

**The Silver Lining:
Policies to Support British Columbia's Seniors to
Delay Frailty and Age Well**

**by
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Abstract

Canada has a rapidly aging population. While life expectancy is high, *healthy* life expectancy is significantly lower, with 10 years of life generally spent in poor health before death. Living in poor health is generally defined as living with several co-morbidities and becoming frail. While frailty is a natural consequence of aging, research reveals that it can be delayed and even reversed. This study explores physical activity interventions that have a positive impact on delaying, minimizing, and/or reversing frailty among seniors. A critical analysis of research case studies is used to identify successful interventions and how applicable these interventions will be in the BC context. Ultimately, expansion of the existing Community Actions and Resources Empowering Seniors program in BC, along with development of holistic frailty prevention programs, are recommended.

Keywords: Delaying frailty; Seniors; Healthcare; Physical activity; Policy analysis; British Columbia

Dedication

For my grandparents:

公公, 婆婆

爺爺, 阿嫲

Grandpa Vince

Grandma Gorman

Acknowledgements

I never thought I'd be here. But here I am and I have many people to thank, for without them, this capstone and completing this chapter in my life would not have been possible. Thank you, Doug McArthur, for giving me the chance to be part of this program.

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List of Acronyms

CARES	Community Actions and Resources Empowering Seniors
CFS	Clinical Frailty Scale
CGA	Comprehensive Geriatric Assessment
eFI-CGA	Electronic Frailty Index Comprehensive Geriatric Assessment
EMR	Electronic Medical Record
FI	Frailty Index
PHV	Preventive Home Visits
RCT	Randomized Controlled Trial

Executive Summary

Policy Problem

The World Health Organization calls population aging “one of humanity’s greatest triumphs”; yet, it is also “one of our greatest challenges” (World Health Organization, 2002). As in other countries, per capita health care expenditures in Canada rise rapidly with age among cohorts over age 60, with the average annual spending on health being over \$11,000 for those aged 65 years and older (Canadian Institute for Health Information, 2019). Moreover, quality of life for seniors appears to diminish with age, with the presence of chronic comorbidities and increased frailty.

It is estimated that roughly half of Canadians over the age of 85 are living with frailty, “a state of health where one’s overall well-being and functional ability are reduced and vulnerability to deterioration are increased” (Canada Frailty Network, 2019). While frailty is common with increasing age, it is not an inevitable part of aging. Evidence reveals that physical activity can help delay and even reverse an individual’s frailty status; yet, many seniors are remaining sedentary as they age and becoming prematurely frail. This Capstone provides an overview of the impact of frailty on healthy aging and a policy analysis of interventions that contribute to delaying frailty among seniors. By delaying frailty, seniors are able to improve their quality of life while aging by “adding life to years”.

Methodology

My research was motivated by several questions: 1) What research currently exists related to interventions that seek to delay or reverse frailty; 2) how successful have these interventions been at changing frailty outcomes; and 3) How applicable are these interventions in the BC health system context. An examination of the literature related to physical activity interventions that delay frailty was undertaken, followed by a critical appraisal of five recent randomized controlled trials and cohort studies. Additionally, an examination of grey literature was undertaken to better understand provincial and local priorities related to healthy aging and frailty prevention.

Results

There are various approaches to designing interventions that seek to delay frailty. Some interventions primarily focus on the physical aspect of frailty by designing exercise programs to improve seniors' functional ability. Other interventions explore empowering seniors to make healthy life choices, including increasing physical activity and social integration. Assessment of various frailty interventions reveals that some approaches are better than others at delaying and/or reversing frailty in seniors. As such, understanding which frailty prevention interventions lead to the best outcomes requires consideration of several key themes including intervention design and implementation; and adherence to the physical activity programming.

The use of multidisciplinary care teams to carry out frailty prevention programs can improve frailty outcomes among seniors. Moreover, empowering seniors by supporting them to make healthy life choices, including proper nutrition, sustained participation in physical activity programs, and remaining socially integrated in their communities can reduce both functional and cognitive decline in seniors.

