lay foundational work for the development of loneliness and social isolation collaborative action plans or triggers within the interRAI HC. The large-scale adoption of the interRAI assessments provides new opportunities for international research and policy development through the establishment of a standard measurement for the interRAI suite of assessments. The interRAI Home Care is used on a large-scale basis in Canada, the United States, Iceland, Finland, Belgium, Switzerland, Hong Kong, and New Zealand (Mathias et al.,

2026). Hence, there is an opportunity to examine cross-national and cross-cultural differences in social isolation.

A note-worthy opportunity is to use the ISI to flag individuals at-risk or experiencing social isolation as targets for social prescribing (Schumacher et al., 2026). The improved integration of identification and response to needs of different individuals and agencies allows for cross-sectional or longitudinal assessment of individuals throughout the care system (Bray et al., 2026; Hirdes et al., 2022). This decision support tool can be scaled up with relative ease where the interRAI HC assessment has been implemented through coding standards available to governments and software providers (Hirdes et al., 2022; Vereker et al., 2026).

Moving forward, research should be conducted to evaluate the reliability and validity of the Index of Social Isolation in other countries or provinces, expanding the applicability and use in performance measurement. In addition, future studies could evaluate the Index of Social Isolation to determine whether a scale with differentially weighted items would perform better. Supplementary Table A lists the considered index items and their associated crude odds ratios, which vary in their associations with loneliness. Further, the index should be further evaluated for use in other interRAI assessments, such as the Check-Up Self-Report and Community Mental Health (Hirdes et al., 2019; Schumacher et al., 2023). This would further expand breadth and applicability while allowing for cross-referencing and tracing of individuals across assessments throughout several domains of care.

This study has many strengths, including a large representative sample of the Ontario home care population, allowing for generalizability through the representation of various groups. Additionally, the creation of the Index of Social Isolation allows opportunities for communication and comparison between assessments and research inquiries using interRAI data. A limitation of

this analysis is the lack of longitudinal assessment to determine responsiveness to interventions such as social resources. Second, this index was not validated with individuals with a CPS score higher than three at any time point, thus, index use within this population is unclear and should be further explored. However, the items included in the Index of Social Isolation are all applicable to this population due to their objective nature. Additionally, this index should be compared with other measures of social isolation to determine its association with other established measurement tools. As previously noted, it is also important to evaluate the use of this scale internationally to provide cultural and geographic context as well as drive future analyses. These limitations should be addressed in future research and analyses.

3.5 Conclusion

In conclusion, the Index of Social Isolation developed and validated within this study demonstrates strong potential for implementation and use within future interRAI data studies. This study provided strong evidence for the consistency and responsiveness of the index in both cross-sectional and longitudinal studies. Therefore, it is recommended that this six-item Index of Social Isolation be implemented within analyses using interRAI HC data.

Chapter 4: Health Behaviours and Outcomes Related to Social Isolation and Loneliness in Community-Dwelling Older Adult Home Care Recipients

4.1 Background

The perceived or actual lack of social relationships may have a negative effect on health through a variety of health behaviours and changes in health status (Singer, 2018). For example, depression, cognitive function, cardiovascular disease, lower self-rated health, smoking, physical activity, chronic conditions, and other lifestyle factors have been linked with social isolation and loneliness (Alpass & Neville, 2003; Cacioppo & Hawkley, 2009; Hawthorne, 2008; Nummela et al., 2011; Smith & Victor, 2019; Valtorta, Kanaan, Gilbody, Ronzi, et al., 2016). It has be proposed that health status contributes to the ability of an individual to be socially engaged and subsequently that social isolation and loneliness may contribute to changes in health status (Singer, 2018). This creates a cause and effect dilemma when examining the relationships between loneliness, social isolation, health outcomes, health behaviours, and mortality (Singer, 2018).

Social isolation and loneliness have been reported to be associated with increased risk of mortality in a number of international studies (Hawkley, 2022; Henriksen et al., 2019; Steptoe et al., 2013). Claims from international figures, such as the U.S. Surgeon General stating "loneliness poses health risks as deadly as smoking up to 15 cigarettes daily", have amplified international concerns regarding loneliness and health (Seitz, 2023). A large national sample of older Americans in the general population reported that loneliness had a modest association with mortality that was no longer significant when adjusting for health behaviours, demographic factors, and interim health conditions (Luo et al., 2012). Other studies have also reported that demographic variables, baseline health status, age, sex, cognitive status, functional impairments, comorbidities such as chronic disease, and lifestyle factors may influence in the relationship with mortality (Ejiri et al., 2021; Lee et al., 2019; Luo et al., 2012; Richard et al., 2017; Savikko et al., 2005; Steptoe et al., 2013).

Home care clients are more likely to be older, living alone, experiencing functional deficits, and have higher likelihood of comorbidities and frailty in comparison to the general population (Canadian Home Care Association, 2003; Pollak et al., 2025). These factors may exacerbate the health effects of loneliness and social isolation among already vulnerable home care clients. A recent cross-national survival analysis of loneliness and all-cause mortality by Egbujie et al. (2025) found that loneliness is not predictive of all-cause mortality in Canada, Finland, and New Zealand after adjusting for age-related confounding variables. Further, Steptoe et al. (2013) and Luo et al. (2012) reported a weakening of the relationship between loneliness and mortality after controlling for confounding variables and interim health states. This suggests that there may be a pathway through which social isolation and loneliness can lead to mortality indirectly, rather than being direct causes (Egbujie et al., 2025).

Steptoe et al. (2013) note that if emotional processes of social isolation and loneliness do not explain adverse effects on mortality, there is a need for further examination of other mechanisms. For example, lifestyle factors such as poor diet, physical inactivity, malnutrition, and substance abuse have been linked to social isolation and loneliness (Boulos et al., 2017; Hämmig, 2019; Jensen et al., 2025; Shankar et al., 2011; Steptoe et al., 2013). These behavioural factors can influence the practice of health-protective behaviours, reduce adherence to medical advice and reduce intake of adequate nutrition (Steptoe et al., 2013). A study of the 2017 Danish National Health Survey revealed that loneliness was associated with a 30% increased risk of daily smoking, 87% increased risk of physical inactivity, 58% increased risk of unhealthy diet, and 60% increased risk of obesity compared with non-lonely counterparts (Jensen et al., 2025).

Health behaviours are commonly associated with adverse health outcomes. Thus, it is plausible that they are a key step of a pathway in which loneliness may affect health and mortality.

For example, food insecurity has been associated with social isolation and poor mental health-related quality of life among American adults (Park & Berkowitz, 2024). Food insecure adults were identified as being 2.9 times less likely to report good self-reported mood compared to food secure adults in 2020, potentially following suit in the proposed pathway (Park & Berkowitz, 2024). In addition, loneliness and social isolation have been associated with lower mental and physical health-related quality of life scores in older adults, which are potentially explained by changes in health behaviours (Durán-Arias et al., 2026; Kobayashi & Steptoe, 2018; Shankar et al., 2011; Sherman et al., 2024).

Broadly, loneliness has been associated with health outcomes encapsulated in measures of mental health, physical health, sleep, cognition, and general health and well-being (Park et al., 2020). Social isolation and loneliness have previously been associated with depressive symptoms, poor cognitive functioning, and further cognitive impairments, demonstrating effects on mental health (Cacioppo & Hawkley, 2009; Ge et al., 2017; Smith & Victor, 2019). Similarly, social isolation and loneliness have been associated with physical health outcomes such as chronic disease, coronary heart disease and stroke, inflammation, frailty, and poor self-rated health (Christiansen et al., 2020; Cudjoe et al., 2022; Ge et al., 2022; Nummela et al., 2011; Park et al., 2020; Sherman et al., 2024; Valtorta, Kanaan, Gilbody, Ronzi, et al., 2016). Therefore, there are a variety of health behaviours and outcomes associated with loneliness and social isolation that may contribute to the pathway to mortality.

4.2 Research Questions

1. What are the main effects and interactive effects of social isolation and loneliness on selected health behaviours of community-dwelling older adults receiving home care services in the province of Ontario, Canada?

2. What are the main effects and interactive effects of social isolation and loneliness on selected health outcomes of community-dwelling older adults receiving home care services in the province of Ontario, Canada?
3. How do the health effects of loneliness differ from social isolation in community-dwelling older adults receiving home care services?

4.3 Methods

4.3.1 Study Design and Setting

A cross-sectional retrospective analysis was conducted of assessments of adults aged 65 and older, receiving home care services in Ontario. Data were obtained from the most recent home care assessment for each individual collected from September 1, 2018, to December 31, 2024. The University of Waterloo's Office of Research Ethics (#30173) provided ethics approval for the study.

4.3.2 Sample

The study sample was restricted to include only the first home care assessment within the period of interest of adults aged 65+ conducted within community settings (excluding hospitals, residential care facilities, hospices, correctional facilities, and other non-community settings). Participants were included if they were receiving services in Ontario and had a follow-up assessment occurring less than twelve months after their baseline assessment. Individuals were excluded due to lack of follow-up assessment within twelve months of the baseline assessment, presence of end-stage disease or Cognitive Performance Scale score greater than three to limit confounding effects.

4.3.3 Data Collection Instrument and Recruitment

The interRAI Home Care Assessment is used in routine practice to identify the needs of home care clients who are expected to receive services for more than two months (McArthur et

al., 2022). This assessment is first conducted within seven days of the individual being identified as eligible for long-term home care services (Canadian Institute for Health Information, 2025). Assessments are then completed every six to twelve months following the initial intake assessment, or earlier if prompted by a noteworthy change in health status (McArthur et al., 2022). The person-centered information included in this comprehensive assessment pertains to categories such as cognition, mood, activities of daily living, health events (e.g., falls), behaviour, and a range of health diagnoses, symptoms, and behaviours (Hirdes, Ljunggren, et al., 2008).

4.3.4 Dependent Variables of Interest

The three dependent variables of interest for these analyses are health behaviours previously identified as having relationships with social isolation and loneliness in older adults. Previous evidence suggests that the quality of an individual's relationships has potential indirect effects on health outcomes, such as cardiovascular disease, due to the promotion of healthy behaviours (Cacioppo & Patrick, 2008; Paul et al., 2021). Thus, the absence of these relationships may impair self-regulation and may increase the risk of negative behaviours, such as smoking (Cacioppo et al., 2014; Paul et al., 2021). Previous studies have presented contradicting results in which the relationship between loneliness and cardiovascular disease has persisted or been attenuated when adjusting for lifestyle and behavioural factors (Bu, Zaninotto, et al., 2020; Hakulinen et al., 2018; Paul et al., 2021). To consider an array of health behaviours that may represent different mechanisms in the pathway linking loneliness and social isolation to negative health outcomes, this study focuses on smoking, inadequate nutrition, and medication management (Eskelinen et al., 2016; Improta et al., 2026; Shankar et al., 2011). Smoking status, eating one or fewer meals in the last three days, and medication non-adherence were all identified with

corresponding single items within the interRAI Home Care assessment and collapsed into binary variables for data analysis to represent the chosen different health behaviours.

Three health outcomes previously identified as having relationships with social isolation and loneliness in older adults were used for the multivariate analysis. The Pain Scale is a clinical measure that evaluates pain intensity and frequency to produce a score between no pain and daily severe pain (Hogeveen et al., 2017). The Self-Rated Mood Scale is a mental health measure that includes indicators of anhedonia, dysphoria, and anxiety (Hirdes et al., 2022). Self-rated health is a widely used global, subjective measure of health based on a singular question asking how the respondent would rate their health given the options: excellent, good, fair, poor, and could/would not respond.

4.3.5 Independent Variables of Interest

Independent variables included interRAI Home Care items that were pertinent to health behaviours and outcomes in older adults based on reports in the literature.

The Index of Social Isolation is an objective measure of isolation using six items that correspond to social isolation , including: single marital status, living alone, being alone for eight or more hours of the day, having no informal caregiver, not having supportive friends and family, and experiencing a decline in social activities in the last 90 days (Ochwat, 2022). Loneliness is the subjective aspect of isolation used in conjunction with the Index of Social Isolation to gain a comprehensive understanding of both the objective and subjective dimensions of isolation. A single item based on clinician-rated loneliness was used to measure loneliness in this analysis. An additional composite variable was created to combine loneliness and isolation into a single nominal measure. The cut-points for social isolation in Chapter 3 were used to classify individuals into four

categories: a) None - neither socially isolated nor lonely; b) Only lonely; c) Only isolated; and d) Both lonely and socially isolated.

A variety of clinical measures were considered as well. Validated against the Mini-Mental State Exam, the Cognitive Performance Scale (CPS) is used to evaluate cognition using items analyzing memory impairment, consciousness, and executive functioning, ranging from intact to severely impaired (Hogeveen et al., 2017; Morris et al., 1994). The Activities of Daily Living Hierarchy Scale (ADLH) measures functional independence based on ADLs for personal hygiene, locomotion, toileting, and eating. A score of 0 to 6 corresponds with categories independent to total dependence (Morris et al., 2013; Morris et al., 1999). The Changes in Health, End-Stage Disease, Signs, and Symptoms Scale (CHESS) identifies those at risk of serious health decline by evaluating health instability using a count of decline in ADLs, cognition, clinical symptoms, and a clinician rating of prognosis less than six months (Hirdes et al., 2014; Hogeveen et al., 2017). Due to the continuous nature of these clinical measures, previously established cut points were used for these measures.

Other covariates of interest include gender, rural or urban living situations, economic trade-offs, and a diagnosis of heart failure, cancer, ADHD, Parkinson's Disease, schizophrenia, or bipolar disorder, each identified with a corresponding single item in the interRAI Home Care assessment. Additionally, age was collapsed into a categorical variable distinguishing individuals 65 years and older from younger individuals. Further, an assessment item measuring hospitalization within the last 90 days was collapsed into a binary variable. Time between the baseline assessment and the follow-up assessment for each individual was used to control for variations in follow-up time. Finally, an item establishing languages spoken was collapsed into a binary variable to determine English as a first language in comparison to other languages.

4.3.6 Statistical Analysis – Bivariate Analysis

Participant characteristics were summarised as frequency (n) and percentage (%) at baseline assessment within the overall analytic cohort. Using exclusively baseline assessments, these cross-sectional analyses were binary logistic regression models to determine association of potential covariates with health behaviours of interest. Chi-square statistics, unadjusted odds ratios, c-statistics, and their associated p-values were acquired to determine the direction and magnitude of associations between variables as well as their statistical significance. Confidence intervals including 1.00 or with a p-value greater than 0.05 were deemed not significant.

4.3.7 Statistical Analysis – Multivariate Analysis

Using baseline and follow-up assessments, three health transitions were modelled using longitudinal retrospective data analysis of the interRAI Home Care Assessment. Health behaviours and other variables identified as statistically significant at baseline assessment using bivariate analysis or with longitudinal bivariate analyses were inserted into a logistic regression model as independent variables with each of the three health outcomes (Pain Scale, Self-Rated Health, and Self-Reported Mood) indicated as binary outcome variables representing worsening health outcomes at the follow-up assessment. The analysis of worsening health outcomes resulted in different sample sizes for the three health outcome models in comparison to the health behaviour sample sizes as each sample encapsulated only individuals that had worsening health outcomes between assessments. Next, statistically significant potential covariates were inserted into stepwise selection to create a logistic regression model that predicts worsening health outcomes. Stepwise selection is sequential insertion, deletion, and investigation of predictor variables in a model (Mundry & Nunn, 2009). In addition, a final manual re-analysis was done of the models to rule out order of entry-deletion effects in the candidate stepwise models.

All three health behaviours were included as individual variables in this study. The c-statistic of the model was considered when testing the proposed models during addition of additional variables. This process was replicated three times to capture the best models for each of the three health outcomes of interest based on the variables other than loneliness or isolation. The final models were then tested using loneliness and social isolation independently, as well as using the loneliness-isolation typologies that group individuals as lonely, socially isolated, both, or neither. This ensured statistically significant variables and consistent models despite the potential limitation of stepwise selection in which potentially meaningful variables are excluded from the final model (Derksen & Keselman, 1992; Mundry & Nunn, 2009). Main and interaction effects of loneliness and social isolation were tested separately from loneliness-isolation typologies to ensure accurate and reliable testing of the algorithms in the three final models. All statistical analyses were secondary data analysis of interRAI Home Care Assessment data, performed using SAS Studio (SAS Institute, 2023).

4.4 Results

4.4.1 Sample Characteristics

Sample characteristics at baseline are provided in Table 4.1. The sample is representative of a home care population as most individuals are female (61.2%) and most of the sample is aged 85 and older (39.7%). Adverse health behaviours of interest are generally low in prevalence. For example, 8.3% are smokers, 5.0% have inadequate nutritional intake, and 15.2% are non-adherent to their medication (Table 4.1). 21.9% reported feeling lonely while 54.3% were identified as socially isolated. When differentiating combinations of these variables, 5.4% were only lonely, 37.7% were only isolated, 16.6% were both, and 40.4% were neither (Table 4.1). Finally, participants had an average total of 195.5 days between their baseline and follow-up assessment.

Table 4.1 Demographic Characteristics of Ontario Home Care Client Sample at Baseline Assessment (n=189,761)

Variable	**Percentage (n)**
Age (years)	
< 65	11.3 (21,503)
65 to 74	16.0 (30,426)
75 to 84	32.9 (62,468)
85 and older	39.7 (75,364)
Female	
Yes	61.2 (116,181)
No	38.8 (73,580)
Lonely	
Yes Lonely	21.9 (41,619)
Not Lonely	78.1 (148,142)
Smoker	
Yes	8.3 (15,766)
No	91.7 (173,995)
Ate one or fewer meals on at least 2 of last 3 days	
Yes	5.0 (9567)
No	95.0 (180,194)
Medication Adherence	
Adherent	84.9 (161,009)
Non-Adherent	15.2 (28,752)
Index of Social Isolation	
0	14.0 (26,641)
1	31.7 (60,206)
2	21.5 (40,699)
3	17.0 (32,289)
4	11.7 (22,098)
5	3.3 (6197)
6	0.9 (1631)
Lives Alone	
Yes	35.6 (67,589)
No	64.4 (122,172)
Single	
Yes	60.4 (114,517)
No	39.7 (75,244)
Loneliness-Isolation Typology	
Only Lonely	5.4 (10,147)
Only Isolated	37.7 (71,442)
Both	16.6 (31,472)
Neither	40.4 (76,700)
Mean (SD) Days Between Baseline and Follow-Up Assessment	195.5 (89.6)

4.4.2 Bivariate cross-sectional analyses for health behaviours

Loneliness and social isolation were both significantly related to smoking at baseline, each presenting greater odds of smoking at baseline (COR=1.42, 95% CI=1.37 – 1.47; COR=1.32, 95% CI=1.30 – 1.33) (Table 4.2). The interaction term for loneliness and social isolation was not statistically significant, and therefore, was not reported. Analysis of loneliness-isolation typologies demonstrated that all groups had higher odds of smoking in comparison to the neither group, with 'both' having the greatest odds (COR=2.12, 95% CI=2.03 – 2.22) (Table 2). Further, all potential covariates, except cancer and CHESS, analyzed in relation to smoking status were statistically significant (Table 2). All age groups greater than 65 years old had lower odds of smoking status in comparison to individuals less than 65, decreasing with increases in age. Odds of smoking decreased with each 1-point increase in CPS score (COR=0.98, 95% CI=0.98 – 0.99), being female (COR=0.66, 95% CI=0.64 – 0.69), the presence of heart failure (COR=0.76, 95% CI=0.72 – 0.80), cancer (COR=0. 98, 95% CI=0.93 – 1.02), Alzheimer's and other dementias (COR=0.59, 95% CI=0.57 – 0.62), Parkinson's disease (COR=0.34, 95% CI=0.30 – 0.38), any ADL assistance in comparison to independent individuals, and English as a primary language (COR=0.94, 95% CI=0.90 – 0.98).

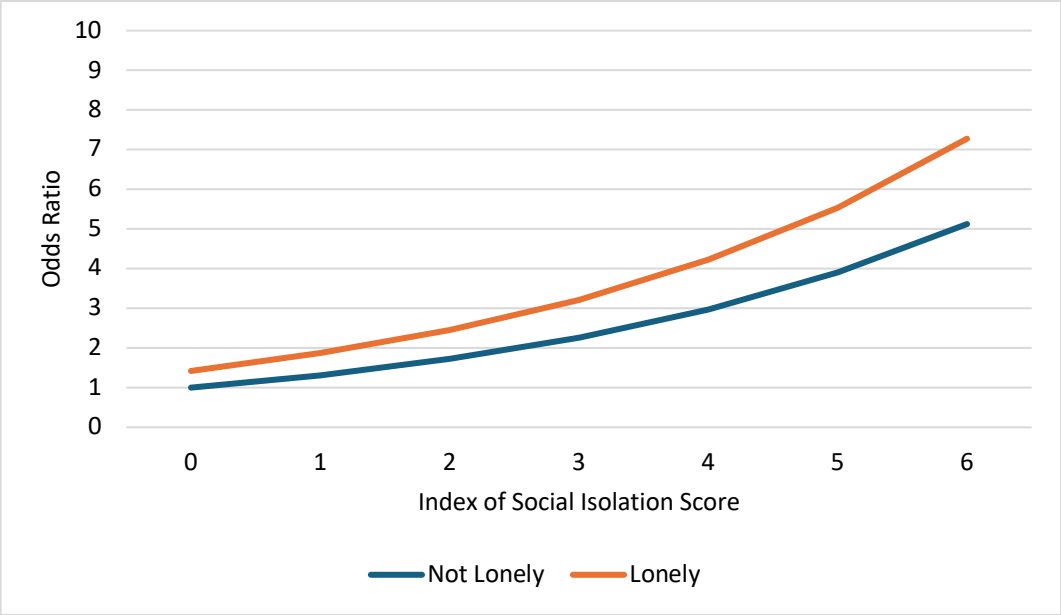
Odds of smoking increased with rural living (COR=1.45, 95% CI=1.39 – 1.52), economic trade-off (COR=4.04, 95% CI=3.80 – 4.29), schizophrenia (COR=4.69, 95% CI=4.34 – 5.06), bipolar disorder (COR=3.83, 95% CI=3.54 – 4.14), and hospitalization (COR=1.13, 95% CI=1.10 – 1.17).

Table 4.2 Bivariate Analysis of Smoking Among Ontario Home Care Clients at Baseline (n=189,761)

Variable	Level	Parameter Estimate (Standard Error)	COR (95% CI)	P-value	C-statistic
Loneliness	No	Reference			
	Yes	0.351 (0.02)	1.42 (1.37, 1.47)	<0.0001	0.532
Index of Social Isolation	Continuous Variable	0.27 (0.006)	1.31 (1.30, 1.33)	<0.0001	0.603
Age	<65	Reference			
	65 – 74	-0.53 (0.02)	0.59 (0.56, 0.61)	<0.0001	0.757
	75-84	-1.61 (0.03)	0.20 (0.19, 0.21)	<0.0001	
	85+	-2.82 (0.03)	0.06 (0.06, 0.06)	<0.0001	
Female	No	Reference			
	Yes	-0.41 (0.02)	0.66 (0.64, 0.69)	<0.0001	0.550
Cognitive Performance Scale	Continuous Variable	-0.02 (0.002)	0.98 (0.98, 0.99)	<0.0001	0.519
Rurality	Urban	Reference			
	Rural	0.37 (0.02)	1.45 (1.39, 1.52)	<0.0001	0.526
Economic Trade-Off	No	Reference			
	Yes	1.40 (0.032)	4.04 (3.80, 4.29)	<0.0001	0.534
Heart Failure	No	Reference			
	Yes	-0.27 (0.03)	0.76 (0.72, 0.80)	<0.0001	0.513
Cancer	No	Reference			
	Yes	-0.03 (0.02)	0.98 (0.93, 1.02)	0.30	0.502
Alzheimer's and Other Dementias	No	Reference			
	Yes	-0.53 (0.02)	0.59 (0.57, 0.62)	<0.0001	0.546
Parkinson's Disease	No	Reference			
	Yes	-1.08 (0.06)	0.34 (0.30, 0.38)	<0.0001	0.518
Schizophrenia	No	Reference			
	Yes	1.54 (0.04)	4.69 (4.34, 5.06)	<0.0001	0.523
Bipolar Disorder	No	Reference			
	Yes	1.34 (0.040)	3.83 (3.54, 4.14)	<0.0001	0.521
ADL Hierarchy	Independent	Reference			
	Limited Assistance	-0.30 (0.020)	0.74 (0.71, 0.77)	<0.0001	0.539
	Extensive Assistance	-0.25 (0.02)	0.78 (0.75, 0.82)	<0.0001	
	Dependent	-0.47 (0.05)	0.63 (0.57, 0.69)	<0.0001	
CHESS	Continuous Variable	0.02 (0.01)	1.02 (1.00, 1.04)	0.06	0.506
English as a Primary Language	No	Reference			
	Yes	-0.07 (0.02)	0.94 (0.90, 0.98)	0.002	0.505
Hospitalized in the Last 90 Days	No	Reference			
	Yes	0.13 (0.02)	1.13 (1.10, 1.17)	<0.0001	0.514
Loneliness-Isolation Typology	Neither	Reference			
	Only Isolated	0.54 (0.02)	1.72 (1.66, 1.79)	<0.0001	0.579
	Only Lonely	0.22 (0.04)	1.25 (1.15, 1.36)	<0.0001	
	Both	0.75 (0.0234)	2.12 (2.03, 2.22)	<0.0001	

Figure 4.1 demonstrates the main effects of social isolation and loneliness on smoking status. Despite no statistically significant interaction term, odds of smoking increase with both lonely and not lonely groups as ISI score increases.

Figure 4.1 Odds Ratio Model for Smoking Among Ontario Home Care Clients with Loneliness and Social Isolation (n=189,761)



Loneliness and social isolation were both significantly related to inadequate nutrition at baseline, therefore, the interaction term was tested and included due to statistical significance (Table 4.3; Figure 4.2). Analysis of loneliness-isolation typologies demonstrated that all groups had higher odds of inadequate nutrition in comparison to the neither group, with odds increasing from isolated to lonely to 'both' having the greatest odds (COR=2.77, 95% CI=2.62 – 2.93) (Table 4.3). Additionally, all potential covariates analyzed in relation to inadequate nutrition were statistically significant, with the exception of rurality and schizophrenia (Table 4.3). All age groups greater than 65 years old had lower odds of inadequate nutrition in comparison to individuals less than 65, decreasing with increases in age (Table 4.3).

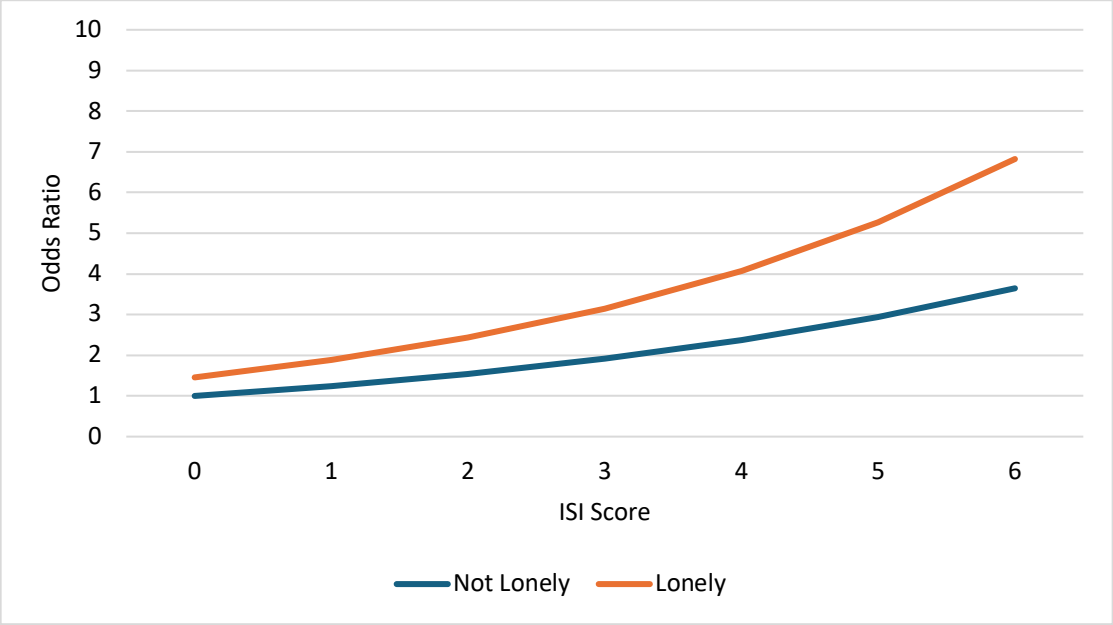
Odds of inadequate nutrition decreased with each 1-point increase in CPS score (COR=0.99, 95% CI=0.99 – 1.00), the presence of heart failure (COR=0.93, 95% CI=0.87 – 0.99), Alzheimer's and other dementias (COR=0.83, 95% CI=0.79 – 0.87), Parkinson's disease (COR=0.76, 95% CI=0.68 – 0.84), and English as a primary language (COR=0.79, 95% CI=0.75 – 0.83). Additionally, odds of inadequate nutrition increased with each 1-point increase in CHESS score (COR=3.16, 95%=3.08 – 3.24), being female (COR=1.05, 95% CI=1.00 – 1.09), economic trade-off (COR=3.12, 95% CI=2.89 – 3.38), cancer (COR=1.41, 95% CI=1.33 – 1.49), bipolar disorder (COR=1.47, 95% CI=1.29 – 1.67), all levels of ADL assistance in comparison to independence, and hospitalization (COR=1.36, 95% CI=1.31 – 1.42).

Table 4.3 Bivariate Analysis of Inadequate Nutrition Among Ontario Home Care Clients at Baseline (n=189,761)

Variable	Level	Parameter Estimate (Standard Error)	COR (95% CI)	P-value	C-statistic
Loneliness	No	Reference			
	Yes	0.38 (0.05)	See figure 4.2	<0.0001	0.619
Index of Social Isolation	Continuous Variable	0.212 (0.009)	See figure 4.2	<0.0001	
Loneliness and Social Isolation	Interaction	0.04 (0.02)	See figure 4.2	0.008	
Age	<65	Reference			
	65 – 74	-0.29 (0.03)	0.75 (0.70, 0.80)	<0.0001	0.579
	75-84	-0.57 (0.03)	0.56 (0.53, 0.60)	<0.0001	
	85+	-0.84 (0.03)	0.43 (0.41, 0.46)	<0.0001	
Female	No	Reference			
	Yes	0.04 (0.02)	1.05 (1.00, 1.09)	0.04	0.505
Cognitive Performance Scale (1-point Increments)	Continuous Variable	-0.006 (0.002)	0.99 (0.99, 1.00)	0.006	0.507
Rurality	Urban	Reference			
	Rural	-0.03 (0.03)	0.97 (0.91, 1.03)	0.30	0.502
Economic Trade-Off	No	Reference			
	Yes	1.134 (0.04)	3.12 (2.89, 3.38)	<0.0001	0.527
Heart Failure	No	Reference			
	Yes	-0.08 (0.03)	0.93 (0.87, 0.99)	0.02	0.504
Cancer	No	Reference			
	Yes	0.34 (0.03)	1.41 (1.33, 1.49)	<0.0001	0.523
Alzheimer's and Other Dementias	No	Reference			
	Yes	-0.19 (0.02)	0.83 (0.79, 0.87)	<0.0001	0.518
Parkinson's Disease	No	Reference			
	Yes	-0.28 (0.05)	0.76 (0.68, 0.84)	<0.0001	0.506
Schizophrenia	No	Reference			
	Yes	0.01 (0.08)	1.01 (0.86, 1.18)	0.89	0.500
Bipolar Disorder	No	Reference			
	Yes	0.39 (0.07)	1.47 (1.29, 1.67)	<0.0001	0.504
ADL Hierarchy	Independent	Reference			
	Limited Assistance	0.155 (0.03)	1.17 (1.11, 1.23)	<0.0001	0.540
	Extensive Assistance	0.37 (0.03)	1.45 (1.38, 1.53)	<0.0001	
	Dependent	0.38 (0.05)	1.46 (1.32, 1.61)	<0.0001	
CHESS	Continuous Variable	1.15 (0.01)	3.16 (3.08, 3.24)	<0.0001	0.755
English as a Primary Language	No	Reference			
	Yes	-0.24 (0.03)	0.79 (0.75, 0.83)	<0.0001	0.518
Hospitalized in the Last 90 Days	No	Reference			
	Yes	0.31 (0.02)	1.36 (1.31, 1.42)	<0.0001	0.536
Loneliness-Isolation Typology	Neither	Reference			
	Only Isolated	0.40 (0.03)	1.49 (1.41, 1.57)	<0.0001	0.598
	Only Lonely	0.51 (0.05)	1.66 (1.52, 1.83)	<0.0001	
	Both	1.02 (0.03)	2.77 (2.62, 2.93)	<0.0001	

Figure 4.2 demonstrates the main and interaction effects of social isolation and loneliness on inadequate nutrition. Odds of inadequate nutrition increase with both lonely and not lonely groups as ISI score increases; however, the odds of inadequate nutrition for lonely individuals increases at a more exponential rate as ISI score increases in comparison to their non-lonely counterparts (Figure 4.2).

Figure 4.2 Odds Ratio Model for Inadequate Nutrition with Loneliness, Social Isolation, and the Interaction Term Among Ontario Home Care Clients (n=189,761)



Loneliness and social isolation were both significantly related to medication non-adherence at baseline. The interaction term was tested but ultimately excluded due to lack of statistical significance (Table 4.4). Analysis of loneliness-isolation typologies showed that all groups had higher odds of medication non-adherence in comparison to the neither group, with 'both' having the greatest odds (COR=2.67, 95% CI=2.58 – 2.76), following the same distribution pattern as smoking (Table 4.4; Table 4.2). Further, all potential covariates, excluding female, analyzed in relation to medication non-adherence were statistically significant (Table 4). All age groups greater than 65 years old had lower odds of medication non-adherence in comparison to individuals less

than 65, decreasing with increases in age, a trend visible in bivariate analyses of smoking and inadequate nutrition as well (Table 4.2; Table 4.3; Table 4.4).

