Environmental Supports for Aging in Place at the Home and Community Levels

by

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Abstract

Aging in place is a common topic among gerontologists, policy-makers, older adults, and other stakeholders, and is widely recognized as the most desirable option for older adults in Canada. A critical synthesis of the literature related to home-level and community-level environmental supports for older adults to age in place is presented in this capstone project. Two distinct literature reviews were conducted on the following topics: a) home modifications for older adults, and b) age-friendly community-based programs, services, and features for older adults. This research project is guided and informed by selected theories in environmental gerontology, including Lawton and Nahemow's (1973) seminal ecological theory of aging, or person-environment fit model. The findings and analysis of this project work to bridge existing concepts of aging in place (AIP) and age-friendly communities (AFC), and provides implications for future research and policy development for supporting independence and well-being of community dwelling older adults in Canada.

Keywords: aging in place; age-friendly; home; community; environment

Acknowledgements

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List of Acronyms

AFC	Age-friendly city and/or community
AIP	Aging in place
COVID-19	Coronavirus disease
ETA	Ecological Theory of Aging
P-E fit	Person-environment fit
WHO	World Health Organization

Chapter 1.

Introduction

"People do not just live in houses: They live in and experience neighborhoods"

(Shaw, 2004, p. 412).

1.1. Background

According to Statistics Canada (2019), the proportion of older adults aged 65 years and over will increase from approximately 17% of the total population of Canada in 2018, to approximately 22% in 2030, and 26% in 2068. The proportion of older adults aged 80 years and over is also expected to increase rapidly, from approximately 4% of the total population in 2018, to approximately 6% in 2030, and 12% in 2068 (Statistics Canada, 2019). In British Columbia (BC), 94% of older adults aged 65 years and over, and 72% of older adults aged 85 years and over, live independently in the community (Office of the Seniors Advocate of BC, 2020). Older cohorts of adults face declining functional abilities as they continue to age, which can impact their ability to remain independent in daily living and remain living in the community (Alley et al., 2007). Lawton and Nahemow (1973) have enabled our understanding that as a person ages, their ability to compensate for functional decline decreases, creating an important role for the environment to support older adults to live comfortably in their homes.

One of the key topics in gerontology is the notion of aging in place. There has been wide recognition that older adults prefer to remain in their familiar homes and neighbourhoods, for as long as possible, as they continue to age (Scharlach & Diaz Moore, 2016). According to the United States of Aging Survey (National Council on Aging, 2012), 90% of older adult Americans prefer to age in place, with similar desires reflected among Canadian older adults. Although there is not one common definition of aging in place, as described by Bigonnesse (2017), aging in place "broadly refers to the notion of aging in one's home and community as long as possible and to delay relocation to a long-term care setting" (Bigonnesse, 2017, p. 8). It is not only one's home or residential living space that is important for aging in place, but also the community or neighbourhood space that are critical for understanding how older adults are able to

remain living in their current homes (Wiles et al., 2011). There are also different contexts of the environment that are crucial to understanding aging in place, which include the physical and social environments (Menec et al., 2011; Bigonnesse & Chaudhury, 2021). Additionally, subjective perceptions of where one lives, and how accommodating their home and community is of their needs, is another important component of aging in place (Golant, 2011). Further, the desire to age in place is related to one feeling a sense of emotional attachment to the place they live, maintaining consistency and connections to where they live, and enjoy a sense of belonging (Pani-Harreman et al., 2020). Aging in place appears especially important to older cohorts of older adults as they require more support from the environment to allow them to continue living independently in the community. As the population of older adults are diverse in their wants, needs, and capabilities, there is no single, or 'one-size-fits-all', approach to supporting older adults to age in place. Aging in place is a concept representing many interacting factors and different scales of a person's living environment (Bigonnesse & Chaudhury, 2021).

A complimentary concept developed by the World Health Organization's (WHO; 2007) is the notion of age friendly cities or communities (AFC). The WHO defines an age-friendly city or community as having "policies, services, settings and structures [that] support and enable people to age actively" (WHO, 2007, p. 5). The WHO's AFC framework (Figure 1) identifies eight key areas, or domains, of a city or community that impact how accommodating the community is for older adults. The eight domains are: a) *outdoor spaces and buildings*, b) *transportation*, c) *housing*, d) *social participation*, e) *respect and social inclusion*, f) *civic participation and employment*, g) *communication and information*, and h) *community support and health services* (World Health Organization, 2007). These eight domains were developed in consultation with older adults across the globe to represent areas of the community that impact older adults' ability to remain active as they age and retain independence. Maintaining functional abilities that enable independence in later life is important for older adults that wish to age in place and remain living in the community (Pani-Harreman et al., 2020). Further, AFC initiatives not only benefit and support the independence of older adults, but also work to improve accessibility of communities for people of all ages (Neal & DeLaTorre, 2016).

Figure 1.   WHO Age-Friendly City Domains (WHO, 2007).

While aging in place is a broad, conceptual topic, the WHO's AFC framework is a macro-level movement that targets policy areas to support the goal of active aging and aging in place for older adults (WHO, 2007). The linkages between aging in place and AFC are important to consider in order to connect the breadth of academic work that looks at aging in place with the policy work that implements the AFC initiative, which influences the ability of older adults to remain living independently in the community. Similarly, understanding the range of community based services that are tied to operationalizing the AFC initiative may suggest aspects of, and within, a community that support the goal of aging in place, or where there is need for additional community supports.

In addition to the community, there are aspects of an older adult's home that may or may not support them to age in place, such as the incidence of environmental hazards or barriers. Therefore, there is an important role for home modifications to help adapt existing home environments to support older adults' changing needs (Bigonnesse & Chaudhury, 2020). When an older adult's home is no longer supportive, a decision point is presented for what actions an older adult may take to feel comfortable and in control in their home (Golant, 2011). One of the options available to older adults is to relocate to more supportive housing, such as moving into purpose-built seniors housing, co-housing, living with family, or other available supportive living settings. A recent

scoping review conducted by Mahmood et al. (2020) provides an overview of the various types of innovative housing options that are available for older adults, including: a) co-living, b) co-housing, c) home-sharing, d) co-op housing, e) affinity communities, f) service integrated housing, and g) life lease housing (p. 4). An alternative option is to make architectural and design modifications to an older adult's existing home that intend to improve accessibility within the home and allow older adults to continue living independently. Older adults' ability to participate in a range of activities and remain active in daily life is impacted by the accessibility of their home environments (Iwarsson et al., 2006).

In early 2020, a global pandemic emerged due to the novel coronavirus disease (COVID-19), which currently remains an ongoing risk to population health in Canada. Older adults have been significantly impacted by the spread of COVID-19, with approximately 30% of total deaths in Canada being individuals aged 60 to 79 years old, and approximately 64% of total deaths in Canada of being those aged 80 years and older; the majority (94%) of all people in Canada who have died from COVID-19 are older adults (as of July 16, 2021; Government of Canada, 2020). The repercussion of the pandemic, along with the data showing that most older adults wish to age in place, necessitates an exploration of the home and community level supports that exist to operationalize the WHO's (2007) AFC framework and enable older adults to remain living independently in the community for as long as possible.

1.2. Research Purpose

The purpose of this capstone project is to review the range of supportive features at the home and community levels to support older adults to age in place, specifically: reviewing the literature that describes a) home modifications for older adults, and b) community-based services, programs, and features that operationalize the AFC framework and initiative. Home modifications relate to several aspects of the *housing* domain of the AFC framework, while community- based services address the other remaining AFC domains: *outdoor spaces and buildings, transportation, social participation, respect and social inclusion, communication and information, civic participation and employment*, and *community support*. As the present project is guided by and concerned with environmental gerontology perspectives, health care, and the *health services* domain of the AFC framework, are considered out of scope. Two

separate literature reviews have been conducted and findings reported for each of the aspects of this project in order to better understand the landscape of supports for aging in place (AIP) in Canada:

1. Home modifications for older adults, and

2. Community-based services, programs, and features that operationalize the AFC framework and initiative.

1.3. Project Outline

An overarching research question has guided the inquiries within this project, in addition to sub-research questions that have been developed for each separate literature review. Broadly, this project aims to answer the following: *What environmental home modifications and supports at the community level are available for older adults aging in place in Canada?* A significant aspect of this project is the intention to discuss AIP and AFC with regard to both the home environment and community environment, as both of these settings, in addition to person-environment fit, are critical in understanding an older adult's ability to remain living independently. While most of the discussion contained in this project emphasizes the interconnectedness of the home and community environments, for the purposes of conducting manageable and distinct literature reviews, the home and community levels are addressed separately and guided by the following sub-research questions:

a) What are the various intervention strategies for home modifications for older adults living in independently in the community? How do these home modifications promote older adults to live independently?

b) What community-level services, programs, and features embody specific domains of the WHO's age-friendly cities framework?

Following in Chapter 2, a description of the theoretical underpinnings and conceptual framework are included. Key theorists that have informed the work in this project include Lawton & Nahemow (1973), Golant (2011), and Menec et al. (2011). The influence of these theorists can be observed through the fundamental concepts in the conceptual model that has been adapted based on the outcomes of the literature reviews contain in this project. Chapter 3 provides additional details on the methods of how each literature review was conducted, including flow-chart presentations of the database search and screening processes. In Chapters 4 and 5, the findings of each

literature review are reported. Chapter 4 includes the typology of home modifications for older adults, in addition to the thematic findings of the literature. Chapter 5 also presents a typology and thematic findings related to the AFC programs, services, and features that emerged in the literature. The final section, Chapter 6, presents the discussion, limitations, implications, and conclusion of this project.

The importance of considering both home and community contexts for understanding older adults' ability to age in place as well as age-friendliness of communities is demonstrated throughout this project. Critical perspectives in environmental gerontology have guided and informed the following inquiries into home modifications for older adults, and the supportive services, programs, and features that exist at the community level for older adults. Environmental adaptations that can be made at the home level pose as a promising option for older adults to consider if they wish to remain in their current homes and neighbourhood as long as possible. Similarly, environmental features in the neighbourhood, such as walkability, are also important for supporting the desire of older adults to age in place. The overall objective of this project is to communicate the importance of considering the home and community environments together in order to support older adults to age in place in age-friendly communities.

Chapter 2.

Theoretical and Conceptual Frameworks

2.1. Theoretical Framework

Theoretical frameworks within the field of environmental gerontology help us to contextualize the importance of the built environment at the home and community levels for older adults. One of the prominent theories within this field is Lawton and Nahemow's (1973) ecological theory of aging (ETA), also known as person-environment (P-E) fit model or competence-press model. The P-E fit model emphasizes the interaction between the person and their environment. Depending on the person's level of competence (physical health, cognitive ability, functionality, and emotional capacity) and the level of environmental press, or challenge, the older adult is interacting with, the resulting P-E fit enforces and allows either adaptive or maladaptive behaviour. A person with a high level of competence has more resources to adapt to the press of the environment and remain in their comfort zone, while a person with low competence is more likely to experience discomfort and maladaptive behaviour due to the barriers presented in the environment. Both a person's competence and the press of the environment can be adjusted or enhanced to allow an older adult to remain in their adaptation zone (Lawton & Nahemow, 1973). The P-E fit model has broadened our understanding of the significance of the environment for the well-being of older adults. Lawton and Nahemow's (1973) ETA theory was influential in producing second generation theories in environmental gerontology, such as Wahl et al.'s (2012) integrative model of aging and environment, Chaudhury and Oswald's (2019) integrative conceptual framework of P-E exchange, and of particular focus in this project, Stephen Golant's (2011) model of residential normalcy,

Golant's (2011) model of residential normalcy proposes that older adults engage in active assessments of where they live in order to determine if where they live is appropriate for them, or a "congruent environment" (Golant, 2011, p. 193). A person living in a congruent environment can achieve residential normalcy when they are occupying both zones of residential comfort and residential mastery. Residential mastery refers to a person feeling competent and in control of where they live, while residential

comfort refers to how pleasurable and enjoyable a person finds their home to be (Golant, 2011). If a person is outside of either of the mastery or comfort zones, they will engage in coping strategies in an attempt to regain congruence in their environment (Golant, 2011).