Policy Options and Recommendation

Based on case study research, four policy options were compared: 1) a seniors prescription for health program; 2) expansion of the existing Community Actions and Resources Empowering Seniors (CARES) program; 3) preventive home visits; and 4) referrals to holistic frailty prevention programs. Analysis of the research reveals that delaying frailty involves supporting seniors to remain independent, physically active, and socially integrated. The CARES program helps empower seniors to make healthy choices. Additionally, the telephone health coaching component of the CARES program helps seniors sustain these healthy choices over time, resulting in overall improvements in frailty status. Based on criteria including delaying frailty, implementation costs, and stakeholder acceptance, this Capstone supports the expansion of the existing CARES program in BC to help delay frailty among seniors.

In addition to expanding the CARES program, seniors in BC would benefit from holistic frailty prevention programs that help them age well. These programs will not only help delay and/or reverse frailty, but also contribute to helping seniors integrate in their

communities. Thus, this Capstone supports dedicated resources to developing holistic frailty prevention programs in BC as a secondary recommendation.

Chapter 1.

Introduction

1.1. Policy problem

Currently in Canada, seniors (those aged 65 years and older) represent a rapidly growing segment of our population. The population of seniors (17.5%) is now higher than that of children aged 0 to 14 (16%) (Statistics Canada, 2019). While Canadians are living longer, the question of whether we are living healthier lives as we age remains. Findings from the 2017 Global Burden of Disease Study reveal that while life expectancy in developed countries is high, *healthy* life expectancy is significantly lower (Institute for Health Metrics and Evaluation, 2018). In fact, on average, 10 years of life are spent in poor health (Institute for Health Metrics and Evaluation, 2018).

Living in poor health can largely be defined as living with several chronic comorbidities, such as high blood pressure, arthritis, and heart disease, and becoming more frail. In Canada, the proportion of adults between the ages of 61 and 70 living with one chronic condition is over 30% (Statistics Canada, 2015). Unhealthy aging creates unnecessary distress for seniors and their families. Additionally, it leads to excessive health care expenditures for governments. As the population continues to age, concerns emerge related to whether our health and social care systems are sufficiently prepared to manage the challenges that come with aging populations.

While frailty is a natural consequence of aging, particularly with the presence of chronic conditions, research reveals that it can be delayed and even reversed. The evidence is clear that remaining physically active helps delay frailty among seniors; yet, too many seniors are remaining sedentary as they age and hence, becoming prematurely frail. This capstone seeks to address how to help seniors age well by prioritizing the prevention of frailty.

1.2. Motivation

A growing body of research has examined the impact of physical activity interventions on frailty outcomes among seniors. The goal of this capstone is to help determine what investments the provincial government should make that will have the most impact on delaying and/or reversing frailty, by looking at the evidence to help inform policy.

Aging is inevitable; however, there is an opportunity to support and empower BC seniors to age well and live a better quality of life. This includes prioritizing efforts, such as physical activity, targeted at seniors, which help prevent premature frailty and poor health as they age. Not prioritizing these efforts will lead to more seniors being exposed to “unrecognized frailty and unintended harms” related to inappropriate medical interventions (Young, 2018).

Chapter 2.

Background: Understanding Frailty

In this chapter I define the concept of frailty, explain what it looks like, and discuss why stakeholders, including governments, should care about this issue. I discuss attitudes and popular misconceptions about frailty and aging, as this helps better understand how the public perceives frailty. I also outline the prevalence of frailty in Canada and BC to show how many people currently live with frailty. Finally, I discuss the impacts of frailty on older adults, family caregivers, and the health system to highlight the importance of addressing this issue.