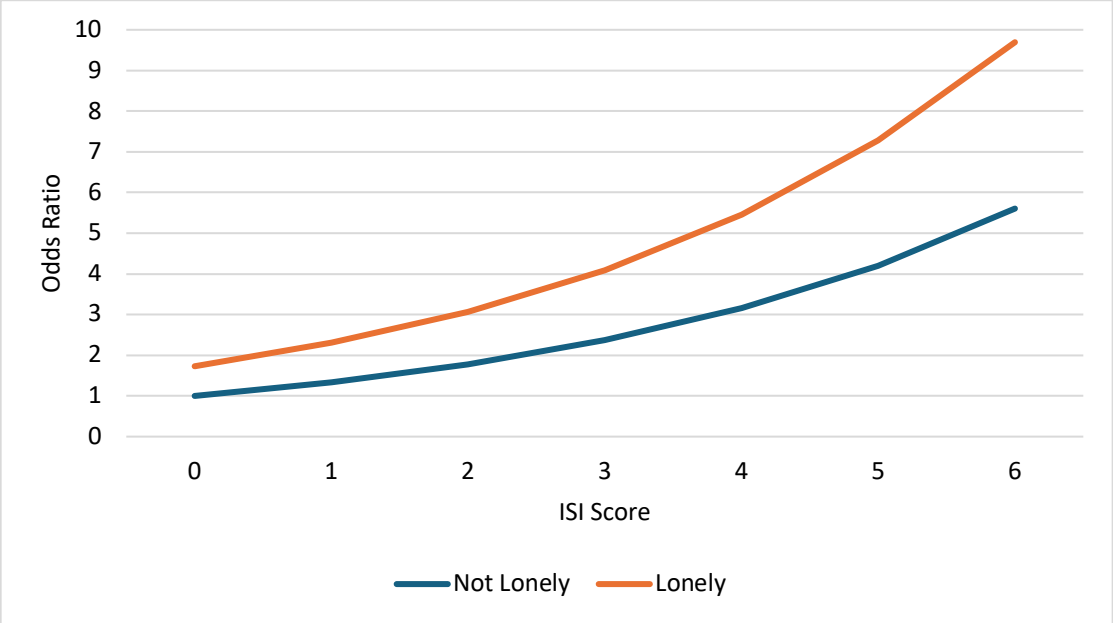
Table 4.4 highlights that the odds of medication non-adherence decreased with the presence of heart failure (COR=0. 86, 95% CI=0.83 – 0.90), cancer (COR=0.82, 95% CI=0.79 – 0.86), Parkinson's disease (COR=0.72, 95% CI=0.67– 0.76), all levels of ADL assistance in comparison to independence, English as a primary language (COR=0.79, 95% CI=0.76– 0. 82), and hospitalization (COR=0.76, 95% CI=0.74 – 0.78). In contrast, odds of medication non-adherence increased with each 1-point increase in CPS score (COR=1.04, 95% CI=1.03 – 1.04), rural living (COR=1.18, 95% CI=1.14 – 1.22), economic trade-off (COR=2.55, 95% CI=2.41 – 2.70), Alzheimer's and other dementias (COR=1.85, 95% CI=1.80 – 1.90), schizophrenia (COR=1.34, 95% CI=1.22 – 1.46), and bipolar disorder (COR=1.45, 95% CI=1.33 – 1.57).

Table 4.4 Bivariate Analysis of Medication Non-Adherence Among Ontario Home Care Clients at Baseline (n=189,761)

Variable	Level	Parameter Estimate (Standard Error)	COR (95% CI)	P-value	C-statistic
Loneliness	No	Reference			
	Yes	0.55 (0.01)	1.73 (1.68, 1.78)	<0.0001	0.552
Index of Social Isolation	Continuous Variable	0.29 (0.004)	1.33 (1.32, 1.35)	<0.0001	0.612
Age	<65	Reference			
	65 – 74	-0.07 (0.02)	0.93 (0.89, 0.98)	0.003	0.533
	75-84	-0.14 (0.02)	0.87 (0.83, 0.90)	<0.0001	
	85+	-0.33 (0.02)	0.72 (0.69, 0.75)	<0.0001	
Female	No	Reference			
	Yes	-0.01 (0.01)	0.99 (0.96, 1.01)	0.29	0.502
Cognitive Performance Scale	Continuous Variable	0.04 (0.001)	1.04 (1.03, 1.04)	<0.0001	0.539
Rurality	Urban	Reference			
	Rural	0.17 (0.02)	1.18 (1.14, 1.22)	<0.0001	0.511
Economic Trade-Off	No	Reference			
	Yes	0.934 (0.03)	2.55 (2.41, 2.70)	<0.0001	0.518
Heart Failure	No	Reference			
	Yes	-0.15 (0.02)	0.86 (0.83, 0.90)	<0.0001	0.508
Cancer	No	Reference			
	Yes	-0.19 (0.02)	0.82 (0.79, 0.86)	<0.0001	0.511
Alzheimer's and Other Dementias	No	Reference			
	Yes	0.61 (0.01)	1.85 (1.80, 1.90)	<0.0001	0.565
Parkinson's Disease	No	Reference			
	Yes	-0.33 (0.03)	0.72 (0.67, 0.76)	<0.0001	0.507
Schizophrenia	No	Reference			
	Yes	0.29 (0.05)	1.34 (1.22, 1.46)	<0.0001	0.503
Bipolar Disorder	No	Reference			
	Yes	0.37 (0.04)	1.45 (1.33, 1.57)	<0.0001	0.504
ADL Hierarchy	Independent	Reference			
	Limited Assistance	-0.09 (0.01)	0.91 (0.88, 0.94)	<0.0001	0.538
	Extensive Assistance	-0.32 (0.02)	0.73 (0.70, 0.76)	<0.0001	
	Dependent	-0.71 (0.04)	0.49 (0.45, 0.53)	<0.0001	
CHESS	Continuous Variable	0.25 (0.008)	1.28 (1.26, 1.30)	<0.0001	0.548
English as a Primary Language	No	Reference			
	Yes	-0.24 (0.02)	0.79 (0.76, 0.82)	<0.0001	0.518
Hospitalized in the Last 90 Days	No	Reference			
	Yes	-0.28 (0.01)	0.76 (0.74, 0.78)	<0.0001	0.529
Loneliness-Isolation Typology	Neither	Reference			
	Only Isolated	0.57 (0.02)	1.77 (1.72, 1.83)	<0.0001	0.598
	Only Lonely	0.38 (0.03)	1.47 (1.38, 1.56)	<0.0001	
	Both	0.98 (0.02)	2.67 (2.58, 2.76)	<0.0001	

Figure 4.3 demonstrates the main effects of social isolation and loneliness on medication non-adherence. The odds of medication non-adherence increase with both lonely and not lonely groups as ISI score increases despite the lack of statistically significant interaction term, similar to smoking (Figure 4.1; Figure 4.3). However, when using the composite measure of loneliness and isolation, the "both" group had the highest overall odds of non-adherence.

Figure 4.3 Unadjusted Odds Ratio Model for Medication Non-Adherence Among Ontario Home Care Clients with Only Loneliness and Social Isolation (n=189,761)



4.4.3 Bivariate and multivariate longitudinal analyses of health outcomes

4.4.3.1 Longitudinal models for worsening self-reported health

To begin the analysis of longitudinal health outcomes, Table 4.5 presents the bivariate analysis of worsening self-rated health from baseline to follow-up assessment. Potential covariates that were statistically significant include female, CPS, rurality, heart failure, cancer, Alzheimer's and other dementias, Parkinson's disease, all levels of ADL hierarchy, CHESS, English as a primary language, hospitalization, smoking status, medication non-adherence, inadequate nutritional intake, and the number of days between baseline and follow-up assessment. Non-

significant variables were age, economic trade-off, schizophrenia, and bipolar disorder. Although loneliness was statistically significant, social isolation was not, thus, an interaction term was not included in this analysis (Table 4.5).

Table 4.5 Bivariate Analysis of Worsening Self-Rated Health Among Ontario Home Care Clients from Baseline to Follow-Up Assessment (n=63,109)

Variable	Level	Parameter Estimate (Standard Error)	COR (95% CI)	P-value	C-statistic
Loneliness	No	Reference			
	Yes	0.19 (0.02)	1.21 (1.15, 1.26)	<0.0001	0.515
Index of Social Isolation	Continuous Variable	0.01 (0.007)	1.01 (1.00, 1.03)	0.09	0.503
Loneliness-Isolation Typology	Neither	Reference			
	Only Isolated	-0.02 (0.04)	0.98 (0.94, 1.02)	0.26	0.517
	Only Lonely	0.24 (0.04)	1.27 (1.17, 1.38)	<0.0001	
	Both	0.15 (0.03)	1.17 (1.10, 1.23)	<0.0001	
Age	<65	Reference			
	65 – 74	0.08 (0.04)	1.08 (0.99, 1.17)	0.08	0.505
	75-84	0.01 (0.04)	1.01 (0.94, 1.09)	0.80	
	85+	-0.005 (0.04)	1.00 (0.93, 1.07)	0.89	
Female	No	Reference			
	Yes	-0.09 (0.02)	0.92 (0.88, 0.95)	<0.0001	0.510
Cognitive Performance Scale	Continuous Variable	-0.01 (0.002)	0.99 (0.98, 0.99)	<0.0001	0.515
Rurality	Urban	Reference			
	Rural	-0.18 (0.03)	0.83 (0.79, 0.88)	<0.0001	0.512
Economic Trade-Off	No	Reference			
	Yes	0.09 (0.07)	1.10 (0.96, 1.25)	0.18	0.501
Heart Failure	No	Reference			
	Yes	0.21 (0.03)	1.23 (1.16, 1.31)	<0.0001	0.509
Cancer	No	Reference			
	Yes	0.11 (0.03)	1.12 (1.06, 1.18)	0.0001	0.506
Alzheimer's and Other Dementias	No	Reference			
	Yes	-0.25 (0.02)	0.78 (0.75, 0.81)	<0.0001	0.529
Parkinson's Disease	No	Reference			
	Yes	0.35 (0.05)	1.42 (1.29, 1.55)	<0.0001	0.507
Schizophrenia	No	Reference			
	Yes	-0.14 (0.08)	0.87 (0.75, 1.02)	0.09	0.501
Bipolar Disorder	No	Reference			
	Yes	0.13 (0.08)	1.14 (0.98, 1.33)	0.10	0.501
ADL Hierarchy	Independent	Reference			
	Limited Assistance	-0.06 (0.02)	0.94 (0.90, 0.98)	0.003	0.511
	Extensive Assistance	0.05 (0.03)	1.05 (0.99, 1.11)	0.10	
	Dependent	0.10 (0.06)	1.10 (0.98, 1.23)	0.09	
CHESS	Continuous Variable	0.11 (0.01)	1.12 (1.09, 1.15)	<0.0001	0.523
English as a Primary Language	No	Reference			
	Yes	-0.15 (0.03)	0.85 (0.82, 0.90)	<0.0001	0.511
Hospitalized in the Last 90 Days	No	Reference			
	Yes	0.20 (0.02)	1.22 (1.17, 1.27)	<0.0001	0.520
Smoker	No	Reference			
	Yes	0.11 (0.04)	1.12 (1.04, 1.20)	0.003	0.504
Medication Adherence	Adherent	Reference			
	Non-Adherent	-0.11 (0.03)	0.90 (0.85, 0.95)	<0.0001	0.507
Nutritional Intake	Adequate	Reference			
	Inadequate	0.168 (0.05)	1.18 (1.07, 1.31)	0.001	0.503
Days Between Baseline and Follow-up Assessment	Continuous Variable	-0.0003 (0.0001)	1.00 (1.00, 1.00)	0.02	0.506

Only statistically significant variables from the bivariate analysis were included in the stepwise selection of covariates to adjust in models with loneliness and isolation included (Table 4.6). The final model included female, CPS, rurality, heart failure, cancer, Alzheimer's disease and other dementias, Parkinson's disease, CHESS, English as a primary language, hospitalization, smoking status, medication non-adherence, and number of days between baseline and follow-up assessment. This indicates that all levels of ADL hierarchy and inadequate nutritional intake were removed from the final model in stepwise selection due to lack of statistical significance.

Using adjusted odds ratios, Table 4.6 highlights that the odds of worsening self-rated health decreased with every one-point increase in CPS score (AOR=0.99, 95% CI=0.99 – 0.99), being a female (AOR=0. 94, 95% CI=0.90 – 0.98), rural living (AOR=0.82, 95% CI=0.78 – 0.87), Alzheimer's and other dementias (AOR=0.80, 95% CI=0.77– 0.84), English as a primary language (AOR=0.88, 95% CI=0.84– 0.92), and medication non-adherence (AOR=0.93, 95% CI=0.88 – 0.98). In contrast, adjusted odds of worsening self-rated health increased with heart failure (AOR=1.17, 95% CI=1.10 – 1.25), cancer (AOR=1.07, 95% CI=1.01 – 1.13), Parkinson's disease (AOR=1.41, 95% CI=1.28 – 1.54), every one-point increase in CHESS score (AOR=1.11, 95% CI=1.08 – 1.14), hospitalization (AOR=1.10, 95% CI=1.06 – 1.15), and smoking status (AOR=1.12, 95% CI=1.04 – 1.20). Despite having a statistically significant p-value, the number of days between baseline and follow-up assessment did not increase nor decrease the odds of worsening self-rated health (AOR=1.00, 95% CI= 1.00 – 1.00). The c-statistic for this interim model was 0.562.

Table 4.6 Results of Stepwise Selection of Potential Covariates in Relation to Worsening Self-Rated Health from Baseline to Follow-Up Assessment Among Ontario Home Care Clients (n=63,109)

Variable	**Level**	**Parameter Estimate (Standard Error)**	**AOR (95% CI)**	**P-value**
Female	No	Reference		
	Yes	-0.06 (0.02)	0.94 (0.90, 0.98)	0.001
Cognitive Performance Scale	Continuous Variable	-0.01 (0.002)	0.99 (0.99, 0.99)	<0.0001
Rurality	Urban	Reference		
	Rural	-0.19 (0.03)	0.82 (0.78, 0.87)	<0.0001
Heart Failure	No	Reference		
	Yes	0.157 (0.032)	1.17 (1.10, 1.25)	<0.0001
Cancer	No	Reference		
	Yes	0.06 (0.03)	1.07 (1.01, 1.13)	0.03
Alzheimer's and Other Dementias	No	Reference		
	Yes	-0.22 (0.02)	0.80 (0.77, 0.84)	<0.0001
Parkinson's Disease	No	Reference		
	Yes	0.34 (0.05)	1.41 (1.28, 1.54)	<0.0001
CHESS	Continuous Variable	0.105 (0.01)	1.11 (1.08, 1.14)	<0.0001
English as a Primary Language	No	Reference		
	Yes	-0.13 (0.03)	0.88 (0.84, 0.92)	<0.0001
Hospitalized in the Last 90 Days	No	Reference		
	Yes	0.096 (0.02)	1.10 (1.06, 1.15)	<0.0001
Smoker	No	Reference		
	Yes	0.11 (0.04)	1.12 (1.04, 1.20)	0.003
Medication Adherence	Adherent	Reference		
	Non-Adherent	-0.07 (0.03)	0.93 (0.88, 0.98)	0.008
Days Between Baseline and Follow-up Assessment	Continuous Variable	-0.0003 (0.0001)	1.00 (1.00, 1.00)	0.003

Table 4.7 tests the final model of worsening self-rated health from baseline to follow-up assessment presented in Table 4.6 against three independent variables each depicting variations of

measuring social isolation and loneliness. All covariates had significant effects in all three test environments, with adjusted odds ratios of loneliness and social isolation in Test 1 and Test 2 providing consistent results with the loneliness-isolation typologies in Test 3.

Test 3 shows the odds of worsening self-rated health from baseline to follow-up for lonely and the 'both' typologies increase in comparison to individuals identified as neither lonely nor socially isolated. Social isolation as a typology and a measurement category itself were not statistically significant, demonstrating consistency in the model and measurements. Therefore, only loneliness increases the odds of worsening self-rated health from baseline to follow-up assessment (AOR=1.29, 95% CI=1.18 – 1.41) and the combination of both loneliness and social isolation increases the odds of worsening self-rated health from baseline to follow-up assessment (AOR=1.16, 95% CI=1.09 – 1.22) in comparison to individuals that are neither lonely nor socially isolated when controlling for female, CPS, rurality, heart failure, cancer, Alzheimer's and other dementias, Parkinson's disease, CHESS score, English as a primary language, hospitalization, smoking status, medication non-adherence, and the number of days between baseline and follow-up assessment (Table 4.7). This indicates that although loneliness is associated with increased odds of worsening self-rated health, there are a variety of health behaviours and outcomes that may act as mediating factors in this relationship.

Table 4.7 Final Model Testing with Three Independent Variables in Relation to Worsening Self-Rated Health from Baseline to Follow-Up Assessment Among Ontario Home Care Clients (n=63,109)

		Test 1 - Loneliness			Test 2 - Social Isolation			Test 3 – Loneliness-Isolation Typologies		
Variable	**Level**	**Parameter Estimate (SE)**	**AOR (95% CI)**	**P-value**	**Parameter Estimate (SE)**	**AOR (95% CI)**	**P-value**	**Parameter Estimate (SE)**	**AOR (95% CI)**	**P-value**
Lonely	No	Reference								
	Yes	0.19 (0.02)	1.21(1.16, 1.27)	<0.0001						
Index of Social Isolation	Continuous Variable				0.002 (0.007)	1.00 (0.99, 1.02)	0.77			
Loneliness-Isolation Typology	Neither	Reference								
	Only Isolated							-0.04 (0.02)	0.96 (0.92, 1.01)	0.09
	Only Lonely							0.25 (0.04)	1.29 (1.18, 1.41)	<0.0001
	Both							0.14 (0.03)	1.16 (1.09, 1.22)	<0.0001
Female	No	Reference								
	Yes	-0.073 (0.02)	0.93 (0.89, 0.97)	0.0002	-0.06 (0.02)	0.94 (0.90, 0.98)	0.001	-0.065 (0.02)	0.94 (0.90, 0.98)	0.001
Cognitive Performance Scale	Continuous Variable	-0.01 (0.002)	0.99 (0.99, 0.99)	<0.0001	-0.01 (0.002)	0.99 (0.99, 0.99)	<0.0001	-0.01 (0.002)	0.99 (0.99, 0.99)	<0.0001
Rurality	Urban	Reference								
	Rural	-0.19 (0.03)	0.83 (0.78, 0.87)	<0.0001	-0.19 (0.03)	0.83 (0.78, 0.87)	<0.0001	-0.20 (0.03)	0.82 (0.78, 0.87)	<0.0001
Heart Failure	No	Reference								
	Yes	0.16 (0.03)	1.17 (1.10, 1.24)	<0.0001	0.16 (0.03)	1.17 (1.10, 1.25)	<0.0001	0.16 (0.03)	1.17 (1.10, 1.25)	<0.0001
Cancer	No	Reference								
	Yes	0.06 (0.03)	1.07 (1.01, 1.13)	0.03	0.06 (0.03)	1.07 (1.01, 1.13)	0.02	0.06 (0.03)	1.07 (1.01, 1.13)	0.03
Alzheimer's and Other Dementias	No	Reference								
	Yes	-0.22 (0.02)	0.81 (0.77, 0.84)	<0.0001	-0.22 (0.02)	0.80 (0.77, 0.84)	<0.0001	-0.22 (0.02)	0.80 (0.77, 0.83)	<0.0001
Parkinson's Disease	No	Reference								
	Yes	0.34 (0.047)	1.41 (1.28, 1.54)	<0.0001	0.34 (0.05)	1.41 (1.28, 1.54)	<0.0001	0.33 (0.05)	1.40 (1.27, 1.53)	<0.0001
CHESS	Continuous Variable	0.10 (0.01)	1.10 (1.08, 1.13)	<0.0001	0.10 (0.01)	1.11 (1.08, 1.14)	<0.0001	0.10 (0.01)	1.10 (1.08, 1.13)	<0.0001
English as a Primary Language	No	Reference								
	Yes	-0.13 (0.03)	0.88 (0.83, 0.92)	<0.0001	-0.13 (0.03)	0.88 (0.84, 0.92)	<0.0001	-0.13 (0.03)	0.88 (0.83, 0.92)	<0.0001
Hospitalized in the Last 90 Days	No	Reference								
	Yes	0.10 (0.02)	1.11 (1.06, 1.16)	<0.0001	0.10 (0.02)	1.10 (1.05, 1.15)	<0.0001	0.10 (0.02)	1.11 (1.06, 1.16)	<0.0001
Smoker	No	Reference								
	Yes	0.10 (0.04)	1.11 (1.03, 1.19)	0.006	0.11 (0.04)	1.12 (1.04, 1.20)	0.004	0.11 (0.04)	1.11 (1.04, 1.20)	0.004
Medication Adherence	Adherent	Reference								
	Non-Adherent	-0.09 (0.03)	0.92 (0.87, 0.97)	0.001	-0.07 (0.03)	0.93 (0.88, 0.98)	0.008	-0.08 (0.03)	0.92 (0.88, 0.98)	0.004
Days Between Baseline and Follow-up Assessment	Continuous Variable	-0.0003 (0.0001)	1.00 (1.00, 1.00)	0.004	-0.0003 (0.0001)	1.00 (1.00, 1.00)	0.003	-0.0003 (0.0001)	1.00 (1.00, 1.00)	0.003
C-Statistic		0.565			0.562			0.565		

4.4.3.2 Longitudinal models for worsening pain

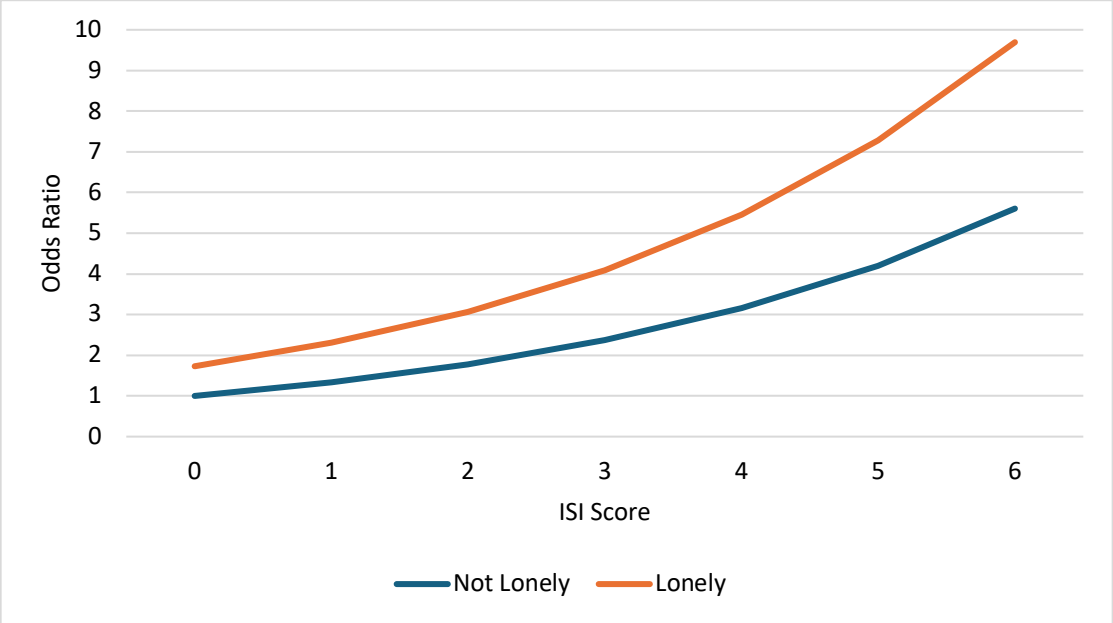
Table 4.8 presents the bivariate analysis of worsening Pain Scale scores from baseline to follow-up assessment. Potential covariates that were statistically significant include female, CPS, heart failure, cancer, Alzheimer's and other dementias, schizophrenia, all levels of ADL hierarchy, CHESS, English as a primary language, hospitalization, medication non-adherence, inadequate nutritional intake, and the number of days between baseline and follow-up assessment. Insignificant variables were age, economic trade-off, schizophrenia, and bipolar disorder. Loneliness and social isolation were both statistically significant, thus, an interaction term was included and included as statistically significant as well (p=0.02) (Table 4.8).

Table 4.8 Bivariate Analysis of Worsening Pain Scale Scores from Baseline to Follow-Up Assessment Among Ontario Home Care Clients (n=58,755)

Variable	Level	Parameter Estimate (Standard Error)	COR (95% CI)	P-value	C-statistic
Loneliness	No	Reference			
	Yes	0.22 (0.05)	See figure 4.4	<0.0001	0.527
Index of Social Isolation	Continuous Variable	0.06 (0.008)	See figure 4.4	<0.0001	
Loneliness and Social Isolation	Interaction	-0.04 (0.02)	See figure 4.4	0.02	
Loneliness-Isolation Typology	Neither	Reference			0.523
	Only Isolated	0.12 (0.02)	1.13 (1.09, 1.18)	<0.0001	
	Only Lonely	0.21 (0.05)	1.23 (1.13, 1.35)	<0.0001	
	Both	0.23 (0.03)	1.26 (1.19, 1.34)	<0.0001	
Age	<65	Reference			
	65 – 74	0.007 (0.04)	1.01 (0.93, 1.09)	0.85	0.502
	75-84	0.01 (0.03)	1.01 (0.95, 1.08)	0.76	
	85+	0.02 (0.03)	1.03 (0.96, 1.09)	0.47	
Female	No	Reference			
	Yes	0.24 (0.02)	1.27 (1.21, 1.31)	<0.0001	0.529
Cognitive Performance Scale	Continuous Variable	-0.006 (0.002)	0.99 (0.99, 1.00)	0.003	0.507
Rurality	Urban	Reference			
	Rural	-0.007 (0.03)	0.99 (0.94, 1.05)	0.79	0.500
Economic Trade-Off	No	Reference			
	Yes	0.086 (0.06)	1.00 (0.96, 1.23)	0.17	0.501
Heart Failure	No	Reference			
	Yes	0.25 (0.03)	1.28 (1.21, 1.36)	<0.0001	0.513
Cancer	No	Reference			
	Yes	0.18 (0.03)	1.20 (1.14, 1.27)	<0.0001	0.511
Alzheimer's and Other Dementias	No	Reference			
	Yes	-0.51 (0.02)	0.60 (0.58, 0.63)	<0.0001	0.558
Parkinson's Disease	No	Reference			
	Yes	0.03 (0.04)	1.03 (0.95, 1.12)	0.45	0.501
Schizophrenia	No	Reference			
	Yes	-0.32 (0.07)	0.73 (0.64, 0.83)	<0.0001	0.503
Bipolar Disorder	No	Reference			
	Yes	0.03 (0.07)	1.03 (0.89, 1.19)	0.70	0.500
ADL Hierarchy	Independent	Reference			
	Limited Assistance	-0.25 (0.02)	0.78 (0.75, 0.81)	<0.0001	0.531
	Extensive Assistance	-0.19 (0.03)	0.82 (0.78, 0.86)	<0.0001	
	Dependent	-0.27 (0.05)	0.77 (0.69, 0.85)	<0.0001	
CHESS	Continuous Variable	0.09 (0.01)	1.09 (1.07, 1.12)	<0.0001	0.519
English as a Primary Language	No	Reference			
	Yes	-0.15 (0.03)	0.86 (0.82, 0.90)	<0.0001	0.511
Hospitalized in the Last 90 Days	No	Reference			
	Yes	0.32 (0.02)	1.38 (1.32, 1.43)	<0.0001	0.535
Smoker	No	Reference			
	Yes	0.02 (0.04)	1.02 (0.95, 1.10)	0.55	0.501
Medication Adherence	Adherent	Reference			
	Non-Adherent	-0.14 (0.03)	0.87 (0.82, 0.91)	<0.0001	0.509
Nutritional Intake	Adequate	Reference			
	Inadequate	0.09 (0.05)	1.10 (1.00, 1.20)	0.04	0.502
Days Between Baseline and Follow-up Assessment	Continuous Variable	0.0009 (0.0001)	1.00 (1.00, 1.00)	<0.0001	0.524

Figure 4.4 demonstrates the main and interaction effects of social isolation and loneliness on worsening Pain scale scores from baseline to follow-up assessment. Odds of worsening pain increase with both lonely and not lonely groups as ISI score increases; however, the odds of worsening pain for lonely individuals increases at a more exponential rate as ISI score increases in comparison to their non-lonely counterparts due to their interaction (Figure 4.4).

Figure 4.4 Odds Ratio Model for Worsening Pain Scale Scores from Baseline to Follow-Up Assessment Among Ontario Home Care Clients with Loneliness and Social Isolation (n=58,755)



Only statistically significant variables from the bivariate analysis were included in the stepwise selection of potential covariates for the models with social isolation and loneliness (Table 4.9). The final model included female, heart failure, cancer, Alzheimer's disease and other dementias, schizophrenia, ADL hierarchy, CHESS, English as a primary language, hospitalization, medication non-adherence, and number of days between baseline and follow-up assessment. This indicates that CPS and inadequate nutrition were removed from the final model due to lack of statistical significance during stepwise selection.

Using adjusted odds ratios, Table 4.9 highlights that the odds of worsening pain increased with being female (AOR=1.30, 95% CI=1.26 – 1.25), heart failure (AOR=1.13, 95% CI=1.07 – 1.20), every one-point increase in CHESS score (AOR=1.09, 95% CI=1.06 – 1.12), hospitalization (AOR=1.23, 95% CI=1.18 – 1.28), and the number of days between baseline and follow-up assessment (AOR=1.00, 95% CI= 1.00– 1.00). Further, the odds of worsening pain decreased with Alzheimer's disease and other dementias (AOR=0.64, 95% CI=0.61 – 0.67); schizophrenia (AOR=0.70, 95% CI=0.61 – 0.80); limited assistance for ADLs (AOR=0.83, 95% CI=0.80 – 0.87), extensive assistance (AOR=0.83, 95% CI=0.78 – 0.87), and dependent (AOR=0.72, 95% CI=0.65 – 0.80) compared to individuals independent in ADLs; English as a primary language (AOR=0.93, 95% CI=0.88 – 0.97), and medication non-adherence (AOR=0.92, 95% CI=0.87 – 0.97). The c-statistic for this interim model was 0.597.

Table 4.9 Results of Stepwise Selection of Potential Covariates in Relation to Worsening Pain Scale Scores from Baseline to Follow-Up Assessment Among Ontario Home Care Clients (n=58,755)

Variable	**Level**	**Parameter Estimate (Standard Error)**	**AOR (95% CI)**	**P-value**
Female	No	Reference		
	Yes	0.26 (0.02)	1.30 (1.26, 1.35)	<0.0001
Heart Failure	No	Reference		
	Yes	0.126 (0.03)	1.13 (1.07, 1.20)	<0.0001
Cancer	No	Reference		
	Yes	0.11 (0.03)	1.11 (1.06, 1.18)	<0.0001
Alzheimer's and Other Dementias	No	Reference		
	Yes	-0.45 (0.02)	0.64 (0.61, 0.67)	<0.0001
Schizophrenia	No	Reference		
	Yes	-0.36 (0.07)	0.70 (0.61, 0.80)	<0.0001
ADL Hierarchy	Independent	Reference		
	Limited Assistance	-0.18 (0.02)	0.83 (0.80, 0.87)	<0.0001
	Extensive Assistance	-0.19 (0.03)	0.83 (0.78, 0.87)	<0.0001
	Dependent	-0.33 (0.05)	0.72 (0.65, 0.80)	<0.0001
CHESS	Continuous Variable	0.08 (0.01)	1.09 (1.06, 1.12)	<0.0001
English as a Primary Language	No	Reference		
	Yes	-0.08 (0.03)	0.93 (0.88, 0.97)	0.003
Hospitalized in the Last 90 Days	No	Reference		
	Yes	0.21 (0.02)	1.23 (1.18, 1.28)	<0.0001
Medication Adherence	Adherent	Reference		
	Non-Adherent	-0.09 (0.03)	0.92 (0.87, 0.97)	0.001
Days Between Baseline and Follow-up Assessment	Continuous Variable	0.0007 (0.0001)	1.00 (1.00, 1.00)	<0.0001

Table 4.10 provides the final model of worsening pain from baseline to follow-up assessment using three independent variables measuring social isolation and loneliness. All covariates had significant effects in all three test environments, with adjusted odds ratios of loneliness and social isolation in Test 1 and Test 2 providing similar results with the loneliness-isolation typologies in Test 3.

Test 3 shows the odds of worsening pain from baseline to follow-up for lonely, socially isolated, and the 'both' typologies increase in comparison to individuals identified as neither lonely nor socially isolated. Therefore, the odds of worsening pain from baseline to follow-up assessment were increased by only loneliness (AOR=1.24, 95% CI=1.14 – 1.36), only social isolation (AOR=1.08, 95% CI=1.04 – 1.13), and both (AOR=1.20, 95% CI=1.13 – 1.36) in comparison to individuals that are neither lonely nor socially isolated when controlling for heart failure, cancer, Alzheimer's and other dementias, schizophrenia, ADL hierarchy, CHESS score, English as a primary language, hospitalization, medication non-adherence, and the number of days between baseline and follow-up assessment (Table 4.10). Similar to self-rated health, the relationships between social isolation and loneliness and worsening pain, there may be mediating effects from health behaviours and outcomes.