Both of these theoretical frameworks highlight that environmental and behavioural adaptations are key components that enable older adults to remain independent in their home in the community (Ahn & Hegde, 2011). These two models considered together with the WHO's AFC framework guide the conceptualization of this capstone project. Linking the two environmental gerontology models to the AFC framework helps to frame aging in place within the context of micro- (e.g. individual or home), meso- (neighbourhood or community), and macro- (city or region) settings of the environment. These settings can be visualized as a set of interconnected nested system similar to Bronfenbrenner and Morris' (2006) socio-ecological model. Lawton and Nahemow's ETA is complementary to the AFC framework and using both to elaborate on the interactions between the person and the environment is useful (Menec et al., 2011).

2.2. Conceptual Framework

In order to aid the conceptualization of the different aspects of this research project, the work of Menec et al. (2011) regarding age-friendly communities (AFC) serves as the foundational conceptual framework (Figure 2). Menec and colleagues (2011) developed a conceptual model that is informed by the ecological perspectives and approach to AFC. At the centre of the model is social connectivity of older adults and the interactions with their environments, which must be considered when discussing AFC policies and initiatives (Menec et al., 2011). Supportive environments for older adults include considerations of P-E fit, home environment, neighbourhood and community environments, as well as the more macro city, region, and policy environments. Older adults' social and physical connections to family and friends are included as an important factor in conceptualizing AFC, and is presented in the nested system between the older person and their community. In this work, Menec et al. (2011) also discuss the eight WHO (2007) AFC domains, and recognize that there are two fundamental aspects that are being addressed by the domains: the physical environment and the social environment. This conceptual model developed by Menec and colleagues

(2011) emphasizes that AFC initiatives promote social connectivity for older adults, in addition to the physical supports that can be provided. The findings and outcomes of this capstone project (presented in Chapter 6) further highlight the importance and interconnectedness of the physical and social environments. While this model rightly includes the *health services* component of the WHO's (2007) AFC framework, due to the scope of this capstone project, that domain is excluded from analysis and discussion. The inclusion of the *housing* domain in this project is limited to the discussion of home modifications for older adults; innovative housing options are not in scope (see Mahmood et al. 2020 for a recent discussion of different housing options).

As the AFC framework emphasizes both the physical and social environments of the community for promoting age-friendliness and supporting aging in place, this works to expand the discussion from just the physical to the social environment (Greenfield et al., 2015). Three AFC domains including *outdoor spaces and buildings, transportation*, and *housing,* relate to the physical, natural, and built environment aspects of a city or community to support independence and mobility for older adults. While the remaining five domains of the AFC framework, *social participation, respect and social inclusion, civic participation and employment, communication and information*, and *community support and health services*, relate to aspects of the social environment that provide support for older adults' well-being and ability to age in place (WHO, 2007). These eight domains of the AFC framework have been identified by older adults, and further developed by the WHO, intentionally to encourage active aging and support a high quality of life for older adults (WHO, 2007). The ecological approach to conceptualizing AIP and AFC that has been presented by the selected theorists has significantly informed and guided the inquiry and discussion of this project.

Figure 2.   **Menec and colleagues' (2011) Conceptualizing Age-friendly Communities**

The model for conceptualizing AFC by Menec et al. (2011) has been adapted as informed by the findings of this project, and is presented in Chapter 6. While much of the existing model remains relevant to the discussion of the findings of this project, a few additional elements are proposed and discussed. The following Chapter describes the guiding research questions and methodology that was used for the two literature reviews that are conducted in this project.

Chapter 3.

Methods

The methodologies that were used to conduct each literature review are expanded in this chapter, beginning with a description of the guiding research questions. Note that the methodology for each literature review is slightly different, as each was conducted separately and sequentially, where each review aimed to answer separate research questions. Despite that, both reviews work together to answer the overarching research question guiding the broader inquiry into environmental supports for older adults to age in place.

3.1. Research Questions

The guiding research question that is answered through the project is: *What environmental home modifications and supports at the community level are available for older adults aging in place in Canada?* Two distinct literature reviews have been conducted in order to address the guiding research question, as well as the following two sub-research questions:

1. What are the various intervention strategies for home modifications for older adults living in independently in the community? How do these home modifications promote older adults to live independently?

2. What community-level services, programs, and features embody specific domains of the WHO's age-friendly cities framework?

3.2. Population Scope

Aging in place (AIP) is an important concept for all older adults, regardless of where they are currently living or how independent they are. It is pertinent to consider factors at both the home and community levels when considering supports for aging in place (Bigonnesse & Chaudhury, 2020). In light of the recent scoping review conducted by Mahmood et al. (2020) on the range of innovative housing options available for older adults, the focus of this project is on two complimentary aspects of the environment and aging: home modifications and community services, programs, and features. Rather

than including a discussion of housing options, this project is focused on home modifications at the home-level and services and features at the community-level that are accessible to those living in the community to support AIP and AFC. For the purposes of this project, the population of older adults that is the focus of the discussion are those who are living independently in the community. Older adults that are living independently in the community may be living in various types of dwellings, such as single-family homes or apartments, as well as having varying forms of tenure status, such as home ownership or rental agreements. Older adults may be living alone or with others, and they may also be receiving and/or participating in community services that are supporting them to remain in their current home. Architectural modifications and community services that are targeting congregate living settings such as retirement homes, long-term care homes, or assisted living settings are out of scope.

3.3. Literature Review: Home Modifications

Two sub-research questions are answered throughout this first review, which are: *What are the various intervention strategies for home modifications for older adults living in independently in the community? How do these home modifications promote older adults to live independently?* Literature for this review was compiled primarily through the use of scholarly database searches together with previously known literature relevant to the topic. Three databases were searched for peer-reviewed articles published in English, between 2000 and 2020: AgeLine, PsycINFO, and CINAHL Complete. The following key words were used in the search: "older adult*", "elderly", "senior*", "home adaptation", "home accessibility", "housing accessibility", "environmental barriers", "universal design", "home modification", "home renovation", and "accessib* AND hous*". There was a strategic use of Boolean phrases and the truncation/asterisk search function. Additional articles were located through hand searches of the references of key articles that were returned through the database searches, as well as previously known articles or book chapters on the topic. Grey literature was also found using the databases as well as generic search engines. Studies that were conducted in geographic regions outside of Canada, United States of America (USA), the United Kingdom (UK), Australia, or Europe were excluded. Titles and abstracts were reviewed for potential inclusion in the next step of screening, which was followed by a full-text review of the selected articles (n=22; see Appendix A for the data

chart of the final list of literature included in the review). Articles were selected for inclusion based on their relevance to the research question and overarching inquiry, as well as those that provide relevant information on physical home modifications and adaptations. Among the 22 articles selected for inclusion, 11 articles are empirical studies that were primarily conducted in the USA (n=5), as well as Australia (n=2), Canada (n=2), and Europe (n=2). All 11 studies focused on older adults as the study participants, ranging from 45 years to 95 years of age. Reasons that articles were excluded from inclusion were mainly related to the study focus not being relevant to home modifications or the research question, study focus is on a housing setting that is out of scope, and the study population being out of scope. Due to the nature of the research question being exploratory, both empirical and non-empirical (i.e. grey literature, review articles, book chapters) literature is included in the analysis. The different types of literature that have been reviewed are presented in Appendix A.

Figure 3.   Flow chart of home modifications literature review screening and selection process.

13
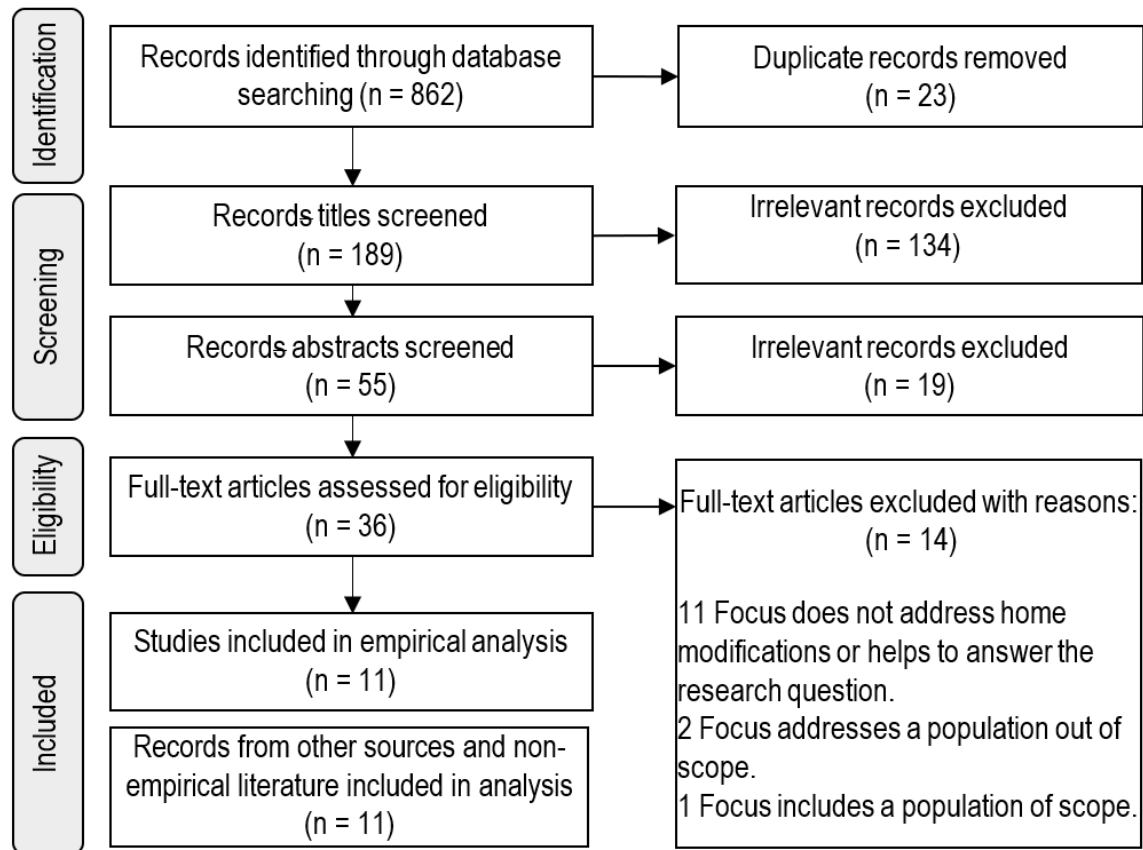
As briefly mentioned, there are slight differences in how each review was conducted in order to tailor each review appropriately. The following section expands on the details of the literature review that was undertaken to assess AFC programs, services, and features. In comparison to the home modifications literature review, which was more exploratory in nature, the following AFC literature review may be considered a scoping review as it maps key aspects of a topic that has not yet been reviewed comprehensively (Arksey & O'Malley, 2005).