2.1. Defining terms

2.1.1. What is frailty?

There are many definitions and measures of frailty in the literature. Some researchers define frailty as a “clinical *state* of increased vulnerability and functional impairment as a result of cumulative declines across multiple systems” (BC Guidelines, 2017), while others describe frailty as a “clinical *syndrome* that is distinct but related to aging, disability, and the presence of comorbidities” (National Institute on Ageing, 2018). For ease of understanding, this capstone uses the Canadian Frailty Network’s definition of frailty as “a state of health where an individual’s overall well-being and ability to function are reduced and vulnerability to deterioration are increased” (Canada Frailty Network, 2019).

It is clear in the literature that frailty has multiple causes. It is multidimensional, consisting of physical, psychological, and social elements, and characterized by declining reserve that impact an individual’s ability to withstand and recover from internal and external stressors (Morley, et al., 2013; Rockwood, et al., 2005).

People who are frail may have “loss of muscle mass and strength, reduced energy and exercise tolerance, cognitive impairment, and decreased physiological reserve” (BC Guidelines, 2017). This increased vulnerability puts people at risk for adverse health outcomes, functional impairment, falls and injuries, progressive disability,

and hospitalization (Espinoza & Fried, 2007). Additionally, frailty can lead to an increased susceptibility to disease, acute illness, and even death (Espinoza, & Walston, 2005).

2.1.2. What does frailty look like?

Frailty is a dynamic state that exists on a spectrum (British Geriatrics Society, 2014). As Trevisan et al. (2017) explain, while frailty is often chronic and progressive, some individuals are able to improve their frail status. The Clinical Frailty Scale, a validated tool for assessing frailty, provides a useful visual categorization of frailty, based on the needs of the individual (see Figure 1). There are nine points on the Clinical Frailty Scale ranging from very fit to terminally ill (Rockwood et al. 2005).