Table 4.10 Final Model Testing with Three Independent Variables in Relation to Worsening Pain Scale Scores from Baseline to Follow-Up Assessment Among Ontario Home Care Clients (n=58,755)

		Test 1 - Loneliness			Test 2 - Social Isolation			Test 3 – Loneliness-Isolation Typologies		
Variable	**Level**	**Parameter Estimate (SE)**	**AOR (95% CI)**	**P-value**	**Parameter Estimate (SE)**	**AOR (95% CI)**	**P-value**	**Parameter Estimate (SE)**	**AOR (95% CI)**	**P-value**
Lonely	No	Reference								
	Yes	0.16 (0.03)	1.17 (1.11, 1.23)	<0.0001						
Index of Social Isolation	Continuous Variable				0.04 (0.007)	1.04 (1.02, 1.05)	<0.0001			
Loneliness-Isolation Typology	Neither	Reference								
	Only Isolated							0.080 (0.022)	1.08 (1.04, 1.13)	0.0002
	Only Lonely							0.22 (0.046)	1.24 (1.14, 1.36)	<0.0001
	Both							0.19 (0.03)	1.20 (1.13, 1.28)	<0.0001
Heart Failure	No	Reference								
	Yes	0.13 (0.03)	1.13 (1.07, 1.20)	<0.0001	0.12 (0.03)	1.13 (1.07, 1.20)	<0.0001	0.13 (0.03)	1.13 (1.07, 1.20)	<0.0001
Cancer	No	Reference								
	Yes	0.09 (0.03)	1.09 (1.03, 1.15)	0.002	0.09 (0.03)	1.09 (1.04, 1.15)	0.001	0.09 (0.03)	1.09 (1.04, 1.15)	0.001
Alzheimer's and Other Dementias	No	Reference								
	Yes	-0.44 (0.02)	0.65 (0.62, 0.67)	<0.0001	-0.43 (0.02)	0.65 (0.63, 0.68)	<0.0001	-0.43 (0.02)	0.65 (0.62, 0.68)	<0.0001
Schizophrenia	No	Reference								
	Yes	-0.37 (0.07)	0.69 (0.60, 0.79)	<0.0001	-0.39 (0.07)	0.68 (0.59, 0.78)	<0.0001	-0.38 (0.07)	0.68 (0.60, 0.78)	<0.0001
ADL Hierarchy	Independent	Reference								
	Limited Assistance	-0.19 (0.02)	0.83 (0.79, 0.87)	<0.0001	-0.18 (0.02)	0.83 (0.80, 0.87)	<0.0001	-0.18 (0.02)	0.83 (0.80, 0.87)	<0.0001
	Extensive Assistance	-0.20 (0.03)	0.82 (0.77, 0.86)	<0.0001	-0.20 (0.03)	0.82 (0.78, 0.86)	<0.0001	-0.20 (0.03)	0.82 (0.78, 0.87)	<0.0001
	Dependent	-0.33 (0.05)	0.72 (0.65, 0.80)	<0.0001	-0.32 (0.05)	0.73 (0.66, 0.81)	<0.0001	-0.32 (0.05)	0.73 (0.66, 0.81)	<0.0001
CHESS	Continuous Variable	0.08 (0.01)	1.08 (1.06, 1.11)	<0.0001	0.08 (0.01)	1.09 (1.06, 1.11)	<0.0001	0.08 (0.01)	1.08 (1.06, 1.11)	<0.0001
English as a Primary Language	No	Reference								
	Yes	-0.07 (0.03)	0.93 (0.88, 0.98)	0.004	-0.07 (0.03)	0.93 (0.89, 0.98)	0.005	-0.07 (0.03)	0.93 (0.88, 0.98)	0.004
Hospitalized in the Last 90 Days	No	Reference								
	Yes	0.20 (0.02)	1.22 (1.17, 1.27)	<0.0001	0.19 (0.02)	1.21 (1.16, 1.26)	<0.0001	0.20 (0.02)	1.22 (1.17, 1.27)	<0.0001
Medication Adherence	Adherent	Reference								
	Non-Adherent	-0.09 (0.03)	0.91 (0.86, 0.96)	0.0005	-0.11 (0.03)	0.90 (0.85, 0.95)	0.0001	-0.10 (0.03)	0.90 (0.86, 0.95)	0.0001
Days Between Baseline and Follow-up Assessment	Continuous Variable	0.0008 (0.0001)	1.00 (1.00, 1.00)	<0.0001	0.0008 (0.0001)	1.00 (1.00, 1.00)	<0.0001	0.0008 (0.0001)	1.00 (1.00, 1.00)	<0.0001
C-Statistic		0.592			0.591			0.592		

4.4.3.3 Longitudinal models for self-reported mood

Table 4.11 presents the bivariate analysis of worsening self-reported mood from baseline to follow-up assessment. Potential covariates that were statistically significant in this analysis include age, female, CPS, economic trade-off, cancer, Alzheimer's and other dementias, Parkinson's disease, bipolar disorder, all levels of ADL hierarchy, CHESS, English as a primary language, hospitalization, smoker, medication non-adherence, inadequate nutritional intake, and the number of days between baseline and follow-up assessment. Insignificant variables were age, economic trade-off, schizophrenia, and bipolar disorder. Loneliness and social isolation were both statistically significant. Thus, an interaction term was tested but ultimately excluded due to statistical non-significance.

Table 4.11 Bivariate Analysis of Worsening Self-Reported Mood from Baseline to Follow-Up Assessment Among Ontario Home Care Clients (n=101,759)

Variable	Level	Parameter Estimate (Standard Error)	COR (95% CI)	P-value	C-statistic
Loneliness	No	Reference			
	Yes	0.45 (0.02)	1.57 (1.50, 1.65)	<0.0001	0.528
Index of Social Isolation	Continuous Variable	0.04 (0.006)	1.04 (1.03, 1.05)	<0.0001	0.513
Loneliness-Isolation Typology	Neither	Reference			
	Only Isolated	-0.02 (0.02)	0.99 (0.95, 1.02)	0.42	0.529
	Only Lonely	0.42 (0.05)	1.52 (1.39, 1.66)	<0.0001	
	Both	0.46 (0.03)	1.58 (1.49, 1.66)	<0.0001	
Age	<65	Reference			
	65 – 74	-0.02 (0.03)	0.98 (0.91, 1.05)	0.53	0.531
	75-84	-0.08 (0.03)	0.92 (0.87, 0.98)	0.006	
	85+	-0.29 (0.03)	0.75 (0.71, 0.80)	<0.0001	
Female	No	Reference			
	Yes	0.16 (0.02)	1.17 (1.13, 1.21)	<0.0001	0.519
Cognitive Performance Scale	Continuous Variable	-0.006 (0.002)	0.99 (0.99, 1.00)	0.0007	0.507
Rurality	Urban	Reference			
	Rural	-0.003 (0.02)	1.00 (0.95, 1.05)	0.9	0.500
Economic Trade-Off	No	Reference			
	Yes	0.28 (0.06)	1.33 (1.19, 1.48)	<0.0001	0.503
Heart Failure	No	Reference			
	Yes	0.02 (0.03)	1.02 (0.97, 1.07)	0.41	0.501
Cancer	No	Reference			
	Yes	0.07 (0.02)	1.07 (1.02, 1.12)	0.004	0.504
Alzheimer's and Other Dementias	No	Reference			
	Yes	-0.17 (0.02)	0.84 (0.81, 0.88)	<0.0001	0.516
Parkinson's Disease	No	Reference			
	Yes	0.15 (0.04)	1.16 (1.07, 1.25)	0.0001	0.503
Schizophrenia	No	Reference			
	Yes	-0.05 (0.07)	0.95 (0.82, 1.10)	0.47	0.500
Bipolar Disorder	No	Reference			
	Yes	0.41 (0.07)	1.52 (1.33, 1.74)	<0.0001	0.503
ADL Hierarchy	Independent	Reference			
	Limited Assistance	-0.20 (0.02)	0.82 (0.79, 0.85)	<0.0001	0.532
	Extensive Assistance	-0.26 (0.02)	0.77 (0.74, 0.81)	<0.0001	
	Dependent	-0.43 (0.05)	0.65 (0.59, 0.72)	<0.0001	
CHESS	Continuous Variable	0.07 (0.01)	1.07 (1.05, 1.10)	<0.0001	0.515
English as a Primary Language	No	Reference			
	Yes	-0.25 (0.02)	0.78 (0.75, 0.81)	<0.0001	0.519
Hospitalized in the Last 90 Days	No	Reference			
	Yes	0.10 (0.02)	1.10 (1.06, 1.14)	<0.0001	0.511
Smoker	No	Reference			
	Yes	0.27 (0.03)	1.30 (1.23, 1.39)	<0.0001	0.509
Medication Adherence	Adherent	Reference			
	Non-Adherent	0.15 (0.03)	1.16 (1.10, 1.22)	<0.0001	0.508
Nutritional Intake	Adequate	Reference			
	Inadequate	0.17 (0.05)	1.19 (1.80, 1.30)	0.0002	0.503
Days Between Baseline and Follow-up Assessment	Continuous Variable	-0.001 (0.0001)	1.00 (1.00, 1.00)	<0.0001	0.526

To strengthen the analysis, only statistically significant variables from the bivariate analysis were included in the stepwise selection (Table 4.12). The final model included age, female, economic trade-off, cancer, Alzheimer's and other dementias, Parkinson's disease, bipolar disorder, all levels of ADL hierarchy, CHESS, English as a primary language, hospitalization, smoker, medication non-adherence, and the number of days between baseline and follow-up assessment. This indicates that CPS and inadequate nutritional intake were removed from the final model due to lack of statistical significance during stepwise selection, similar to results for pain (Table 4.9).

Using adjusted odds ratios, Table 4.12 shows that the odds of worsening self-reported mood increased with being female (AOR=1.22, 95% CI=1.18 – 1.26), economic trade-off (AOR=1.19, 95% CI=1.07 – 1.34), Parkinson's disease (AOR=1.22, 95% CI=1.13 – 1.32), bipolar disorder (AOR=1.36, 95% CI=1.19 – 1.56), each 1-point increase in CHESS score (AOR=1.07, 95% CI=1.04 – 1.09), hospitalization (AOR=1.05, 95% CI=1.01 – 1.09), smoker (AOR=1.17, 95% CI= 1.10 – 1.17), and medication non-adherence (AOR=1.12, 95% CI=1.06 – 1.17).

The odds of worsening self-reported mood decreased with ages 65-74 (AOR=0.95, 95% CI=0.88 – 1.02), 75-84 (AOR=0.91, 95% CI=0.85 – 0.97), and 85+ (AOR=0.75, 95% CI=0.71 – 0.80) in comparison to individuals less than 65; Alzheimer's disease and other dementias (AOR=0.86, 95% CI=0.82 – 0.89); limited assistance (AOR=0.84, 95% CI=0.81 – 0.87), extensive assistance (AOR=0.77, 95% CI=0.73 – 0.81), and dependent (AOR=0.63, 95% CI=0.57 – 0.70) compared to independent individuals; and English as a primary language (AOR=0.82, 95% CI=0.78 – 0.86). The c-statistic for this interim model was 0.574.

Table 4.12 Results of Stepwise Selection of Potential Covariates in Relation to Worsening Self-Reported Mood from Baseline to Follow-Up Assessment Among Ontario Home Care Clients (n=101,759)

Variable	**Level**	**Parameter Estimate (Standard Error)**	**AOR (95% CI)**	**P-value**
Age	<65	Reference		
	65 – 74	-0.05 (0.04)	0.95 (0.88, 1.02)	0.18
	75-84	-0.09 (0.03)	0.91 (0.85, 0.97)	0.003
	85+	-0.28 (0.03)	0.75 (0.71, 0.80)	<0.0001
Female	No	Reference		
	Yes	0.20 (0.02)	1.22 (1.18, 1.26)	<0.0001
Economic Trade-Off	No	Reference		
	Yes	0.18 (0.06)	1.19 (1.07, 1.34)	0.002
Alzheimer's and Other Dementias	No	Reference		
	Yes	-0.16 (0.02)	0.86 (0.82, 0.89)	<0.0001
Parkinson's Disease	No	Reference		
	Yes	0.20 (0.04)	1.22 (1.13, 1.32)	<0.0001
Bipolar Disorder	No	Reference		
	Yes	0.31 (0.07)	1.36 (1.19, 1.56)	<0.0001
ADL Hierarchy	Independent	Reference		
	Limited Assistance	-0.17 (0.02)	0.84 (0.81, 0.87)	<0.0001
	Extensive Assistance	-0.26 (0.02)	0.77 (0.73, 0.81)	<0.0001
	Dependent	-0.46 (0.05)	0.63 (0.57, 0.70)	<0.0001
CHESS	Continuous Variable	0.07 (0.01)	1.07 (1.04, 1.09)	<0.0001
English as a Primary Language	No	Reference		
	Yes	-0.20 (0.02)	0.82 (0.78, 0.86)	<0.0001
Hospitalized in the Last 90 Days	No	Reference		
	Yes	0.05 (0.02)	1.05 (1.01, 1.09)	0.02
Smoker	No	Reference		
	Yes	0.15 (0.03)	1.17 (1.10, 1.25)	<0.0001
Medication Adherence	Adherent	Reference		
	Non-Adherent	0.11 (0.03)	1.12 (1.06, 1.17)	<0.0001
Days Between Baseline and Follow-up Assessment	Continuous Variable	-0.001 (0.0001)	1.00 (1.00, 1.00)	<0.0001

The final model of worsening self-reported mood from baseline to follow-up assessment is presented in Table 4.13 against three independent variables measuring social isolation and loneliness. All covariates had overall significant effects in all three test scenarios, with adjusted odds ratios of loneliness and social isolation in Test 1 and Test 2 providing similar results with the loneliness-isolation typologies in Test 3 despite the discrepancies in p-value between social isolation in Test 2 and Test 3.

Test 3 shows the odds of worsening self-reported mood from baseline to follow-up for lonely and the 'both' typologies increase in comparison to individuals identified as neither lonely nor socially isolated. In contrast, the odds of worsening self-reported mood from baseline to follow-up for the isolated typology decrease in comparison to individuals identified as neither lonely nor socially isolated. Therefore, the odds of worsening self-reported mood from baseline to follow-up assessment were decreased by only isolated (AOR=0.92, 95% CI=0.88 – 0.95), but increased by only loneliness (AOR=1.49, 95% CI=1.36 – 1.63) and both (AOR=1.44, 95% CI=1.36 – 1.51) in comparison to individuals that are neither lonely nor socially isolated when controlling for age, female, economic trade-off, Alzheimer's and other dementias, Parkinson's disease, bipolar disorder, ADL hierarchy, CHESS score, English as a primary language, hospitalization, smoking status, medication non-adherence, and the number of days between baseline and follow-up assessment (Table 4.13). This model indicates that social isolation and loneliness have unique relationships with self-reported mood despite controlling for potential covariates.

Table 4.13 Final Model Testing with Three Independent Variables in Relation to Worsening Self-Reported Mood from Baseline to Follow-Up Assessment Among Ontario Home Care Clients (n=101,759)

		Test 1 - Loneliness			Test 2 - Social Isolation			Test 3 – Loneliness-Isolation Typologies		
Variable	**Level**	**Parameter Estimate (SE)**	**AOR (95% CI)**	**P-value**	**Parameter Estimate (SE)**	**AOR (95% CI)**	**P-value**	**Parameter Estimate (SE)**	**AOR (95% CI)**	**P-value**
Lonely	No	Reference								
	Yes	0.42 (0.02)	1.52 (1.45, 1.59)	<0.0001						
Index of Social Isolation	Continuous Variable				0.003 (0.007)	1.00 (0.99, 1.02)	0.64			
Loneliness-Isolation Typology	Neither	Reference								
	Only Isolated							-0.09 (0.02)	0.92 (0.88, 0.95)	<0.0001
	Only Lonely							0.40 (0.05)	1.49 (1.36, 1.63)	<0.0001
	Both							0.36 (0.03)	1.44 (1.36, 1.51)	<0.0001
Age	<65	Reference								
	65 – 74	-0.05 (0.04)	0.95 (0.89, 1.02)	0.17	-0.05 (0.04)	0.95 (0.89, 1.02)	0.18	-0.05 (0.04)	0.95 (0.89, 1.02)	0.17
	75-84	-0.10 (0.03)	0.91 (0.85, 0.97)	0.002	-0.09 (0.03)	0.91 (0.85, 0.97)	0.003	-0.10 (0.03)	0.91 (0.85, 0.96)	0.002
	85+	-0.29 (0.03)	0.75 (0.70, 0.80)	<0.0001	-0.28 (0.03)	0.75 (0.71, 0.80)	<0.0001	-0.29 (0.03)	0.75 (0.71, 0.80)	<0.0001
Female	No	Reference								
	Yes	0.18 (0.018)	1.20 (1.16, 1.25)	<0.0001	0.20 (0.02)	1.22 (1.18, 1.26)	<0.0001	0.20 (0.02)	1.22 (1.18, 1.26)	<0.0001
Economic Trade-Off	No	Reference								
	Yes	0.15 (0.06)	1.17 (1.04. 1.31)	0.008	0.18 (0.06)	1.19 (1.07, 1.33)	0.002	0.16 (0.06)	1.18 (1.05, 1.32)	0.0051
Alzheimer's and Other Dementias	No	Reference								
	Yes	-0.15 (0.02)	0.86 (0.83, 0.90)	<0.0001	-0.15 (0.02)	0.86 (0.82, 0.89)	<0.0001	-0.16 (0.02)	0.86 (0.82, 0.89)	<0.0001
Parkinson's Disease	No	Reference								
	Yes	0.21 (0.04)	1.23 (1.14, 1.33)	<0.0001	0.20 (0.04)	1.23 (1.13, 1.32)	<0.0001	0.20 (0.04)	1.22 (1.13, 1.32)	<0.0001
Bipolar Disorder	No	Reference								
	Yes	0.30 (0.07)	1.34 (1.17, 1.54)	<0.0001	0.31 (0.07)	1.36 (1.19, 1.56)	<0.0001	0.30 (0.07)	1.35 (1.18, 1.55)	<0.0001
ADL Hierarchy	Independent	Reference								
	Limited Assistance	-0.16 (0.02)	0.85 (0.82, 0.89)	<0.0001	-0.17 (0.02)	0.84 (0.81, 0.87)	<0.0001	-0.17 (0.02)	0.85 (0.82, 0.88)	<0.0001
	Extensive Assistance	-0.25 (0.02)	0.78 (0.75, 0.82)	<0.0001	-0.26 (0.02)	0.77 (0.73, 0.81)	<0.0001	-0.25 (0.02)	0.78 (0.74, 0.82)	<0.0001
	Dependent	-0.44 (0.05)	0.64 (0.58, 0.71)	<0.0001	-0.45 (0.05)	0.64 (0.58, 0.70)	<0.0001	-0.45 (0.05)	0.64 (0.58, 0.70)	<0.0001
CHESS	Continuous Variable	0.05 (0.01)	1.067 (1.03, 1.08)	<0.0001	0.07 (0.01)	1.07 (1.04, 1.09)	<0.0001	0.06 (0.01)	1.06 (1.03, 1.08)	<0.0001
English as a Primary Language	No	Reference								
	Yes	-0.21 (0.02)	0.81 (0.78, 0.85)	<0.0001	-0.20 (0.02)	0.82 (0.78, 0.86)	<0.0001	-0.21 (0.02)	0.81 (0.78, 0.85)	<0.0001
Hospitalized in the Last 90 Days	No	Reference								
	Yes	0.06 (0.02)	1.06 (1.02, 1.10)	0.003	0.05 (0.02)	1.05 (1.01, 1.09)	0.018	0.06 (0.02)	1.06 (1.02, 1.10)	0.0016
Smoker	No	Reference								
	Yes	0.15 (0.03)	1.16 (1.09, 1.24)	<0.0001	0.15 (0.03)	1.17 (1.09, 1.24)	<0.0001	0.16 (0.03)	1.17 (1.10, 1.25)	<0.0001
Medication Adherence	Adherent	Reference								
	Non-Adherent	0.09 (0.03)	1.09 (1.04, 1.15)	0.0008	0.11 (0.03)	1.11 (1.06, 1.17)	<0.0001	0.10 (0.03)	1.10 (1.05, 1.16)	0.0002
Days Between Baseline and Follow-up Assessment	Continuous Variable	-0.001 (0.0001)	1.00 (1.00, 1.00)	<0.0001	-0.001 (0.0001)	1.00 (1.00, 1.00)	<0.0001	-0.001 (0.0001)	1.00 (1.00, 1.00)	<0.0001
C-Statistic		0.584			0.574			0.585		

4.5 Discussion

Bivariate analyses revealed the associations of loneliness and social isolation with smoking, inadequate nutrition, and medication non-adherence at baseline. Although all six relationships were statistically significant, the interaction term between social isolation and loneliness was only statistically significant in inadequate nutrition and was therefore excluded in the other two models. Most variables were significantly associated with each health behaviour of interest, with slight variations. For example, smoking was associated with all but cancer and CHESS, inadequate nutrition was associated with all but rurality and schizophrenia, and medication non-adherence was associated with all but sex. Additionally, all three health outcomes of interest demonstrated increasing odds with both lonely and not lonely groups as ISI scores increased, regardless of interaction term (Figures 4.1 - 4.3). This indicates that smoking, inadequate nutrition, and medication non-adherence are each statistically significantly associated with loneliness and social isolation. Additionally, the bivariate analyses of loneliness-isolation typologies were all statistically significant for each health behaviour of interest. Individuals identified as both socially isolated and lonely had the highest odds of smoking, inadequate nutrition, and medication non-adherence of the three loneliness-isolation typologies compared to their non-lonely and non-isolated counterparts depicted in the 'neither' group.

The final model presenting worsening self-rated health from baseline to follow-up demonstrated that loneliness and social isolation had different relationships with the dependent variable when controlling for female, CPS, rurality, heart failure, cancer, Alzheimer's and other dementias, Parkinson's disease, CHESS score, English as a primary language, hospitalizations, smoking status, medication non-adherence, and the number of days between baseline and follow-up assessment. Lonely individuals had 21% higher odds of worsening self-rated health from

baseline to follow-up assessment in comparison to non-lonely individuals when controlling for covariates.

Next, the final model presenting worsening pain scale scores from baseline to follow-up assessment demonstrated that loneliness and social isolation both had relationships with the dependent variable when controlling for heart failure, cancer, Alzheimer's and other dementias, schizophrenia, ADL hierarchy, CHESS score, English as a primary language, hospitalizations, medication non-adherence, and the number of days between baseline and follow-up assessment. Lonely individuals had approximately 17% higher odds of worsening pain from baseline to follow-up assessment in comparison to non-lonely individuals when controlling for covariates. In comparison, socially isolated individuals had approximately 4% higher odds of worsening pain from baseline to follow-up assessment in comparison to non- socially isolated individuals when controlling for covariates.

The final model presenting worsening self-reported mood from baseline to follow-up assessment demonstrated that loneliness and social isolation had different relationships with the dependent variable when controlling for age, sex, economic trade-offs, Alzheimer's and other dementias, Parkinson's disease, bipolar disorder, ADL hierarchy, CHESS score, English as a primary language, hospitalizations, smoking status, medication non-adherence, and the number of days between baseline and follow-up assessment. Lonely individuals had approximately 52% higher odds of worsening self-reported mood from baseline to follow-up assessment in comparison to non-lonely individuals when controlling for covariates.

These results add to previous literature by clarifying the differences in health outcomes and health behaviours for social isolation and loneliness. The two types of measures are separate and unique concepts with differing relationships with health behaviours and outcomes.

Smith and Victor (2019) suggest that social isolation and loneliness should be grouped into typologies reflecting the experiences of older adults. The final model of each health outcome of interest in our study provides a multivariate logistic regression testing the relationship of the health outcome with loneliness-isolation typologies by separating loneliness and social isolation from each other to determine true main effects and interaction effects using the 'both' groups. The final models demonstrate that for worsening self-rated health, worsening pain, and worsening self-reported mood, all three typologies provided unique and statistically significant results in comparison to the 'neither' group. Therefore, the presence of any level of social isolation or loneliness in older adult Ontario home care clients is associated with self-rated health, pain, and self-reported mood in a relationship that is unique from other loneliness-isolation typologies. However, it is not always that case that both isolation and loneliness had the highest adjusted odds ratios with health outcomes. In some instances, loneliness was a more important factor than objective isolation.

Our findings provide strong evidence for the differentiation of social isolation and loneliness. Past literature has intertwined loneliness and social isolation definitions as well as health outcomes and associated them with high risk of mortality. This study provides clear differentiation of the relationships of social isolation and loneliness with three health behaviours and three health outcomes. Additionally, the loneliness-isolation typologies present further opportunity for the exploration of pathways from loneliness and social isolation to mortality, allowing for further clarification within the literature.

For routine use in clinical practice, the composite measure of isolation and loneliness has a number of advantages, including ease of interpretation, ability to differentiate subgroups, and targeting for interventions that may be more closely related with specific sub-categories. In

addition, this composite measure could serve as a triggering mechanism for new care planning protocols related to isolation and loneliness in the interRAI HC.

One of the many strengths of this study include the large representative sample of the Ontario home care population, allowing for generalizability through the representation of various groups. Additionally, most literature has focused on the general population, providing insights for generally less vulnerable individuals. This study broadens this to examine a community-dwelling population that is vulnerable and potentially more susceptible to loneliness or social isolation and their associated health behaviours and outcomes.

A key limitation of this paper is that we did not examine every health behaviour and outcome that has been linked with social isolation, loneliness, or older adults. The six health behaviours and outcomes used in this study were selected to provide a broad overview of one's health. Smoking, inadequate nutrition, and medication nonadherence each represent a different facet of negative health behaviours that are present in the literature, but not all explored to the same depth. Further, pain and self-reported mood depict physical and mental health, while self-rated health provides a subjective overview of the general health of the individual. While these six variables are a strong foundation, future studies should examine other health behaviours and outcomes to create more comprehensive profiles of each typology. Another limitation of this study is the use of a single-item measurement tool for loneliness, preventing the opportunity from gaining a comprehensive analysis of loneliness that may be possible with a more complex scale (Mund et al., 2023). Future analyses should examine the relationships between the multivariate logistic regression models created in this study and the progression to mortality to begin understanding the full pathway.

4.6 Conclusion

In conclusion, the relationships of social isolation or loneliness and health presented in this chapter provide strong supporting evidence for the need to differentiate social isolation and loneliness within the literature. Using loneliness-isolation typologies, unique health profiles can be built for social isolation and loneliness as they are each their own respective health concern regardless of mortality risk. Moreover, any future analyses related to loneliness, isolation, and mortality should consider mediating effects of health behaviours and interim physical and mental health states.

Chapter 5: Identifying Targets for Social Interventions: A Community Health Needs Assessment of Home Care Clients in Huron - Perth Region, Ontario

5.1 Background

Needs can be operationalized in a variety of ways, including as felt needs, expressed needs, normative needs, or comparative needs (Bradshaw, 1972). Within the context of health, a need can be defined based on available preventive or treatment-based interventions as 'the ability to benefit from health care' (Higginson et al., 2007; Stevens, 2004). While traditionally health care focuses on clinical services, social interventions have been promoted as non-medical solutions to health needs in both research and practice.

Community health needs assessments consider the strengths and limitations of a target population to establish priorities, improve community health status, and enhance quality of life through collaborative action planning (Winnipeg Regional Health Authority). Without up-to-date information on a community's needs, it is extremely difficult to plan, structure, or evaluate programs (Neuber, 1980, pp. 15-16). Thus, the collection of this type of data provides a foundation for rational decision-making for planning future services (Neuber, 1980, pp. 15-16).

Three approaches to assessing need are the epidemiological approach, the corporate approach, and a comparative approach (Higginson et al., 2007). This study will use a comparative approach in which members of a target community are compared with those in a broader reference population to gain insight on needs and services (Higginson et al., 2007). This also completes the first three steps of the epidemiological approach in which the problem is stated, the target population is divided into relevant demographic subcategories, and the size of the need is determined (Higginson et al., 2007). The final three steps are conducted in the next phase of this study (Chapter 6) in which a resource inventory is established to determine the current level of services, the effectiveness and cost-effectiveness, and finally bringing the information together to make recommendations for the future (Higginson et al., 2007).

This project involved a two-year community-based participatory research initiative that included a team of researchers at the University of Waterloo, collaborators at the Canadian Red Cross, and a working group comprised of community partners from agencies within the Huron-Perth region. The goal of this project was to identify needs in the community that could be addressed using local social interventions. In the case of this needs assessment, the need will have an effective solution in social initiatives as 'needs' are equated with 'capacity to benefit' through clinical benefit, reassurance, caregiver relief, and supportive care (Higginson et al., 2007).

Consistent communication and updates with community partners and stakeholders provided a strong foundation for relationships to be built between stakeholders and the research team. The information gathered and presented in this needs assessment aims to align resources and strategy, clarify opportunities for implementation of social interventions, and set goals for future action using the data to inform decision-making (Sleezer et al., 2014). Further, this needs assessment will establish the objectives and target variables for interventions and provide baseline data for later evaluation of results that are outside the scope of this dissertation (Sleezer et al., 2014).

5.2 Research Objectives

1. What are the health and social needs of home care clients in the Huron-Perth region of compared with the broader population of Ontario home care clients?
2. How are health needs are associated with social isolation and loneliness among home care clients in Huron-Perth and the rest of Ontario?
3. What health and social needs might be addressed through social interventions offered locally?

5.3 Methods

5.3.1 Study Design and Setting

A cross-sectional retrospective needs assessment study of older adults, aged 65 and older, receiving home care services in Ontario was conducted. Data were obtained from the most recent community assessment for each individual collected from January 1, 2018 to January 1, 2022 in nine forward sortation areas (FSAs) covering rural cities, towns, and communities in the Huron-Perth region. This region was selected because it was identified as a priority area by a benefactor to the Red Cross partners in this project.

The Huron-Perth region is made up of communities from both Huron County (N0G, N0M, N7A) and Perth County (N0K, N4W, N4X, N4Z, N5A). There is overlap between counties and FSAs; however, FSAs containing parts of the region of interest were included. Although the N0B FSA includes many areas outside the scope of the region of interest, it was retained because it included the Huron-Perth community of Shakespeare, Ontario.

Larger urban city centres such as London, Ontario and Waterloo, Ontario were omitted from the region of interest due to demographic differences as well as differences in access to resources and services. The included FSAs were then compared to the rest of Ontario, to obtain a provincial-level reference point.

The University of Waterloo's Office of Research Ethics (#45215) provided ethics approval for the study.

5.3.2 Sample

The study sample was restricted to include only assessments of adults aged 65+ conducted within community settings (excluding hospitals, residential care facilities, hospices, correctional facilities, and other non-community settings). Data for the Huron-Perth region of Ontario, Canada

were compared to community assessment data from older adults aged 65+ living within the rest of Ontario, Canada. Participants were included if they were receiving services in Ontario.

5.3.3 Data Collection Instrument and Recruitment

The interRAI Home Care Assessment is used in routine practice to identify the needs of home care clients who are expected to receive services for more than two months (McArthur et al., 2022). This assessment is first conducted within seven days of the individual being categorized as eligible for long-term home care services (Canadian Institute for Health Information, 2025). Assessments are then completed every six to twelve months following the initial intake assessment, or earlier if prompted by a noteworthy change in health status (McArthur et al., 2022). The person-centered information collected within this comprehensive assessment pertains to categories such as cognition, mood, activities of daily living, falls, behaviour, and a range of health diagnoses, symptoms, and behaviours (Hirdes, Ljunggren, et al., 2008).

Due to the importance of community support and integration for this project, stakeholders and a local gerontologist were invited to discuss their thoughts on the main areas of concern for community-dwelling older adults in the Huron-Perth counties. Highlighted topics were then considered and added as dependent variables of interest within this analysis. Quarterly working groups, monthly updates, and a variety of interactive presentations and information sessions were held by the interRAI Canada team at the University of Waterloo to engage members of the Huron-Perth communities as active contributors. This needs assessment represents a comprehensive list of variables that were presented to community members and stakeholders along with their prevalences in Huron-Perth FSAs in comparison to Ontario, Canada. Key areas of need were then identified collaboratively.

5.3.4 Dependent Variables of Interest

The Red Cross partners in this project had an interest in psychosocial factors that would be amenable to community interventions, including a "friendly caller" program that they had established. Consequently, this needs assessment included a specific focus on social isolation and loneliness while also considering a broader set of areas of concern such as depression, cognition, functional capacity, clinical indicators, health service use, and informal care.

The Index of Social Isolation (ISI) is an objective measure of isolation using six items that correspond to social isolation , including: single marital status, living alone, being alone for eight or more hours of the day, having no informal caregiver, not having supportive friends and family, and experiencing a decline in social activities in the last 90 days (see Chapter 3).

Loneliness is the subjective aspect of isolation used in conjunction with the ISI to gain a comprehensive understanding of both the objective and subjective dimensions of isolation. A single item based on clinician-rated loneliness was used to measure loneliness in this analysis. This item has been used in previously published research on the association between loneliness and mortality in Canada, Finland, and New Zealand (Egbujie et al., 2025).

A variety of clinical measures were also considered in the need analysis. Validated against the Mini-Mental State Exam, the Cognitive Performance Scale (CPS) is used to evaluate cognition using items analyzing consciousness, memory impairment, and executive functioning, ranging from intact to severely impaired (Hogeveen et al., 2017; Morris et al., 1994). The Activities of Daily Living Hierarchy Scale (ADLH) measures functional independence based on ADLs for personal hygiene, locomotion, toileting, and eating (Mofina et al., 2026; Morris et al., 2000). A score of 0 to 6 corresponds with categories independent to total dependence (Morris et al., 1999). The Instrumental Activities of Daily Living Capacity Hierarchy Scale (IADLCH) assesses the

difficulty for an individual to perform IADLs shopping, meal preparation, housework, managing medications, and managing finances, ranging from 0 to 6, with level of difficulty increasing with score (Morris et al., 2013). The Changes in Health, End-Stage Disease, Signs, and Symptoms Scale (CHESS) identifies those at risk of serious health decline by evaluating health instability using a count of decline in ADLs, cognition, clinical symptoms, and a clinician rating of prognosis less than six months (Hirdes et al., 2014; Hogeveen et al., 2017). The Method for Assigning Priority Levels (MAPLe) is a strong predictor of caregiver distress, nursing home placement, and need for alternative placement to improve outlook, prioritizing individuals from low to very high (Hirdes, Poss, et al., 2008). The Pain Scale evaluates pain intensity and frequency to produce a score between no pain and daily severe pain (Hogeveen et al., 2017).

To align with Chapter 4, an array of health behaviours and outcomes were assessed. The Composite Mood Scale reports mood symptoms using three self-reported and four clinician-rated items regarding dysphoria, anhedonia, and anxiety (Hirdes et al., 2022). The scale ranges from none to severe symptom burden, with higher scores denoting greater mood disturbances (Hirdes et al., 2022). Smoking status, eating one or fewer meals in the last three days, and medication non-adherence were all identified with corresponding single items within the interRAI Home Care assessment and collapsed into binary variables for data analysis to represent the chosen health behaviours. Self-rated health is a widely used global, subjective measure of health based on a singular question asking how the respondent would rate their health given the options: excellent, good, fair, poor, and could/would not respond.

Formal care services assessed in the interRAI Home Care assessments include the number of days of formal care service received in the last seven days from home health aides, home nurses, homemaking services, meal services, occupational therapy, speech-language pathology and

audiology services, physical therapy, and psychological therapy. Some indicators of health service use were also considered as process indicators of health needs. These include the number of days in the last 90 that the individual had an in-patient acute hospital with overnight stay, physician visit, and an emergency room visit.

The primary and secondary key informal helpers' relationship to the care recipient and help provided with ADLs or IADLs. Financial situation was measured through a single question that asks if the individual has made financial trade-offs in the last 30 days due to limited funds, representing a measure of poverty (Davies et al., 2016). A hazardous home environment was assessed based on any of the following conditions: disrepair of the home, squalid conditions, lack of personal safety, and limited access to home or rooms in home.

5.3.5 Statistical Analysis

Participant characteristics were summarised as frequency (n) and proportion (%). Individuals were stratified based on their geographic location and chi-square analyses were used with p-values to determine statistical significance, defined as $\alpha < 0.05$. All statistical analyses were secondary data analysis of interRAI Home Care Assessment data, performed using SAS Studio (SAS Institute, 2023).

5.4 Results

A total of 332, 395 individuals were included in the analytic sample. Table 5.1 outlines the FSA and their associated towns; for clarity, each FSA will subsequently be referred to as the largest town listed within the region of interest. The identified FSAs likely include other towns not listed in Table 5.1 as well due to the rurality of the regions of interest; thus, only larger settlements were named. The largest Huron-Perth FSA in the sample was N0G with 1,816 individuals, while the comparative sample for the rest of Ontario was 325, 510 (Table 5.1).