3.4. Literature Review: Community Services, Programs, and Features

In order to answer the community-level aspect of the research question, a scoping review was conducted. As discussed previously, the sub-research question that is guiding the scoping review is: *What community-level services, programs, and features embody specific domains of the WHO's age-friendly cities (AFC) framework?* The focus for this inquiry is on community-based supportive services as well as the built environment of communities, that embody and/or implement the AFC framework in various communities. This literature review addresses several domains of the AFC framework, including: *transportation, outdoor spaces and buildings, community support, social participation, respect and social inclusion, communication and information*, and *civic participation and employment*. As the scoping review is concentrated on AFC services at the community level, of the eight AFC domains, the *housing* domain and *health services* (part of *community services* domain) are considered out of scope for this review; health care services are out of scope for this project. The aim of the literature review is to identify existing programs, services, and features of the community that work to operationalize the AFC initiative, and ultimately support older adults to remain living in the community. Individual or home level programs or services are not within the scope of this review as the inquiry is addressing the community level. In this way, older adults' perceptions of age-friendliness are also not the focus of this review. Community level initiatives that are addressing a specific population of older adults, such as persons with dementia or other cognitive or intellectual disability, are also excluded from this review.
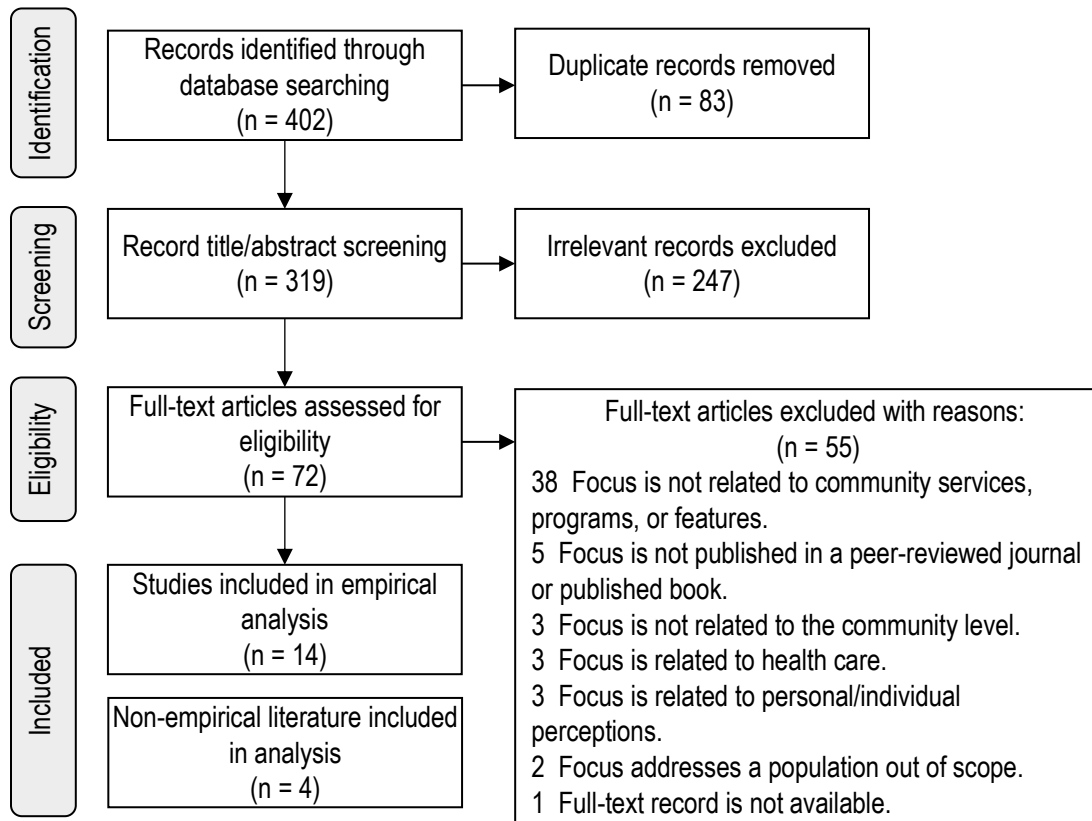
The scoping review was conducted as informed by the five-step approach presented by Arksey & O'Malley (2005): a) developing the research question, b) locating literature, c) selecting studies, d) charting the data, and e) presenting the findings

(Arksey & O'Malley, 2005, p. 22). A total of five academic databases were selected to conduct the literature searches with a key word search string, and include AgeLine, PsycINFO, CINAHL Complete, Academic Search Premier, and Scopus. The two literature reviews contained in this project were conducted sequentially, where the home modifications literature review was performed first, followed by the AFC review. In contrast to the home modifications review, in this review there were fewer records that were returned through the database searches, therefore two additional databases were searched. The additional database search for the first review was not completed due to time constraints of the project as well as the review process yielded a sufficient number of articles. In future research on this topic, additional databases can be searched. The search string was developed using key words that relate to the research question including "age-friendly", "community", "city", "neighbourhood", "environment", "service", "support", "transportation", and "infrastructure". Careful attention was paid to the use of Boolean operators, the truncation/asterisk search function, and American/Canadian spelling variations. As the WHO's AFC initiative was developed in 2006 (Rémillard-Boilard, 2018), the search was limited to literature published between 2006 and 2021, as well was limited to publishing in English language. This is the reasoning behind the different timeframes of each separate and distinct literature review. It is also acknowledged that there has been research and development of the AFC concept prior to 2006, however the dates of published literature in this review were limited in order to review the current literature on the topic. Geographic regions that are in scope for this review include: Canada, USA, UK, Australia, Europe, Scandinavian countries, Japan, and Hong Kong.

The database searches resulted in 319 unique records after removing 83 duplicate records. Title and abstract screening of the records resulted in 72 records identified for full-text review. Data charting occurred for each article included in the full-text review in order to capture the relevant information related to the research question. Inclusion and exclusion criteria were established prior to the full-text review. The exclusion criteria include: studies where the focus is not related to community services, programs and features; study focus is on a population that is out of scope; study focus is not related to the community-level setting/environment; study focus is on perceptions of AFC; study focus is related to health care; record type is not in scope; and full text record is not available. Based on this criteria, the final number of records contributing to

the scoping review is 18 (see Appendix B for the data chart of the final list of literature included in the review). The articles for inclusion in the final list of literature were selected primarily based on the inclusion/exclusion criteria, specifically looking to include articles that objectively describe programs, services, or features of AFC. In this way, both empirical and non-empirical literature (i.e. grey literature, review articles, book chapters) are included in the analysis. The different types of literature that have been reviewed are presented in Appendix B. Among the 18 articles selected for inclusion, 14 articles are empirical studies that were primarily conducted in the USA (n=5), as well as Australia (n=3), Canada (n=2), the UK (n=2), Europe (n=1), and Japan (n=1). The 14 studies focused primarily on older adults (aged between 45 and 92 years) as the study participants, as well as service providers and municipal staff. The chart presented in Figure 4 outlines the details of each step of the literature selection process; one record that was previously known is included in the 18 records that have been analyzed. In order to complete the fifth and final step of Arksey & O'Malley's (2005) scoping review framework, a thematic analysis of the 18 records was conducted and is presented in Chapter 5.

Figure 4.   Flow chart of community services literature review screening and selection process

| Identification | Records identified through database searching (n = 402) | → | Duplicate records removed (n = 83) |

| Screening | Record title/abstract screening (n = 319) | → | Irrelevant records excluded (n = 247) |

| Eligibility | Full-text articles assessed for eligibility (n = 72) | → | Full-text articles excluded with reasons: (n = 55) 38 Focus is not related to community services, programs, or features. 5 Focus is not published in a peer-reviewed journal or published book. 3 Focus is not related to the community level. 3 Focus is related to health care. 3 Focus is related to personal/individual perceptions. 2 Focus addresses a population out of scope. 1 Full-text record is not available. |

| Included | Studies included in empirical analysis (n = 14) |
| Included | Non-empirical literature included in analysis (n = 4) |

As each literature review was conducted separately, the findings of each review are also presented separately in the following Chapters 4 (home modifications) and 5 (AFC services, programs, and features). Both sets of findings include a thematic analysis of the literature as well as a listing, or typology, of aspects that are addressed in each review.

Chapter 4.

Home Modifications

Findings of the literature review addressing home modifications for older adults are presented here. The goal of this review was to develop a listing of the various different home modifications and adaptations that can be made in older adults' homes that were reported in the literature. Additionally, how these home modifications and interventions strategies enable older adults to live independently was also part of the inquiry. Table 1 includes a summary of the areas in the home where modifications are being targeted, while Appendix C includes the full details of these specific interventions and strategies. Following the thematic analysis of the literature reviewed, the results regarding specific interventions are included.

4.1. Findings

The literature review revealed two distinct sets of findings. The first is a thematic analysis related to the need, desire, uptake, and intentions of community dwelling older adults to make home modifications, and the second is a review of the specific home modifications and interventions that can take place within/to the home to support older adults to age in place.

4.1.1. Thematic Analysis

A thematic analysis of the literature was completed in addition to a review of the literature regarding intervention strategies for home modifications for older adults. The literature reviewed demonstrates a series of themes related to the need, desire, uptake, and intentions of community dwelling older adults to make home modifications. The five themes are:

1. Importance of home modifications;
2. Resistance to home modifications;
3. Positive experiences of home modifications;
4. Promoting visitability; and
5. Promoting aging in place.

There is some implicit hierarchy among these five themes. Promoting visitability and promoting aging in place suggest the higher level, big picture goals of older adults, while the other three themes describe why, or why not, home modifications are undertaken.

Importance of Home Modifications

The primary reasons presented by the literature regarding the importance of home modifications relate to environmental barriers, risks to safety, and risk of falls (Iwarsson et al., 2006; Sorcinelli et al., 2007; Steinfeld et al., 2012). Steinfeld et al. (2012) identify five core purposes of home modifications: a) *security*, b) *fire safety*, c) *risk reduction*, d) *accessibility*, and e) *usability* (p. 248). Stark (2004) studied environmental barriers in the homes of older adults and the impacts of home modification interventions on their functional performance. Using pre- and post-intervention assessments, Stark (2004) found that removing environmental barriers in the home had a positive impact on older adults' ability to function independently at home. By focusing on modifying the built environment, Stark's (2004) findings support the ecological approach to understanding where and how older adults live. Iwarsson and colleagues' (2006) study resulted in the identification of 20 common environmental barriers in the homes of older adults, which includes several activities requiring the functional use of an individual's upper body. The implementation of home modifications can work to reduce and/or mitigate some of the risks that are presented in the home environment. Additionally, the majority of households in the United States live in single-family homes, as reported by the American Association of Retired Persons, which are typically designed with stairs at entrances and narrow doors and hallways (Maisel et al., 2008). These design features may act as environmental barriers for people who experience different levels of mobility ability and for users of mobility devices. Sorcinelli et al. (2007) evaluated a Canadian, self-assessment home hazard checklist for preventing falls in the homes of older adults. This study highlighted the importance of home modifications for falls prevention, in order to keep older adults safe in their homes, and the importance of a collaborative approach to assessing and supporting home safety (Sorcinelli et al., 2007).

Resistance to Home Modifications

Despite the literature suggesting home modifications can support safety and independence at home, there is evidence of older adults resisting to make modifications

in their home. Two sub-themes have been identified based on the literature reviewed, which include: a) perceptions of home, and b) affordability.

Perceptions of home. Kruse et al. (2010) conducted a qualitative study with the goal of learning about older adults' attitudes to home modifications as a means to prevent falls. The results of this study identified that many of the older adults interviewed preferred not to discuss environmental hazards in the home at all, suggesting the denial of risks in the home (Kruse et al., 2010). Older adults have demonstrated that they may not welcome all home modifications as they may not be satisfied with the function or appearance of the interventions (Lau et al., 2018). There is a perceived risk that older adults' personal choice may be jeopardized by making home modifications that appear to look institutional (Kruse et al., 2010; Sanford & Butterfield, 2005). Older adults' meaning of home may also be impacted by home modifications that are not home-like in the look and feel as experienced by the older adult (Tanner et al., 2008). The findings around perceptions of home underscores the importance of considering not only objective assessments of home environments, but also older adults' subjective perceptions of where they live, and how supportive their home may or may not be. By fearing their home may look like an institution rather than a home, the negative association some older adults hold towards home modifications further highlights the societal issue around ageism and the negative views society has of older adults (Kruse et al., 2010). Older adults may not view home modifications in a positive way, and thus resist any interventions that may suggest to the public that they have decreasing functional abilities, regardless of the potential increased safety resulting from the interventions (Hazen & McCree, 2001).

Affordability. In a discussion of universal design features, Hunter et al. (2011) report on the higher cost to retrofit a private dwelling to accommodate greater accessibility, compared to the lower cost to include principles of universal design in the initial construction of the home. Brawley (2001) associates some of this issue with the lack of knowledge transfer between disciplines, such as gerontologists and occupational therapists to architects and designers creating new housing stock. Additionally, there is limited government funding available to financially support older adults to make home modifications, particularly in subsidized housing settings where the need for maintenance and repair is critical (Nishita & Pynoos, 2006; Pynoos et al., 2009).

Positive Experiences of Home Modifications

Tanner et al. (2008) describe how home modifications for older adults can elevate their meaning of home as the environmental press, or demand, is reduced and comfort within the home is improved. Improved safety and security are also reported by Tanner et al. (2008). Stark (2004) concluded that older adults' daily activity or "performance" in the home, in addition to their "perception of performance" in the home, can be improved by implementing home modifications to reduce environmental barriers (p. 37). Despite findings by Lau and colleagues (2018) that suggest that not all older adults view home modifications positively, the study results support home modifications as effective in supporting older adults' functional abilities and safety within the home. Thordardottir et al. (2019) conducted qualitative, pre-post-post interviews with older adults to assess their experiences of home adaptations. The results of this study demonstrated positive experiences of the interventions for some participants, but not all, and for those who experienced improved performance, improved participation was also noted (Thordardottir et al., 2019). Interestingly, a study by McCunn and Gifford (2014) did not find the level of satisfaction among older adults occupying accessible homes to be significantly different from those occupying traditional or non-accessible units. This finding further supports the importance of subjective perceptions of housing and supportive living environments.