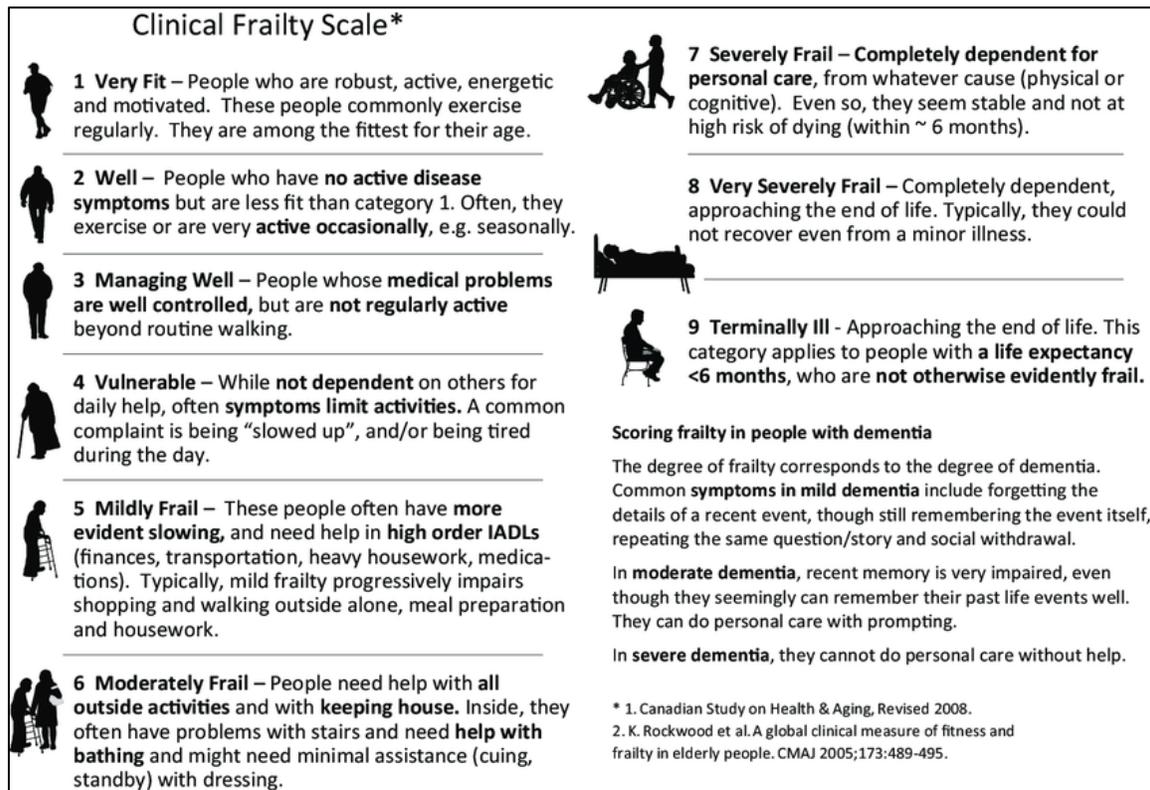


Figure 1 Clinical Frailty Scale

Source: Rockwood K, et al. (2005). A Global Clinical Measure of Fitness and Frailty in Elderly People. *CMAJ*, 173:489-295.

Other models that measure frailty include the Phenotype Model and the Frailty Index. The Phenotype Model predicts frailty based on examining an individual’s observable traits using a set of five criteria that are pre-defined: slow walking speed,

unintentional weight loss, exhaustion/poor endurance, poor grip strength, and low levels of physical activity (Fried et al., 2001). Using the pre-defined criteria, clinicians can then define an individual as robust, pre-frail, or frail.

Table 1 Phenotype Model

Robust	None of the criteria
Pre-frail	One or two criteria
Frail	Three or more criteria

Adapted from Fried et al. (2001) Frailty in Older Adults: Evidence for a Phenotype. *Journal of Gerontology: Medical Sciences*, 51A:M146-M156.

The Frailty Index, developed by Dr. Kenneth Rockwood and Dr. Arnold Mitnitski, is often referred to as the Accumulation of Deficits Model. This model looks at over 70 physical, cognitive, and clinical conditions, including depression, memory loss, chronic illnesses, falls, and the ability to carry out simple tasks, or activities of daily living to determine the risk and level of frailty in individuals (Rockwood et al., 2005). The more conditions or “deficits” an individual has, the greater the level of frailty. Those with more than 40-50 conditions or deficits have an increased risk of developing frailty.

2.1.3. Attitudes and misconceptions about frailty and aging

A review published by Parish et al. (2018) reveals that the public does not understand frailty well, which leads to frailty being under-recognized. People’s pre-existing knowledge about aging, in addition to stereotypes and culture related to aging play a factor in people’s general beliefs and perceptions about aging and frailty. There is a tendency for people to believe that frailty is inevitable and unavoidable, and that it is simply a part of growing old. People’s level of awareness of the main risks associated with frailty and what preventative strategies are available in their communities are also often mixed. People tend to think that frailty is linked to chronological age; yet, frailty is “different and distinguishable from advanced age, disability, and comorbidity” (Kojima, Liljas, & Iliffe, 2019).

In 2015, a report was published in the United Kingdom looking into attitudes and perceptions that the public and health care providers held about frailty (Britain Thinks, 2015). The report highlights that seniors generally do not identify with the label ‘frail’. The