Table 5.1 Forward Sortation Areas and Associated Towns Included in the Huron-Perth Study (n=332,395)

Forward Sortation Area	Primary Town(s)	Percentage (n)			Chi-Square Test for Huron-Perth VS Rest of Ontario
		Entire Sample	Huron Perth	Remainder of Ontario	
N0G	Wingham	0.4 (1426)	20.7 (1426)	0.0 (0)	332,395 (p<0.0001)
N0M	Exeter	0.6 (1816)	26.4 (1816)	0.0 (0)	
N7A	Goderich	0.1 (400)	5.8 (400)	0.0 (0)	
N4W	Listowel	0.1 (341)	5.0 (341)	0.0 (0)	
N0K	Milverton	0.1 (432)	6.3 (432)	0.0 (0)	
N0B	Shakespeare	0.3 (1133)	16.5 (1133)	0.0 (0)	
N4X	St. Mary's	0.1 (249)	3.6 (249)	0.0 (0)	
N4Z, N5A	Stratford	0.3 (1088)	15.8 (1088)	0.0 (0)	
Ontario		97.9 (325,510)	0.0 (0)	100.0 (325,510)	

About half of the sample was aged 85 and older, and 61.7% were females. Additionally, 61.2% of the total sample was single. Demographics of the sample population are displayed in Table 5.2.

Table 5.2 Demographic Characteristics of Ontario Home Care Clients (n=332,395)

Variable	Percentage (n)			Chi-Square Test for Huron-Perth VS Rest of Ontario
	Entire Sample	Huron Perth	Rest of Ontario	
Sex				
Female	61.7 (204,977)	58.6 (4036)	61.7 (200,941)	39.04 (p<0.0001)
Male	38.3 (127,377)	41.3 (2845)	38.3 (124,532)	
Other	0.01 (41)	0.1 (4)	0.01 (37)	
Age				
65 to 74	18.7 (62,061)	18.8 (1293)	18.7 (60,768)	3.5 (p=0.17)
75 to 84	34.3 (113,952)	35.2 (2425)	34.3 (111,527)	
85 and above	47.1 (156,382)	46.0 (3167)	47.1 (153,215)	
Marital Status				
Single	61.2 (203,559)	57.7 (3971)	61.3 (199,588)	37.6 (p<0.0001)
Not Single	38.8 (128,836)	42.3 (2914)	38.7 (125,922)	

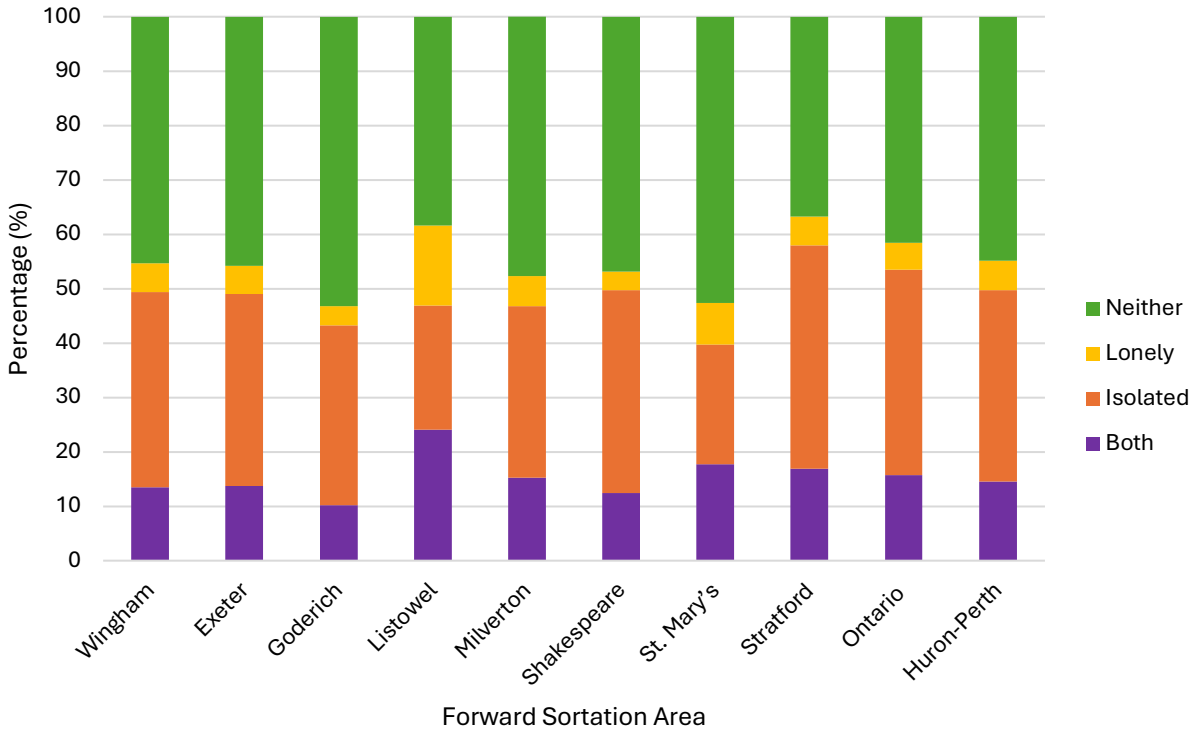
Most FSAs in the region are comparable to the 20.7% Ontario rate of loneliness, apart from Goderich and Listowel who represent the minimum and maximum values, respectively (Table 5.3). While Goderich had the lowest rate with 13.8%, Listowel had nearly double the Ontario percentage with 38.7%. In contrast, social isolation percentages all fall within a similar range of the 53.5% Ontario average as determined by the cut point of 2 in the Index of Social Isolation; however, these objective isolation rates are all notably high. St. Mary's has the lowest prevalence of social isolation with 39.8% while Stratford has the highest with 58.0% in comparison (Table 5.3). The chi-square test of social isolation in the Huron-Perth region compared to Ontario with presented a large chi-square value of 138.0 and p-value less than 0.0001, indicating large statistically significant discrepancies between social isolation prevalences in the two regions.

Table 5.3 Social Isolation and Loneliness of Home Care Clients in Huron-Perth Region by Forward Sortation Areas (n=332,395)

Variable	**Percentage (n)**										**Chi-Square Test for Huron-Perth VS Ontario**
	Wingham (n=1426)	**Exeter (n= 816)**	**Goderich (n = 400)**	**Listowel (n = 341)**	**Milverton (n = 432)**	**Shakespeare (n = 1133)**	**St. Mary's (n = 249)**	**Stratford (n = 1088)**	**Ontario (n = 325,510)**	**Huron-Perth (n=6885)**	
Loneliness (p<0.0001)	18.7 (267)	18.9 (343)	13.8 (55)	38.7 (132)	20.8 (90)	15.9 (180)	25.3 (63)	22.2 (242)	20.7 (67,211)	19.9 (1372)	2.1 (p=0.14)
Index of Social Isolation (p<0.0001)											138.0 (p<0.0001)
0	16.1 (229)	19.1 (346)	16.0 (64)	22.9 (78)	19.4 (84)	16.5 (187)	28.1 (70)	11.9 (129)	13.7 (44,523)	17.2 (1187)	
1	34.5 (492)	31.9 (579)	40.8 (163)	30.2 (103)	33.8 (146)	33.8 (383)	32.1 (80)	30.2 (328)	32.9 (106,971)	33.0 (2274)	
2	20.8 (297)	20.5 (373)	20.0 (80)	32.8 (81)	19.4 (84)	23.3 (264)	16.9 (42)	26.8 (292)	23.0 (74,754)	22.0 (1513)	
3	18.6 (265)	17.8 (323)	12.0 (48)	15.3 (52)	17.6 (76)	17.5 (198)	15.7 (39)	17.1 (186)	16.4 (53,496)	17.2 (1187)	
4	8.4 (119)	8.9 (162)	8.5 (34)	7.0 (24)	8.8 (38)	6.7 (76)	5.6 (14)	10.8 (117)	10.6 (34,546)	8.5 (584)	
5	1.4 (20)	1.6 (29)	2.5 (10)	0.6 (2)	0.9 (4)	1.9 (22)	1.6 (4)	2.8 (30)	2.8 (9039)	1.8 (121)	
6	0.3 (4)	0.2 (4)	0.3 (1)	0.3 (1)	0.0 (0)	0.3 (3)	0.0 (0)	0.6 (6)	0.7 (2181)	0.3 (19)	

Further analyses were conducted to determine how loneliness and objective social isolation were related to each other (Figure 5.1). Individuals were grouped into one of four groups depending on their loneliness and social isolation status, varying across the FSAs and geographic regions. Social isolation is more prevalent in comparison to loneliness across all geographic regions and FSAs. The highest prevalences for social isolation, and neither were Stratford and Goderich, respectively, while both loneliness and 'both' were most prevalent in Listowel (Figure 5.1).

Figure 5.1 Social Isolation and Loneliness Typologies Among Ontario and Huron-Perth Home Care Clients (n=332,395)



Despite the differences in values between CHESS levels within each FSA, there is little difference between each community and the Ontario value (Table 5.4). Additionally, Listowel has the highest prevalence of 'moderate' MAPLe levels (23.2%) with the rest of the sample distributed

similarly to the Ontario values and consistently across the low/mild and moderate categories (Table 5.4). Shakespeare and St. Mary's contain higher prevalences of individuals with 'very high' MAPLe levels at 24.2% and 26.5%, respectively (Table 5.4). All FSAs within Huron-Perth have lower prevalences of category 3 on the Cognitive Performance Scale, except for Shakespeare (12.6%), in comparison to Ontario (11.0%). Notably, Goderich has the most prevalence of older adults in CPS category 0 and 1 with values of 21.5% and 67.8%, respectively (Table 5.4). Listowel had the highest prevalence of Pain Scale category 2 with 19.7% while Goderich had the lowest at 3.5%, representing the minimum and maximum values of this distribution around the Ontario prevalence 14.3% (Table 5.4).

All FSAs in Huron-Perth reported lower prevalences of dependence in ADL hierarchy in comparison to the 9.7% Ontario prevalence (Table 5.4). The FSAs of Huron-Perth followed the same distribution with a decrease in prevalence as ADL dependence increases. Ontario and Shakespeare each have a unique distribution as 'limited' is the category with the highest prevalence, then 'independent' and then falling into similar distributions to the rest of the subsamples (Table 5.4). All regions of interest have similar distributions to the Ontario reference values in which the majority (45.5%) are dependent, followed by total dependence (34.1%), supervision (10.3%), limited (8.3%), and independent IADL capacity (1.7%) remaining the lowest prevalence among all FSAs (Table 5.4). Approximately 6% of each FSA listed were reported as 'severe' on the composite mood scale, capturing more indications of mood disturbances among the population (Hirdes et al., 2022). In contrast, most of the sample was identified as experiencing no indicators of mood disturbances (Table 5.4). Chi-square values of all scales were large and statistically significant, with the exception of the composite mood scale.

Further, loneliness rates do not seem to have parallel rates of mood disturbance, as indicated by the composite mood scale scores across the province and Huron-Perth. Listowel demonstrates significant amounts of loneliness (Table 5.3) with no corresponding trend in mood disturbance (Table 5.4).

Table 5.4 interRAI Scales Among Ontario and Huron-Perth Home Care Clients (n=332,395)

Variable	Percentage (n)										Chi-Square Test for Huron-Perth VS Ontario
	Wingham (n = 1426)	**Exeter (n = 1816)**	**Goderich (n = 400)**	**Listowel (n = 341)**	**Milverton (n = 432)**	**Shakespeare (n = 1133)**	**St. Mary's (n = 249)**	**Stratford (n = 1088)**	**Ontario (n = 325,510)**	**Huron-Perth (n=6885)**	
CHESS (p < 0.0001)											138.9 (p<0.0001)
0	21.3 (303)	18.2 (331)	19.0 (76)	17.0 (58)	13.0 (56)	15.9 (180)	16.1 (40)	15.9 (173)	14.0 (45,686)	17.7 (1217)	
1-2	53.2 (758)	58.9 (1070)	54.3 (217)	57.2 (195)	58.6 (253)	53.1 (602)	59.8 (149)	55.3 (602)	53.8 (175,242)	55.9 (3846)	
3	17.7 (253)	15.6 (284)	18.0 (72)	16.7 (57)	18.3 (79)	19.8 (224)	14.9 (37)	20.1 (219)	20.9 (68,141)	17.8 (1225)	
4+	7.9 (112)	7.2 (131)	8.8 (35)	9.1 (31)	10.2 (44)	11.2 (127)	9.2 (23)	8.6 (94)	11.2 (36,441)	8.7 (597)	
MAPLe (p < 0.0001)											140.9 (p<0.0001)
Low/Mild	13.1 (187)	15.8 (286)	18.5 (74)	23.2 (79)	15.7 (68)	10.9 (123)	12.1 (30)	14.5 (158)	10.6 (34,349)	14.6 (1005)	
Moderate	25.5 (364)	20.4 (371)	25.3 (101)	25.5 (87)	25.9 (112)	25.5 (289)	15.7 (39)	18.1 (197)	25.7 (83,581)	22.7 (1560)	
High	45.8 (653)	46.0 (836)	46.3 (185)	35.8 (122)	43.3 (187)	39.5 (447)	45.8 (114)	46.1 (501)	43.4 (141,109)	44.2 (3045)	
Very High	15.6 (222)	17.8 (323)	10.0 (40)	15.5 (53)	15.1 (65)	24.2 (274)	26.5 (66)	21.3 (232)	20.4 (66,471)	18.5 (1275)	
CPS (p < 0.0001)											170.2 (p<0.0001)
0	17.9 (255)	18.8 (341)	21.5 (86)	25.8 (88)	20.1 (87)	20.5 (232)	14.1 (35)	15.6 (170)	16.3 (53,113)	18.8 (1294)	
1-2	66.6 (949)	63.1 (1146)	67.8 (271)	56.6 (193)	64.1 (277)	50.3 (570)	61.0 (152)	60.9 (663)	57.5 (187,157)	61.3 (4221)	
3-4	9.9 (141)	12.5 (227)	8.3 (33)	10.6 (36)	12.7 (55)	16.6 (188)	14.9 (37)	16.7 (182)	15.2 (49,313)	13.1 (899)	
5-6	5.7 (81)	5.6 (102)	2.5 (10)	7.0 (24)	3.0 (13)	12.6 (143)	10.0 (25)	6.7 (73)	11.0 (35,927)	6.8 (471)	
Pain Scale (p < 0.0001)											96.2 (p<0.0001)
0	35.1 (501)	31.5 (572)	37.5 (150)	35.5 (121)	30.3 (131)	44.6 (505)	37.4 (93)	30.7 (334)	31.5 (102,544)	35.0 (2407)	
1-2	54.8 (782)	59.1 (1074)	59.0 (236)	44.9 (153)	59.5 (257)	44.8 (507)	47.0 (117)	58.3 (634)	54.2 (176,482)	54.6 (3760)	
3+	10.0 (143)	9.4 (170)	3.5 (14)	19.7 (67)	10.2 (44)	10.7 (121)	15.7 (39)	11.0 (120)	14.3 (46,484)	10.4 (718)	
ADL Hierarchy (p < 0.0001)											635.9 (p<0.0001)
Independent	39.0 (556)	47.6 (864)	46.0 (184)	59.2 (202)	51.6 (223)	34.8 (394)	50.2 (125)	46.9 (510)	31.6 (102,789)	44.4 (3058)	
Limited	36.0 (513)	32.5 (591)	40.8 (163)	19.1 (65)	26.6 (115)	29.0 (328)	24.1 (60)	28.9 (314)	31.8 (103,481)	31.2 (2149)	
Extensive	20.0 (285)	15.3 (278)	9.8 (39)	15.5 (53)	17.4 (75)	29.3 (332)	20.5 (51)	16.9 (184)	27.0 (87,802)	18.8 (1297)	
Dependent	5.1 (72)	4.6 (83)	3.5 (14)	6.2 (21)	4.4 (19)	7.0 (79)	7.4 (13)	7.4 (80)	10.0 (31,438)	5.5 (381)	
IADL Hierarchy (p < 0.0001)											222.2 (p<0.0001)
Independent	2.6 (37)	4.1 (75)	3.3 (13)	4.1 (14)	3.9 (17)	2.3 (26)	2.8 (7)	2.9 (32)	1.7 (5595)	3.2 (221)	
Supervision	14.8 (211)	15.1 (274)	17.3 (69)	13.5 (46)	11.3 (49)	10.5 (119)	13.3 (33)	12.6 (137)	10.3 (33,527)	13.6 (938)	
Limited	10.5 (149)	11.3 (206)	13.0 (52)	8.5 (29)	9.7 (42)	7.3 (83)	8.8 (22)	10.4 (113)	8.3 (27,134)	10.1 (696)	
Dependent	42.6 (607)	41.4 (752)	44.0 (176)	39.0 (133)	41.7 (180)	40.0 (453)	37.0 (92)	39.0 (424)	45.5 (148,248)	40.9 (2817)	
Total Dependence	29.6 (422)	28.0 (509)	22.5 (90)	34.9 (119)	33.3 (144)	40.0 (452)	38.2 (95)	35.1 (382)	34.1 (111,006)	32.1 (2213)	
Composite Mood Scale (p < 0.0001)											9.0 (p = 0.03)
None	46.9 (669)	43.1 (782)	48.5 (194)	41.9 (143)	44.7 (193)	49.6 (562)	54.6 (136)	39.1 (425)	46.7 (151,894)	45.1 (3104)	
Mild	30.2 (430)	33.9 (615)	32.3 (129)	30.2 (103)	31.0 (134)	29.7 (336)	28.9 (72)	28.1 (306)	29.4 (95,541)	30.9 (2125)	
Moderate	16.3 (232)	16.6 (302)	14.3 (57)	20.8 (71)	19.2 (83)	14.5 (164)	23.3 (26)	23.3 (253)	17.1 (55,689)	17.3 (1188)	
Severe	6.7 (95)	6.4 (117)	5.0 (20)	7.0 (24)	5.1 (22)	6.3 (71)	6.0 (15)	9.6 (104)	6.9 (22,386)	6.8 (468)	

To supplement the interRAI scales in Table 5.4, a heat map was created using the percentage in the highest need category for each scale. The Huron-Perth values were used as the reference values with light blue indicating prevalences 0.8 times the rate of the Huron-Perth value or lower, green indicating prevalences greater than 0.8 and less than or equal to 0.9 times the rate of the Huron-Perth value, white indicating prevalences greater than 0.9 and less than or equal to 1.1 times the rate of the Huron-Perth value, orange indicating prevalences greater than 1.1 and less than or equal to 1.25 times the rate of the Huron-Perth value, and red indicating prevalences at least 1.25 times the Huron-Perth value. Echoing the results of Table 5.4, the region of Huron-Perth experiences lower rates of need and impairment compared to the rest of Ontario. This is particularly evident with ADL hierarchy scores, in which every community in Huron-Perth reports lower levels of dependence, indicating that it may be more difficult to live in these rural communities with functional impairment (Table 5.5). In other words, there may be a greater rate of long-term care placement for persons with higher levels of functional impairment in Huron Perth compared with the rest of Ontario, resulting in an apparently healthier home care population.

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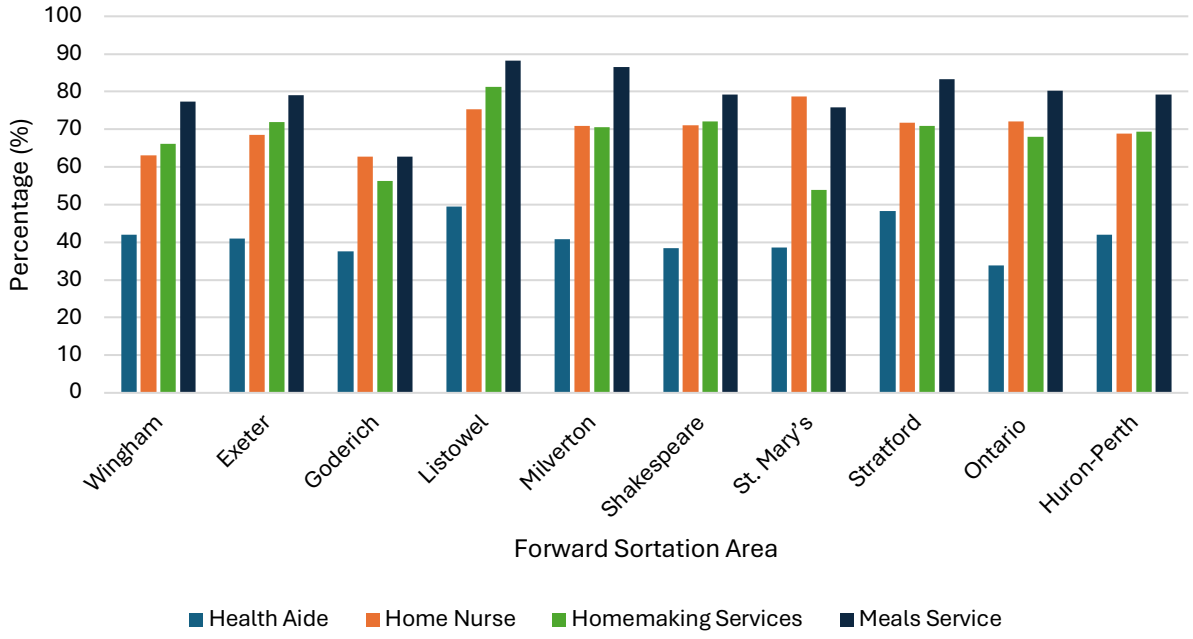
Table 5.5 interRAI Scales Supplemental Heat Map Comparing FSAs with Huron-Perth as a Reference (n=332,395)

	Percentage (n)									
Variable	**Wingham (n=1426)**	**Exeter (n=1816)**	**Goderich (n=400)**	**Listowel (n=341)**	**Milverton (n=432)**	**Shakespeare (n=1133)**	**St. Mary's (n=249)**	**Stratford (n=1088)**	**Ontario (n=325,510)**	**Huron-Perth (n=6885)**
CHESS 4+ (p < 0.0001)	7.9 (112)	7.2 (131)	8.8 (35)	9.09 (31)	10.2 (44)	11.2 (127)	9.2 (23)	8.6 (94)	11.2 (36,441)	8.7 (597)
MAPLe Very High (p < 0.0001)	15.6 (222)	17.8 (323)	10.0 (40)	15.5 (53)	15.1 (65)	24.2 (274)	26.5 (66)	21.3 (232)	20.4 (66,471)	18.5 (1275)
CPS 5-6 (p < 0.0001)	5.7 (81)	5.6 (102)	2.5 (10)	7.0 (24)	3.0 (13)	12.6 (143)	10.0 (25)	6.7 (73)	11.0 (35,927)	6.8 (471)
Pain Scale 3+ (p < 0.0001)	10.0 (143)	9.4 (170)	3.5 (14)	19.7 (67)	10.2 (44)	10.7 (121)	15.7 (39)	11.0 (120)	14.3 (46,484)	10.4 (718)
ADL Hierarchy Dependent (p < 0.0001)	5.1 (72)	4.6 (83)	3.5 (14)	6.2 (21)	4.4 (19)	7.0 (79)	7.4 (13)	7.4 (80)	9.7 (31,438)	5.5 (381)
IADL Hierarchy Total Dependent (p < 0.0001)	29.6 (422)	28.0 (509)	22.5 (90)	34.9 (119)	33.3 (144)	39.9 (452)	38.2 (95)	35.1 (382)	34.1 (111,006)	32.1 (2213)
Composite Mood Scale Severe (p < 0.0001)	6.7 (95)	6.4 (117)	5.0 (20)	7.0 (24)	5.1 (22)	6.3 (71)	6.0 (15)	9.6 (104)	6.9 (22,386)	6.8 (468)

Prevalence in Comparison to Huron-Perth
≤0.8
0.8 to ≤0.9
>0.9 to ≤1.1
>1.1 to ≤1.25
>1.25

The least commonly received formal care service across FSAs is meals services with 90% of respondents in Listowel reporting not receiving these services and 62.8% of respondents in Goderich reporting not receiving these services (Figure 5.2). Home health aides were the most used service, out of the four, across the FSAs as 33.9% of Ontario respondents do not receive home health aide services and 49.6% of Listowel respondents not receiving these services (Figure 5.2). Home nursing services and homemaking services follow similar distributions to each other, often falling within 10% of each other within each respective FSA other than St. Mary's which displays a 24.9% difference.

Figure 5.2 Percentage of Ontario Home Care Clients in Each Region that do not Receive Formal Care Services (n=332,395)



For both hospital stays and emergency department visits, most participants reported no usage in the previous 90 days (Table 5.6). Shakespeare had the highest prevalence of individuals with three or more hospital stays in the last 90 days (1.9%) and the highest prevalence of one to two hospital stays (32.7%). Additionally, St. Mary's had the highest prevalence of no hospital stays

within the last 90 days (71.1%), although each FSA fell within the 6% range displayed between the highest and lowest prevalences of no hospital stays in the last 90 days, St. Mary's and Ontario, respectively (Table 5.6). Milverton had the highest prevalence of three or more emergency department visits in the last 90 days (5.3%) compared with Listowel with the lowest prevalence (1.5%). Additionally, Listowel had the highest prevalence of no emergency department visits within the last 90 days (76.0%). This is in contrast to Goderich having the highest prevalence of total emergency department visits demonstrated by the lowest prevalence in no emergency department visits (66.3%). The percentages with no physician visits in the last 90 days ranged between Stratford (34.3%) and Goderich (14.5%), representing the maximum and minimum values, respectively (Table 5.6). Three or more physician visits is highest in Wingham (21.3%), more than four times the value of the minimum (5.0%) in Listowel. The remaining individuals reported one to two physician visits in the last 90 days, ranging from 54.1% (Shakespeare) to 72.3% (Goderich). Listowel appears to be the least likely to receive formal care services compared with other FSAs (Figure 5.2) and had lowest likelihood of seeing a physician three or more times in 90 days (Table 5.6), indicating a lower usage of clinical services. Chi-square tests indicated that primary care service usage was significantly different in Huron-Perth as compared to Ontario, demonstrating that Huron-Perth was less likely to use these services as frequently as the rest of Ontario (Table 5.6).

Table 5.6 Primary Care Service Usage Among Ontario and Huron-Perth Home Care Clients by Forward Sortation Area (n=332,395)

Variable	**Percentage (n)**										**Chi-Square Test for Huron-Perth VS Ontario**
	Wingham (n=1426)	**Exeter (n=1816)**	**Goderich (n=400)**	**Listowel (n=341)**	**Milverton (n=432)**	**Shakespeare (n=1133)**	**St. Mary's (n=249)**	**Stratford (n=1088)**	**Ontario (n=325,510)**	**Huron-Perth (n=6885)**	
Hospital Stays (p = 0.0458)											8.0 (p=0.02)
0	69.9 (997)	69.8 (1267)	67.5 (270)	68.9 (235)	67.6 (292)	65.5 (742)	71.1 (177)	69.9 (760)	67.4 (219,365)	68.9 (4740)	
1-2	29.5 (421)	28.8 (523)	31.5 (126)	31.3 (100)	31.3 (135)	32.7 (370)	27.3 (68)	29.4 (320)	31.2 (101,503)	30.0 (2063)	
3+	0.6 (8)	1.4 (26)	1.0 (4)	1.8 (6)	1.2 (5)	1.9 (21)	1.6 (4)	0.7 (8)	1.4 (4642)	1.2 (82)	
Emergency Department Visits (p < 0.0001)											68.6 (p<0.0001)
0	70.8 (1009)	68.2 (1238)	66.3 (265)	76.0 (259)	72.7 (314)	75.5 (855)	68.3 (170)	71.4 (777)	75.1 (244,385)	71.0 (4887)	
1-2	25.7 (367)	26.7 (485)	31.3 (125)	22.6 (77)	22.0 (95)	22.7 (257)	26.5 (66)	26.1 (284)	22.4 (72,792)	25.5 (1756)	
3+	3.5 (50)	5.1 (93)	2.5 (10)	1.5 (5)	5.3 (23)	1.9 (21)	5.2 (13)	2.5 (27)	2.6 (8333)	3.5 (242)	
Physician Visits (p < 0.0001)											79.7 p<0.0001)
0	15.9 (227)	28.4 (516)	14.5 (58)	24.1 (82)	23.8 (103)	33.4 (378)	23.3 (58)	34.3 (373)	29.3 (95,284)	26.1 (1795)	
1-2	62.8 (895)	60.6 (1101)	72.3 (289)	71.0 (242)	64.6 (279)	54.1 (613)	68.3 (170)	56.7 (617)	55.7 (181,371)	61.1 (4206)	
3+	21.3 (304)	11.0 (199)	13.3 (53)	5.0 (17)	11.6 (50)	12.5 (142)	8.4 (21)	9.0 (98)	15.0 (48,855)	12.8 (884)	

The majority of participants reported having a primary caregiver with 'none' ranging from 0.7% (Milverton) to 3.2% (Listowel) (Table 5.7). The most likely primary caregiver within each FSA is the participant's child, ranging from 47.3% (Goderich) to 54.3% (Ontario), this is followed by partner which ranges from 29.0% (Stratford) to 41.0% (Goderich). Other family and friend primary caregivers each represent less than 10% of each FSA, indicating less popular primary caregiver options. The presence of secondary caregivers is less prevalent with 18.5% (Milverton) to 32.9% (Ontario) indicating having no secondary caregiver. Similar to the presence of a primary caregiver, the secondary caregiver is most likely to be a child of the individual, ranging from 53.1% (Ontario) to 61.1% (Stratford). However, the least prevalent option for a secondary caregiver is a partner with no more than 2% of each FSA demonstrating the presence of a partner as the secondary caregiver (Table 5.7). Chi-square tests indicate a significant difference in informal caregiver relationships between Huron-Perth and Ontario, evident as participants in Huron-Perth were half as likely to not have a primary caregiver and 6% less likely to not have a secondary caregiver as compared to Ontario (Table 5.7). Notably, Listowel is twice as likely to have no primary caregiver in comparison to the Huron-Perth region. This could be potentially driving levels of loneliness; however, this is unlikely due to the relatively small percentages of 3.2% and 1.7% for Listowel and Huron-Perth, respectively (Table 5.7).

Table 5.7 Informal Caregiver Relationships Among Ontario and Huron-Perth Home Care Clients by Forward Sortation Area (n=332,395)

Variable	**Percentage (n)**										**Chi-Square Test for Huron-Perth VS Ontario**
	Wingham (n=1426)	**Exeter (n=1816)**	**Goderich (n=400)**	**Listowel (n=341)**	**Milverton (n=432)**	**Shakespeare (n=1133)**	**St. Mary's (n=249)**	**Stratford (n=1088)**	**Ontario (n=325,510)**	**Huron-Perth (n=6885)**	
Caregiver 1 (p<0.0001)											113.7 (p<0.0001)
None	1.5 (21)	1.9 (35)	1.8 (7)	3.2 (11)	0.7 (3)	1.2 (14)	2.4 (6)	1.8 (19)	3.1 (10,178)	1.7 (116)	
Child	48.7 (695)	50.9 (924)	47.3 (189)	51.9 (177)	48.4 (209)	51.7 (586)	54.2 (135)	54.1 (589)	54.3 (176,609)	50.9 (3504)	
Partner	38.6 (550)	32.9 (597)	41.0 (164)	31.4 (107)	36.6 (158)	35.8 (406)	35.3 (88)	29.0 (315)	29.8 (97,122)	34.6 (2385)	
Family	6.1 (87)	7.7 (139)	5.5 (22)	8.5 (29)	8.6 (37)	7.5 (85)	5.6 (14)	9.2 (100)	7.8 (25,313)	7.5 (513)	
Friend	5.1 (73)	4.5 (121)	4.5 (18)	5.0 (17)	5.8 (25)	3.7 (42)	2.4 (6)	6.0 (65)	5.0 (16,288)	5.3 (367)	
Caregiver 2 (p<0.0001)											161.4 (p<0.0001)
None	29.9 (426)	25.5 (463)	30.0 (120)	29.0 (99)	18.5 (80)	30.0 (340)	31.7 (79)	19.85 (216)	32.9 (107,125)	26.5 (1823)	
Child	56.5 (806)	58.2 (1056)	53.8 (215)	54.0 (184)	65.3 (282)	57.9 (656)	58.6 (146)	61.12 (665)	53.1 (172,916)	58.2 (4010)	
Partner	1.9 (27)	1.4 (26)	1.8 (7)	1.2 (4)	2.8 (12)	1.1 (12)	0.8 (2)	1.84 (20)	1.7 (5638)	1.6 (110)	
Family	6.8 (97)	8.7 (157)	6.8 (27)	11.1 (38)	8.1 (35)	6.3 (71)	6.4 (16)	9.10 (99)	8.0 (26,125)	7.8 (540)	
Friend	4.9 (70)	6.3 (114)	7.8 (31)	4.7 (16)	5.3 (23)	4.8 (54)	2.4 (6)	8.09 (88)	4.2 (13,706)	5.8 (402)	

Hazardous home environment, financial trouble, and limited outside resource availability are not prevalent amongst the population of interest, with financial trouble lacking statistical significance (Table 5.8). Hazardous home environment ranging from 9.7% in Stratford to 19.2% in Ontario, representing the minimum and maximum values respectively. Prevalence of limited outside resource availability is comparatively lower, ranging from 1.6% (St. Mary's) to 9.2% (Ontario). This indicates that all FSAs within Huron-Perth are lower than the Ontario reference value for both hazardous home environment and limited outside resource availability. Table 5.8 indicates differences in home environment and outside resource availability for Ontario and Huron-Perth while also supporting a lack of relationship between financial trouble and increasing levels of loneliness.

Table 5.8 Home and Environmental Status Among Ontario and Huron-Perth Home Care Clients by Forward Sortation Area (n=332,395)

Variable	**Percentage (n)**										**Chi-Square Test for Huron-Perth VS Ontario**
	Wingham (n=1426)	**Exeter (n=1816)**	**Goderich (n=400)**	**Listowel (n=341)**	**Milverton (n=432)**	**Shakespeare (n=1133)**	**St. Mary's (n=249)**	**Stratford (n=1088)**	**Ontario (n=325,510)**	**Huron-Perth (n=6885)**	
Hazardous Home Environment (p<0.0001)	14.1 (201)	15.7 (285)	10.0 (40)	14.7 (50)	17.1 (74)	16.7 (192)	18.5 (46)	9.7 (105)	19.2 (62,359)	14.4 (993)	98.0 (p<0.0001)
Financial Trouble (p = 0.06)	1.8 (26)	2.5 (45)	1.8 (7)	2.6 (9)	2.8 (12)	2.2 (25)	0.8 (2)	3.5 (38)	2.1 (6952)	2.4 (164)	2.0 (p=0.1624)
Limited Outside Resource Availability (p<0.0001)	4.0 (57)	5.0 (90)	3.3 (13)	7.6 (26)	5.1 (22)	10.2 (116)	1.6 (4)	5.2 (57)	9.2 (29,933)	5.6 (385)	105.6 (p<0.0001)

Table 5.9 demonstrates the variability in health outcome and behaviour prevalences by loneliness-isolation typologies using a composite isolation measure consisting of the Index of Social Isolation and loneliness measures. Health outcome and behaviour prevalences remain relatively consistent across typologies and geographic regions; however, the prevalences for isolated and lonely vary from one another in all measures (Table 5.9). For those experiencing both loneliness and social isolation, the *relative* prevalence of worse health status and health behaviours are substantially higher compared with the "none" group for smoking, inadequate nutrition, and medication non-adherence. Self-reported health was not strongly associated with the combined loneliness and isolation algorithm; however, severe mood disturbance and pain were substantially higher in the "both" and "lonely" groups compared with "none".