Promoting Visitability

Among the literature that discusses home modifications for older adults, a common theme emerged regarding the notion of visitability. Visitability refers to an idea that people of all ages and abilities should be able to visit the homes of neighbours, family, and friends, without encountering accessibility challenges (Lynott, 2009). Lynott (2009) describes the three design principles of visitability that sets it apart from other concepts such as universal design; the three principles of visitability are: a) zero-step entrance on the ground floor, b) wide hallways and passages, and c) a minimum half-bathroom provided on the ground floor (Lynott, 2009; Maisel et al., 2008). Visitability is a small component of universal design, yet a significant one (Hartje et al., 2006). The underlying goal of promoting visitability within the homes of older adults is to support their continued participation in the community and in their social lives (Maisel et al., 2008). Visitability design features are closely related to those supporting aging in place,

as the three specific design features for visitability can further support independent living and aging in place (Granbom et al., 2019; Maisel et al., 2008).

Promoting Aging in Place

It can be argued that much of the published literature on design features and intervention strategies for home modifications for older adults are ultimately intending to support older adults to remain in their current homes for as long as possible. Supporting safety, security, performance, and functionality in the home is also supporting older adults' ability to age in place, with specific regard to the physical environment. Granbom et al. (2019) looked at the options for older adults to either make home modifications to their current home or to relocate. Findings of this study concluded that the level of accessibility in an older adult's home environment relates to their decisions regarding relocation (Granbom et al., 2019). Nishita and Pynoos (2005) argue that for some older adults there would not be a need to relocate if the home environment can be adapted to support the older adult's changing needs. The authors also indicate that a lack of purposeful government funding to support home modifications for older adults is a barrier to the implementation and uptake of home modifications by older adults (Nishita & Pynoos, 2005). Similarly, Hunter et al. (2011) suggest that home modifications to support aging in place could be promoted further by requiring a minimum set of accessible design features in by-laws and regulations for different types of newly built housing.

4.1.2. Interventions

The literature on specific home modification interventions compliments the above thematic analysis, revealing four different concepts, or conceptual lenses, that are being promoted through the implementation of certain home modifications: a) aging in place (AIP), b) visitability (V), c) safety and falls prevention (SF), and d) universal design (UD; Brawley, 2001; Hartje, et al., 2006; Hazen & McCree, 2001; Maisel et al., 2008; Pynoos et al., 2009; SAIL, 2002; Sanford, 2012; Unwin et al., 2009). Several different areas of the home are targeted for making home modifications, with specific areas being promoted more or less by the four different conceptual lenses. As informed by the literature, a snapshot of the various areas of the home where home modifications are targeted and the conceptual lenses that are being promoted in each area of the home

can be found in Table 1 (a detailed table of specific modification/intervention strategies for each area of the home can be found in Appendix C). The literature review demonstrated that there are overlapping ideas among the four concepts or lenses being promoted as certain aspects are similar in their objectives; this can be observed by the check marks for multiple lenses being promoted in each area of the home in Table 1.

Table 1.   Summary of Intervention Strategies for Home Modifications for Older Adults.

Area in the Home	Promoting:			
	AIP	V	SF	UD
Entrance		✓		✓
Kitchen	✓		✓	✓
Living/Dining rooms	✓		✓	✓
Bedroom			✓	✓
Bathroom	✓	✓	✓	✓
Stairs	✓		✓	✓
Windows and doors				✓
Floors			✓	✓
Outdoors	✓		✓	✓
Lighting				✓
General/Misc.	✓		✓	✓

Notes: AIP = Aging in place; V = Visitability; SF = Safety/falls prevention; UD = Universal design. See Appendix C for full details and descriptions of modifications.
Sources: Brawley, 2001, p. S79-S82; Hartje, et al., 2006, p. 195-196, 204-205, 208-210; Hazen & McCree, 2001, p. 29-43; Maisel et al., 2008, p. 9; Pynoos, et al., 2009, p. 27-28; SAIL, 2002, p. 4-17; Sanford, 2012, p. 71, 73-78; Unwin et al., 2009, p. 966-967.

Among the four concepts for promoting home modifications as identified by the literature, there appears to be both macro and micro level concepts, indicating a sense of hierarchy. AIP suggests a higher, macro-level initiative, where there is an overarching goal is to support older adults to remain living where they are currently. Universal design may be considered another macro-level concept as accessible design features promoting universal design are not only in personal dwellings, and not only for older adults, but across all public and private spaces for users of all ages and abilities (Sandford, 2012; Hartje et al., 2006). Safety and falls prevention may fall within the notion of AIP, as a person needs to maintain a minimum level of safety in order to remain living in their current home. Similarly, visitability may be considered another

micro- or meso-level concept that falls under the umbrella of universal design and is being promoted more so by disability disciplines rather than targeting older adults specifically. The hierarchy of AIP and universal design as higher level concepts for home modifications can be visually understood by the quantity of check marks in those two columns illustrated in Table 1.

From the lens of promoting AIP, specific home modifications are addressing independent living and functional performance of older adults in areas of the home such as the kitchen, bathroom, and stairways (Pynoos et al., 2009). Pynoos and colleagues (2009) suggest that areas in the home where an older adult may experience the greatest challenges are the priority areas for making home modifications, which include the three mentioned areas, in addition to the entrance to the home. Installing task lighting in the kitchen, providing necessary areas for daily living on the ground floor (such as a bedroom, bathroom, and kitchen), providing additional space around the toilet and shower areas, and positioning of switches and outlets, are examples of home modifications that support AIP by supporting independent living (Hazen & McCree, 2001; McCunn & Gifford, 2014). Making home modifications that support an older adult's independence and autonomy in their home is the ideal option for older adults wishing to AIP (Ahn & Hegde, 2011).

The notion of visitability was also emphasized in the literature regarding home modifications for older adults. As previously mentioned, visitability is a concept that focuses on three accessible features in single-family homes that can accommodate residents and visitors of all ages and abilities (Maisel et al., 2008). While visitability does not explicitly target the environmental needs of older adults, there are overlapping considerations when designing a home to accommodate a range of abilities that work to improve accessibility for older adults as well. From the lens of visitability, there are three key home design principles that are targeted for improving visitability: a) zero-step entrance, b) 32-inch wide doorway clearance, and c) a minimum half-bathroom provided on the ground floor (Lynott, 2009, p. 85-86; Maisel et al., 2008, p. 1). As visitability has been explicitly defined in relation to these three design features, the areas of the home where visitability-focused interventions are targeted are limited (this can be observed in the minimal check marks in the visitability column as illustrated in Table 1).

The third key lens that has been used to address home modifications for older adults is improving safety and preventing falls. The prevention of falls has been cited as supporting independent living of older adults as well as helping to reduce health care costs related to injuries from falls (Sorcinelli et al., 2007). Decluttering, removing throw rugs, and providing sufficient space for moving safely throughout the home and around furniture are examples of home modifications that specifically target improving safety in the home (Lau et al., 2018).

Universal design is the fourth key concept promoted by the literature regarding home modifications. The far-right column in Table 1 demonstrates that universal design features are being promoted in the majority of areas in the home. Similar to visitability, universal design is not explicitly targeting the environments that older adults occupy and interact with, but rather target design features that support ease of use for all people regardless of ability or disability (Sandford, 2012; Hartje et al., 2006). There are seven principles of universal design that inform the types of home modifications being promoted, which are: a) *equitable use*, b) *flexibility in use*, c) *simple and intuitive use*, d) *perceptible information*, e) *tolerance for error*, f) *low physical effort*, and g) *size and space for approach and use* (Hartje et al., 2006, p. 202). It is worthwhile to note that universal design features are not limited to those in homes or residential settings but include the broader community and public spaces as well.

The strong overlap across these four concepts by different disciplines and advocates highlight the significance of viewing the various intervention strategies through a more wholistic and nuanced lens, compared to addressing home modifications from one point of view or discipline. Only two of the four lenses being promoted by the literature explicitly emphasize an age based sub-group (i.e., older adults) as the target population of the architecture and design interventions: AIP and safety/falls prevention. The other two lenses promote improving accessibility rather than specific population groups: visitability and universal design. These findings present important considerations for those designing and building housing, which is to include accessible design features as living environments can be designed purposefully to support people of all ages, abilities, and at all stages in life, not only for older adults wishing to remain at home as they age.

The themes that emerged from a review of the literature highlight the various processes and assessments that older adults and their families are confronted with when an older adult's home is no longer supportive of their needs. For a range of reasons, older adults choose to implement intervention strategies in their homes to allow them to continue to live in their home and AIP. For a range of other reasons, older adults have resisted making any modifications to their home despite the literature suggesting there can be positive outcomes for older adults that do implement home modifications. To compliment this review of the home environment, further understanding and consideration regarding the community or neighbourhood environment, and the supports that may exists there, is also warranted.

Chapter 5.

Community Services, Programs, and Features

The literature that was selected for this review aimed to answer the sub-research question: *What community-level services, programs, and features embody specific domains of the WHO's age-friendly cities (AFC) framework?* Although there were a limited number of studies that met the search criteria for this scoping review of AFC services, programs, and features, there are salient findings that have been reported below. The findings of this review as presented in this chapter include both a typology of the different types of services, programs, and features that emerged from the literature, as well as thematic analysis around these types of AFC features.

5.1. Findings

There are different expert opinions, reports and grey literature on AFC. Many of the records that were selected for the full-text review (72 records) for this project were ultimately excluded as the literature did not specifically discuss community services, programs, or features. Other topics that are common in this area of research include considerations of older adults' perceptions of age-friendliness, assessing and evaluating age-friendliness, how age-friendly initiatives were developed in various communities, and barriers to age-friendliness; these topics are not the focus of this review. The selection process shows that there are only a limited number of records of empirical literature that discuss objectively the community-level features, programs, and services that work to operationalize the AFC framework. A total of 18 records were identified for the literature review and subsequent thematic analysis. As the intent of this inquiry is to understand the types of services, programs, and features that support the AFC initiative, the results presented can be understood as a typology of existing features, programs, and services. Each type of services, programs, or features is described in more detail under each key theme that emerged.

5.1.1. Thematic Analysis

There were several aspects of the neighbourhood environment that were identified as age-friendly community features with the literature reviewed. Four key themes emerged that describe the types of services, programs, and features at the community level that implement and support the domains of WHO's AFC initiative:

1. Community design features;

2. Fostering social connections;

3. Opportunities for participation; and

4. Enabling mobility.

When considered together, these four themes highlight the various domains of the AFC framework (with the exception of the *housing* and *health services* domains, which are out of scope for this review), and suggest the interconnectedness of each domain included in the framework. These four themes are closely related to the theoretical underpinnings of this project, and signify the need to consider both the physical and social environments when assessing the AFC initiative, as previously emphasized by Menec et al. (2011). Broadly, each theme related to programs, services, and features target either the physical environment or the social environment (see Table 2). Table 2 provides a brief summary of the four themes, the types of services, programs, and features that have been found in the literature, and the related AFC domains. Each theme is described further in the following section.