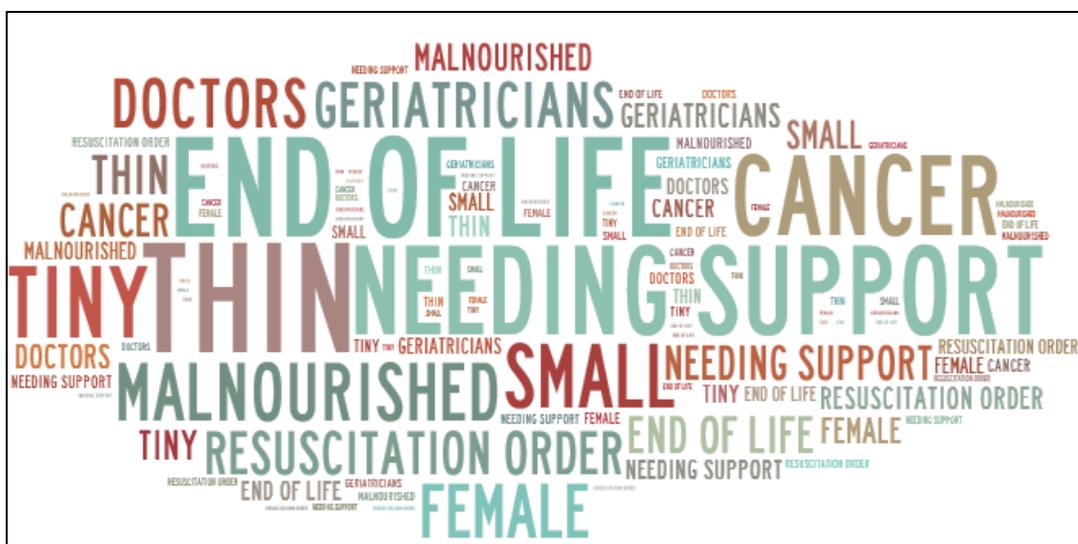


Figure 3 Synonyms Associated with Frailty by Health Care Providers
 Source: Britain Thinks. (2015). Frailty: Language and Perceptions, A Report Prepared by Britain Thinks on Behalf of Age UK and the British Geriatrics Society.

Despite growing evidence around using a Comprehensive Geriatric Assessment (CGA) to determine frailty, there remains a lack of clarity around which seniors are most likely to benefit from a CGA (Nicholson, Gordon, & Tinker, 2017). Many non-specialist health care providers continue to see frailty as something they can identify visibly or 'know when they see it'.

While the literature clearly demonstrates that there is heterogeneity in aging, in general, the public and even many health care providers continue to see frailty as simply a natural part of aging. Nicholson, Gordon, & Tinker (2017) write that we need to change the conversation in order to support seniors to age well and delay and even prevent frailty. In order to help seniors age well, there is a need to look at frailty using a holistic approach, as opposed to a medicalized approach that primarily considers people's deficits.

2.2. Prevalence of frailty

Currently in Canada, roughly 50% of people over the age of 85 are living with frailty (National Institute on Ageing, 2018). The prevalence of frailty increases with age, though it is not synonymous with chronological age. A study conducted in 2017 on Canadians aged 18-79 found that between 6.6% and 7.6% of participants were believed to be frail (Kehler et al., 2017). Based on the changing demographic, over two million

Canadians may be living with frailty within the next ten years (Canadian Frailty Network, 2019).

While there is no consensus as to how frailty is being measured in Canada, various studies show the following statistics:

- According to the definition of Kehler et al. (2017), 7% of Canadians aged 18-79 are frail.
- According to the definition of Hoover, et al. (2013), 16% of Canadians aged 65-74 are frail.
- According to the definition of Hoover, et al. (2013), 28.6% of Canadians aged 75-84 are frail.
- According to the definition of Hoover, et al. (2013), 52.1% of Canadians aged 85 and over are frail.
- According to the definition of Kojima (2015), up to 50% of nursing home residents are frail.
- According to the definition of Handforth, et al. (2015), 42% of older cancer patients are frail.
- According to the definition of Bibas et al. (2014), 60% of cardiovascular disease patients are frail.

In BC, while some adults remain physically active as they age, many will progress into frailty. In 2009/10, an estimated 20.4% of British Columbians aged 65 years and older living in the community were frail (Hoover et al., 2013). The prevalence of frailty increases with advanced age, and often affects women more than men (Hoover et al. 2013). Many seniors with co-morbidities will also have frailty that may be overlooked when the focus becomes on treating their chronic diseases (British Geriatrics Society, 2014).