For example, medication non-adherence was nearly 2.5 times higher in 'both' compared to 'neither' groups in Huron-Perth, with a similar distribution difference in the rest of Ontario. Severe mood disturbance occurred at triple the rate of the "none' group in the "lonely" and "both" groups. This indicates that the loneliness-isolation typologies vary significantly in their health profiles, echoing results from Chapter 4.

Table 5.9 Associations of Health Outcomes and Behaviours with Social Isolation and Loneliness Typologies in Huron-Perth and Ontario Home Care Clients (n=332,395)

	Percentage (n)									
	Huron-Perth (n=6885)					**Ontario (n=325,510)**				
Composite Isolation Measure	**Neither**	**Lonely**	**Isolated**	**Both**	**Chi-Square Test**	**Neither**	**Lonely**	**Isolated**	**Both**	**Chi-Square Test**
Pain Scale					61.9					4265.5
0	38.5 (1191)	32.4 (120)	34.1 (827)	26.9 (269)	(p<0.0001)	35.6 (48,209)	25.7 (4115)	31.4 (38,582)	22.8 (11,638)	(p<0.0001)
1-2	52.2 (1613)	54.2 (201)	56.1 (1358)	58.7 (588)		52.3 (70,809)	55.7 (8936)	55.0 (67,531)	57.1 (29,206)	
3+	9.3 (286)	13.5 (50)	9.8 (238)	14.4 (144)		12.1 (16,432)	18.7 (2993)	13.6 (16,736)	20.2 (10,323)	
Composite Mood Scale					459.9 (p<0.0001)					26647.8 (p<0.0001)
None	50.7 (1565)	18.6 (69)	50.1 (1215)	25.5 (255)		52.9 (71,705)	22.6 (3629)	52.8 (64,837)	22.9 (11,723)	
Mild	29.9 (923)	35 (130)	30.2 (732)	34.0 (340)		28.5 (38,555)	34.1 (5463)	28.4 (34,858)	32.6 (16,665)	
Moderate	15.1 (466)	30.5 (113)	14.5 (352)	25.7 (257)		14.1 (19,038)	28.0 (4494)	14.2 (17,412)	28.8 (14,745)	
Severe	4.4 (136)	15.9 (59)	5.1 (124)	14.9 (149)		4.5 (6152)	15.3 (2458)	4.7 (5742)	15.7 (8034)	
Self-Reported Health					9.6 (p=0.02)					737.3 (p<0.0001)
Good/Excellent	40.6 (1255)	40.2 (149)	44.2 (1070)	39.7 (397)		27.5 (37,299)	24.9 (3990)	30.7 (37,697)	25.1 (12,835)	
Fair/Poor/No Response	59.4 (1835)	59.8 (222)	55.8 (1353)	60.3 (604)		72.5 (98,151)	75.1 (12,054)	69.3 (85,152)	74.9 (38,332)	
Smoker					31.4					1340.7
Yes	5.1 (156)	6.2 (23)	7.5 (181)	9.8 (98)	(p<0.0001)	4.1 (5590)	5.2 (829)	6.8 (8397)	7.8 (4013)	(p<0.0001)
No	95.0 (2934)	93.8 (348)	92.5 (2242)	90.2 (903)		95.9 (129,860)	94.8 (15,215)	93.2 (114,452)	92.2 (47,154)	
Nutrition					20.5					1083.9
Adequate	96.1 (2968)	94.9 (352)	93.6 (2267)	93.5 (936)	(p=0.0001)	95.5 (19,336)	93.8 (15,055)	94.2 (115,666)	91.6 (46,842)	(p<0.0001)
Inadequate	4.0 (122)	5.1 (19)	6.4 (156)	6.5 (65)		4.5 (6114)	6.2 (989)	5.9 (7183)	8.5 (4325)	
Medication					130.4					4274.0
Adherent	89.6 (2767)	86.3 (320)	83.6 (2026)	75.2 (753)	(p<0.0001)	91.2 (123,465)	87.6 (14,057)	86.3 (106,050)	80.2 (41,040)	(p<0.0001)
Non-Adherent	10.5 (323)	13.8 (51)	16.4 (397)	24.8 (248)		8.9 (11,985)	12.4 (1987)	13.7 (16,799)	19.8 (10,127)	

5.5 Discussion

Using a large, representative sample of the Ontario older adult home care population, differences in physical and mental health status, service use, informal caregivers, and environment provided an assessment of needs within the Huron-Perth region in comparison to the rest of Ontario. Community health needs assessments for community-dwelling older adults have not been conducted within the Huron-Perth region before, making this study a first of its kind.

In many ways, Huron-Perth's home care population appears clinically healthier than the rest of Ontario with generally lower prevalences in all clinical needs and the majority of primary care services (Tables 5.5 and 5.6). An important caveat is that these findings may indicate that individuals probably have adequate health and absence of impairment to live in the rural communities of Huron-Perth. The variability in distributions among FSAs for each variable of interest is expected as each FSA is geographically and demographically unique. The Huron-Perth region is considered part of rural Ontario; however, there are notable differences in rurality within. For instance, FSAs with a '0' in the second position are classified as rural, while those with a number from 1 to 9 are classified as urban (Canada Post, 2022). Table 5.1 demonstrates that four of the eight FSAs within Huron-Perth are classified as rural. Additionally, the results of this study demonstrate significant inter-region differences in clinical and social variables. Thus, analyzing Huron-Perth as a whole would mask important subregion differences. For example, the presence of a secondary caregiver was significantly more prevalent in Huron-Perth in comparison to the rest of Ontario, indicating that these FSAs may rely more strongly on their family and community supports. This may also be demonstrated in the variability in physical and mental health outcomes as each FSA is varied and there is no evident pattern in the individual FSA prevalences and the Ontario reference value.

There is historically a noteworthy difference in distribution of primary care services and their scope of practice between rural and urban locations (Clark et al., 2021; Wenghofer et al., 2018). Wenghofer et al. (2018) found that rural Ontario physicians reported a wider scope of practice, less time spent per clinical activity, and higher amounts of working hours per week than urban physicians. This may indicate that there is likely a lower availability of primary care and other healthcare resources in rural areas, resulting in comparatively negative health outcomes and behaviours (Clark et al., 2021). However, Table 5.5 demonstrates that rural areas such as Wingham, Exeter, Milverton, and Shakespeare had higher use of primary care services in comparison to the rest of Ontario. Further, health outcomes were typically worse in Ontario in comparison to Huron-Perth (Table 5.6). Therefore, these claims are not supported by our analyses of the Huron-Perth region.

The strongest variations among FSAs were for the social isolation and loneliness values in which Listowel presented as three times the prevalence of loneliness of the other FSAs and the Ontario reference value (Figure 5.1). This finding suggests that individuals in this FSA may not feel as connected to their families and communities despite the connections suggested by presence and relationships with primary and secondary informal caregivers (Table 5.7; Figure 5.3). It may be that these regions are not as isolated, suggested by levels of social isolation in Listowel and St. Mary's compared to Ontario (Figure 5.1); rather they have feelings of loneliness, demonstrating the subjective side of isolation. In light of these findings, the community stakeholders chose to focus on loneliness and social isolation as major psychosocial needs for their communities.

Loneliness rates across Huron-Perth, notably in Listowel, were not necessarily driven by equally high rates of clinical measures analyzed (Table 5.4). The lack of formal care services received in Listowel may be driving these results due to the home care service deficit in

comparison to other FSAs; however, lower clinical and care needs in other domains do not support the additional implementation of home care services. Table 5.9 demonstrates that Huron-Perth and Ontario as a whole have comparable patterns of associations of health outcomes and behaviours with the loneliness-isolation typology. Clinical interventions will be important to deal with health risks, but services aimed at addressing the combined effects of loneliness and isolation should also be considered. Implementation of a social resource intervention, such as a friendly calls or visitors program, could address the psychosocial concerns highlighted by community stakeholders and the findings of this study without increasing burdens on healthcare services.

This study provides the first high-level community health needs assessment conducted of older adult home health care recipients within the FSAs of the Huron-Perth regions in comparison to the general older adult Ontario homecare clientele population. This needs assessment provides a strong foundation for a comparison between needs and available resources in a fit-and-gap analysis. Future studies may choose to specify a dimension of health or health service availability and usage to better understand the specific relationships at play.

This study has some limitations. First, the measure of loneliness is a single self-report question in which responses are binary and may not be captured as accurately as if a scale was used. This is balanced with the Index of Social Isolation used to measure the objective side of loneliness; however, this scale has only been used in interRAI assessments and thus, creates complexity if these results were to be compared to other studies. Additionally, these data are representative of the Ontario home care population rather than all community-dwelling older adults. This choice was made to present the most comprehensive and representative data available within the interRAI suite of assessments thus far; however, generalizability may be limited as a result.

5.6 Conclusion

In conclusion, this study provides a unique and comprehensive community health needs assessment of older adult home health care recipients within the Huron-Perth regions in comparison to the general older adult Ontario homecare clientele population. Results from this study can be used to identify resident needs and gaps in services to strengthen the overall health outcomes and behaviours of this population. The areas of concern for community stakeholder aligned with the results of this needs assessment, highlighting social isolation and loneliness. These results should be used in a comparative analysis in which the needs and services of the Huron-Perth regions are assessed and gaps are identified. This study provides the first step in a series of initiatives to target gaps in health outcomes using social resources.

Chapter 6: Creating an Inventory of Community Resources Addressing Loneliness and Social Isolation for Older Adults in Huron - Perth Region, Ontario

6.1 Background

Social prescribing is defined as the identification and referral of non-medical interventions (e.g., friendly visitors, meal delivery, group activity programs) to address and improve an array of health determinants and outcomes (Canadian Coalition for Seniors' Mental Health, 2024; Drinkwater et al., 2019; Kimberlee, 2015). Social prescribing interventions target vulnerable groups that may be at elevated risk of adverse health outcomes or who require a higher level of social support to improve their health and well-being (Drinkwater et al., 2019; Percival et al., 2022).

Wakefield and colleagues reported that social prescribing was effective in improving and sustaining quality of life (Wakefield et al., 2022). Given that other studies have reported on a positive association between social resources and mental health (McIntyre et al., 2018; White & Salamon, 2010), social prescribing is often seen as a particularly appealing intervention to address potential health risks associated with loneliness and social isolation (Cacioppo et al., 2002; Hawkley et al., 2009; Holt-Lunstad et al., 2015)..

As reported in Chapter 2, social prescribing initiatives include a wide array of approaches ranging from physical activities, arts programs and classes, and social supports to access advocacy services (Aydın & Kutlu, 2021; Drinkwater et al., 2019; Ollonqvist et al., 2008; Saito et al., 2012). Typically provided by volunteers and community organizations, these programs have individuals referred to them from primary care settings to satisfy the definition of 'social prescribing' (Drinkwater et al., 2019). However, many of these programs are provided to members of the community without a referral and may still offer the same benefits of addressing social isolation, loneliness, and their associated health outcomes and behaviours as it is not the 'prescription' that

provides the benefits. As such, these programs are critical components of the public health system to support and promote health and well-being (Li et al., 2025).

Publicly available online information in organizational profiles of community resources can be used to classify and create directories of services available within a geographic region (Li et al., 2025). Mapping these resources can assist in matching available services to community needs, identifying gaps in the amount or types of resources needed, and fostering development of new programs to fill important gaps between existing resources and community needs (Mowle et al., 2025; Ordoñez-Jasis & Myck-Wayne, 2012). Although this information is vital for capacity building at the local level, the COVID-19 pandemic increased the difficulty of maintaining information about these services as communication channels altered their focus, service providers changed operational hours and staffing numbers, and some shifted to virtual operations while other resources were shut down (Li et al., 2025). This effect may have be more pronounced in rural areas where organizations have more limited capacities and staff in comparison to their urban counterparts.

This chapter describes an approach to mapping the potential resources already available to support social prescribing in the Huron-Perth region of Ontario. As part of a Canadian Red Cross research project, an inventory of all existing community programs and services in this region was collaboratively developed with a local Canadian Red Cross partner and approximately 100 Huron-Perth community members with the aim of matching those services to health needs of older adults in the community, as described in Chapter 5. This form of resource mapping within a community consists of the systematic identification and analysis of data related to pre-existing resources within a defined geographic area (Mowle et al., 2025). Of particular interest for this dissertation are resources that specifically aim to address social isolation and loneliness. Following the 2024

Canadian Clinical Guidelines on Social Isolation and Loneliness in Older Adults, this allows for ease of interventions to address loneliness as the resource inventory can be used to match individual interests to pre-existing community resources that have already been appraised (Canadian Coalition for Seniors' Mental Health, 2024).

6.2 Research Objectives

1. What types of social resources that may be used for social prescribing are currently available to older adults in the Huron and Perth regions of Ontario?
2. What types of social resources are currently available within Huron-Perth subregions to specifically respond to social isolation and loneliness?
3. Do the available social resources in Huron-Perth for loneliness and social isolation correspond to those shown to be effective in the scoping review provided in Chapter 2?

6.3 Methods

6.3.1 Study Design and Setting

A resource inventory was created to summarize nonmedical community services in the Huron-Perth area. The resource inventory contains the same postal code Forward Sortation Areas (FSAs) as the needs assessment and summarizes community resources using social prescribing available to older adults in the Huron and Perth regions (Table 6.1). During 2026 revisions, FSA N0B was added into the needs assessment; however, it was not feasible to redo the resource search. Therefore, N0B is excluded from the final resource inventory.

This inventory categorizes each resource into the FSA that corresponds to the main location, or the head office if there are more than one location at which services are provided, to allow for ease of cross-referencing between the two. The resource inventory was created in

2023/2024 and was updated in spring 2026 to accurately represent nonmedical community resources without the addition of new resources.

The University of Waterloo's Office of Research Ethics (#45215) provided ethics approval for the study.

Table 6.1 Forward Sortation Areas and Associated Towns in the Huron-Perth Region

Forward Sortation Area	**Older Adult Population (n) (Statistics Canada, 2023)**
N0G	17,865
N0M	16,260
N7A	4115
N4W	2555
N0K	4550
N4X	2460
N4Z, N5A	8390

6.3.2 Sample

The resource inventory aims to include all services that are targeted at older adults within the Huron and Perth regions of Ontario, Canada outlined by FSAs N0G, N0M, N7A, N0K, N4W, N4X, N4Z, and N5A. For this dissertation, older adults are defined by age of 65 years and older; however, many resources did not specify age restrictions. Thus, inclusion criteria cover any community service or resource provided to persons aged 65 and older.

6.3.3 Data Collection Instrument and Information Recruitment

The inventory was first created using information gathered from Southwest Healthline, 211 Ontario, Huron-Perth community support services central intake, regional directories, and

information obtained from community partners (211 Ontario; Community Support Services; thehealthline.ca, 2026). It was then presented to community partners and stakeholders to further expand the breadth of the resources available, as well as to better the understanding of resources already included. Nonmedical resources were categorized to align with the 2024 Canadian Clinical Guidelines on Social Isolation and Loneliness in Older Adults; thus, social activities, physical activities, animal ownership and animal-assisted therapies, leisure activities and skill development, and technology were included while psychological and pharmacological therapies were excluded (Canadian Coalition for Seniors' Mental Health, 2024). Additionally, programs to support independent living, such as retirement homes, were included in the original resource inventory but excluded from the resource inventory for this study.

6.3.4 Variables of Interest and Statistical Analysis

The resource inventory was compiled in a Microsoft Excel spreadsheet that summarized key variables pertaining to each service, such as organization name, nature of the resource, location, contact information, cost, catchment area, hours of operation, target population, service categorization, and details of the services included within each. The spreadsheet was then separated into eight tabs to represent each of the FSAs contained within the area of interest. This was done to understand the full capacity of each community service available to the Huron-Perth region. The resource inventory was then compared to the results of Study 3 to examine how the available resources correspond to those deemed effective in reducing social isolation and/or loneliness in the literature. No multivariate statistical analysis was conducted. Instead, the aim was to create a descriptive summary of available resources.

6.4 Results

A total of 68 social resources in the Huron-Perth region were identified to assist vulnerable older adults. Many targeted loneliness and social isolation either directly or indirectly (Table 6.2). N0M had the most resources by FSA, with N4Z/N5A following as a close second with 21 and 18 resources, respectively. N0M represents the rural area of Exeter, Clinton, and Grand Bend, while N4Z and N5A encompass Stratford (Table 6.2). Notably, the number of resources did not correlate with the older adult populations of FSAs, as N0G contained the highest count of older adults (Table 6.1) and nearly the lowest count of resources (Table 6.2). Within the entire region of Huron-Perth, 60.3% (n = 41) were community infrastructure while the rest were service systems. As per the C-CAP process coding framework, community infrastructures are physical buildings serving a variety of purposes, such as libraries and recreation centres, while service systems are organisations, services, programs, networks, and associations providing targeted services (Mowle et al., 2025). Both N0M and N4Z/N5A contain mostly community infrastructures with 66.7% (n = 14, n = 12) in comparison to the 33.3% (n = 7, n = 6) that are categorized as service systems.

Table 6.2 Summary of Resources per Forward Sortation Area in the Huron-Perth Region

FSA	**Resources (n)**		
	Community Infrastructure	**Service System**	**Total**
N0G	2	3	5
N0M	14	7	21
N7A	5	3	8
N4W	0	2	2
N0K	7	3	10
N4X	1	3	4
N4Z, N5A	12	6	18
Total	**41**	**27**	**68**

To capture the full extent of social resources available in the Huron-Perth region to older adults, all resources discovered during the original search that met inclusion criteria were catalogued in this resource inventory. Over 50% (n = 40) of the catalogued community resources were free to access, while the others had varying fees depending on membership costs and program registration costs (Table 6.3). Along with having the most resources available, N0M and N4Z/N5A have the highest number of resources with out-of-pocket fees, totalling 64.3% (n = 18) of the resources with a cost from the entire region. In comparison, FSAs N7A and N0K have a larger ratio of free-to-paid resources, representing Goderich and Milverton, respectively. Other FSAs have nearly even distributions of free and paid resources, with N4X containing more paid resources than free. Additionally, most programs were available to everyone (n = 43), with 19.1% (n = 13)

of all resources specifically targeting older adults, and the remainder (n = 12) targeting other populations in need, such as individuals with disabilities. N0K and N4Z/N5A contained the most resources designed for older adults; however, each only had three while N0M and N4Z/N5A each reported 14 resources targeting the general population. N0M reported more than twice as many resources for other populations in need in comparison to older adults where the other FSAs had an equivalent amount or less resources for other populations in need compared to older adults (Table 6.3). Therefore, nearly all the resources can be accessed by older adults but there are few that are used to target older adults specifically and less to target other vulnerable populations.

Table 6.3 also outlines the catchment areas of resources contained within each FSA. The majority (n = 40) are not FSA-specific but rather provide services to all of Huron-Perth. This is most prevalent in N0M where 81% (n = 17) of services in the FSA are provided to all of Huron-Perth. However, N0G, N7A, N4W, and N4X have more FSA-specific resources, leaving N4Z/N5A as the only other FSA providing more resources to Huron-Perth than the FSA-specifically. Within the review of social resources, if the catchment area was not specified by the organization, it was assumed to provide services to all of Huron-Perth.

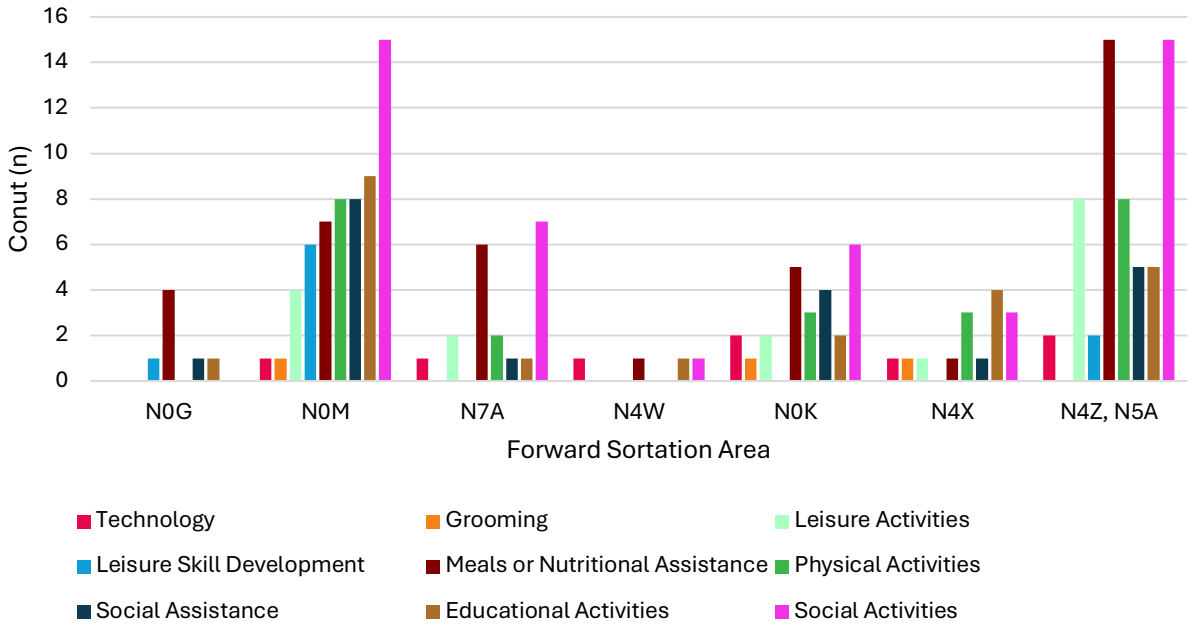
Table 6.3 Characteristics of Resources Included in Huron-Perth Inventory by Forward Sortation Area

FSA	Cost (n)		Target Population (n)			Catchment Area (n)	
	Free	At a Fee / Varies	Older Adults	Other Populations in Need	Everyone	FSA-Specific	Huron-Perth
N0G	3	2	0	2	3	4	1
N0M	10	11	2	5	14	4	17
N7A	6	2	2	2	4	5	3
N4W	1	1	1	0	1	2	0
N0K	8	2	3	1	6	3	7
N4X	1	3	2	1	1	4	0
N4Z, N5A	11	7	3	1	14	6	12
Total	40	28	13	12	43	28	40

Figure 6.1 presents the resource category distribution across FSAs with exclusion of animal-assisted therapies and ownership due to lack of representation in any of the included communities. It can be observed that N0M and N4Z/N5A not only contained the most resources but also housed the most diverse collection of resources as they were the only two FSAs to inventory at least one of each category. N0G and N4W both had resources in four of the nine categories with N4W only having one category per social resource and none providing various types of services. Additionally, N4X and N4W are similarly sized populations, however, N4W has

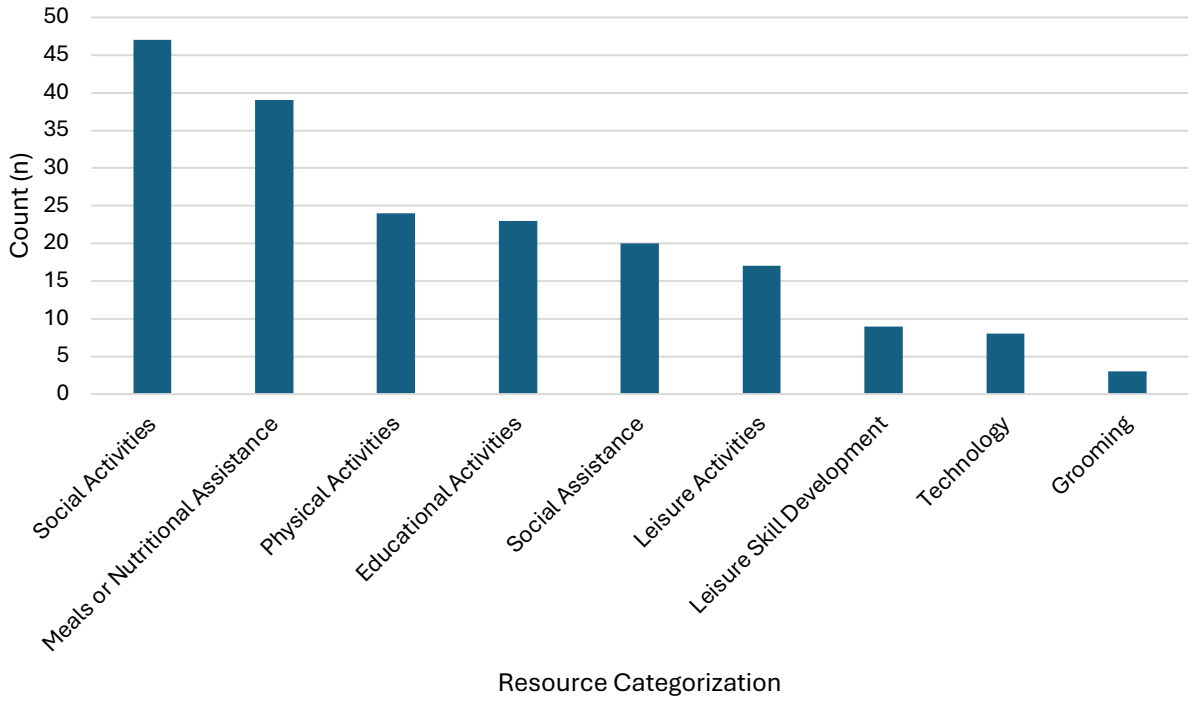
many fewer services to address rates of loneliness presented in the needs assessment in Chapter 5 of this dissertation.

Figure 6.1 Categorization of Resources by Forward Sortation Area in the Huron-Perth Region



Social activities were the most prevalent type of service offered by social resources across Huron-Perth, with a total count of 47, more than 15-times the category with the lowest prevalence, grooming (Figure 6.2). Most other resources fell on a continuum between the two extremes, with nutritional assistance presenting as the closest prevalence to social activities. Technology and leisure skill development also presented with less than ten, however, technology was present in all but two FSAs (Figures 6.1 and 6.2).

Figure 6.2 Total Count (n) of Resource Categories Across Huron-Perth



6.5 Discussion

This resource inventory is a key component in the analysis of the communities of Huron-Perth social system. As the needs assessment in Chapter 5 highlighted the prevalences of loneliness and social isolation in Huron-Perth, Ontario, it illustrated the need for careful attention to the presence and absence of social relationships among home care clients that extends beyond a focus on clinical and functional issues alone (Foster-Fishman et al., 2007). Previous studies have identified noteworthy disparities in accessibility of social resources between urban and rural areas, with urban areas having significantly more access to these resources (Guo et al., 2024). This resource inventory demonstrates that despite the rural nature of the Huron-Perth region, there are a variety of services offered to the public to keep them engaged and connected.

Each FSA contains a variety of resources providing a unique combination of services. Figure 6.1 and Figure 6.2 demonstrate that despite the presence of 68 social resource across the

eight areas of interest, there is an unequal distribution of resources. Despite previous research indicating a higher distribution of resources in urban settings, this study found 47% (n = 32) of resources in Huron-Perth to be located in urban communities, while the rest were located in rural communities (n = 36) (Table 6.2)(Guo et al., 2024). Therefore, the rurality of this region was not found to have severe disparities in social resource accessibility, further supported with the broad catchment areas of most resources included (Table 6.3). However, there are still evident disparities within social resource and service distribution, with significant variations between the maximum and minimum values of resources and associated services (Table 6.2; Figure 6.1). This lack of resources in certain FSAs may correlate with the rates of loneliness and social isolation; however, resources in neighbouring FSAs may also be accessible to these regions due to geographical proximity in addition to the catchment areas of resources documented. For instance, Chapter 5 found that loneliness was most prevalent in Listowel, or FSA N4W; this FSA also has the lowest number of resources inventoried in the Huron-Perth region, indicating a potential correlation between rates of loneliness and social resources available (Table 6.3). In contrast, individuals within Listowel were also able to access 40 other resources that offered services to the entire Huron Perth region rather than excluding communities outside a specified catchment area, potentially mitigating this effect. On the other hand, the physical distances between towns in this region and the lack of accessible public transportation may prove to be an important barrier to older adults with functional impairments. Therefore, it is unclear to what extent the distribution of social resources is associated with the rates of loneliness and social isolation in Huron-Perth.

To address the previously noted rates of loneliness and social isolation in FSAs across the Huron-Perth region, there are a minimum of 68 social resources identified by this resource inventory that may be employed to address these in the Huron-Perth region alone. Of these

resources, 47 offered services including social activities, while 23 offered educational activity services. The scoping review in Chapter 2 of this dissertation determined there to be no combination of locations, time, and sample size that were most effective in addressing loneliness and social isolation. However, programs involving socialization were reported to yield both a decrease in social isolation and loneliness (Aydın & Kutlu, 2021; Chen & Tsai, 2022; Heller et al., 1991; Hernández-Ascanio et al., 2023; Mouriño-Ruiz et al., 2024; Nicholson & Shellman, 2013; Ollonqvist et al., 2008; Saito et al., 2012; Theeke et al., 2016). Figure 6.2 demonstrates the high prevalence of social activities within social resources in Huron-Perth, offering a promising variety of services that may appeal to the older adults within the region. Therefore, it is postulated that many of the social resources found and catalogued in Huron-Perth could be effective in reducing social isolation and loneliness.

This study complements the comprehensive assessment done of the Huron-Perth region for this dissertation and partnership with the Canadian Red Cross. An inventory of social resources helps to identify gaps in services as well as potential solutions to prevalences and patterns observed in the needs assessment previously conducted. When analyzing these two together, one can render an understanding of the older adult population and begin to connect the scoping review to determine what already-existing social resources are available to target the aforementioned gaps using the aforementioned solutions. Further, this resource inventory can be used for capacity-building and service matching at the local level within Huron-Perth.

Despite the strengths of this study, there are some limitations that were identified. First, this resource inventory was originally constructed in 2023 when many social resources were recovering from the effects of the COVID-19 pandemic. Thus, some resources may have been omitted due to temporary closure and have since reopened. Second, FSA N0B was not included in

the resource inventory due to the small representation of Huron-Perth present within the FSA. The FSA N0B contains Shakespeare, Ontario, a small town in Huron-Perth with a likely negligible number of resources. However, this may have excluded some social resources. While these may affect the quality of research conducted in 2026, this resource inventory is a strong and accurate representation of the social resources available to older adults in the Huron-Perth region in the same time frame as the needs assessment, creating a cohesive and comprehensive image of system capacity, functioning, and outcomes.

A second limitation is that it was not possible to get accurate estimates of enrolments of older adults in these programs. According to the need analysis reported in the previous chapter, there were 1,001 home care clients in Huron-Perth identified as being both lonely and socially isolated. It was not possible to determine whether the service capacity in the region would be able to meet the needs of all those individuals. Therefore, it was not feasible to compare the service capacities associated with these programs and the population estimates of needs for services.

Another consideration is the challenge of maintaining and updating a resource inventory of this type. Given the rapid changes in service offerings, efforts should be made by agencies within the region to keep such an inventory up to date for planning and service matching purposes.

6.6 Conclusion

The presence of social resources across Huron-Perth is unequally distributed and it does not follow the typical pattern expected in resource distribution between urban and rural settings. The distribution of 68 resources, with majority serving all of Huron-Perth, provides a plethora of services through social resources available to the older adult population of these communities. As social resources have been used to reduce rates of loneliness and social isolation in older adults in previous studies, this collection of resources can be used in a similar fashion in Huron-Perth to aid

in capacity building at the local level. These results suggest that available services and social programs in the Huron-Perth region may be used to respond to the health and social needs of persons experiencing loneliness or social isolation in this region. However, whether the capacity of those services matches the number of persons and needs could not yet be determined.

Chapter 7: Discussion

Social isolation and loneliness have been highlighted as major international health concerns, frequently being associated with chronic diseases, poor lifestyle factors, and mortality (Christiansen et al., 2020; Luo et al., 2012; Richard et al., 2017). Older adults, especially home care clients, may be particularly vulnerable to these health effects due to their increased susceptibility to loneliness through age-related life changes (Canadian Home Care Association, 2003; Schafer et al., 2021) combined with pre-existing complex health needs (Saari et al., 2024). Public health concerns about loneliness and social isolation have motivated the development of social prescribing interventions; however, these have often been implemented based on limited evidence.

This dissertation provided an in-depth examination of the health outcomes and behaviours associated with loneliness and social isolation. It also provided a useful targeting mechanism based on real-world readily available clinical data. This evidence can be used to inform the targeting, design, and implementation of social prescribing interventions for home care settings.

7.1 Summary of Findings

We conducted five studies examining conceptual and operational definitions of loneliness and social isolation; associated health outcomes and behaviours; targeting mechanisms and potential social resources that can be implemented to attenuate their health effects.

To begin, a scoping review was conducted to assess the literature on social interventions to identify approaches that have been successfully implemented in social prescribing. Of the 18 studies included, 11 investigated both loneliness and social isolation, seven investigated only loneliness, and none investigated social isolation without loneliness. More than half the studies reported statistically significant reductions in levels of loneliness, supporting the implementation of social interventions to reduce loneliness. Similar conclusions could not be drawn regarding

social isolation due to the lack of standardized measurement tools and terminology for social isolation. This is consistent with other reviews noting confusion in the literature due to the pervasiveness of the lack of standardized measures of social isolation and loneliness (Canadian Coalition for Seniors' Mental Health, 2024; National Academies of Sciences, 2020; Valtorta et al., 2016). The evidence compiled in this review provides an unclear conclusion regarding the specific characteristics of successful interventions for reducing social isolation and loneliness in community-dwelling older adults.

Study 2 was conducted to develop a new interRAI-based measure for objective social isolation to provide a consistent operational definition and measure of social isolation among interRAI assessments. The final Index of Social Isolation was an additive measure of six items chosen in accordance with conceptual domains and significant predictors and indicators within the literature (Adams et al., 1989; Berkman & Syme, 1979; Bu, Steptoe, et al., 2020; Cheung et al., 2019; Cohen et al., 1997; Cornwell & Waite, 2009; De Koning et al., 2017; Fiori et al., 2006; Havens et al., 2004; Keefe et al., 2006; Kobayashi et al., 2009; Lee et al., 2019; Lubben, 1988; Nicholson, 2009; Paúl & Ribeiro, 2009; Shiovitz-Ezra & Leitsch, 2010; Sinha & Bleakney, 2014; Theeke, 2010; Visser & El Fakiri, 2016; Wister & McPherson, 2014). This study provided strong evidence for the consistency and responsiveness of the Index of Social Isolation in both cross-sectional and longitudinal studies and can therefore be implemented as a standard measurement and decision support tool across the interRAI network.