Table 2. **Summary of Findings: Typology of AFC Services, Programs, and Features**

Environment >	Physical Environment		Social Environment	
Theme >	**Community design features**	**Enabling mobility**	**Fostering social connections**	**Opportunities for participation**
Type of services, programs, features >	• accessible physical environments • streets and sidewalks • walkability • parks and community gardens	• public bus transit • public para-transit • ride sharing	• third places • gathering spaces • clubhouses and seniors' centres	• employment and volunteering • NORC programs • partnerships with businesses
AFC Domains >	• outdoor spaces and buildings	• transportation	• social participation • respect and social inclusion • communication and information	• civic participation and employment • community support

Community Design Features

The "community design features" theme heading is borrowed from Lehning, (2014, p. 108), who lists the features of age-friendliness that were implemented in the San Francisco Bay Area in the USA. Community design features refers to urban design elements and infrastructure in the neighbourhood that work to support the mobility and independence of older adults in the community. This theme is closely related to the *outdoor spaces and buildings* domain of the AFC framework, which is described as "the outside environment and public buildings [that] have a major impact on the mobility, independence and quality of life of older people and affect their ability to "age in place"." (WHO, 2007, p.12). The types of features found among the literature that fall within this theme include: accessible built environments (Brooks-Cleator et al., 2019; Menec et al., 2014), streets and sidewalks (Brossoie & Burns, 2020; Lehning, 2014; Menec et al., 2014), walkability (Lehning, 2014; van Hoof et al., 2021), and parks and community gardens (Clark & Glicksman, 2012; Menec et al., 2014). Brooks-Cleator et al. (2019) discuss the importance of having an accessible and inclusive environment to support older adults' mobility within their community, especially for those with a disability. Menec and colleagues' (2014) research on the implementation of an AFC initiative in Manitoba,

Canada includes information on specific design features of accessibility such as automated doors, wheelchair accessible building entrances, installation of ramps, and widening hallways and aisles to provide adequate space for mobility device users. The quality of streets and sidewalks has also emerged as important environmental design features that support the AFC initiative (van Hoof et al., 2021). Brossoie and Burns (2020) in the USA, focused on supportive social and built features of the environment that foster aging well. Their research demonstrated that features such as sidewalks, roads, and parking were important for creating an age-friendly community (Brossoie & Burns, 2020).

Closely related to accessibility of built environments and the quality of sidewalks is the notion of walkability. Lehning (2014) describes neighbourhood design features that work to improve walkability of a community, such as repairing and widening sidewalks, installing pedestrian footpaths, traffic calming measures, and enhancing street lighting. Menec et al. (2014) identify maintenance of streets and sidewalks as important aspects of AFC, and similarly van Hoof et al. (2021) describe sidewalk conditions as being important facilitators (or barriers) to aging in place. Walkability, and these physical design features, are required to support the health and well-being of older adults living in the community (Lehning, 2014).

The final type of community design features that was found in the literature and related to the *outdoor spaces and buildings* domain of AFC is the provision of parks and community gardens. Clark and Glicksman (2012) describe an AFC initiative in Philadelphia, USA, and specifically discuss the development of an "Age-Friendly Parks Checklist", which can be used to evaluate and enhance the age-friendliness of parks in the city (p. 126). Parks that provide adequate seating (benches), shaded areas, railings and handrails at grade changes and stairs, accessible public washrooms, adequate lighting, and wide pathways that accommodate mobility device users may work to encourage park use by older adults (Clark & Glicksman, 2012; Menec et al., 2014). In addition to parks, community gardens are discussed as providing opportunities for socialization and recreation, volunteerism, as well as promoting healthy eating (Clark & Glicksman, 2012).

The findings within this theme illustrate the importance of physical design features that are implemented at the neighbourhood level to support the AFC initiative

and ultimately support older adults to continue to age in place. In addition to physical environment features, additional themes emerged from the literature that relate to the social environment of neighbourhoods.

Fostering Social Connections

The importance of social aspects for supporting the well-being of older adults are indicated through the *social participation* and *respect and social inclusion* domains of the WHO's AFC initiative. A third AFC domain is also briefly addressed by the literature findings of this theme, which is *communication and information*. Three types of services are discussed that work to foster social connections among older adults in the community and include: third places (Alidoust et al., 2019; Fong et al., 2020), gathering spaces (Brooks-Cleator et al., 2019; Fields et al., 2016), and clubhouses and seniors centres (Crabtree et al., 2018; Fong et al., 2020; Lehning, 2014; Menec et al., 2014; Sen & Prybutok, 2021). Third places are described simply by Alidoust et al. (2019) as "popular public places where many people go to socialize" (p. 1461) and provide examples of third places such as mixed-use centres or areas, cafes and restaurants, churches, shopping areas, and clubhouses. The authors report the significance of local third places that provide opportunities older adults to socialize with others in their neighbourhood that also contribute to a sense of belonging (Alidoust et al., 2019; Fong et al., 2020). In the context of these findings, third places may be understood as an overarching type of community feature, with specific types of third places falling within it, such as gathering spaces, clubhouses, and seniors' centres.

Brooks-Cleator et al. (2019) focus on the lives of Inuit and First Nations older adults in Ottawa, Canada, and emphasize the importance of gathering spaces for supporting the practice of Indigenous culture and traditions. In addition, the location of such a space, for example provided in an Inuit-supporting organization, is an important consideration for ensuring the space is accessible to those who use it (Brooks-Cleator et al., 2019). Gathering spaces that support religious affiliations, specifically congregation-based services, are also discussed by Fields et al. (2016). Churches can foster social inclusion and connectedness for older adults, in addition to volunteerism and access to information, all of which are important aspects of AFC (Fields et al., 2016). It has been reported that older adults' participation in various clubs also works to foster social connections and inclusion, where the provision of programs and services at these clubs

support multiple AFC domains. Crabtree et al. (2018) discuss a recreational clubhouse known as "men's sheds", which are common in Australia, although this study was looking at men's sheds in London, England, where they are less popular. Men's sheds typically focus on woodworking activities and other hands-on work in a community centre setting that permits men-only participation. As with many third places, these clubhouses provide members with opportunities for socializing, as well as provide a sense of accomplishment and contribute to improved health and well-being (Crabtree et al., 2018). Similarly, Fong et al. (2020) discuss a bridge club, which is another recreational club provided at a community centre where older adults play the card game, bridge. Again, the significance of these types of places in the community is the opportunity for older adults to meet, socialize, and exchange information. In addition to specific clubhouses presented in the literature, both Lehning (2014) and Menec et al. (2014) describe the provision of activities and educational programs for older adults that are provided at local seniors' centres. The last type of service that was found among the literature to contribute to older adults' social participation is an exercise-based program and seniors' centre that aims to improve older adults' mobility. Seniors in Motion is a small physical activity centre in Texas, USA, that provides exercise classes and routines for older adults (Sen & Prybutok, 2021). This program is strengthened by the collaboration and supervision by physical therapists and specialists who are staffed at the centre to provide safe and tailored exercise programs to older adults. Interviews with members of the program demonstrated that Seniors in Motion provided daily routine and motivation to participate, in addition to encouraging social and physical engagement of older adults (Sen & Prybutok, 2021).

Places and programs in the community that help to foster social connections, social inclusion, and the exchange of information are key features of AFC that support older adults to age well. In addition to recreation based social opportunities, other types of services and programs that aim to implement the AFC initiative can provide opportunities for older adults to participate in their community.

Opportunities for Participation

To distinguish this theme from the previous, the types of programs and services that follow are related more closely to the *civic participation and employment* and *community support* domains of AFC and are discussed in this way, however it is

understood that these features also support social participation and inclusion. The types of services and programs that contribute to opportunities for engagement and participation of older adults in the community are: employment and volunteering (Gonzales & Morrow-Howell, 2009; Halvorsen & Emerman, 2013; Lehning, 2014), naturally occurring retirement community (NORC) programs (Greenfield & Frantz, 2016), and partnerships with retail businesses (Igarashi et al., 2020; Malet-Larrea et al., 2019). The opportunities for participation that have emerged from the literature include both formal and informal opportunities for engagement. Gonzales and Morrow-Howell (2009) provide a review of AFC initiatives in Atlanta, Georgia, USA that focus on both paid and volunteer-based civic engagement opportunities for older adults. Various initiatives have been implemented that provide support to older adults for seeking employment, acquiring new skills and training, networking, career counselling, and more, as well as providing incentives to employers for hiring older adult workers (Gonzales & Morrow-Howell, 2009). Volunteer work opportunities are also important in the lives of older adults, and services that support this type of engagement relate to recruitment and placement support (Gonzales & Morrow-Howell, 2009; Lehning, 2014). Similarly, Halvorsen and Emerman (2013) reviewed initiatives in the USA that specifically relate to the idea of an "encore career" (p. 33). Encore careers describe the desire of older adults to engage in volunteer work, emphasizing meaningful work, as they approach later life and retirement careers (Halvorsen & Emerman, 2013). In the USA, there have been several initiatives that help older adults to make a shift to, or re-enter, a work environment that builds on their existing experience and skillsets while benefiting the local community. These initiatives focus on connecting older adults to work and volunteer opportunities with non-profit organizations, faith-based groups, underserved groups, students and intergenerational programming, and more (Halvorsen & Emerman, 2013).

Another type of service that provides community engagement opportunities for older adults are the programs provided by NORCs. NORC programs are intended to bring together community partners, older adults, and property managers in order to provide programs and services that support older adults to age in place (Greenfield & Frantz, 2016). Greenfield and Frantz (2016) surveyed NORC program service providers in New York, USA, and found that these programs engage older adults not only as participants in various programs, but also as co-creators and organizers of such

programs. Along a similar line of creating partnerships between older adults and existing organizations in the community, two unique examples of AFC services in Japan and Spain are centered on collaboration with local businesses.

In Tokyo, Japan, an educational initiative was developed to help bring together local convenience stores and older adult-serving service providers in order to create community networks that include the neighbourhood convenience store staff (Igarashi et al., 2020). Convenience stores were identified as important collaborators in serving older adults in the community as the majority of older adults in urban areas of Japan live nearby to a local convenience store, in addition to these stores providing access to necessities of daily living, social support, and providers of information for older adults (Igarashi et al., 2020). A similar but distinct collaborative effort was made in Spain where an AFC pharmacy initiative was developed. Malet-Larrea et al. (2019) state they are the first to consider an AFC initiative that specifically targets pharmacies and describe characteristics of an age-friendly pharmacy as physically accessible, accommodating (provision of seating and washrooms), staff providing a friendly and trusting relationship, and communicating information about other services that are important to older adults. While the topic of health services and care is out of scope for this literature review and overall project, the AFC pharmacy initiative described by Malet-Larrea et al. (2019) is included as it is representative of a community-level service provided in older adults' local neighbourhoods that operationalize the WHO's AFC initiative and supports older adults to age in place.

Enabling Mobility

The fourth and final theme of the literature review is focused on age-friendly transportation services for older adults, which itself is an AFC framework domain. Among the literature reviewed, three different modes or types of transportation initiatives were identified: public bus transit (Brossoie & Burns, 2020; Clark & Glicksman, 2012; Lehning, 2014; Reinhard et al., 2018), para-transit (Brooks-Cleator et al., 2019; Lehning, 2014; Menec et al., 2014), and ride sharing (Lee et al., 2018). In addition to these modes or types of transportation services, van Hoof et al. (2021) describe walking and walkability as being an important mode of transport for older adults. Reinhard et al. (2018) studied the impact of free public bus transit for older adults in England, UK, and demonstrated that free bus use among older adults resulted in more frequent use of

public transit, greater physical accessibility, and reduced loneliness and social isolation. Brossoie and Burns (2020) similarly emphasize the importance of affordable public transit for older adults; Lehning (2014) also describes municipal-level transportation AFC initiatives such as discounted public transit fares and bus stop features. Public bus transit in Philadelphia, USA has also been provided at no cost to older adults, and Clark and Glicksman (2012) also describe the importance of age-friendly bus stops (those that provide adequate seating, shelter, and lighting) for encouraging transit use among older adults. Para-transit, which refers to accessible public transit for persons with disabilities, was identified as an important service for older adults who have a disability, or use a mobility device, for providing access to amenities and services that are located further away from one's home (Brooks-Cleator et al., 2019). Menec et al. (2014) similarly describes a local community initiative in Manitoba, Canada to acquire a para-transit vehicle and reduce the costs of managing the service.

Personal vehicle use was not discussed in the literature as an age-friendly transportation initiative in this review, as studies addressing this topic were found to be related to individual perceptions and capability to drive a personal vehicle and did not reflect an AFC initiative at the community level. One study was identified for inclusion that describes a "batching" ride share program in Perth, Australia, where older adults can receive rides to social and medical appointments at a subsidized rate, with other older adults travelling a similar route (Lee et al., 2018, p. 55). However, details of who is running this service (municipality, non-profit, private company) were not available, although the authors report that older adults who used the ride share program benefited from an affordable transportation option, social connections, and access to information (Lee et al., 2018).

The significance of adequate and affordable transportation options for older adults rests along the ability for transportation to either enable or hinder older adults to participate socially, access goods and services, and ultimately to live independently (Clark & Glicksman, 2012; Reinhard et al., 2018).

5.1.2. Additional Findings

In addition to the four key themes that emerged to describe the types of community-based services, programs, and features, there are a few other aspects of the

literature findings that warrant a brief discussion. Two of the articles reviewed (Lehning 2014; Menec et al., 2014) provide substantial listings of examples of best practices that have been implemented as part of AFC initiatives in different communities. Lehning (2014) lists the features of age-friendliness that have been implemented in the San Francisco Bay Area in the USA, while Menec et al. (2014) list examples of AFC projects that have been implemented in communities in Manitoba, Canada. Both of these sources provide important insight into the types of services, programs, and features that have been, or can be, implemented to enhance age-friendliness of a given community in North America. Menec et al. (2014) and Lehning (2014) help to demonstrate the different types of services and features across each domain of the AFC framework. One of the AFC domains that is only briefly touched on in this review is *communication and information*, yet Lehning (2014) and Menec et al. (2014) list various efforts to provide information and resources to older adults in the community, through initiatives such as improving websites, providing newsletters, posting event notices, and providing online and telephone directories.

Although housing is not the focus of this review or chapter, Clark and Glicksman (2012) describe how modernizing zoning by-laws in Philadelphia, USA, contributed to newly designed housing that is supportive of older adults. The city's zoning code was revised to explicitly include mentions of older adults in the policies, as well as introducing provisions related to accessory dwelling units. Accessory dwelling units refer to an additional suite located on the property of an existing residences, and can be helpful for older adults looking to downsize, accommodate a caregiver, and for adult children wishing to be closer to their aging parents (Clark & Glicksman, 2012). The provision of accessory dwelling units is also described by Lehning (2014) who goes on to list additional initiatives to provide incentives to developers to build more age-friendly housing. Again, while housing is out of scope for this review, it is worthwhile to note this type of initiative is taking place at the municipal level to improve age-friendliness in communities.

The findings of this scoping review present various types of services, programs, and features of a community that are aiming to support and create age-friendliness in a given community. As more objective approach was taken for this review, the research question is answered with a typology of existing AFC services, programs, and features, rather than an exploration of older adults' perceptions of age-friendliness or the supports

available in their communities. Next, an analytical discussion of the findings presented in this chapter, along with Chapter 4 (home modifications), is presented.

Chapter 6.

Discussion, Limitations, Implications, and Conclusion

As the two literature reviews were conducted separately for home modifications (Chapter 4) and AFC supportive features (Chapter 5), a combined discussion of these findings is needed to identify complementary aspects. This chapter includes this discussion along with connections that are drawn across the findings and theoretical underpinnings of the project. This chapter also includes a discussion on the strengths and limitations, followed by a section on implications of this work for future research and policy development, and closes this project with the conclusion.

6.1. Discussion

A major focus of this capstone project was to discuss environmental aspects at both the home and community levels that support aging in place (AIP) and address strategies for age-friendliness. Although there is no commonly accepted definition of AIP, there is consensus among researchers and professionals in the gerontology field that AIP factors cover both the home/residential setting as well as community environments (Bigonnesse & Chaudhury, 2020). The importance of considering both the home and community environments is reinforced by theoretical frameworks that have guided this work: Lawton and Nahemow's (1973) person-environment (P-E) fit theory and Golant's (2011) model of residential normalcy. For instance, older adults are enabled to AIP when there is optimal P-E fit between the older adult and their home and community otherwise considered a congruent environment, and where older adults feel a sense of residential normalcy (Lawton & Nahemow, 1973; Golant, 2011). Similarly, older adults may live in a home that accommodates their needs, but their community may be unsupportive, creating an incongruent environment for the person. Where a community offers many supportive amenities and features, the home environment may still contain physical barriers that not only increases the risks for falls but also provides barriers to accessing the community and benefiting from the available supportive services. These types of person-environment incongruency do not allow older adults to reach residential normalcy or achieve an optimal P-E fit (Golant, 2011). Thus for optimal

P-E fit, both the home and the community environments need to be supportive of the person's needs at their current level of competency, as well as the ability to adapt and respond to the person's changing needs.

The findings in Chapter 4 (home modifications) revealed the important role home modifications play in maintaining and supporting independence of community dwelling older adults. Along the lines of inclusivity in home design, visitability was a key concept that emerged through the home modifications literature (Chapter 4) and is discussed in the context of the need to provide accessible housing for people of all ages, particularly for those who use mobility devices, parents with children, older adults, and others who experience challenges with stairs (Clark & Glicksman, 2012). One of the additional findings in Chapter 5 (AFC services, programs, and features) is related to the use of land use planning tools, such as zoning policies, to promote the development of age-friendly housing, and ultimately support both visitability and aging in place. Similarly, the cost of home modifications was seen as deterrent to AIP as it fostered resistance among older adults to implement some of these modifications that could make their homes more accessible and safe. This resistance may be partially reduced through the development of new housing stock that is proactively built to be physically accessible and inclusive.

The notion of visitability is not only concerned with the provision of accessible homes, but also with the desire for people to engage in the community and foster social connections with their neighbours (Greenfield et al., 2015; Scharlach & Lehning, 2015; Maisel et al., 2008). As it has been discussed previously, initiatives that aim to support older adults to remain living independently in their communities (i.e. AIP and AFC) must consider both physical and social aspects of the environment (Menec et al., 2011). The typology developed through the review of AFC literature in Chapter 5 demonstrates that age-friendly environmental features and services not only promoted independence and access, but also social engagement and participation of older adults in the community. For instance, presence of services and features in the built environment, such as public transportation and urban design promoting walkability, are important facilitators of social engagement and recreational activities of older adults. These findings highlight that planning, design, and legislation related to home and community need to consider both physical and social environmental aspects to promote AIP and create AFC. These findings are also consistent with the discussion by Menec et al. (2011) on fundamental aspects of AFC, which are the physical and social environments.

As well in Chapter 5, the review was focused on identifying specific types of services, programs, and features of the community that support age-friendliness and AIP, but was not addressing older adults' perceptions of age-friendliness. Thus, the subjective aspects linked to AFC services cannot be discussed in this project. However in Chapter 4 (home modifications), the review was conducted in a more exploratory nature, and included both objective aspects (questioning "what") and subjective aspects of home modifications (questioning "how"). Subjective perceptions of home modifications were related to older adults' acceptance, resistance, and experiences of home modifications. Findings from the review demonstrated that while objective home modifications can be implemented, how an older adult perceives the home modification will determine the success and uptake of the interventions (Kruse et al., 2010; Lau et al., 2018).

6.1.1. Adapted Conceptual Model

Menec et al.'s (2011) conceptualization of AFC (Figure 2), was adapted based on the findings from the two literature reviews conducted in this project and is presented in Figure 5 (the "adapted model"). The purpose of providing an adapted model is to aid the conceptualization of the significant ideas and findings of this project while maintaining the connections and propositions of Menec et al.'s (2011) existing model (the "original model").

Figure 5.   Adapted Conceptualization of Aging in Place and Age-Friendly Communities (AFC)

P-E = Person-environment
PhE = Physical environment
SE = Social environment
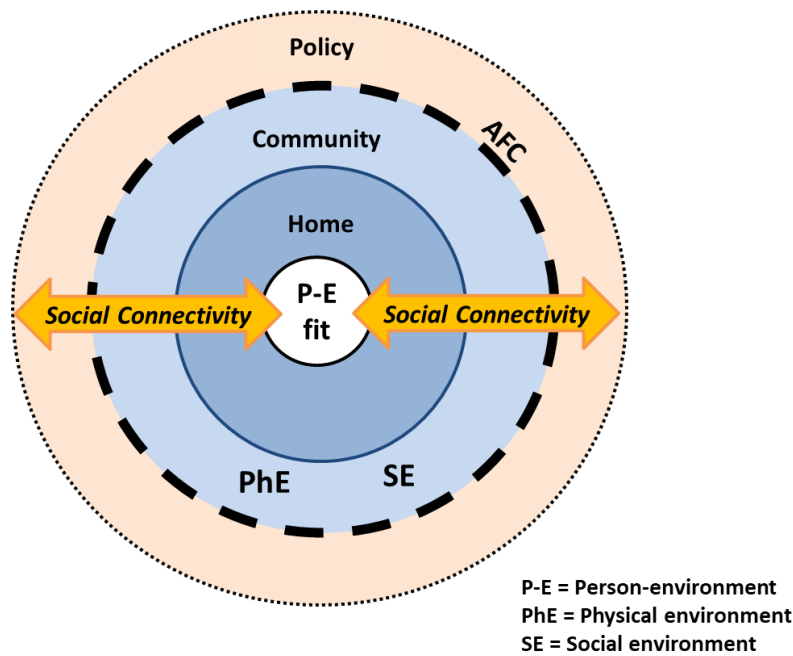
The nested systems or environments that are part of the original model remain in the adapted model with a few changes. The micro-level environment of the older person is shifted slightly to focus on the individual's person-environment (P-E) fit. Lawton and Nahemow's (1973) ecological theory of aging has largely informed this research project's positioning, where P-E fit has remained a critical focus. In contrast to the original model, older adults' relationships with family and friends have not been a focus of this project, thus the next level of environmental systems has been replaced with the home environment of the individual. At the meso-level environment, the community is illustrated, similar to the original model, as well as the macro-level policy environment. The physical environment (PhE) and social environment (SE) are also included in the adapted model at the community level, as both aspects are of equal importance for AIP and AFC. Despite the illustrations of these aspects at the community level, the importance of considering both the physical and social environments at all system levels (including the individual, home, and policy environments) has been demonstrated through the findings in this project. The wide, black, dotted line represents the WHO's AFC initiative, and has been intentionally placed between the community and policy environments as AFC can be considered a policy initiative targeting community environments. The findings of this project have further illustrated that the AFC framework

is multi-faceted and emphasizes many interlinked aspects of an older adult's environment (WHO, 2007).

Although social connectivity was not the focus of the research questions, it did emerge in many thematic findings of both literature reviews (Chapter 4 and 5), and the social environment has been emphasized in many ways as equally important as the physical environment. Therefore the strong depiction of social connectivity as illustrated in Menec et al.'s (2011) original model is carried forward into the adapted model (orange double-headed arrow). It is worthwhile to acknowledge that there may be other types of environments or systems that are also important for AIP, such as healthcare and psychosocial considerations, and could be considered for inclusion in the adapted model. However for applicability to the findings, only selected environments are included.

The desired outcome in the context of this research is for older adults to AIP, and can also be considered the desired outcome of the adapted model. While not all older adults are supported or able to AIP, it is argued to be an overarching goal that cities and communities must strive toward. Menec and colleagues (2011) provided a relevant and applied conceptualization that has informed the discussion throughout this project. In order to emphasize the salient findings and theoretical underpinnings of this research, the original model has been 'added to and stirred' (Cosco et al., 2018, p. 3) and presented as an adapted conceptualization of AIP and AFC for community dwelling older adults.

6.2. Limitations

A limitation of this project is related to the AFC literature review (Chapter 5) which did not address older adults' subjective perceptions of the features of age-friendliness. This is an important topic of inquiry in order to understand uptake and acceptance of these programs, services, and features. However a strength of the AFC literature review taking an objective approach is the resulting listing, or types, of age-friendly programs, services, and features that have been implemented in various communities. An additional limitation of this project is regarding the scope of research, applicability, and relevancy of the findings exclusively to older adults living independently, or semi-independently, in the community in primarily urban settings. The

scope of this research does not include older adults living in other housing arrangements such as congregate settings and long-term care. Further, there is a recognition that not all community dwelling older adults have the means or resources to implement home modifications, or have access to community services based on where they live. This may also limit the applicability of this research to older adults that may be lower income or experiencing housing insecurity. Additionally, as most of the literature is focused on urban settings in the global North, there is limited applicability of the AFC services identified here to rural and remote communities, as well as countries and regions that are in varying stages of development. However, this research has its merit and importance as the majority of older adults in BC are community dwelling, and the majority of older adults in Canada and the USA wish to remain in their familiar home and community for as long as they can (Office of the Seniors Advocate of BC, 2020; Scharlach & Diaz Moore, 2016). This research will benefit this population of older adults as it contributes to identifying and highlighting the salient considerations at both the home and community levels for supporting the well-being and independence of older adults striving to age in place.

Although there are limitations that must be understood when considering the applicability of this research project to specific population groups or contexts, the findings of the two literature reviews that were undertaken have several implications for future research and policy development.