Development of a measure of social isolation within the interRAI Home Care assessment provides new opportunities for international research to examine differences in social isolation. Study 3 implements this new Index of Social Isolation to examine the main and interactive effects of social isolation and loneliness on selected health behaviors and outcomes in community-

dwelling home care clients in a two-part analysis. This study provides clear differentiation of the relationships of social isolation and loneliness with six health behaviours and outcomes, creating unique health profiles for individuals of different loneliness-isolation typologies. These profiles can be used to tailor social resources for individuals with different loneliness-isolation typologies and health profiles to better target social isolation or loneliness in their specific context.

Study 4 is a community health needs assessment using a comparative needs approach in which the community-dwelling home care clients of Huron-Perth are compared to those residing in the rest of Ontario. This project involved a two-year community-based participatory research initiative that included a team of researchers at the University of Waterloo, collaborators at the Canadian Red Cross, and a working group comprised of community partners from agencies within the Huron-Perth region. The goal of this project was to identify needs in the community that could be addressed using local social interventions. Results revealed that home care clients in the Huron-Perth region appear to be clinically healthier than the rest of Ontario with variability in distributions among FSAs. This may be due, at least in part, to differentials in long-term care home placement that were not examined in this study. The strongest variations between FSAs were for the social isolation and loneliness values in which Listowel presented as three times the prevalence of loneliness of any other region. These psychosocial needs were identified as the focus of Huron-Perth stakeholders for their communities as they might be addressed using existing social resources.

In response to Study 4, we created a resource inventory of all social resources in Huron-Perth that could be implemented to target social isolation and loneliness in community-dwelling older adults in that region (Study 5). This provides opportunities for local engagement groups as the resource inventory can be used to match individual interests to pre-existing community

resources that have already been appraised (Canadian Coalition for Seniors' Mental Health, 2024). A total of 68 resources were included and categorized in accordance with the nature of the resource, location, contact information, cost, catchment area, hours of operation, target population, service categorization, and details of the services included. The unequal distribution of resources was compared with the rates of loneliness and social isolation, presenting a potential association between high rates of loneliness in Listowel and low numbers of social resources.

The combined results from Studies 4 and 5 provide a comprehensive assessment of needs and resources to address social isolation and loneliness in the Huron-Perth region. The resource inventory identified gaps in services in addition to potential solutions to patterns of loneliness and social isolation previously observed. When cross-referenced with Study 1, the high prevalence of social activities within Huron-Perth present promising results for targeting of social isolation and loneliness as programs involving socialization reported decreases in social isolation and loneliness (Aydın & Kutlu, 2021; Chen & Tsai, 2022; Heller et al., 1991; Hernández-Ascanio et al., 2023; Mouriño-Ruiz et al., 2024; Nicholson & Shellman, 2013; Ollonqvist et al., 2008; Saito et al., 2012; Theeke et al., 2016). However, to maximize effectiveness of social resources, they should be tailored to the individual. For example, not all people have the same interests or be motivated by the same activities, thus, efficacy of one intervention in an individual or small group is not indicative of generalizable results for all older adults. This is supported by Study 3 in which social isolation and loneliness were each associated with a unique combination of variables to influence health behaviours and outcomes cross-sectionally and longitudinally.

Further, utilization of the loneliness-isolation typologies across studies provides the ability to use targeting social interventions with a single variable. Due to the unique health profiles of social isolation and loneliness determined, social prescribing mechanisms must be tailored to fit

the psychosocial and overall health needs of the individual to be effective in reducing or preventing social isolation or loneliness. Appropriate interventions for loneliness may not be the same as those for social isolation given the diverse patterns of associations in their potential pathways to adverse health outcomes. For example, social isolation is not statistically significant in its relationship with worsening self-rated health from baseline to follow-up assessment while loneliness is associated with a 29% increase in odds in comparison to their non-lonely and non-socially isolated counterparts captured in the 'neither' typology (Table 4.7). On the other hand, social isolation has strong associations with worsening pain from baseline to follow-up assessment (Table 4.10). If loneliness and social isolation were identical concepts, we would expect to see the same parameter estimates, standard errors, odds ratios, and p-values; however, no analysis in Study 3 supports this conclusion as loneliness and social isolation always have different patterns of association with health behaviours and outcomes. Therefore, we can infer that loneliness and social isolation are not identical concepts and must not be used interchangeably in the literature.

7.2 Practical Implications

The findings within this dissertation have implications for various stakeholders including clinicians, service providers, policy makers, and researchers.

7.2.1 Clinical Practice

Social isolation and isolation are associated with an array of health concerns that require a response from the health care system (Christiansen et al., 2020; Luo et al., 2012; Richard et al., 2017). Chronically lonely older adults reported significantly higher numbers of visits to doctors, hospitals, contact with community nurses, and hospitalizations in comparison to their non-lonely counterparts (Gerst-Emerson & Jayawardhana, 2015; Wang et al., 2019; Zhang et al., 2018). Thus, it can be inferred that an increase in social isolation and loneliness would increase the prevalence

of associated health concerns as well as use of primary care and hospital services. The implementation of social resources to target social isolation and loneliness through social prescribing aims to address the health behaviours and outcomes by connecting traditional medical practices with community supports, such as those identified in Study 5 (Drinkwater et al., 2019). The Canadian Coalition for Seniors' Mental Health (2024) clinical guidelines advocate for the systemic integration of screening and response tools for social isolation and loneliness in clinical settings to prevent oversight of these important yet invisible determinants of health (Checkland, 2025). In addition, the clinical guidelines recommend psychotherapy as an intervention for some individuals experiencing loneliness due to the problems with coping mechanisms and mood symptom management (Canadian Coalition for Seniors' Mental Health, 2024).

While there may be ways to safely address loneliness and social isolation to prevent further health decline, it is unlikely that simplistic interventions in social prescribing will eliminate the burden of these conditions on the health care system. The pathways linking social isolation and loneliness to health outcomes are diverse and complex. The community availability of the resource inventory (Study 5) suggests that there are social resources available without requiring the service to be prescribed by a primary care clinician. A direct referral pathway linking home care services to community agencies with social resources may be a more effective mechanism for addressing these concerns. This could decrease the burden of these psychosocial conditions on the limited primary care services available in Huron-Perth while still accomplishing the goal of decreasing social isolation and loneliness. Further, as suggested by Morton et al. (2015), one may anticipate that the prevention and reduction of social isolation and loneliness could decrease the prevalences of associated health outcomes and behaviours, as outlined in Study 3. However, evaluation of the

effectiveness of social interventions in Huron Perth was outside the scope of this dissertation. Therefore, no clear conclusion can be reasonably drawn in that regard.

7.2.2 Service Provision and Health Care Management in Huron-Perth

This dissertation arose from a partnership between the Canadian Red Cross and interRAI Canada at the University of Waterloo to inform approaches to manage the health needs of socially isolated and lonely older adults in Huron-Perth (Hirdes et al., 2025). Through creation of the Index of Social Isolation, older adults living within the community and receiving home care services can now be identified clearly and categorized into one of four loneliness-isolation typologies outlined in this dissertation. The needs assessment of Huron-Perth allowed for an expanded identification and understanding of needs among older adults in a specific geographic region in comparison to the rest of Ontario (Hirdes et al., 2025). This in conjunction with the cross-sectional and longitudinal analyses in Study 3 provide a comprehensive profile of community-dwelling older adults and expands the understanding of their needs.

This dissertation also provides recommendations for interventions within Huron-Perth to better address social isolation and loneliness (Hirdes et al., 2025). The scoping review conducted in Study 1 provides a summary of information available within academic literature to inform identification of social resources that were successful in the reduction of loneliness or social isolation. When cross-referenced with the resource inventory created in Study 5 summarizing all the social resources in Huron-Perth that can be mobilized to target social isolation and loneliness, we were able to draw evidence-informed conclusions and recommendations. The resource inventory in conjunction with the scoping review provide an understanding of the local older adult population. When cross-referenced with Study 1, it was determined that the resources available in Huron-Perth had a high prevalence of social activities, offering a promising array of services that

have been demonstrated to be effective in reducing social isolation and loneliness within the literature (Study 1). Our results suggest that available services in the Huron-Perth region may be used to respond to the health and social needs of persons experiencing loneliness or social isolation in this region in an effort to support capacity building at the local level to support a well-resourced and coordinated system for community health (Mulligan, 2024). Finally, we intend on passing the resource inventory to a local community organization free of cost to further support these initiatives.

7.2.3 Policy

This dissertation has positively identified a minimum of six health outcomes and behaviours that are associated with loneliness or social isolation. These findings support the claims of association for social isolation and loneliness with negative health outcomes and behaviours in previous literature. While social prescribing has been widely supported, there is no widespread initiative for implementation Canada-wide; rather, it is a collection of local initiatives created on an 'as-needed' basis (Checkland, 2025; Mulligan, 2024).

Policymakers are encouraged to consider social isolation and loneliness as key upstream factors affecting health outcomes and behaviours. Using an asset-based approach to mobilize community resources allows for the promotion of resilience and development of prevention strategies across the voluntary and public sector (Cassetti et al., 2020; Leigh-Hunt et al., 2017). The Huron-Perth region is an example of a community responding to specific needs, capacities, and contexts of their residents using an integrated approach (Mulligan, 2024). Therefore, this dissertation provides supporting evidence of the health consequences of loneliness and social isolation, aside from mortality, and also provides a methodology that can be replicated for a fit and gap analysis. Due to the federated nature of Canada's healthcare system, there is increased

difficulty in nation-wide policy implementation (Mulligan, 2024). As such, the development of a national strategy for using social prescribing in Canada needs to be an evolving process that ensures programs are adaptable to specific contexts (Goldman et al., 2026; Mulligan, 2024).

Our findings highlight the potential effects of social isolation and loneliness aside from mortality. Policymakers can use this to continue building momentum and strengthening strategies of implementation through the use of evidence-based interventions and evaluations while incorporating provincial and international collaborations for knowledge translation (Goldman et al., 2024). Informed by the findings of this dissertation, this approach bolsters the understanding of loneliness and social isolation while ensuring interventions are well-targeted, scalable, and effective for the populations of interest (Goldman et al., 2024). In conclusion, policymakers can effectively manage loneliness and social isolation rates while increasing social cohesion through the directing of funds to development and implementation of impactful interventions (D'souza et al., 2025; Goldman et al., 2024).

7.2.4 Future Research

This dissertation provides a strong definition and measurement tool for social isolation within the interRAI Home Care assessment. The global scope of interRAI allows the Index of Social Isolation to be implemented internationally, providing opportunity for multinational studies. The standardization of a measure for social isolation also allows for future research to have a strong and consistent measurement tool, allowing for clear and logical comparisons between populations, programs, and more. Additionally, the loneliness-isolation typologies of lonely, socially isolated, both, and neither aid in clarifying differences in health outcomes and behaviours, further supporting the need for future research on social isolation independent of loneliness.

Our findings add strong empirical evidence regarding the complex nature of the relationships of social isolation and loneliness with health behaviours and outcomes. For example, the longitudinal models in Study 3 provide evidence of the effects of social isolation and loneliness on self-rated health, pain, and self-reported mood. Future research can build upon these transitions in health to further determine associations between morbidity and loneliness or social isolation. Additionally, the morbidities analyzed in Study 3 can be evaluated as a potential pathway from loneliness and isolation to mortality.

We recommend future research to continue evaluating social resources that can be used to target social isolation and loneliness in older adults. The expansion of research will enable key stakeholders to make data-informed decisions regarding the implementation of strategies to target these public health concerns.

The Index of Social Isolation in conjunction with the measure of loneliness can be used as a triggering mechanism to initiate care planning with a new Collaborative Action Plan (CAP) for loneliness and social isolation based on interRAI assessments. This can be implemented as a pathway for social prescribing or as a cautionary measure to inform healthcare practitioners and caretakers of potential health outcomes and behaviours that may be associated with social isolation and loneliness, such as those observed in Study 3. Further, this flagging mechanism can be implemented as a community initiative in which individuals flagged as socially isolated and lonely can be referred to a directory, such as the resource inventory in Study 5, and they can choose a program or resource that suits their needs. However, it is not recommended that the triggering rules for this CAP be complex with overly granular subtypes of loneliness. Rather, it will flag the individual for a more open-ended qualitative discussion of the person's strengths, preferences and

needs as part of a shared decision-making approach to determine the appropriate response to loneliness and isolation.

This dissertation did not evaluate the effectiveness of the social resources included in the resource inventory due to the inability to link service recipient data with the interRAI Home Care dataset longitudinally. This is an opportunity for interRAI to continue partnerships within the Huron-Perth region and expand on this dissertation or for future research to evaluate the efficacy of social resources in reducing negative health outcomes and behaviours associated with social isolation and loneliness.

7.2.5 Strengths

The studies in this dissertation have large sample sizes representing all home care clients over the age of 65, allowing for a representative sample and increased generalizability in results. Further, stratification by FSA in Chapter 4 allowed for an in-depth analysis of eight FSAs within the Huron-Perth region. This allowed for the cross-referencing from Studies 4 and 5 to complete the fit-and-gap analysis of needs and social resources in the FSAs of the Huron-Perth region. The partnerships with the Canadian Red Cross and members of Huron-Perth guided Studies 1, 4, and 5, enabling a unique blend of data and community input. As such, a scoping review, comprehensive needs assessment, and resource inventory guided the assessment and implementation of social resources in the region to target social isolation and loneliness in community-dwelling older adults. Therefore, this dissertation is the first to closely evaluate a community in this fashion.

7.2.6 Limitations

The first limitation encountered in this dissertation was the use of a singular self-reported item as a measure of loneliness. This may have affected results as a singular measure may not have equivalent sensitivity to multi-item scales or indices. Further, older adults may be less likely to

admit to feelings of loneliness due to past stigmatization of mental health and feelings of loneliness being associated with weakness. To address this limitation, future research can incorporate a multi-item measure of loneliness in addition to a single item measure or integrate demographics to provide context for the prevalences seen in the population of interest. However, it is difficult to mitigate this limitation as loneliness is an inherently subjective experience.

Within Study 3, the Self-Reported Mood Scale resulted in missing values from the total sample due to non-response in the dependent or independent variables. This may have resulted in skewed results as the Composite Mood Scale may offer different results. However, both the Self-Reported Mood Scale and Composite Mood Scale have been tested and are valid and reliable to be used as a common standard in adults across various care settings (Hirdes et al., 2022). Further, by controlling Cognitive Performance Scale scores to less than four, the inability to respond was controlled, potentially reducing the effect of mood scale use.

Further, the FSA N0B was added to the sample later as it does not contain a large portion of the Huron-Perth region but rather represents Waterloo and Wellington regions. However, N0B contains Shakespeare, Ontario which is located in the Huron-Perth region, so it was integrated following creation of the resource inventory. Therefore, there may be social resources and programs within the Huron-Perth region that were not included in the resource inventory.

Transitions in health outcomes were only measured for a baseline assessment and a follow-up assessment within one year in Study 3. Although longitudinal, changes in self-reported mood, pain, and self-rated health may fluctuate within that time period and not truly change until an extended period of time has passed. Additionally, COVID-19 has been cited as a large contributor of rates of loneliness and social isolation that was not controlled for in the longitudinal analysis.

Therefore, there may be the factors affecting in the changes in health outcomes during the COVID-19 pandemic may be more complex than in other time periods.

7.3 Conclusion

As the population ages and the emphasis on 'aging in place' grows, there will be an increase in home care clients vulnerable to social isolation, loneliness, and their associated health outcomes. In order to prevent increases in chronic illnesses, poor lifestyle choices, and potentially mortality in this vulnerable population, there is a need to define the risks associated with each and provide evidence-informed measurement tools and interventions.

The Index of Social Isolation provides a new mechanism to target persons experiencing loneliness and social isolation in community settings. Like any decision-support tool, the ISI can be helpful in targeting persons in need for specific types of health and social interventions. However, clinical judgement and policy frameworks for service provision will still be needed to inform specific decisions for resource allocation at the person-level.

The findings of this dissertation highlight the importance of distinguishing loneliness from social isolation. Each loneliness-isolation typology has a unique profile including health outcomes and behaviours that differentiate them from others. Therefore, social resources need to be tailored to each individual if loneliness and social isolation are to be targeted. This can be achieved through the conduction of a needs assessment and resource inventory to best suit the needs of the community. Loneliness and social isolation are not equivalent experiences, thus, successful social interventions will not be 'one size fits all'.

There are a variety of opportunities for researchers, policymakers, clinicians, and communities to build upon this dissertation through the development and implementation of resources and capacity-building at the local level. In conclusion, loneliness and social isolation are

independent public health concerns that can be prevented, altered, and need to be addressed regardless of their ties to mortality.

Resources

211 Ontario. *Community Programs*. https://211ontario.ca/211-topics/community-programs/

Adams, J. P., Kaufman, A. V., & Dressler, W. W. (1989). Predictors of Social Isolation in Older Southern Adults: A Cross-Racial Analysis. *Journal of applied gerontology*, *8*(3), 365-381. https://doi.org/10.1177/073346488900800307

Ae-Ri, J., Kowoon, L., & Eun-A, P. (2023). Development and evaluation of the information and communication technology-based Loneliness Alleviation Program for community-dwelling older adults: A pilot study and randomized controlled trial. *Geriatric Nursing*, *53*, 204-211. https://doi.org/10.1016/j.gerinurse.2023.07.011

Akhter-Khan, S. C., Tao, Q., Ang, T. F. A., Itchapurapu, I. S., Alosco, M. L., Mez, J., Piers, R. J., Steffens, D. C., Au, R., & Qiu, W. Q. (2021). Associations of loneliness with risk of Alzheimer's disease dementia in the Framingham Heart Study. *Alzheimers Dement*, *17*(10), 1619-1627. https://doi.org/10.1002/alz.12327

Albrecht, T. L., & Goldsmith, D. J. (2003). Social support, social networks, and health. In *Routledge Handbook of Health Communication* (pp. 277-298). Taylor & Francis Group. http://ebookcentral.proquest.com/lib/waterloo/detail.action?docID=356283

Alliance for Healthier Communities. *Social Prescribing*. Retrieved April 14 from https://www.allianceon.org/Social%20Prescribing#:~:text=How%20Does%20Social%20Prescribing%20Work,skills%20or%20their%20own%20resources).

Alpass, F. M., & Neville, S. (2003). Loneliness, health and depression in older males. *Aging & Mental Health*, *7*(3), 212-216.

Aronson, J., & Neysmith, S. M. (1996). "You're Not Just in There to Do the Work": Depersonalizing Policies and the Exploitation of Home Care Workers' Labor. *Gender and Society*, *10*(1), 59-77. http://www.jstor.org/stable/189553

Aronson, J., & Neysmith, S. M. (2001). Manufacturing Social Exclusion in the Home Care Market. *Canadian Public Policy / Analyse de Politiques*, *27*(2), 151-165. https://doi.org/10.2307/3552194

Aydın, M., & Kutlu, F. Y. (2021). The Effect of Group Art Therapy on Loneliness and Hopelessness Levels of Older Adults Living Alone: A Randomized Controlled Study. *Florence Nightingale J Nurs*, *29*(3), 271-284. https://doi.org/10.5152/fnjn.2021.20224

Barjaková, M., Garnero, A., & d'Hombres, B. (2023). Risk factors for loneliness: A literature review. *Social Science & Medicine*, *334*, 116163. https://doi.org/10.1016/j.socscimed.2023.116163

Beller, J., & Wagner, A. (2018). Loneliness, social isolation, their synergistic interaction, and mortality. *Health Psychology*, *37*(9), 808.

Beller, J., & Wagner, A. (2020). Loneliness and Health: The Moderating Effect of Cross-Cultural Individualism/Collectivism. *Journal of Aging and Health*, *32*(10), 1516-1527. https://doi.org/10.1177/0898264320943336

Berkman, L. F., & Syme, S. L. (1979). SOCIAL NETWORKS, HOST RESISTANCE, AND MORTALITY: A NINE-YEAR FOLLOW-UP STUDY OF ALAMEDA COUNTY RESIDENTS. *American Journal of Epidemiology*, *109*(2), 186-204. https://doi.org/10.1093/oxfordjournals.aje.a112674

Bickerdike, L., Booth, A., Wilson, P. M., Farley, K., & Wright, K. (2017). Social prescribing: less rhetoric and more reality. A systematic review of the evidence. *BMJ Open*, *7*(4), e013384.

Boulos, C., Salameh, P., & Barberger-Gateau, P. (2017). Social isolation and risk for malnutrition among older people. *Geriatrics & Gerontology International*, *17*(2), 286-294. https://doi.org/10.1111/ggi.12711

Bradshaw, J. (1972). Taxonomy of social need.

Brandling, J., & House, W. (2009). Social prescribing in general practice: adding meaning to medicine. *Br J Gen Pract*, *59*(563), 454-456. https://doi.org/10.3399/bjgp09X421085

Bray, N. W., MacNinch, S., Nasiri, N., Friedrich Yap, J., Barańska, I., Bagaragaza, E., Heckman, G., de Almeida Mello, J., Szczerbińska, K., & McArthur, C. (2026). A Scoping Review of Interventions Using an interRAI Information System to Guide Care Management and Assess Intervention Efficacy in Older Adults. *Healthcare Management Forum*, *39*(2), 121-131. https://doi.org/10.1177/08404704251391151

Bu, F., Steptoe, A., & Fancourt, D. (2020). Who is lonely in lockdown? Cross-cohort analyses of predictors of loneliness before and during the COVID-19 pandemic. *Public health (London)*, *186*, 31-34. https://doi.org/10.1016/j.puhe.2020.06.036

Bu, F., Zaninotto, P., & Fancourt, D. (2020). Longitudinal associations between loneliness, social isolation and cardiovascular events. *Heart*, *106*(18), 1394-1399.

Cacioppo, J., & Patrick, W. (2008). Loneliness: Human Nature and the Need for Social Connection. *American Journal of Psychiatry - AMER J PSYCHIAT*, *166*.

Cacioppo, J. T., & Cacioppo, S. (2014). Social Relationships and Health: The Toxic Effects of Perceived Social Isolation. *Soc Personal Psychol Compass*, *8*(2), 58-72. https://doi.org/10.1111/spc3.12087

Cacioppo, J. T., & Hawkley, L. C. (2009). Perceived social isolation and cognition. *Trends in Cognitive Sciences*, *13*(10), 447-454. https://doi.org/10.1016/j.tics.2009.06.005

Cacioppo, J. T., Hawkley, L. C., Crawford, L. E., Ernst, J. M., Burleson, M. H., Kowalewski, R. B., Malarkey, W. B., Van Cauter, E., & Berntson, G. G. (2002). Loneliness and health: potential mechanisms. *Psychosom Med*, *64*(3), 407-417. https://doi.org/10.1097/00006842-200205000-00005

Cacioppo, J. T., Hawkley, L. C., Ernst, J. M., Burleson, M., Berntson, G. G., Nouriani, B., & Spiegel, D. (2006). Loneliness within a nomological net: An evolutionary perspective. *Journal of Research in Personality*, *40*(6), 1054-1085. https://doi.org/10.1016/j.jrp.2005.11.007

Cacioppo, J. T., Hawkley, L. C., & Thisted, R. A. (2010). Perceived social isolation makes me sad: 5-year cross-lagged analyses of loneliness and depressive symptomatology in the Chicago Health, Aging, and Social Relations Study. *Psychology and aging*, *25*(2), 453.

Cacioppo, S., Capitanio, J. P., & Cacioppo, J. T. (2014). Toward a neurology of loneliness. *Psychol Bull*, *140*(6), 1464-1504. https://doi.org/10.1037/a0037618

Canada Post. (2022). *Postal codes*. Retrieved February 8 from https://www.canadapost-postescanada.ca/cpc/en/support/articles/addressing-guidelines/postal-codes.page#:~:text=In%20rural%20areas%2C%20the%20last,identify%20a%20specific%20rural%20community.

Canadian Coalition for Seniors' Mental Health. (2024). *Canadian Clinical Guidelines on Social Isolation and Loneliness in Older Adults*.

Canadian Home Care Association. (2003). *Canadian Home Care Human Resources Study*. www.homecarestudy.ca

Canadian Institute for Health Information. (2022). *Canadian COVID-19 Intervention Timeline*. Retrieved April 9 from https://www.cihi.ca/en/canadian-covid-19-intervention-timeline

Canadian Institute for Health Information. (2025). *interRAI assessment types and timelines*. Retrieved June 2, 2025 from https://www.cihi.ca/en/interrai-implementation-toolkit/understanding-interrai-ltcf-interrai-hc-and-interrai-ca/interrai-assessment-types-and-timelines

Cassetti, V., Powell, K., Barnes, A., & Sanders, T. (2020). A systematic scoping review of asset-based approaches to promote health in communities: development of a framework. *Global Health Promotion*, *27*(3), 15-23. https://doi.org/10.1177/1757975919848925

Chatterjee, H. J., Camic, P. M., Lockyer, B., & Thomson, L. J. M. (2018). Non-clinical community interventions: a systematised review of social prescribing schemes. *Arts & Health*, *10*(2), 97-123. https://doi.org/10.1080/17533015.2017.1334002

Checkland, C. (2025). From awareness to action: Addressing social isolation and loneliness among older adults in Canada. *Open Access Government*, 148-149.

Chen, M.-F., & Tsai, C.-C. (2022). The Effectiveness of a Thanks, Sorry, Love, and Farewell Board Game in Older People in Taiwan: A Quasi-Experimental Study. *International Journal of Environmental Research and Public Health*, *19*(5), 3146. https://www.mdpi.com/1660-4601/19/5/3146

Cheung, G., Wright-St Clair, V., Chacko, E., & Barak, Y. (2019). Financial difficulty and biopsychosocial predictors of loneliness: A cross-sectional study of community dwelling older adults. *Archives of Gerontology and Geriatrics*, *85*, 103935. https://doi.org/10.1016/j.archger.2019.103935

Christiansen, J., Lund, R., Qualter, P., Andersen, C. M., Pedersen, S. S., & Lasgaard, M. (2020). Loneliness, Social Isolation, and Chronic Disease Outcomes. *Annals of Behavioral Medicine*, *55*(3), 203-215. https://doi.org/10.1093/abm/kaaa044

Clark, K., John, P. S., Menec, V., Cloutier, D., Newall, N., O'Connell, M., & Tate, R. (2021). Healthcare utilisation among Canadian adults in rural and urban areas – The Canadian Longitudinal Study on Aging. *Canadian Journal of Rural Medicine*, *26*(2), 69-79. https://doi.org/10.4103/cjrm.Cjrm_43_20

Clegg, A., Young, J., Iliffe, S., Rikkert, M. O., & Rockwood, K. (2013). Frailty in elderly people. *The Lancet*, *381*(9868), 752-762. https://doi.org/10.1016/S0140-6736(12)62167-9

Cohen, S., Doyle, W. J., Skoner, D. P., Rabin, B. S., & Gwaltney, J. M. (1997). Social ties and susceptibility to the common cold. *Jama*, *277*(24), 1940-1944.

Cohen, S., & McKay, G. (2020). Social support, stress and the buffering hypothesis: A theoretical analysis. In *Handbook of psychology and health, Volume IV* (pp. 253-267). Routledge.

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological bulletin*, *98*(2), 310.

Community Support Services. *Contact Us*. https://cssontario.ca/contact-us/

Cornwell, E. Y., & Waite, L. J. (2009). Social Disconnectedness, Perceived Isolation, and Health among Older Adults. *Journal of health and social behavior*, *50*(1), 31-48. https://doi.org/10.1177/002214650905000103

Cudjoe, T. K., Selvakumar, S., Chung, S. E., Latkin, C. A., Roth, D. L., Thorpe Jr, R. J., & Boyd, C. M. (2022). Getting under the skin: Social isolation and biological markers in the National Health and Aging Trends Study. *Journal of the American Geriatrics Society*, *70*(2), 408-414.

D'souza, N. A., Biswass, S., & Mulligan, K. (2025). Social Prescribing: A Pragmatic Pathway to Address Loneliness and Mental Health in Canada. *Healthcare Quarterly*, *28*(2), 20-26. https://www.longwoods.com/product/27683

Davies, L. A., Hirdes, J. P., & Mannell, R. (2016). When healthcare is delivered in your home, will you need to make economic trade-offs? In *Diverse Perspectives on Aging in a Changing World* (pp. 144-167). Routledge.

De Koning, J. L., Stathi, A., & Richards, S. (2017). Predictors of loneliness and different types of social isolation of rural-living older adults in the United Kingdom. *Ageing and society*, *37*(10), 2012-2043. https://doi.org/10.1017/S0144686X16000696

Derksen, S., & Keselman, H. J. (1992). Backward, forward and stepwise automated subset selection algorithms: Frequency of obtaining authentic and noise variables. *British Journal of Mathematical and Statistical Psychology*, *45*(2), 265-282.

Drinkwater, C., Wildman, J., & Moffatt, S. (2019). Social prescribing. *BMJ: British Medical Journal*, *364*. https://www-jstor-org.proxy.lib.uwaterloo.ca/stable/26958936

Durán-Arias, M., Yévenes-Briones, H., Banegas, J. R., Rodríguez-Artalejo, F., Lopez-Garcia, E., & Caballero, F. F. (2026). Loneliness, social isolation, and health-related quality of life in older adults. *European Journal of Ageing*, *23*(1), 13. https://doi.org/10.1007/s10433-025-00905-6

Egbujie, B. A., Betini, G., Ochwat, S., Mulla, R. T., Häsä, J., Edgren, J., Aaltonen, M., Bullmore, I., Cheung, G., & Jamieson, H. A. (2025). Cross-National Evidence on Risk of Death Associated With Loneliness: A Survival Analysis of 1-Year All-Cause Mortality Among Older Adult Home Care Recipients in Canada, Finland, and Aotearoa| New Zealand. *Journal of the American Medical Directors Association*.

Ejiri, M., Kawai, H., Ishii, K., Oka, K., & Obuchi, S. (2021). Predictors of older adults' objectively measured social isolation: A systematic review of observational studies. *Archives of Gerontology and Geriatrics*, *94*, 104357. https://doi.org/10.1016/j.archger.2021.104357

Eskelinen, K., Hartikainen, S., & Nykänen, I. (2016). Is Loneliness Associated with Malnutrition in Older People? *International Journal of Gerontology*, *10*(1), 43-45. https://doi.org/10.1016/j.ijge.2015.09.001

Filderman, B., Williams, N., Mofina, A., & Guthrie, D. M. (2024). What contributes to a decline in cognitive performance among home care clients? Analysis of interRAI data from across Canada. *BMC Geriatrics*, *24*(1), 822. https://doi.org/10.1186/s12877-024-05414-2

Fiori, K. L., Antonucci, T. C., & Cortina, K. S. (2006). Social network typologies and mental health among older adults. *J Gerontol B Psychol Sci Soc Sci*, *61*(1), P25-32. https://doi.org/10.1093/geronb/61.1.p25

Foebel, A. D., Hirdes, J. P., Heckman, G. A., Kergoat, M. J., Patten, S., & Marrie, R. A. (2013). Diagnostic data for neurological conditions in interRAI assessments in home care, nursing home and mental health care settings: a validity study. *BMC Health Serv Res*, *13*, 457. https://doi.org/10.1186/1472-6963-13-457

Fokkema, T., Jenny, D. J. G., & and Dykstra, P. A. (2012). Cross-National Differences in Older Adult Loneliness. *The Journal of Psychology*, *146*(1-2), 201-228. https://doi.org/10.1080/00223980.2011.631612

Ford, E. S., Li, C., & Sattar, N. (2008). Metabolic syndrome and incident diabetes: current state of the evidence. *Diabetes care*, *31*(9), 1898-1904. https://doi.org/10.2337/dc08-0423

Foster-Fishman, P. G., Nowell, B., & Yang, H. (2007). Putting the system back into systems change: a framework for understanding and changing organizational and community systems. *American Journal of Community Psychology*, *39*(3), 197-215. https://doi.org/10.1007/s10464-007-9109-0

Fries, B. E., Heckman, G., Hirdes, J. P., Finne-Soveri, H., Hirdes, A., Mashalla, Y. J. S., & Stewart, S. L. (2026). Born from Crisis: The Evolution of interRAI and Its Relevance to Today's Healthcare Challenges. *Healthc Manage Forum*, *39*(2), 75-84. https://doi.org/10.1177/08404704251389190

Galassi, A., Reynolds, K., & He, J. (2006). Metabolic Syndrome and Risk of Cardiovascular Disease: A Meta-Analysis. *The American Journal of Medicine*, *119*(10), 812-819. https://doi.org/10.1016/j.amjmed.2006.02.031

Ge, L., Yap, C. W., & Heng, B. H. (2022). Associations of social isolation, social participation, and loneliness with frailty in older adults in Singapore: a panel data analysis. *BMC Geriatrics*, *22*(1), 26. https://doi.org/10.1186/s12877-021-02745-2

Ge, L., Yap, C. W., Ong, R., & Heng, B. H. (2017). Social isolation, loneliness and their relationships with depressive symptoms: A population-based study. *PLoS One*, *12*(8), e0182145. https://doi.org/10.1371/journal.pone.0182145

Gerst-Emerson, K., & Jayawardhana, J. (2015). Loneliness as a Public Health Issue: The Impact of Loneliness on Health Care Utilization Among Older Adults. *American Journal of Public Health*, *105*(5), 1013-1019. https://doi.org/10.2105/ajph.2014.302427

Glover, T. (2016). Leveraging leisure-based community networks to access social capital. *Leisure matters: The state and future of leisure studies*, 277-285.

Glover, T. D., & Parry, D. C. (2008). Friendships Developed Subsequent to a Stressful Life Event: The Interplay of Leisure, Social Capital, and Health. *Journal of Leisure Research*, *40*(2), 208-230. https://doi.org/10.1080/00222216.2008.11950138

Glover, T. D., & Parry, D. C. (2019). Non-medical health centers – directions for service researchers. *The Journal of Services Marketing*, *33*(6), 655-659. https://doi.org/10.1108/JSM-02-2019-0081

Goldman, N., Alemdar, M., Megges, H., Matsumoto, N., Schoenmakers, E., van den Berg, P., Lasgaard, M., Christiansen, J., Junttila, N., Goldman, A., Draxl, D., El-Osta, A., & Qualter, P. (2026). National policy responses to address loneliness: A global scoping review of 194 WHO member states. *Health Policy*, *165*, 105553. https://doi.org/10.1016/j.healthpol.2025.105553

Goldman, N., Khanna, D., El Asmar, M. L., Qualter, P., & El-Osta, A. (2024). Addressing loneliness and social isolation in 52 countries: a scoping review of National policies. *BMC Public Health*, *24*(1), 1207. https://doi.org/10.1186/s12889-024-18370-8

Gonyea, J. G., & Burnes, K. (2013). Aging Well at Home: Evaluation of a Neighborhood-based Pilot Project to "Put Connection Back into Community". *Journal of housing for the elderly*, *27*(4), 333-347. https://doi.org/10.1080/02763893.2013.813425

Goossens, L., van Roekel, E., Verhagen, M., Cacioppo, J. T., Cacioppo, S., Maes, M., & Boomsma, D. I. (2015). The Genetics of Loneliness: Linking Evolutionary Theory to Genome-Wide Genetics, Epigenetics, and Social Science. *Perspectives on Psychological Science*, *10*(2), 213-226. http://www.jstor.org.proxy.lib.uwaterloo.ca/stable/44290062

Grafanaki, S., Pearson, D., Cini, F., Godula, D., McKenzie, B., Nason, S., & Anderegg, M. (2005). Sources of renewal: A qualitative study on the experience and role of leisure in the life of counsellors and psychologists. *Counselling Psychology Quarterly*, *18*(1), 31-40.