6.3. Implications

This research project has presented key implications for future empirical efforts to study and address the notions of aging in place and age-friendly cities, in addition to several policy implications. The first is that this work contributes to the efforts to prolong the need for community dwelling older adults to relocate to a different living environment or setting. The implementation of home modifications and access to supportive community services can enable older adults to maintain independent living in their homes in the community. A more comprehensive understanding of existing AFC services and features may also enable greater access and utilization of these services by older adults. The insights regarding older adults acceptance and resistance to home modifications (as seen in Chapter 4) allows us to more appropriately tailor home modifications and other environmental adaptations to older adults preferences and

needs. Encouraging greater awareness of, and access to, community services and/or home modifications supports the overarching desire of many aging North Americans to age in place. Increasing awareness and utilization of services promoting AIP and AFC may also suggest to municipalities and other governments that this is a priority area for policy development and funding. As well, in reviewing the summary of home modifications design interventions (Table 1 and Appendix C), it can be observed that there are specific home modifications designed for most areas of the home where the purpose is related to safety and falls prevention. Several of the grey literature sources that informed the summary were also written from the perspective of reducing falls among older adults. Thus, implementing home modifications is not only an approach to increase accessibility of older adults' homes and their ability to AIP, but also serve as important considerations for reducing built environment risks that cause injuries.

One of the prominent findings that emerged from the AFC programs, services, and features review (Chapter 5) that has been discussed previously is that there is a limited amount of empirical research that meets the search criteria to address a more objective approach to AFC services. Identifying this gap in the literature was not an expected outcome of the literature review, yet it is a salient finding. The World Health Organization developed the AFC framework in 2006 and published the AFC Guide in 2007, thus the concept is fairly new and empirical research may also be limited. This gap between academic research and the WHO's (2007) AFC framework points to an area for researchers to further explore in order to add to the typology of AFC services and features that has been developed here. Conducting this research alongside the subjective research focus will allow us to better understand how AFC initiatives are being implemented and perceived around the globe.

Additionally, the typology of community-based services (Chapter 5) can be used as a springboard for further research into the different types of community services, programs, and features that relate to each domain of the AFC framework. This typology of AFC features includes a wide variety of services and features, further highlighting the need to consider multiple contexts for age-friendliness, including the micro- (individual or home), meso- (neighbourhood or community), and macro- (city or region) environments. These implications are relevant not only to the research community but also municipalities and policy makers that are considering ways to increase age-friendliness in their communities. Again, policy development that aims to support AIP and

independence of older adults should aim to address both social and physical environments, as emphasized by both literature review findings (Chapters 4 and 5).

Due to the practical limitations and timeline of a capstone project, an extensive review of existing policies that relate to home modifications and age-friendly community services was not conducted. This represents a key area for future efforts to conduct an in-depth policy analysis of environmental supports for aging in place, which may be conducted in part by a rigorous search of policy databases, such as the Canadian Electronic Library from desLibris or the custom Google search for Canadian Public Policy Sources (for Canadian-specific policy). Without having conducted the policy inquiry, this research points to a few key implications that should be considered when assessing policies that work to support older adults in prolonging relocation to institutionalized settings. First, land use planning policy can be revised or developed to proactively allow for more purpose built accessible, and visitable, housing. Planning instruments such as community plans and zoning by-laws may require the inclusion of specific language related to older adults, aging in place, and age-friendliness. These planning instruments could also be amended to allow for a range of home modifications to be made that would not require approval of variances to existing by-laws. This research may also suggest policy development for the provision of funding and grants to older adults in order to make home modifications, or additional funding to local organizations that are providing age-friendly programs and services to a community.

Realities of the COVID-19 pandemic have highlighted social isolation among community dwelling older adults and a lack of community supports that are easily available to them for improving their well-being. The pandemic has also brought to the forefront some of the limitations of long-term care and other congregate setting for older adults and the propensity of higher rates of infection and death in these settings. Issues such as understaffing, negative care outcomes, inadequate physical environments, outbreak, dementia care, and more have been the focus of long-term care advocacy groups and researchers for many years (Kadowaki, 2020). Further safety and staffing challenges that emerged due to the current pandemic have not only heightened public attention on long-term care homes, but have also raised broader questions about how older adults are housed and cared for in our communities (Chaudhury, 2020). Many community-based organizations, such as seniors' centres and community centres, were required to scale up the services and programs that were being provided to older adults

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prior to the pandemic, in order to serve a greater number of older adults that are now stuck at home and in their neighbourhoods. These issues and considerations demonstrate the need for a) a better understanding of the types of community services and features that support older adults to AIP, and what is needed to support them under different circumstances, and b) understanding how older adults' homes can be made more accommodating (through home modification and adaptations) to prolong relocation to more institutionalized settings. Finally, this project provides a discussion that helps to bridge the concepts of aging in place (AIP) and age-friendly communities (AFC). AIP has been a substantial focus of gerontological inquiry while the AFC framework as presented by the WHO is still a fairly new initiative and is less empirically researched. Both of these initiatives share many of the same goals, with the ultimate objective to allow and support older adults to maintain independence to live in their current homes and communities as opposed to residential care settings (Brandis & DeLaTorre, 2018). This project has contributed to the efforts of researchers, policy-makers, older adults, and other stakeholders, to address different aspects of the community and home environments to support a high quality of life and well-being for older adults.

6.4. Conclusion

The findings presented in this project contribute to the growing literature on the World Health Organization's (2007) age-friendly cities (AFC) initiative and the ongoing focus on aging in place (AIP) by gerontologists. A critical feature of this project is the deliberate attempt to review environmental supports that exist at both the home and community levels, as both proximal and distal living areas contribute to age-friendliness and the ability for older adults to AIP. In addition to the home (micro) and community (meso) environments, this research provides implications for the macro-environments, including considerations for municipalities, regions, and the broader policy contexts around housing and care for older adults. As introduced first by the theoretical underpinnings of this research, in addition to the findings of both literature reviews conducted herein, there is recognition and emphasis that not only the built, natural, and physical environments of are important for supporting the independence and well-being of older adults, but also the social environment and the ability for older adults to engage in meaningful social activity.

This research contributes to a greater understanding of the types of age-friendly community-based services that exist for older adults living in the community, which have garnered greater attention due to the challenges presented by the recent and ongoing COVID-19 pandemic. The additional challenges that the pandemic has presented for residents and staff in long-term care homes further reinforces the need to provide adequate supports at the home and community levels to help older adults to remain living in the community and avoid relocation to such settings. Developing a typology of AFC programs, services, and features of communities, together with a categorization of home modifications for older adults, supports this endeavour. In conclusion, considering the growing proportion of the population that are older adults and their desires to age in place, home and community level environmental supports for older adults are critical components of research and policy development across Canada.

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Appendix A.

Home Modifications Literature Review Articles

Citation	Country of Study	Methods	Findings	Additional Concepts
Empirical Research				
Granbom et al., 2019	USA	Longitudinal survey data of older adults aged 65+ (n=7197)	Specific home modifications, strategies, and interventions	Home design supporting AIP
Iwarsson et al., 2006	Sweden, Germany, Latvia	Interviews and observations of older adults (n=851)	Environmental barriers in older adults' homes	Ecological theory of aging.
Kruse et al., 2010	USA	Interviews and falls risk assessments of older adults aged 60+ (n=10)	Home modifications to reduce falls among older adults	Denial of hazards
Lau et al., 2018	Australia	Questionnaire and interviews with older adults	Satisfaction with home modifications recommended by OTs	Negative/stigmatized perceptions
McCunn & Gifford, 2014	Canada	Questionnaire of older adults, mean age 75 (n=100)	Specific home modifications, strategies, and interventions	Positive impacts not significant
Naik & Gill, 2005	USA	Home assessments of older adults aged 73+ (n=566)	Home modifications related to bathing	
Sanford & Butterfield, 2005	USA	Home assessments of older adults (n=73)	Evaluating two home assessment tools	Factors contributing to lack of home modifications

Citation	Country of Study	Methods	Findings	Additional Concepts
Sorcinelli et al., 2007	Canada	Surveys of older adults aged 55+ (n=76)	Evaluation of a falls prevention checklist	Environmental hazards related to falls
Stark, 2004	USA	Pre/post assessments of home modifications for low-income older adults with disabilities (n=16)	Environmental barriers in older adults' homes	Positive impacts of home modifications
Tanner et al., 2008	Australia	Exploratory study. Interviews with older adults (n=16)	Impact of home modifications for older adults	Factors contributing to lack of home modifications
Thordardottir et al., 2019	Sweden	Pre/post/post interviews with older adults aged 45-95 (n=11)	Impact of home modifications for older adults	Continuous assessment of living environment
Grey Literature and Review Articles				
Brawley, 2001	--	Literature review	Specific home modifications, strategies, and interventions	Knowledge transfer between disciplines
Hartje et al., 2006	--	Book chapter	Specific home modifications, strategies, and interventions	Visitability; Universal design
Hazen & McCree, 2001	--	Book chapter	Specific home modifications, strategies, and interventions	
Hunter et al., 2011	--	Literature review	Environmental factors and healthy aging	Costs of retrofitting; Promoting accessibility
Lynott, 2008	--	AARP Public Policy Institute paper	Visitability	
Maisel et al., 2008	--	AARP Public Policy Institute paper	Promoting visitability	
Nishita & Pynoos, 2005	--	Literature review	Retrofitting existing housing for older adults	Promoting AIP

Citation	Country of Study	Methods	Findings	Additional Concepts
Pynoos et al., 2009	--	Literature review	Accessibility and home modifications for older adults	Visitability
SAIL, 2002	--	Guidebook	Specific home modifications, strategies, and interventions	Universal design
Sanford, 2012	--	Book chapter	Specific home modifications, strategies, and interventions	Universal design
Unwin et al., 2009	--	Literature review	Specific home modifications, strategies, and interventions	

Appendix B.

Age-Friendly Cities (AFC) Literature Review Articles

Citation	Country of Study	Methods	Findings	Type of Service, Program, or Feature	AFC Domains
Empirical Research					
Alidoust et al., 2019	Australia	Interviews and observations of older adults aged 65+ (n=55)	Accessibility of older adults to third places	Third places	Outdoor spaces; Social participation
Brooks-Cleator et al., 2019	Canada	Interviews, focus groups, and photovoice with Inuit and First Nations older adults aged 55-79 (n=32)	AFC services, programs, and features	Physical accessibility; Para-transit; Gathering spaces	Outdoor spaces; Transportation; Social participation; Community support
Brossoie & Burns, 2020	USA	Survey data of adults aged 45+ (n=623)	Community built and social environment features that support aging well	Transportation; Physical accessibility; Streets and sidewalks	Outdoor spaces; Transportation
Crabtree et al., 2018	UK	Interviews with men aged 65+ (n=8)	Benefits of men's sheds	Clubhouse	Social participation
Fields et al., 2016	USA	Interviews and focus groups with older adults aged 55-92 (n=60)	Age-friendliness and the role of churches	Faith-based programs and services; Gathering space	Social participation; Community support
Fong et al., 2020	Australia	Focus groups with older adults aged 59-87 (n=31); Coproduction approach	Facilitators and barriers to participation in a bridge (card game) club	Third places; Clubhouse	Social participation

Citation	Country of Study	Methods	Findings	Type of Service, Program, or Feature	AFC Domains
Greenfield & Frantz, 2016	USA	Surveys and interviews with NORC service providers (n=53)	Sustainability of NORC programs and services	NORC programs and services	Community support
Igarashi et al., 2020	Japan	Interviews with owners/staff of convenience stores.	Development of an AFC initiative between community service providers and convenience stores	Partnerships with businesses	Community support
Lee et al., 2018	Australia	Longitudinal cohort study; Interviews with older adults with disabilities aged 65+ (n=32)	Impact of a "batching" ride share program (p.55)	Ride-share program	Transportation
Lehning, 2014	USA	Surveys of municipal staff	Assessing AFC features in various municipalities	Multiple	All
Malet-Larrea et al., 2019	Spain	Focus groups with older adults and community pharmacists (n=30)	Development of an age-friendly pharmacy initiative	Partnerships with businesses	Community support
Menec et al., 2014	Canada	Interviews and questionnaires of municipal staff	Implementation of local AFC initiatives	Multiple	All
Reinhard et al., 2018	UK	Longitudinal study data (n=18164)	Impact of a free bus pass program for older adults	Public transit	Transportation

Citation	Country of Study	Methods	Findings	Type of Service, Program, or Feature	AFC Domains
Sen & Prybutok, 2021	USA	Interviews with older adults aged 51-87 that are members of an exercise program (n=15)	Impact of an exercise program/centre for older adults	Exercise program	Community support
Grey Literature and Review Articles					
Clark & Glicksman, 2012	--	Literature review	Development and implementation of a municipal AFC initiative	Parks and community gardens; Public transit	Outdoor spaces; Transportation
Gonzales & Morrow-Howell, 2009	--	Literature review	Age-friendly work and volunteer opportunities	Employment and volunteering	Civic participation and employment
Halvorsen & Emerman, 2013	--	Literature review	Importance and examples of initiatives supporting encore careers	Employment and volunteering	Civic participation and employment
van Hoof et al., 2021	--	Conceptual paper	AFC initiative with a focus on the built environment.	Multiple	Outdoor spaces; Transportation

Appendix C.