Gray, L. C., Berg, K., Fries, B. E., Henrard, J. C., Hirdes, J. P., Steel, K., & Morris, J. N. (2009). Sharing clinical information across care settings: the birth of an integrated assessment system. *BMC Health Serv Res*, *9*, 71. https://doi.org/10.1186/1472-6963-9-71

Greenfield, E. A., & Russell, D. (2011). Identifying living arrangements that heighten risk for loneliness in later life: Evidence from the US National Social Life, Health, and Aging Project. *Journal of applied gerontology*, *30*(4), 524-534.

Guo, C., Zhou, W., Jing, C., & Zhaxi, D. (2024). Mapping and measuring urban-rural inequalities in accessibility to social infrastructures. *Geography and Sustainability*, *5*(1), 41-51. https://doi.org/10.1016/j.geosus.2023.11.004

Gustafsson, S., Berglund, H., Faronbi, J., Barenfeld, E., & Ottenvall Hammar, I. (2017). Minor positive effects of health-promoting senior meetings for older community-dwelling persons on loneliness, social network, and social support. *Clin Interv Aging*, *12*, 1867-1877. https://doi.org/10.2147/cia.S143994

Hajek, A., R., S. A., Giuliana, P., Yannick, S., Karl, P., Antonio, T., Martina, L., & and König, H.-H. (2025). Chronic loneliness and chronic social isolation among older adults. A systematic review, meta-analysis and meta-regression. *Aging & Mental Health*, *29*(2), 185-200. https://doi.org/10.1080/13607863.2024.2385448

Hakulinen, C., Pulkki-Råback, L., Virtanen, M., Jokela, M., Kivimäki, M., & Elovainio, M. (2018). Social isolation and loneliness as risk factors for myocardial infarction, stroke and mortality: UK Biobank cohort study of 479 054 men and women. *Heart*, *104*(18), 1536-1542.

Hämmig, O. (2019). Health risks associated with social isolation in general and in young, middle and old age. *PLoS One*, *14*(7), e0219663. https://doi.org/10.1371/journal.pone.0219663

Harzing, A.-W. (2007). *Publish or Perish*. In https://harzing.com/resources/publish-or-perish

Havens, B., Hall, M., Sylvestre, G., & Jivan, T. (2004). Social Isolation and Loneliness: Differences between Older Rural and Urban Manitobans. *Canadian journal on aging*, *23*(2), 129-140. https://doi.org/10.1353/cja.2004.0022

Hawkley, L. C. (2022). Loneliness and health. *Nature Reviews Disease Primers*, *8*(1), 22. https://doi.org/10.1038/s41572-022-00355-9

Hawkley, L. C., Thisted, R. A., & Cacioppo, J. T. (2009). Loneliness predicts reduced physical activity: Cross-sectional & longitudinal analyses. *Health Psychology*, *28*(3), 354-363. https://doi.org/10.1037/a0014400

Hawkley, L. C., Thisted, R. A., Masi, C. M., & Cacioppo, J. T. (2010). Loneliness predicts increased blood pressure: 5-year cross-lagged analyses in middle-aged and older adults. *Psychol Aging*, *25*(1), 132-141. https://doi.org/10.1037/a0017805

Hawthorne, G. (2008). Perceived social isolation in a community sample: its prevalence and correlates with aspects of peoples' lives. *Social Psychiatry and Psychiatric Epidemiology*, *43*(2), 140-150. https://doi.org/10.1007/s00127-007-0279-8

Heller, K., Thompson, M. G., Trueba, P. E., Hogg, J. R., & Vlachos-Weber, I. (1991). Peer support telephone dyads for elderly women: was this the wrong intervention? *Am J Community Psychol*, *19*(1), 53-74. https://doi.org/10.1007/bf00942253

Henriksen, J., Larsen, E. R., Mattisson, C., & Andersson, N. W. (2019). Loneliness, health and mortality. *Epidemiol Psychiatr Sci*, *28*(2), 234-239. https://doi.org/10.1017/s2045796017000580

Hernández-Ascanio, J., Perula-de Torres, L., Rich-Ruiz, M., González-Santos, J., Mielgo-Ayuso, J., & González-Bernal, J. (2023). Effectiveness of a multicomponent intervention to reduce

social isolation and loneliness in community-dwelling elders: A randomized clinical trial. *Nurs Open*, *10*(1), 48-60. https://doi.org/10.1002/nop2.1277

Higginson, I. J., Hart, S., Koffman, J., Selman, L., & Harding, R. (2007). Needs Assessments in Palliative Care: An Appraisal of Definitions and Approaches Used. *Journal of Pain and Symptom Management*, *33*(5), 500-505. https://doi.org/10.1016/j.jpainsymman.2007.02.007

Hirdes, J. P., Ljunggren, G., Morris, J. N., Frijters, D. H., Finne Soveri, H., Gray, L., Björkgren, M., & Gilgen, R. (2008). Reliability of the interRAI suite of assessment instruments: a 12-country study of an integrated health information system. *BMC health services research*, *8*, 1-11.

Hirdes, J. P., Morris, J. N., Perlman, C. M., Saari, M., Betini, G. S., Franco-Martin, M. A., van Hout, H., Stewart, S. L., & Ferris, J. (2022). Mood Disturbances Across the Continuum of Care Based on Self-Report and Clinician Rated Measures in the interRAI Suite of Assessment Instruments. *Frontiers in psychiatry*, *13*, 787463-787463. https://doi.org/10.3389/fpsyt.2022.787463

Hirdes, J. P., Poss, J. W., & Curtin-Telegdi, N. (2008). The Method for Assigning Priority Levels (MAPLe): A new decision-support system for allocating home care resources. *BMC Medicine*, *6*(1), 9. https://doi.org/10.1186/1741-7015-6-9

Hirdes, J. P., Poss, J. W., Mitchell, L., Korngut, L., & Heckman, G. (2014). Use of the interRAI CHESS scale to predict mortality among persons with neurological conditions in three care settings. *PLoS One*, *9*(6), e99066. https://doi.org/10.1371/journal.pone.0099066

Hirdes, J. P., van Everdingen, C., Ferris, J., Franco-Martin, M., Fries, B. E., Heikkilä, J., Hirdes, A., Hoffman, R., James, M. L., Martin, L., Perlman, C. M., Rabinowitz, T., Stewart, S. L.,

& Van Audenhove, C. (2019). The interRAI Suite of Mental Health Assessment Instruments: An Integrated System for the Continuum of Care. *Front Psychiatry*, *10*, 926. https://doi.org/10.3389/fpsyt.2019.00926

Hirdes, J. P., Ziraldo, M. M., & Gorgenyi, E. (2025). *Community Assessment Collaboration Project*.

Hogeveen, S. E., Chen, J., & Hirdes, J. P. (2017). Evaluation of data quality of interRAI assessments in home and community care. *BMC Med Inform Decis Mak*, *17*(1), 150. https://doi.org/10.1186/s12911-017-0547-9

Holt-Lunstad, J., Smith, T. B., Baker, M., Harris, T., & Stephenson, D. (2015). Loneliness and social isolation as risk factors for mortality: a meta-analytic review. *Perspect Psychol Sci*, *10*(2), 227-237. https://doi.org/10.1177/1745691614568352

Honigh-de Vlaming, R., Haveman-Nies, A., Heinrich, J., van't Veer, P., & de Groot, L. C. (2013). Effect evaluation of a two-year complex intervention to reduce loneliness in non-institutionalised elderly Dutch people. *BMC Public Health*, *13*, 984. https://doi.org/10.1186/1471-2458-13-984

Hoogendijk, E. O., Smit, A. P., van Dam, C., Schuster, N. A., de Breij, S., Holwerda, T. J., Huisman, M., Dent, E., & Andrew, M. K. (2020). Frailty Combined with Loneliness or Social Isolation: An Elevated Risk for Mortality in Later Life. *J Am Geriatr Soc*, *68*(11), 2587-2593. https://doi.org/10.1111/jgs.16716

Husk, K., Elston, J., Gradinger, F., Callaghan, L., & Asthana, S. (2019). Social prescribing: where is the evidence? *Br J Gen Pract*, *69*(678), 6-7. https://doi.org/10.3399/bjgp19X700325

Hwang, T. J., Rabheru, K., Peisah, C., Reichman, W., & Ikeda, M. (2020). Loneliness and social isolation during the COVID-19 pandemic. *Int Psychogeriatr*, *32*(10), 1217-1220. https://doi.org/10.1017/s1041610220000988

Improta, A., Taborri, S., Giannetta, N., Dionisi, S., Di Simone, E., Renzi, E., Massimi, A., De Leo, A., Panattoni, N., Orsi, G. B., Fabbian, F., Liquori, G., Amato, L., & Di Muzio, M. (2026). Social isolation and loneliness effects on medication adherence in older adults: perspectives from a systematic review. *BMC Public Health*, *26*(1), 577. https://doi.org/10.1186/s12889-025-26085-7

Jensen, M. M., Friis, K., Maindal, H. T., Hargaard, A.-S., Knudsen, M. G., Grønkjaer, M. S., & Lasgaard, M. (2025). Loneliness is associated with adverse health behaviour and obesity: a Danish population-based study of 122,258 individuals. *BMC Public Health*, *25*(1), 375. https://doi.org/10.1186/s12889-025-21490-4

Keefe, J., Andrew, M. K., Fancey, P., & Hall, M. (2006). *A Profile of Social Isolation in Canada*. https://health.gov.bc.ca/library/publications/year/2006/keefe_social_isolation_final_report_may_2006.pdf

Kim, H., Jung, Y. I., Sung, M., Lee, J. Y., Yoon, J. Y., & Yoon, J. L. (2015). Reliability of the interRAI Long Term Care Facilities (LTCF) and interRAI Home Care (HC). *Geriatr Gerontol Int*, *15*(2), 220-228. https://doi.org/10.1111/ggi.12330

Kimberlee, R. (2015). What is social prescribing? *Advances in Social Sciences Research Journal*, *2*(1).

Kobayashi, K., Cloutier, D., & Roth, M. (2009). Making Meaningful Connections. *Journal of Aging and Health*, *21*, 374-397. https://doi.org/10.1177/0898264308329022

Kobayashi, L. C., & Steptoe, A. (2018). Social isolation, loneliness, and health behaviors at older ages: longitudinal cohort study. *Annals of Behavioral Medicine*, *52*(7), 582-593.

Kojima, G., Taniguchi, Y., Aoyama, R., & Tanabe, M. (2022). Associations between loneliness and physical frailty in community-dwelling older adults: A systematic review and meta-analysis. *Ageing Research Reviews*, *81*, 101705. https://doi.org/10.1016/j.arr.2022.101705

Landi, F., Tua, E., Onder, G., Carrara, B., Sgadari, A., Rinaldi, C., Gambassi, G., Lattanzio, F., & Bernabei, R. (2000). Minimum Data Set for Home Care: A Valid Instrument to Assess Frail Older People Living in the Community. *Medical Care*, *38*(12), 1184-1190. http://www.jstor.org.proxy.lib.uwaterloo.ca/stable/3767996

Lauder, W., Kerry, M., Martyn, J., & and Caperchione, C. (2006). A comparison of health behaviours in lonely and non-lonely populations. *Psychology, Health & Medicine*, *11*(2), 233-245. https://doi.org/10.1080/13548500500266607

Lee, E. E., Depp, C., Palmer, B. W., Glorioso, D., Daly, R., Liu, J., Tu, X. M., Ho-Cheol, K., Tarr, P., Yamada, Y., & Jeste, D. V. (2019). High prevalence and adverse health effects of loneliness in community-dwelling adults across the lifespan: role of wisdom as a protective factor. *International Psychogeriatrics*, *31*(10), 1447-1462. https://doi.org/10.1017/S1041610218002120

Leger. (2020). *COVID-19 Pan-Canadian Tracking Study* (13088-012).

Leigh-Hunt, N., Bagguley, D., Bash, K., Turner, V., Turnbull, S., Valtorta, N., & Caan, W. (2017). An overview of systematic reviews on the public health consequences of social isolation and loneliness. *Public Health*, *152*, 157-171. https://doi.org/10.1016/j.puhe.2017.07.035

Li, J., Sandhu, S., Thomas, C., & Bettger, J. (2025). Volunteers as a resource for asset mapping and maintaining a living resource directory: lessons from an academic–community

partnership. *Perspectives in Public Health*, *145*(1), 45-48. https://doi.org/10.1177/17579139231180807

Lim, J. (2023). Effects of a cognitive-based intervention program using social robot PIO on cognitive function, depression, loneliness, and quality of life of older adults living alone. *Front Public Health*, *11*, 1097485. https://doi.org/10.3389/fpubh.2023.1097485

Lubben, J., Blozik, E., Gillmann, G., Iliffe, S., von Renteln Kruse, W., Beck, J. C., & Stuck, A. E. (2006). Performance of an Abbreviated Version of the Lubben Social Network Scale Among Three European Community-Dwelling Older Adult Populations. *The Gerontologist*, *46*(4), 503-513. https://doi.org/10.1093/geront/46.4.503

Lubben, J. E. (1988). Assessing social networks among elderly populations. *Family & Community Health*, *11*(3), 42-52. https://journals.lww.com/familyandcommunityhealth/fulltext/1988/11000/assessing_social_networks_among_elderly.8.aspx

Luggen, A. S., & Rini, A. G. (1995). Assessment of social networks and isolation in community-based elderly men and women: When are chronically ill elders living at home at risk for social isolation? *Geriatric Nursing*, *16*(4), 179-181. https://doi.org/10.1016/S0197-4572(05)80027-8

Luo, Y., Hawkley, L. C., Waite, L. J., & Cacioppo, J. T. (2012). Loneliness, health, and mortality in old age: A national longitudinal study. *Social Science & Medicine*, *74*(6), 907-914. https://doi.org/10.1016/j.socscimed.2011.11.028

Manemann, S. M., Chamberlain, A. M., Roger, V. L., Griffin, J. M., Boyd, C. M., Cudjoe, T. K., Jensen, D., Weston, S. A., Fabbri, M., & Jiang, R. (2018). Perceived social isolation and

outcomes in patients with heart failure. *Journal of the American Heart Association*, *7*(11), e008069.

Manis, D. R., McArthur, C., & Costa, A. P. (2020). Associations with rates of falls among home care clients in Ontario, Canada: a population-based, cross-sectional study. *BMC Geriatrics*, *20*(1), 80. https://doi.org/10.1186/s12877-020-1483-6

Martín-María, N., Félix, C. F., Marta, M., Stefanos, T., Maria, H. J., Luis, A.-M. J., & and Chatterji, S. (2020). Differential impact of transient and chronic loneliness on health status. A longitudinal study. *Psychology & Health*, *35*(2), 177-195. https://doi.org/10.1080/08870446.2019.1632312

Mathias, K., Martin, L., Alharbi, K. K., Smith, T. F., de Almeida Mello, J., Hermans, K., Vereker, N., de Stampa, M., & Intrator, O. (2026). A Rapid Review of International Evaluations of interRAI Systems. *Healthcare Management Forum*, *39*(2), 93-100. https://doi.org/10.1177/08404704251389191

McArthur, C., Turcotte, L. A., Sinn, C.-L. J., Berg, K., Morris, J. N., & Hirdes, J. P. (2022). Social Engagement and Distress Among Home Care Recipients During the COVID-19 Pandemic in Ontario, Canada: A Retrospective Cohort Study. *Journal of the American Medical Directors Association*, *23*(7), 1101-1108. https://doi.org/10.1016/j.jamda.2022.04.005

McIntyre, J. C., Worsley, J., Corcoran, R., Harrison Woods, P., & Bentall, R. P. (2018). Academic and non-academic predictors of student psychological distress: The role of social identity and loneliness. *Journal of Mental Health*, *27*(3), 230-239.

Mofina, A., Meehan, B., James, M. L., & Berg, K. (2026). The Use of interRAI Scales Across Healthcare Settings: Building a Bridge Between Evidence and Practice. *Healthcare Management Forum*, *39*(2), 149-158. https://doi.org/10.1177/08404704251385067

Morris, J., Carpenter, G., Berg, K., & Jones, R. (2000). Outcome Measures for Use with Home Care Clients. *Canadian Journal on Aging / La Revue canadienne du vieillissement*, *19*, 87-105. https://doi.org/10.1017/S071498080001391X

Morris, J. N., Berg, K., Fries, B. E., Steel, K., & Howard, E. P. (2013). Scaling functional status within the interRAI suite of assessment instruments. *BMC Geriatrics*, *13*(1), 128-128. https://doi.org/10.1186/1471-2318-13-128

Morris, J. N., Declercq, A., Hirdes, J. P., Finne-Soveri, H., Fries, B. E., James, M. L., Geffen, L., Kehyayan, V., Saks, K., Szczerbińska, K., & Topinkova, E. (2018). Hearing the Voice of the Resident in Long-Term Care Facilities—An Internationally Based Approach to Assessing Quality of Life. *Journal of the American Medical Directors Association*, *19*(3), 207-215. https://doi.org/10.1016/j.jamda.2017.08.010

Morris, J. N., Fries, B. E., Mehr, D. R., Hawes, C., Phillips, C., Mor, V., & Lipsitz, L. A. (1994). MDS Cognitive Performance Scale©. *Journal of gerontology*, *49*(4), M174-M182. https://doi.org/10.1093/geronj/49.4.M174

Morris, J. N., Fries, B. E., & Morris, S. A. (1999). Scaling ADLs Within the MDS. *The journals of gerontology. Series A, Biological sciences and medical sciences*, *54*(11), M546-M553. https://doi.org/10.1093/gerona/54.11.M546

Morse, D. F., Sandhu, S., Mulligan, K., Tierney, S., Polley, M., Chiva Giurca, B., Slade, S., Dias, S., Mahtani, K. R., & Wells, L. (2022). Global developments in social prescribing. *BMJ global health*, *7*(5), e008524.

Morton, L., Ferguson, M., & Baty, F. (2015). Improving wellbeing and self-efficacy by social prescription. *Public Health*, *129*(3), 286-289. https://doi.org/10.1016/j.puhe.2014.12.011

Mouriño-Ruiz, R., Serral, G., Continente, X., López, M. J., Lapena, C., & Puigpinós-Riera, R. (2024). Evaluation of effectiveness of an art-based museum intervention in reducing loneliness among older adults (ArtGran): a quasi-experimental study. *Public Health*, *230*, 149-156. https://doi.org/10.1016/j.puhe.2024.02.024

Mowle, A., Klepac, B., Riley, T., & Craike, M. (2025). The C-CAP Process: A Comprehensive Approach to Community Resource Mapping. *Health Promotion Practice*, *26*(1), 46-56. https://doi.org/10.1177/15248399231193696

Muhl, C., Mulligan, K., Bayoumi, I., Ashcroft, R., & Godfrey, C. (2023). Establishing internationally accepted conceptual and operational definitions of social prescribing through expert consensus: a Delphi study. *BMJ Open*, *13*(7), e070184.

Mulligan, K. (2024). Social Prescribing in Canada: Coproduction with Communities. In M. Bertotti, S. Dias, A. Gama, W. Herrmann, K. Husk, & K. Khan (Eds.), *Social prescribing policy, research and practice* (pp. 131-145). Springer. https://doi.org/ 978-3-031-52106-5

Mund, M., Maes, M., Drewke, P. M., Gutzeit, A., Jaki, I., & Qualter, P. (2023). Would the Real Loneliness Please Stand Up? The Validity of Loneliness Scores and the Reliability of Single-Item Scores. *Assessment*, *30*(4), 1226-1248. https://doi.org/10.1177/10731911221077227

Mundry, R., & Nunn, Charles L. (2009). Stepwise Model Fitting and Statistical Inference: Turning Noise into Signal Pollution. *The American Naturalist*, *173*(1), 119-123. https://doi.org/10.1086/593303

National Academies of Sciences, E., and Medicine;. (2020). *Social isolation and loneliness in older adults: Opportunities for the health care system*. The National Academies Press. https://doi.org/10.17226/25663.

Neuber, K. A. (1980). *Needs assessment: A model for community planning* (Vol. 14). Sage.

Nicholson, N. R., Jr. (2009). Social isolation in older adults: an evolutionary concept analysis. *Journal of Advanced Nursing*, *65*(6), 1342-1352. https://doi.org/10.1111/j.1365-2648.2008.04959.x

Nicholson, N. R., Jr., & Shellman, J. (2013). Decreasing social isolation in older adults: effects of an empowerment intervention offered through the CARELINK program. *Res Gerontol Nurs*, *6*(2), 89-97. https://doi.org/10.3928/19404921-20130110-01

Nummela, O., Seppänen, M., & Uutela, A. (2011). The effect of loneliness and change in loneliness on self-rated health (SRH): A longitudinal study among aging people. *Archives of Gerontology and Geriatrics*, *53*(2), 163-167. https://doi.org/10.1016/j.archger.2010.10.023

Ochwat, S. (2022). *Predictors of Loneliness and Transitions in Loneliness in Ontario Home Care Clients: Before and During the COVID-19 Pandemic* University of Waterloo]. https://uwspace.uwaterloo.ca/items/2f220662-7c69-4277-bc70-58da97b778d2

Ollonqvist, K., Palkeinen, H., Aaltonen, T., Pohjolainen, T., Puukka, P., & Hinkka, K. (2008). Alleviating Loneliness among Frail Older People – Findings from a Randomised Controlled Trial. *International Journal of Mental Health Promotion*, *10*. https://doi.org/10.1080/14623730.2008.9721760

Ong, A. D., Uchino, B. N., & Wethington, E. (2015). Loneliness and Health in Older Adults: A Mini-Review and Synthesis. *Gerontology*, *62*(4), 443-449. https://doi.org/10.1159/000441651

Ordoñez-Jasis, R., & Myck-Wayne, J. (2012). Community Mapping in Action:Uncovering Resources and Assets for Young Children and Their Families. *Young Exceptional Children*, *15*(3), 31-45. https://doi.org/10.1177/1096250612451756

Paquet, C., Whitehead, J., Shah, R., Adams, A. M., Dooley, D., Spreng, R. N., Aunio, A. L., & Dubé, L. (2023). Social Prescription Interventions Addressing Social Isolation and Loneliness in Older Adults: Meta-Review Integrating On-the-Ground Resources. *J Med Internet Res*, *25*, e40213. https://doi.org/10.2196/40213

Park, C., Majeed, A., Gill, H., Tamura, J., Ho, R. C., Mansur, R. B., Nasri, F., Lee, Y., Rosenblat, J. D., Wong, E., & McIntyre, R. S. (2020). The Effect of Loneliness on Distinct Health Outcomes: A Comprehensive Review and Meta-Analysis. *Psychiatry Research*, *294*, 113514. https://doi.org/10.1016/j.psychres.2020.113514

Park, J., & Zhu, Y. (2024). Mortality risk of loneliness: Culture matters. *Health Psychol*, *43*(11), 791-802. https://doi.org/10.1037/hea0001401

Park, S., & Berkowitz, S. A. (2024). Social Isolation, Loneliness, and Quality of Life Among Food-Insecure Adults. *American Journal of Preventive Medicine*, *67*(1), 120-123. https://doi.org/10.1016/j.amepre.2024.02.001

Paúl, C., & Ribeiro, O. (2009). Predicting loneliness in old people living in the community. *Reviews in Clinical Gerontology*, *19*(1), 53-60. https://doi.org/10.1017/S0959259809990074

Paul, E., Bu, F., & Fancourt, D. (2021). Loneliness and Risk for Cardiovascular Disease: Mechanisms and Future Directions. *Current Cardiology Reports*, *23*(6), 68. https://doi.org/10.1007/s11886-021-01495-2

Peplau, L., & Perlman, D. (1982). Perspectives on loneliness. In L. Peplau & D. Perlman (Eds.), *Loneliness: A sourcebook of current theory, research and therapy* (pp. 1-18). Wiley. https://peplau.psych.ucla.edu/wp-content/uploads/sites/141/2017/07/Peplau_perlman_82.pdf

Peplau, L. A., & Perlman, D. (1979). Blueprint for a social psychological theory of loneliness. *Love and attraction*, 99-108. https://iscet.pt/uploads/obSolidao/blueprint_for_a_social_psychological_theory_of_loneliness.pdf

Percival, A., Newton, C., Mulligan, K., Petrella, R. J., & Ashe, M. C. (2022). Systematic review of social prescribing and older adults: where to from here? *Fam Med Community Health*, *10*(Suppl 1). https://doi.org/10.1136/fmch-2022-001829

Peters, M., Godfrey, C., McInerney, P., Trico, A., & Khalil, H. (2020). Chapter 11: Scoping Reviews. In. https://doi.org/10.46658/JBIMES-20-12

Pollak, C., Pham, Y., Ehrlich, A., Verghese, J., & Blumen, H. M. (2025). Loneliness and social isolation risk factors in community-dwelling older adults receiving home health services. *BMC Geriatrics*, *25*(1), 290. https://doi.org/10.1186/s12877-025-05947-0

Pynnönen, K., Törmäkangas, T., Rantanen, T., Tiikkainen, P., & Kallinen, M. (2018). Effect of a social intervention of choice vs. control on depressive symptoms, melancholy, feeling of loneliness, and perceived togetherness in older Finnish people: a randomized controlled trial. *Aging Ment Health*, *22*(1), 77-84. https://doi.org/10.1080/13607863.2016.1232367

Qualter, P., Vanhalst, J., Harris, R., Van Roekel, E., Lodder, G., Bangee, M., Maes, M., & Verhagen, M. (2015). Loneliness Across the Life Span. *Perspectives on Psychological Science*, *10*(2), 250-264. http://www.jstor.org.proxy.lib.uwaterloo.ca/stable/44290065

Qureshi, T., Gallant, G., Bronstein, T., Hazelden, M., Brierley, A., & Sinha, S. (2026). *Perspectives on Growing Older in Canada: The 2025 NIA Ageing in Canada Survey* (978-1-77417-104-2). Toronto Metropolitan University.

Reinhardt, G., Vidovic, D., & Hammerton, C. (2021). Understanding loneliness: a systematic review of the impact of social prescribing initiatives on loneliness. *Perspectives in Public Health*, *141*(4), 204-213. https://doi.org/10.1177/1757913920967040

Richard, A., Rohrmann, S., Vandeleur, C. L., Schmid, M., Barth, J., & Eichholzer, M. (2017). Loneliness is adversely associated with physical and mental health and lifestyle factors: Results from a Swiss national survey. *PLoS One*, *12*(7), e0181442. https://doi.org/10.1371/journal.pone.0181442

Rico-Uribe, L. A., Caballero, F. F., Martín-María, N., Cabello, M., Ayuso-Mateos, J. L., & Miret, M. (2018). Association of loneliness with all-cause mortality: A meta-analysis. *PLoS One*, *13*(1), e0190033. https://doi.org/10.1371/journal.pone.0190033

Rodríguez-Romero, R., Herranz-Rodríguez, C., Kostov, B., Gené-Badia, J., & Sisó-Almirall, A. (2021). Intervention to reduce perceived loneliness in community-dwelling older people. *Scand J Caring Sci*, *35*(2), 366-374. https://doi.org/10.1111/scs.12852

Rönneikkö, J. K., Jämsen, E. R., Mäkelä, M., Finne-Soveri, H., & Valvanne, J. N. (2018). Reasons for home care clients' unplanned Hospital admissions and their associations with patient characteristics. *Archives of Gerontology and Geriatrics*, *78*, 114-126. https://doi.org/10.1016/j.archger.2018.06.008

Saari, M. E., Giosa, J. L., Holyoke, P., Heckman, G. A., & Hirdes, J. P. (2024). Profiling the medical, functional, cognitive, and psychosocial care needs of adults assessed for home care in Ontario, Canada: The case for long-term 'life care' at home. *PLoS One*, *19*(4), e0300521. https://doi.org/10.1371/journal.pone.0300521

Saito, T., Kai, I., & Takizawa, A. (2012). Effects of a program to prevent social isolation on loneliness, depression, and subjective well-being of older adults: a randomized trial among

older migrants in Japan. *Arch Gerontol Geriatr*, *55*(3), 539-547. https://doi.org/10.1016/j.archger.2012.04.002

SAS Institute. (2023). *SAS® Studio*. In (Version 5.1) SAS Institute Inc.

Savage, R. D., Sutradhar, R., Luo, J., Strauss, R., Guan, J., Rochon, P. A., Gruneir, A., Sanmartin, C., Goel, V., Rosella, L. C., Stall, N. M., Chamberlain, S. A., Yu, C., Altaf, A., & Bronskill, S. E. (2025). Association of loneliness with healthcare transitions and mortality in older adults in Ontario, Canada: a retrospective cohort study. *BMJ Open*, *15*(4), e087804. https://doi.org/10.1136/bmjopen-2024-087804

Savikko, N., Routasalo, P., Tilvis, R. S., Strandberg, T. E., & Pitkälä, K. H. (2005). Predictors and subjective causes of loneliness in an aged population. *Archives of Gerontology and Geriatrics*, *41*(3), 223-233. https://doi.org/10.1016/j.archger.2005.03.002

Schafer, M. H., Sun, H., & Lee, J. A. (2021). Compensatory Connections? Living Alone, Loneliness, and the Buffering Role of Social Connection Among Older American and European Adults. *The Journals of Gerontology: Series B*, *77*(8), 1550-1560. https://doi.org/10.1093/geronb/gbab217

Schumacher, C., Saari, M., Northwood, M., Mowbray, F., Mensink, C., Heyer, M., Bail, K., & Pyatt, G. (2026). Care Planning Across the Health System: Intersectoral Application of the interRAI Assessment System. *Healthcare Management Forum*, *39*(2), 132-140. https://doi.org/10.1177/08404704251370371

Schumacher, C. L., Correia, R., Hogeveen, S., Salter, M., & Donaldson, B. (2023). Implementing the interRAI Check-Up Comprehensive Assessment: Facilitating Care Planning and Care Coordination during the Pandemic. *Int J Integr Care*, *23*(2), 5. https://doi.org/10.5334/ijic.7007

Seitz, A. (2023). Loneliness poses health risks as deadly as smoking, U.S. surgeon general says. *PBS News*. https://www.pbs.org/newshour/health/loneliness-poses-health-risks-as-deadly-as-smoking-u-s-surgeon-general-says

Sermat, V. (1978). Sources of loneliness. *Essence: Issues in the Study of Ageing, Dying, and Death*.

Shankar, A., McMunn, A., Banks, J., & Steptoe, A. (2011). Loneliness, social isolation, and behavioral and biological health indicators in older adults. *Health Psychology*, *30*(4), 377.

Sherman, D. W., Alfano, A. R., Alfonso, F., Duque, C. R., Eiroa, D., Marrero, Y., Muñecas, T., Radcliffe-Henry, E., Rodriguez, A., & Sommer, C. L. (2024). A Systematic Review of the Relationship between Social Isolation and Physical Health in Adults. *Healthcare*, *12*(11), 1135. https://www.mdpi.com/2227-9032/12/11/1135

Shiovitz-Ezra, S., & Leitsch, S. (2010). The Role of Social Relationships in Predicting Loneliness: The National Social Life, Health, and Aging Project. *Social Work Research*, *34*, 157-167. https://doi.org/10.1093/swr/34.3.157

Singer, C. (2018). Health effects of social isolation and loneliness. *J. Aging Life Care*, *28*, 4-8.

Sinha, M., & Bleakney, A. (2014). Receiving Care At Home. In S. Canada (Ed.), *Spotlight on Canadians: Results from the General Social Survey* (Vol. 89-652-X).

Sleezer, C. M., Russ-Eft, D. F., & Gupta, K. (2014). *A practical guide to needs assessment*. John Wiley & Sons.

Smith, K. J., & Victor, C. (2019). Typologies of loneliness, living alone and social isolation, and their associations with physical and mental health. *Ageing and society*, *39*(8), 1709-1730. https://doi.org/10.1017/S0144686X18000132

Statistics Canada. (2023). Census Profile, 2021 Census of Population. In S. Canada (Ed.). Ottawa.

Statistics Canada. (2025). *Table 45-10-0049-01 Loneliness by gender and other selected sociodemographic characteristics*.

Steptoe, A., Owen, N., Kunz-Ebrecht, S. R., & Brydon, L. (2004). Loneliness and neuroendocrine, cardiovascular, and inflammatory stress responses in middle-aged men and women. *Psychoneuroendocrinology*, *29*(5), 593-611. https://doi.org/10.1016/S0306-4530(03)00086-6

Steptoe, A., Shankar, A., Demakakos, P., & Wardle, J. (2013). Social isolation, loneliness, and all-cause mortality in older men and women. *Proceedings of the National Academy of Sciences*, *110*(15), 5797-5801. https://doi.org/10.1073/pnas.1219686110

Stevens, A. (2004). *Health care needs assessment: the epidemiologically based needs assessment reviews* (Vol. 2). Radcliffe Publishing.

Stickley, A., Koyanagi, A., Roberts, B., Richardson, E., Abbott, P., Tumanov, S., & McKee, M. (2013). Loneliness: its correlates and association with health behaviours and outcomes in nine countries of the former Soviet Union. *PLoS One*, *8*(7), e67978. https://doi.org/10.1371/journal.pone.0067978

Taube, E., Kristensson, J., Sandberg, M., Midlöv, P., & Jakobsson, U. (2015). Loneliness and health care consumption among older people. *Scandinavian Journal of Caring Sciences*, *29*(3), 435-443. https://doi.org/10.1111/scs.12147

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *Int J Med Educ*, *2*, 53-55. https://doi.org/10.5116/ijme.4dfb.8dfd

Teo, R. H., Cheng, W. H., Cheng, L. J., Lau, Y., & Lau, S. T. (2023). Global prevalence of social isolation among community-dwelling older adults: A systematic review and meta-analysis.

Archives of Gerontology and Geriatrics, *107*, 104904. https://doi.org/10.1016/j.archger.2022.104904

Theeke, L. A. (2010). Sociodemographic and Health-Related Risks for Loneliness and Outcome Differences by Loneliness Status in a Sample of U.S. Older Adults. *Research in Gerontological Nursing*, *3*(2), 113-125. https://doi.org/10.3928/19404921-20091103-99

Theeke, L. A., Mallow, J. A., Moore, J., McBurney, A., Rellick, S., & VanGilder, R. (2016). Effectiveness of LISTEN on loneliness, neuroimmunological stress response, psychosocial functioning, quality of life, and physical health measures of chronic illness. *Int J Nurs Sci*, *3*(3), 242-251. https://doi.org/10.1016/j.ijnss.2016.08.004

thehealthline.ca. (2026). *Seniors*. Southwesthealthline.ca. https://www.southwesthealthline.ca/listCategories.aspx?id=10019

Thomas, K. S., Akobundu, U., & Dosa, D. (2016). More Than A Meal? A Randomized Control Trial Comparing the Effects of Home-Delivered Meals Programs on Participants' Feelings of Loneliness. *J Gerontol B Psychol Sci Soc Sci*, *71*(6), 1049-1058. https://doi.org/10.1093/geronb/gbv111

Unal, I. (2017). Defining an Optimal Cut-Point Value in ROC Analysis: An Alternative Approach. *Computational and Mathematical Methods in Medicine*, *2017*(1), 3762651. https://doi.org/10.1155/2017/3762651

Valtorta, N. K., Kanaan, M., Gilbody, S., & Hanratty, B. (2016). Loneliness, social isolation and social relationships: what are we measuring? A novel framework for classifying and comparing tools. *BMJ Open*, *6*(4), e010799. https://doi.org/10.1136/bmjopen-2015-010799

Valtorta, N. K., Kanaan, M., Gilbody, S., Ronzi, S., & Hanratty, B. (2016). Loneliness and social isolation as risk factors for coronary heart disease and stroke: systematic review and meta-analysis of longitudinal observational studies. *Heart*, *102*(13), 1009. https://doi.org/10.1136/heartjnl-2015-308790

Vereker, N., Alharbi, K., De Almeida Mello, J., Hermans, K., Declercq, A., Stewart, S. L., Mathias, K., & Heckman, G. (2026). interRAI Implementation: Health System Considerations. *Healthcare Management Forum*, *39*(2), 108-113. https://doi.org/10.1177/08404704251392816

Veritas Health Innovation. (2024). *Covidence systematic review software*. In www.covidence.org

Visser, M. A., & El Fakiri, F. (2016). The prevalence and impact of risk factors for ethnic differences in loneliness. *Eur J Public Health*, *26*(6), 977-983. https://doi.org/10.1093/eurpub/ckw115

Wakefield, J. R. H., Kellezi, B., Stevenson, C., McNamara, N., Bowe, M., Wilson, I., Halder, M. M., & Mair, E. (2022). Social Prescribing as 'Social Cure': A longitudinal study of the health benefits of social connectedness within a Social Prescribing pathway. *Journal of Health Psychology*, *27*(2), 386-396. https://doi.org/10.1177/1359105320944991

Wang, H., Zhao, E., Fleming, J., Dening, T., Khaw, K.-T., & Brayne, C. (2019). Is loneliness associated with increased health and social care utilisation in the oldest old? Findings from a population-based longitudinal study. *BMJ Open*, *9*(5), e024645. https://doi.org/10.1136/bmjopen-2018-024645

Wenghofer, E. F., Kam, S. M., Timony, P. E., Strasser, R., & Sutinen, J. (2018). Geographic variation in FP and GP scope of practice in Ontario: Comparative provincial study. *Can Fam Physician*, *64*(6), e274-e282.

Whisman, M. A. (2010). Loneliness and the Metabolic Syndrome in a Population-Based Sample of Middle-Aged and Older Adults. *Health Psychology*, *29*(5), 550-554. https://doi.org/10.1037/a0020760

White, M., & Salamon, E. (2010). An interim evaluation of the 'Arts For Well-being'social prescribing scheme in County Durham. *Durham University: Centre for Medical Humanities*.

Wilson, R. S., Krueger, K. R., Arnold, S. E., Schneider, J. A., Kelly, J. F., Barnes, L. L., Tang, Y., & Bennett, D. A. (2007). Loneliness and Risk of Alzheimer Disease. *Archives of General Psychiatry*, *64*(2), 234-240. https://doi.org/10.1001/archpsyc.64.2.234

Winnipeg Regional Health Authority. *Community Health Assessment*. Retrieved January 19 from https://wrha.mb.ca/research/community-health-assessment/

Wister, A. V., & McPherson, B. D. (2014). *Aging as a Social Process* (6th ed.). Oxford University Press.

World Health Organization. (2021). *Social isolation and loneliness among older people: Advocacy Brief*.

Yang, F., & Gu, D. (2021). Widowhood, widowhood duration, and loneliness among older adults in China. *Social Science & Medicine*, *283*, 114179. https://doi.org/10.1016/j.socscimed.2021.114179

Young, J. E. (1982). Loneliness, depression and cognitive therapy: Theory and application. In *Loneliness: A sourcebook of current theory, research and therapy* (pp. 379-406). Wiley.

Zhang, J., Xu, L., Li, J., Sun, L., Ding, G., Qin, W., Wang, Q., Zhu, J., Yu, Z., & Xie, S. (2018). Loneliness and Health Service Utilization among the Rural Elderly in Shandong, China: A

Cross-Sectional Study. *International Journal of Environmental Research and Public Health*, *15*(7), 1468. https://www.mdpi.com/1660-4601/15/7/1468

Zhang, Y., Kuang, J., Xin, Z., Fang, J., Song, R., Yang, Y., Song, P., Wang, Y., & Wang, J. (2023). Loneliness, social isolation, depression and anxiety among the elderly in Shanghai: Findings from a longitudinal study. *Arch Gerontol Geriatr*, *110*, 104980. https://doi.org/10.1016/j.archger.2023.104980

Zhu, G., Shou, Y., & Smithson, M. (2025). An investigation of the convergent validity and test-retest reliability of three uncertainty preference measures. *Behav Res Methods*, *57*(8), 221. https://doi.org/10.3758/s13428-025-02729-9

Zhu, Y. Z., Lin, C. F., Yang, H. L., Jin, G., & Chiu, H. L. (2023). Effects of exergaming on cognitive functions and loneliness of older adults with cognitive frailty. *Int J Geriatr Psychiatry*, *38*(6), e5944. https://doi.org/10.1002/gps.5944

Appendix

Supplementary Table A Unadjusted Odds Ratios for All Potential Index Variables Using the Pre-COVID-19 Period Among Ontario Home Care Clients (n=219,646)

Items Considered for Index of Social Isolation	**Indicator of Isolation**	**OR (95% CI)**
Marital status	Single	2.61 (2.55, 2.68)
Living arrangement	Lives alone	2.54 (2.49, 2.60)
Participation in activities of interest	Withdrawal from activities of interest	2.42 (2.35, 2.48)
Levels of social interaction	Reduced social interaction	2.42 (2.36, 2.48)
Participation in social activities of long-standing interest	Participated in social activities of long-standing interest never or more than 30 days ago	1.41 (1.38, 1.44)
Visit with long-standing social relation or family member	Visit with long-standing social relation or family member never or more than 30 days ago	1.42 (1.37, 1.46)
Other interaction with long-standing social relation or family member	Other interaction with long-standing social relation or family member never or more than 30 days ago	1.09 (1.06, 1.13)
Change in social activities in the last 90 days	Decline in social activities in the last 90 days	1.59 (1.55, 1.62)
Length of time alone during the day	Alone for eight or more hours in the day	2.94 (2.88, 3.01)
Days of formal care in the last seven days	Less than four days (non-lonely cut point) of formal care within the last seven days	0.945 (0.93, 0.97)
Presence of first informal helper	No first informal helper	2.33 (2.23, 2.43)
Presence of second informal helper	No second informal helper	1.31 (1.28, 1.34)
Hours of informal care in the last three days	Less than nine hours (non-lonely cut point) of informal care within the last three days	1.63 (1.59, 1.66)
Relationship with family	Unsupportive family	1.95 (1.90, 2.00)

Participation in social activities of long-standing interest and visits with long-standing social relation or family member	No participation and no visits ever or in the last 30 days	1.47 (1.43, 1.50)

Supplementary Table B Resource Inventory for FSA N0G

Organization Name	Location	Contact Information	Nature of Resource	Cost ($)	Waitlist	Catchment Area	Hours Of Operation	Target Population	Service Category	Service Details
Atwood Presbyterian Church	140 Monument Rd, North Perth ON, N0G 1B0	519-356-2551	Community Infrastructure	Donation	N/A	North Perth	Sunday 10am - 12pm	Everyone	Meal Assistance	Meals every third Monday of the month at noon
Palmerston Community Food Bank	215 William St. Unit 2 Palmerston, ON, N0G 2P0	519-417-4774	Service System	Free	N/A	Huron-Perth	Thursday 3pm - 6pm	People and Families in Need	Meal Assistance	Supplying individuals with food when they are in need. Food hampers available.
Wellington County Library (Various Locations)	265 Bell, Palmerston ON, N0G 2P0	519-343-2142; palmerstonlib@wellington.ca	Community Infrastructure	Free	N/A	Palmerston	Mon/Fri 10am - 5pm; Tues/Wed/Thurs 10am - 8pm; Sat 10am - 3pm	Everyone	Leisure Skill Development, Educational Activities	Build community, enrich lives, & foster creativity by providing universal access to information, skills and ideas.
North Huron Food Share	405 Josephine St., Wingham, ON, N0G 2W0	519-357-2277 ext. 4	Service System	Free	N/A	North Huron	Wed 9am - 1pm	People and Families in Need	Meal Assistance	Seven days of groceries provided once a month
Salvation Army (Various Locations)	205 Josephine St., Wingham, ON, N0G 2W0	Food Bank 519-357-1387; Thrift Store 519-357-3757	Service System	Food bank - free; Thrift store goods for a fee	N/A	Wingham and area	Thrift Store: Mon - Fri 9am - 4pm, Sat 10am - 4pm; Food Bank: Tue 1pm-4pm, Thu 10am-1pm	Everyone	Meal Assistance, Social Assistance	Food bank, thrift store, and emergency family and community assistance

Supplementary Table C Resource Inventory for FSA N0M

Organization Name	Location	Contact Information	Nature of Resource	Cost ($)	Waitlist	Catchment Area	Hours Of Operation	Target Population	Service Category	Service Details
Huron County Library (Various Locations)	77722B London Rd, RR5 Clinton, ON, N0M 1L0	519-482-5457, ext. 3513; libraryadmin@huroncounty.ca	Community Infrastructure	A variety of programs are free	N/A	Huron-Perth	Mon - Fri 8:30am - 4:30pm	Everyone	Social Activities, Leisure Activities, Educational Activities	Build community, enrich lives, & foster creativity by providing universal access to information, skills and ideas.
Londesborough United Church	338 Main St., Londesborough, ON, N0M 2H0	519-523-4225	Community Infrastructure	Free	N/A	Huron-Perth	Wed 9:30am - 11am	Everyone	Social Activities, Leisure Activities	Coffee and Conversation program
Alzheimer Society Huron Perth	Betty Cardno Memorial Centre; 317 Huron St. Clinton, ON, N0M 1L0	519-482-1482	Service System	Varies per program	One year for in-home recreational programs, no waitlist for the other programs	Huron-Perth	Mon - Fri 9am - 4:30pm	Individuals living with Alzheimer's and their caregivers and families	Social Activities, Leisure Activities, Physical Activities, Educational Activities, Social Assistance	Support programs, social recreational programs, safety services, educational programs, and referral services
Clinton Gospel Hall	143 Joseph St., Clinton, ON, N0M 1L0	519-482-8687	Community Infrastructure	Free	N/A	Huron-Perth	24 hours/day	Everyone	Nutritional Assistance, Social Activities	Community dinners provided once a month
Friends of the Community Food Bank & Resource Centre	9 Rattenbury St. E, Clinton, ON, N0M 1L0	519-955-1809	Service System	Free	N/A	Clinton and area	Wed 5pm-7pm, Sat 10am - 12pm	People and Families in Need	Nutritional Assistance, Social Assistance	Provides food items and distributes pamphlets and contacts at the resource centre

Huron Perth Community Support Services Network	c/o ONE CARE Home And Community Support Services; 317 Huron St., PO Box 222, Clinton, ON, N0M 1L0	519-482-7800	Service System	Varies per program	N/A	Huron-Perth	Mon - Fri 8am - 6pm	Older adults; individuals with disabilities, brain injuries, or dementia	Social Assistance	Central intake service providing information regarding services, accessing new services, and changing or cancelling a current service
Vanastra Community Christian Reformed Church	50 Fifth Avenue, Vanastra, ON, N0M 1L0	519-482-7376	Community Infrastructure	Free	N/A	Huron-Perth	Tues - Fri 8am - 12pm	Everyone	Social Activities, Leisure Activities, Physical Activities, Nutritional Assistance	Men's Life social program, Coffee Social program, community dinners, volleyball games, and a food truck
CMHA Thames Valley	1498 Thames Rd. W, Exeter, ON, N0M 1S3	519-235-0335	Service System	Free	N/A	Huron-Perth		Older adults and individuals with mental health or substance use concerns	Social Activities, Educational Activities, Social Assistance	Provide a variety of services to individuals with mental health and substance use concerns; Friendly Callers program for older adults of the community
Exeter Community Food Bank	249 Andrew St., Exeter, ON, N0M 1S6	519-860-4104; exeterfoodbank1@gmail.com	Service System	Free	N/A	Exeter and areas	Thurs 9am - 11am and 6pm - 8pm	People and Families in Need	Nutritional Assistance	Provide five-day supply of food items once a month
South Huron Arts Centre	42 James St., Exeter, ON, N0M 1S0	SHACinquiry@gmail.com	Community Infrastructure	Varies per program	N/A	Huron-Perth	N/A	Everyone	Leisure Skill Development	A variety of arts-based programs

										available for a fee
Grand Bend Area Community Health Centre (Various Locations)	69 Main St. E, Grand Bend, ON, N0M 1T0	519-238-2362	Service System	Varies per program	N/A	Huron-Perth	Mon - Thurs 9am - 7pm; Fri 9am - 4pm	Everyone	Physical Activities, Educational Activities	A variety of programs available including physical activities, group activities involving physical activity, and educational programs for individuals and their families
Grand Bend Arts Centre	16 Municipal Dr, Grand Bend, ON, N0M 1T0	519-238-1155	Community Infrastructure	Varies per program	N/A	Huron-Perth	Wed 1pm - 4pm	Everyone	Leisure Skill Developme nt, Social Activities	A variety of arts-based programs available for a fee; a weekly 'dab and gab' social program for older adults
Lambton County Library (Various Locations)	(Headquarte rs) 787 Broadway St., Box 3100, Wyoming, ON, N0N 1T0	519-845-3324	Community Infrastructure	Free	N/A	Huron-Perth	Mon - Fri 8:30am - 4:30pm	Everyone	Social Activities, Leisure Activities, Technology, Educational Activities	A variety of programs available for all ages; adult programs include Author Talks, Book Clubs, DIY activities, learning opportunities, and technology tutoring and training
Huron Shores United Church	25 Main St., Grand Bend, ON, N0M 1T0	519-238-2402	Community Infrastructure	Free	N/A	Huron-Perth	Mon - Thurs 9am - 12pm	Everyone	Social Activities, Leisure Activities, Physical Activities,	A variety of communtiy events and activities in addition to food pantry,

									Educational Activities, Nutritional Assistance	virtual meditation, pole walking, cooffee club, partners in learning, climate café, ageless vitality fitness
Royal Canadian Legion (Various Branches)	(Branch 498) 20 Municipal Dr., Grand Bend, ON, N0M 1T0	519-238-2120; g.b.legion@hay.net	Community Infrastructure	Membership fee	N/A	Grand Bend and area	Mon/Thurs/ Fri 1pm - 10pm, Sat 1pm - 6pm	Veterans and their families	Social Activities, Social Support	Community supports and social activities for veterans and their families; open to the general public as well
St. Johns by the Lake Anglican Church	70642 Ontario St. N, Grand Bend ON, N0M 1T0	519-238-2489; sjblad@gmail.com	Community Infrastructure	Free	N/A	Huron-Perth	Sun 10:30am - 11:30am	Everyone	Social Activities, Physical Activities, Social Assistance	Provides a variety of programs to the community including yoga, tai chi, community functions, AA meetings, and more
Hensall and Zurich Community Centres and Arenas	14 Mill Ave., Zurich, ON, N0M 2T0	519-236-4351	Community Infrastructure	Varies per program	N/A	Huron-Perth		Everyone	Social Activities, Leisure Activities, Physical Activities, Educational Activities	A variety of programs available for the community, including board games, group fitness, coffee and cards socials, informational workshops and sessions
Hensall United Church	76 King St., Hensall, ON, N0M 1X0	519-262-2935; conversationswithsh	Community Infrastructure	Varies per program	N/A	Huron-Perth	N/A	Everyone	Physical Activities, Nutritional Assistance,	Community meals and dining events, social and

		elley@gmail.com							Social Activities	physical activities
Good Neighbours of Bluewater	28 Goshen St. N, Zurich, ON, N0M 2T0	519-878-9232	Community Infrastructure	Varies per program	N/A	Huron-Perth	Mon 7am - 3:30pm, Wed/Thurs 9:30am - 3:30pm	Everyone	Social Activities, Leisure Activities, Physical Activities, Educational Activities	A variety of programs available for the community, including board games, group fitness, coffee and cards socials, informational workshops and sessions, and various other community events
West Huron Care Centre	37792 Zurich-Hensall Rd, Zurich, ON, N0M 2T0	519-236-4373	Community Infrastructure	Varies per program	N/A	Huron-Perth	24 hours/day	Everyone	Grooming, Social Activities, Social Assistance, Educational Activities	A variety of programs and rentals available including community rental space, hairdressing and barber services, and a family childhood learning centre
Blessings Community Store	45 Main St., Zurich, ON, N0M 1T0	519-236-4376	Service System	Free	N/A	Bluewater, Grand Bend, and South Huron	Food Bank: Thurs 9am - 4pm; Thrift Store: Mon/Tues/ Wed/Fri 10am - 4pm, Thurs 10am - 6pm, Sat 9am - 2pm	Individuals in need of food; Thrift store open to all	Social Assistance, Nutritional Assistance	Food bank and thrift store

Supplementary Table D Resource Inventory for FSA N7A

Organization Name	Location	Contact Information	Nature of Resource	Cost ($)	Waitlist	Catchment Area	Hours Of Operation	Target Population	Service Category	Service Details
Gateway Centre of Excellence In Rural Health	74 Kingston St., Goderich, ON, N7A 3K4	519-612-1053	Service System	Free	N/A	Huron-Perth		Everyone	Social Activities, Educational Activities	Programs focused on enhancing health and well-being of rural communities through research, education, and outreach by collaborating with local partners
Lakeshore United Church	56 North St., Goderich, ON, N7A 1N1	519-524-2103	Community Infrastructure	Free	N/A	Huron-Perth	Tues - Fri 9:30am - 1:30pm, Sundays 10:30am - 12pm	Everyone	Nutritional Assistance, Social Assistance, Social Activities	Food bank, community outreach programs, and women's group
Lonely No More Program	c/o 74 Kingston St., Goderich, ON, N7A 3K4	289-688-2719	Service System	Free	N/A	Huron-Perth	24 hours/day	Older adults identifying as socially isolated	Social Activities	Telephone-based peer support initiative
MacKay Centre For Seniors	10 Nelson St E Goderich, ON, N7A 1R6	519-524-6660	Service System	$25 per year	N/A	Goderich and areas	Mon - Fri 9am - 4:30pm	Older adults	Social Activities, Physical Activities, Leisure Activities, Nutritional Assistance, Technology	Variety of social, recreational, and volunteer opportunities such as fitness classes, Art Club, Choir, Yoga, a community dining program, music, technology

										lessons, card games and special events
Society of Saint Vincent de Paul	441 MacEwan St., Goderich, ON, N7A 4C6	519-524-1087	Community Infrastructure	Varies by service	N/A	Goderich and areas	Mon - Sat 12pm - 4pm	Local community members in need	Nutritional Assistance, Social Assistance	Food bank, thrift store, and other services providing individuals in need of other supports as required
St. George's Anglican Church	87 North St., Goderich, ON N7A 2T7	519-524-2274	Community Infrastructure	Free	N/A	Goderich and areas	Mon - Fri 9am - 12pm	Local community members in need	Nutritional Assistance	Food bank
St. Peter's Catholic Church	156 North St., Goderich, ON, N7A 2V3	519-524-8174	Community Infrastructure	Free	N/A	Goderich and areas	Wed 8am - 10:15am, Fri 11am - 12:45pm, Sat 9am - 11am and 5pm - 6pm, Sun 9am - 10am	Everyone	Social Activities, Physical Activities, Nutritional Assistance	Food bank, community dining events, walking groups, euchre night events, and more
Trinity Christian Reformed Church	245 Mill Rd, Goderich, ON, N7A 4A1	519-524-8003	Community Infrastructure	Free	N/A	Goderich and areas	Mon - Fri 9 am - 1pm	Everyone	Social Activities, Leisure Activities, Nutritional Assistance	Variety of programs such as knitting groups, euchre nights, food bank, and more

Supplementary Table E Resource Inventory for FSA N4W

Organization Name	Location	Contact Information	Nature of Resource	Cost ($)	Waitlist	Catchment Area	Hours Of Operation	Target Population	Service Category	Service Details
It Takes A Village	148 Main St. W Listowel ON, N4W 1A1	519-418-4651	Service System	Free	None	Listowel	Tues/Fri/Sat 10am - 2pm, Wed 10am - 2pm and 4:30pm - 7:30pm, Thurs 2pm - 6pm	Everyone	Meal Assistance, Educational Activities, Technology	Money-less second-hand store; food pantry; assistance for community members navigating addiction, mental health, hunger, etc.; technologies to attend appointments
North Perth Seniors Center	180 Tremaine Ave S., Listowel, ON, N4W 3G8	519-949-8376	Service System	$5 admission	N/A	Listowel and area	N/A	Adults 55 and older	Social Activities	Social programs for older adults, such as dances

Supplementary Table F Resource Inventory for FSA N0K

Organization Name	Location	Contact Information	Nature of Resource	Cost ($)	Waitlist	Catchment Area	Hours Of Operation	Target Population	Service Category	Service Details
Grace Lutheran Church	108 St. David St., Mitchell, ON	519-348-9082	Community Infrastructure	Free	N/A	Huron-Perth	N/A	Everyone	Social Activities	Provides social programs such as a Men's Breakfast on the second Saturday of every month
Mitchell & Area Community Outreach	4118A Rd 164, RR 5, West Perth, ON, N0K 1N0	519-348-9765	Community Infrastructure	Varies by service	N/A	Huron-Perth	Mon - Fri 8:30am - 4pm	Older adults and individuals with disabilities or recovering from injuries and illness	Social Activities, Physical Activities, Leisure Activities, Meals and Nutritional Assistance, Grooming	Transportation, transit services, meals on wheels, wellness programs, exercise and fall prevention programs, grocery assistance, dining programs, euchre and card games, friendly visiting programs, and other activities such as group outings
West Perth Public Library	105 St. Andrew St., Mitchell, ON, N0K 1N0	519-348-9234	Community Infrastructure	Free	N/A	Huron-Perth	Mon - Thurs 10am - 8pm, Fri/Sat 10am - 5pm	Everyone	Social Assistance, Technology	CMHA drop-ins, family services, settlement services, meeting spaces, employment support, tax clinic, and access to

										computers and the internet
Loaves & Fishes Food Bank	Milverton Christian Fellowship; 6619 Perth Rd. 131, Milverton, ON, N0K 1M0	519-595-8762	Community Infrastructure	Free	N/A	Milverton, Ellice, and Mornington Wards	Tues 9:30am - 11:30am	Everyone	Meal Assistance	Foodbank
Milverton Community Outreach Services	Knollcrest Lodge; 50 William St., Milverton, ON, N0K 1M0	519-595-8755	Service System	Varies by service	N/A	Milverton, Perth, and area	Mon - Fri 8:30am - 4:30pm	Older adults and individuals with disabilities	Nutritional Assistance, Social Activities, Physical Activities, Social Assistance	Dining programs, friendly visits, group fitness classes, Meals on Wheels, friendly callers programs, transportation services, and wellness programs for older adults
Bethel Bible Church	126 Main St., Seaforth, ON, N0K 1W0	519-527-0982	Community Infrastructure	Free	N/A	Huron-Perth	Service Sun mornings, Mon - Fri office hours	Everyone	Social Activities, Nutritional Assistance	Church programs offered include Men's Breakfast social events, small group meetings, ladies' events, and more
Huron Perth Seniors Mental Health And Addictions Response Team	28 Centennial Dr, Seaforth, ON, N0K 1W0	519-527-8421 ext. 4818	Service System	Free	N/A	Huron-Perth	Daily 8:30am - 8:30pm	Older adults with an identified mental health concern or adults 55 and older with	Educational Activities, Social Assistance	In addition to medical services, this resource offers community consultation, counselling, advocacy, and education in addition to psycho-

								cognitive impairment		educational groups for caregivers
Parish Of the Holy Spirit	21 Jarvis St., Seaforth, ON, NOK 1W0	519-527-1522; phsseaforth@gmail.com	Community Infrastructure	Free	N/A	Huron-Perth	Service Sun mornings, Coffee program every Fri at 10am	Everyone	Social Activities	Coffee and conversation program in addition to church services
Seaforth & District Food Bank	72 Main St., Seaforth, ON, N0K 1W0	519-527-0281	Service System	Free	N/A	East Huron	Tues 10am - 12pm, Thurs 1pm - 3pm	People and families in need	Nutritional Assistance	Food bank can be accessed once a month for a six-day supply of food
Perth East Public Library	19 Mill St. E, Milverton, ON, N0K 1M0	519-595-8395	Community Infrastructure	Free	N/A	Huron-Perth	Mon/Sat 9am - 1pm, Tues - Thurs 9am - 8pm	Everyone	Social Activities, Physical Activities, Educational Activities, Technology, Leisure Activities, Nutritional Assistance, Social Assistance	Programs include 'The Giving Shelf', AI information sessions, seed library, book clubs, technology tutoring, seated fitness classes for older adults, settlement services, Service Canada assistance, and employment services

Supplementary Table G Resource Inventory for FSA N4X

Organization Name	Location	Contact Information	Nature of Resource	Cost ($)	Waitlist	Catchment Area	Hours Of Operation	Target Population	Service Category	Service Details
Arthritis Society Canada	St Marys Memorial Hospital, 267 Queens St W, St Marys, ON	1-800-321-1433 Ext 3307	Service System	Free	N/A	Perth County	By appointment	Individuals with an arthritis diagnosis and their families	Educational Activities, Social Assistance, Physical Activity	Rehabilitation and education program (AREP), support and self-management programs, informational webinars, and exercise videos
St Marys and Area Friendship Centre	317 James St S, St Marys, ON, N4X 1B6	519-284-3272; friends@town.stmarys.on.ca	Service System	Membership fee	N/A	St Marys and area	Mon - Fri 8am - 4:30pm	Older adults and individuals with specialized needs	Social Activities, Physical Activities, Leisure Activities, Educational Activities	Activities include arts and crafts, leisure sports, informative meetings, card games and programs, day trips, and special events
St. Marys & Area Home Support Services	317 James St. S, St Marys, ON, N4X 1B6	519-284-3272	Service System	Varies per program	N/A	St Marys and area		Older adults and individuals with disabilities	Nutritional Assistance, Educational Activities, Physical Activities, Social Activities, Grooming	Programs include congregate dining, fall prevention and group exercise classes, fitness programs, foot care clinic, meals on wheels, shopping

										services, telephone programs, volunteer visit programs, wellness programs
St. Marys Public Library	15 Church St. N, St Marys, ON, N4X 1B4	519-284-3346	Community Infrastructure	Membership fee and fees for some programs	N/A	St Marys and area	Mon - Fri 10:30am - 8pm, Fri 10:30am - 5pm, Sat 10am - 1pm	Everyone	Educational Activities, Social Activities, Leisure Activities, Technology	Provides book and material loans, child and adult programs, adult learning programs, public computers and WIFI for access

Supplementary Table H Resource Inventory for FSAs N4Z and N5A

Organization Name	Location	Contact Information	Nature of Resource	Cost ($)	Waitlist	Catchment Area	Hours Of Operation	Target Population	Service Category	Service Details
One Care Home and Community Support Services (Various Locations)	90 Greenwood Dr., Stratford ON, N5A 7W5	1-877-502-8277	Service System	Varies per program	Varies per program	Huron-Perth	Administration Mon to Fri 8am to 5pm	Older adults (55 and older)	Social Activities, Physical Activities, Leisure Skill Development, Leisure Activities, Technology, Meals Assistance, Educational Activities	Adult Day Programs, Dining Programs, Easy Ride Transportation, Friendly Visiting, Help at Home, Home at Last, Meals on Wheels, Seniors Active Living Center, Telephone Reassurance, Wellness and Exercise
Avondale United Church	194 Avondale Ave, Stratford, ON, N5A 6N4	519-271-7946	Community Infrastructure	Free	N/A	Huron-Perth	Mon - Thurs 9am - 4pm, Fri 9am - 12pm	Everyone	Nutritional Assistance, Social Activities, Educational Activities, Physical Activities	In addition to church services, resources include community meals, social gatherings, informative conversations and webinars, and labyrinth walks
Avon-Thames Catholic Family of Parishes	96 Huron St, Stratford, ON, N5A 5S6	519-271-6722	Community Infrastructure	Free	N/A	Huron-Perth	Mon - Fri 8:30am - 4pm	Everyone	Nutritional Assistance, Social Activities	Community Kitchen, community meals, and Food Bank

Bethel Pentecostal Church	2988 Ontario St. RR 4, Stratford, ON, N5A 6S5	519-273-0050	Community Infrastructure	Free	N/A	Huron-Perth	Mon - Thurs 9am - 4:30pm	Everyone	Nutritional assistance, social activities, educational activities, physical activities	Community meals, social activities, educational programs and meetings
Community Of Christ	226 Forman Ave, Stratford, ON, N5A 6R4	519-271-4539; stratford.cofc@gmail.com	Community Infrastructure	Free	N/A	Huron-Perth	Sunday service	Everyone	Nutritional Assistance, Social Activities	Community breakfasts and coffee social meetings
Family Services Perth-Huron	142 Waterloo St. S, Stratford, ON, N5A 4B4	519-273-1020	Service System	Varies per program	N/A	Perth County	Mon - Fri 9am - 4:30pm	Everyone	Social Assistance	Employee assistance programs, ndividual supports for coordination of services and referrals to community support services, violence against women program
Fung Loy Kok Institute of Taoism - Taoist Tai Chi	Stratford Branch: 670 Ontario St., Stratford, ON, N5A 3J7	519-273-5614	Community Infrastructure	Varies per program	N/A	Huron-Perth	N/A	Everyone	Physical Activities	Tai Chi classes
Knox Presbyterian Church	142 Ontario St., Stratford, ON, N5A 3H2	519-271-0373	Community Infrastructure	Free	N/A	Huron-Perth	Mon - Fri 9am - 5pm, Sun 10am - 12pm	Everyone	Social Activities, Leisure Activities, Leisure Skill Development, Nutritional	Wig Room for cancer patients, choir, crafting groups, life study group, social

									Assistance, Social Assistance	activities, community dinners, and community support programs
Local Community Food Centre	612 Erie St., Stratford, ON, N5A 2P1	519-508-3663 ext.1007	Service System	Free	N/A	Stratford	N/A (hours vary)	Everyone	Nutritional Assistance, Social Activities, Physical Activities	Monday night dinners, lunch and social activities for older adults, wellness breakfast events with optional yoga
Memorial Baptist Church	113 Bruce St., Stratford, ON, N5A 4A2	519-271-2196	Community Infrastructure	Free	N/A	Stratford		Everyone	Nutritional Assistance, Social Activities	Community meals, social activities
St James Anglican Church	41 Morningtoon St., Stratford, ON, N5A 5E7	519-271-3572	Community Infrastructure	Free	N/A	Huron-Perth	Mon - Fri 9am - 12pm	Everyone	Social Activities, Leisure Activities, Social Assistance, Nutritional Assistance	Meditation, gardening group, outreach committee, community foodbank, community meals, breakfast club programs, outreach lunches, community dinners, and social assistance for marginalized individuals
St. Andrew's Presbyterian Church	25 St. Andrew St., Stratford,	519-271-5668	Community Infrastructure	Varies per program	N/A	Huron-Perth	Tues - Fri 8:30am - 12:30pm	Everyone	Nutritional Assistance, Social Activities,	Community meals, coffee hour, choir, flower arrangement

	ON, N5A 1A2								Leisure Activities	group, crafts, Meals on Wheels, men's and women's groups
St. Paul's Anglican Church Food Bank	9 Douro St., Stratford, ON, N5A 3R2	519-271-4527	Service System	Free	N/A	Stratford	Fri 9:30am - 11am	Everyone	Nutritional Assistance	Provides food items
Stratford Christian Reformed Church	190 Athlone Cres., Stratford, ON, N4Z 1H9	519-273-1292	Community Infrastructure	Free	N/A	Huron-Perth	Sunday service	Everyone	Social Activities, Leisure Activities, Physical Activities, Social Assistance, Nutritional Assistance	Provides a variety of services such as conversational programs, support groups, social meetings, pickleball, women's and seniors groups, volunteer opportunities, groups for individuals with intellectual disabilities, community meals
Stratford House of Blessing Food Bank	423 Erie St., Stratford, ON, N5A 2N3	519-273-3433	Service System	Free	N/A	Stratford and area	Mon - Fri 8:30am - 12:15pm and 12:45pm - 4:30pm	Individuals and families in need	Nutritional Assistance, Social Assistance	Foodbank providing food and hygiene products available for pick up once every 30 days
Stratford Lakeside Active	Stratford Rotary Complex;	519-271-4310	Community Infrastructure	Membership fee	N/A	Stratford and area	Mon - Fri 8:30am -	Adults aged 55 years and	Social Activities, Physical	Community centre for older adults

Adults Association	357 McCarthy Rd W., Stratford, ON, N5A 7S7						12pm and 1pm - 4:30pm	older or 45 years old and full-retired	Activities, Leisure Activities, Educational Activities	including fitness classes, recreational activities, and educational classes
Stratford Public Library	19 St. Andrew St., Stratford, ON, N5A 1A2	519-271-0220	Community Infrastructure	Varies per program	N/A	Huron-Perth	Mon - Thurs 10am - 9pm, Fri 10am - 6pm, Sat 10am - 5pm, Sun 2pm - 5pm	Everyone	Social Activities, Leisure Activities, Technology, Educational Activities, Social Assistance, Nutritional Assistance	Educational supports and activities, social worker drop-in sessions, settlement services, free snacks and menstrual products, tax assistance, technology tutoring, social programs such as gardening and art programs, and a variety of rotating events and programs
Victorian Order of Nurses - Perth-Huron (Various Locations)	40 Long Drive, Suite 111, Stratford, ON, N5A 8A3	519-271-7991	Service System	Varies per program	N/A	Huron-Perth	Mon - Fri 8:30am - 4:30pm	Older adults and individuals with disabilities	Nutritional Assistance, Physical Activities, Social Activities, Leisure Activities	Meals on Wheels, exercise and walking programs, friendly visiting programs, adult day programs, and transportation services