Summary of Home Modifications Interventions and Strategies

Area in the Home	Modifications/Design Features	Promoting: AIP – Aging in place V – Visitability SF – Safety/falls prevention UD – Universal design				Sources
		AIP	V	SF	UD	
Entrance	Main floor at ground level, ideally with no steps/zero-step, or ramps needed to enter At least one entrance at ground level Door width min. 36 inches wide Avoid split-level entry Minimum entry clearance of 5 x 5 feet inside and outside the door Door locks that are easy to operate, such as keyless locks with a remote control or keypad. Lever-style door handles (not round doorknobs). Peepholes at heights for adults, children, and people using a wheelchair; or sidelights (tall, narrow window along one or both sides of the door). Built-in shelf/table with knee space below (beside the exterior front door) Lighting both inside and outside the entrance; motion-sensor lighting Roof, canopy, or awning to protect the entrance from rain and snow Install door alarms; install double key locks Install an intercom system		✓		✓	SAIL, 2002, p. 4-17 Pynoos, Caraviello, & Cicero, 2009, p. 27-28 Maisel, Smith, & Steinfeld, 2008, p. 9 Hartje, Tremblay, & Birdsong, 2006, p. 195-196, 204-205, 208-210. Sanford, 2012, p. 71, 73-78

Area in the Home	Modifications/Design Features	Promoting: AIP – Aging in place V – Visitability SF – Safety/falls prevention UD – Universal design				Sources
		AIP	V	SF	UD	
	Install an identifiable feature such as a bright coloured mailbox or front door; large, high-contrast house numbers					
Kitchen	Install stove/oven and appliance fail-safe features, shut-off valves, auto-pilots, etc. Cover stove burners Disable garbage disposal Remove stove knobs Install scald-proof faucets or reduce water temperature (max. 120º F) Provide sufficient clear counter space Provide sufficient open floor space to maneuver around kitchen. Counters at varying heights (28-42 inches); rounded corners, not sharp edges, on counters. Open space under the sink to allow for a seated user (ensure insulated pipes to avoid burns) Raised platform under dishwasher to reduce bending and kneeling. Appliance controls that are easy to read, easy to reach, and can be operated by touch as well as sight; raised markings for touch discrimination of temperature settings Easy access to kitchen storage (pull-out shelves, lazy susans in corner cupboards, adjustable-height cupboards); easy-access to storage is located between a person's hip and eye level Task lighting over sink, stove, and other work areas.	✓		✓	✓	Unwin et al., 2009, p. 966-967 SAIL, 2002, p. 4-17 Pynoos, Caraviello, & Cicero, 2009, p. 27-28 Hazen & McCree, 2001, p. 29-43 Hartje, Tremblay, & Birdsong, 2006, p. 195-196, 204-205, 208-210.
Living/Dining rooms	Provide sufficient space to allow easy maneuvering around furniture Ease of passage from kitchen to dining area. Avoid changes in floor levels or floor material (such as vinyl to carpet)	✓		✓	✓	SAIL, 2002, p. 4-17 Brawley, 2001, p. S79-S82 Hazen & McCree, 2001, p. 29-43

Area in the Home	Modifications/Design Features	Promoting: AIP – Aging in place V – Visitability SF – Safety/falls prevention UD – Universal design				Sources
		AIP	V	SF	UD	
	Avoid furniture that is hazardous (poor quality or unsafe construction, too low, too soft, too deep to exit easily, unstable—tips easily, casters or wheels) Remove unnecessary furniture					Hartje, Tremblay, & Birdsong, 2006, p. 195-196, 204-205, 208-210.
Bedroom	Night-lights Room-darkening shades or curtains Consider removing carpeting if older adult experiences incontinence Flame-retardant bedding materials Door width min. 36 inches wide, to allow for a 34-inch clear opening. Provide sufficient maneuvering space after all furniture is in the room (min. 36 inches on both sides of the bed, and ideally 60 inches on one side of the bed) Light switches reachable from the bedside and the door; located 36-40 inches above the floor. Extra electrical outlets near the bed (for medical equipment or rechargeable items); 18-24 inches above the floor. Closet rods reachable from a seated or standing position, or adjustable height rods. Bedroom located on main floor.			✓	✓	Unwin et al., 2009, p. 966-967 SAIL, 2002, p. 4-17 Pynoos, Caraviello, & Cicero, 2009, p. 27-28
Bathroom	Grab rails in tub, shower, and near toilet; properly reinforced Handheld shower head; adjustable height Non-skid surfaces on tub/shower Tub chair or bench Raised toilet seat (17 to 19 inches high for middle-age and older people)	✓	✓	✓	✓	Unwin et al., 2009, p. 966-967 SAIL, 2002, p. 4-17 Pynoos, Caraviello, & Cicero, 2009, p. 27-28 Maisel, Smith, & Steinfeld, 2008, p. 9

Area in the Home	Modifications/Design Features	Promoting: AIP – Aging in place V – Visitability SF – Safety/falls prevention UD – Universal design				Sources
		AIP	V	SF	UD	
	Remove inner door locks Replace glass shower doors with plastic doors or curtains Door width min. 36 inches Provide sufficient floor space for maneuvering Walk-in shower with little or no threshold or lip to step over (max. 1/2 inch, and beveled to provide a tiny "ramp") Shower size min. 36 by 36 inches; for a roll-in shower, allow 36 inches by 60 inches. Anti-scald faucets with a single-lever handle Clearance under the sink to allow for a seated user (ensure insulated pipes to prevent burns) Rounded corners, not sharp edges, on bathroom counters. Mirror(s) placed for both standing and sitting Good-quality, non-glare lighting; night-lights; motion-sensor lights Accessible first floor bathroom; or half-bathroom					Brawley, 2001, p. S79-S82 Hazen & McCree, 2001, p. 29-43 Hartje, Tremblay, & Birdsong, 2006, p. 195-196, 204-205, 208-210. Sanford, 2012, p. 71, 73-78
Stairs	Add contrasting color on edge of treads Consider barriers or gates at top and bottom Handrails on both sides of stairways (indoor and outdoor); round rails usual size is 11/4 - 11/2 inches in diameter. Consider replacing stairs with ramp; stairway at least 4 feet wide to allow for a future chairlift. Stair treads deep enough for the entire foot – min. 8 inches, but 10 to 11 inches is better. Stair rise no higher than 7 inches from one step to the next; a smaller rise is better; no open risers (open spaces between each step)	✓		✓	✓	Unwin et al., 2009, p. 966-967 SAIL, 2002, p. 4-17 Pynoos, Caraviello, & Cicero, 2009, p. 27-28 Hazen & McCree, 2001, p. 29-43

| Area in the Home | Modifications/Design Features | Promoting:
AIP – Aging in place
V – Visitability
SF – Safety/falls prevention
UD – Universal design | | | | Sources |
		AIP	V	SF	UD	
	No carpeting on stairs Steps with no "nosing" (tread should not extend out beyond the riser) Stairways well lit, with a light switch at the top and bottom; 36 - 40 inches above the floor					
Windows and Doors	Energy-efficient windows that are easy to open, close, and lock, and require little strength to use. (Crank handles are a good choice.) Placement at a height that allows people to see outdoors while seated or standing – with the windowsills 24-30 inches above the floor. Pocket (sliding) doors instead of swing doors, wherever possible. "Swing-clear" hinges that add a little more maneuvering room by moving the door completely out of the doorway. Install spring-loaded door closers Door widths min. 32-36 inches wide				✓	Unwin et al., 2009, p. 966-967 SAIL, 2002, p. 4-17 Hartje, Tremblay, & Birdsong, 2006, p. 195-196, 204-205, 208-210.
Floors	Single level – no sunken floors or split levels; no change of levels between rooms; if there must be a threshold between two different flooring surfaces, make it very low and beveled; if there must be a step up or down, mark it well with a highly visible, color-contrast material at the edge. Nonslip flooring throughout the house, especially in the bathroom, kitchen, and laundry. Carpeting that is sturdy, low-pile, and tightly woven (such as berber style). Eliminate throw rugs to minimize the risk of tripping. Install flush door thresholds to reduce tripping hazards			✓	✓	Unwin et al., 2009, p. 966-967 SAIL, 2002, p. 4-17 Pynoos, Caraviello, & Cicero, 2009, p. 27-28 Hartje, Tremblay, & Birdsong, 2006, p. 195-196, 204-205, 208-210.

Area in the Home	Modifications/Design Features	Promoting: AIP – Aging in place V – Visitability SF – Safety/falls prevention UD – Universal design				Sources
		AIP	V	SF	UD	
Outdoors	Access to safe outdoor area; awareness of danger areas (e.g. embankments, streams, lakes, busy streets) Variety of outdoor spaces (if possible) Consider fences or hedges around yard Remove poisonous plants Secure outdoor equipment Install bright lights at exterior doors with motion or sound activation Transition area for adjusting to/from bright daylight to/from indoor lighting; provide seating to accommodate potential need to sit to adjust to lighting Trees, shrubs, and plants that require little maintenance All walkways at least 36 inches wide. Maintenance-free exterior and trim. Level walkways with little or no slope. Any slope should be very gradual – max. 1 inch of rise per 20 inches of walkway. Paved driveway	✓		✓	✓	Unwin et al., 2009, p. 966-967 SAIL, 2002, p. 4-17 Brawley, 2001, p. S79-S82 Hazen & McCree, 2001, p. 29-43
Lighting	Maintaining adequate lighting throughout the home Light switches placed 36-48 inches above the floor. Large rocker-style switches that are easy to turn on and off.				✓	SAIL, 2002, p. 4-17 Hartje, Tremblay, & Birdsong, 2006, p. 195-196, 204-205, 208-210.
General/Misc.	Laundry area on main floor, near the bathroom and bedrooms Front loading washer and dryer with switches on the front Hallways min. 36-42 inches wide; 42 inches recommended. Turning space in all rooms 5 feet in diameter	✓		✓	✓	Unwin et al., 2009, p. 966-967 SAIL, 2002, p. 4-17 Pynoos, Caraviello, & Cicero, 2009, p. 27-28 Brawley, 2001, p. S79-S82

Area in the Home	Modifications/Design Features	Promoting: AIP – Aging in place V – Visitability SF – Safety/falls prevention UD – Universal design				Sources
		AIP	V	SF	UD	
	Reduce glare; cover shiny or reflective surfaces; utilize window treatments; tinted mylar shades, mini-blinds, shade trees Childproof electrical outlets Electrical outlets placed at 18 inches above the floor. Thermostat and other controls placed about 48 inches above the floor. Safe storage of cleaning supplies, chemicals, poisons, and medications Program emergency phone numbers on speed dial Consider providing neighbours with set of house keys Reduce clutter; keep min. 3-4 ft. clear passage Remove extension cords Remove free-standing floor and table fans Remove mirrors if they cause delusions or hallucinations Use contrasting colours to aid distinction of items; red/dark neutrals against white/yellow background; avoid pastel shades Reduce echoes and unnecessary acoustics; careful selection of furniture Ease of access to a telephone Self-managed reminders to assist with medication management, appointments, etc. Lever-style door handles (not round doorknobs). Large buttons on controls					Hazen & McCree, 2001, p. 29-43 Hartje, Tremblay, & Birdsong, 2006, p. 195-196, 204-205, 208-210. Sanford, 2012, p. 71, 73-78