According to the BC Seniors Advocate, seniors receiving home care in BC are more frail compared to those in other provinces. In BC, 57% of seniors who receive home care have been assessed as having high or very high needs, which is 8.2% higher than the Canadian average (Office of the Seniors Advocate British Columbia, 2018). As the population in BC ages, the number of frail older adults will continue to increase.

2.3. Why should we care about frailty?

2.3.1. Impacts on seniors

By not addressing frailty and the ability for people to prevent or delay it, we are continuing to expose seniors who may not realize they have frailty to unintended harms. Despite frailty being a predictor for higher rates of surgical complications, longer hospital stays, and greater risk of delirium and institutionalization, existing health care for frail seniors often involves inappropriate and aggressive medical interventions (Bickel et al. 2008; Keller et al. 2014). This often leads to seniors experiencing poor health outcomes, which contribute to a diminished quality of life.

While aging naturally results in a gradual decline in physiological reserve, the aging process is complex. Physiological reserve may be further decreased by factors including chronic co-morbidities, an acute illness, some form of injury, or even a change in environment and social supports. When seniors who are more fit experience a minor stressor or disruption, they may experience a minor deterioration in function before returning to their previous healthy state. As outlined in Figure 4 below, frail seniors, particularly those with severe frailty, may experience more significant deterioration following a similar stressor, which may lead to increased functional dependency or even death.

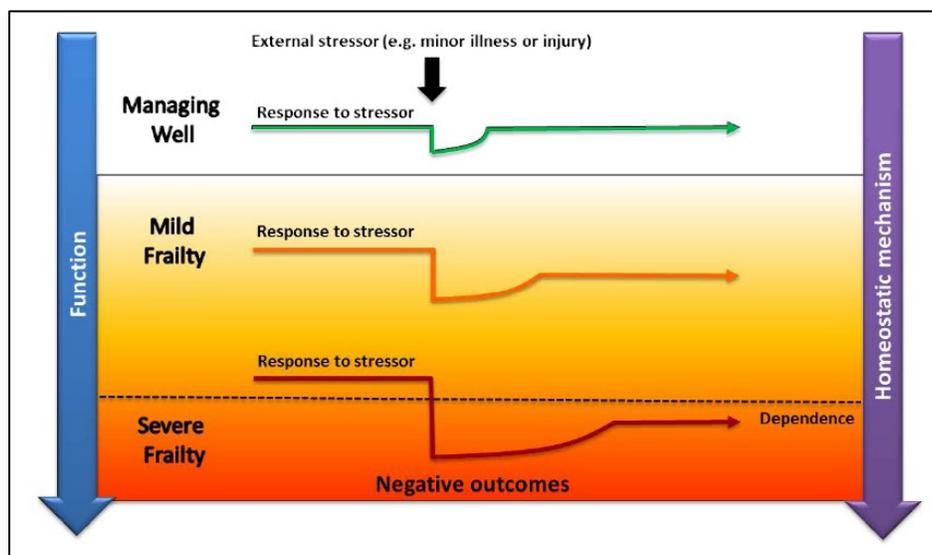


Figure 4 Vulnerability of Frail Seniors to External Stressors

Source: BC Guidelines. (2017). Frailty in Older Adults – Early Identification and Management.

As Mallery and Moorhouse (2010) explain, seniors and their families want and deserve accurate information about frailty, including their prognosis. Additionally, seniors should be provided with information related to the ability to delay and potentially reverse aspects of frailty.

2.3.2. Impacts on families

The presence of frailty has a significant impact on the experiences of family caregivers (informal or unpaid caregivers). As more frail seniors want to age in place, there will be an increased reliance and dependency on the support of family caregivers, not just by the frail seniors themselves, but also from the health care system. As family caregivers provide care and assistance to family or friends without pay, they provide considerable social and economic value, as they assist in offsetting costs and capacity in Canada's health care system (Doctors of BC, 2016).

The literature clearly illustrates that family caregivers who support or provide care to seniors living with frailty are also at risk for adverse health outcomes due to the financial, physical, and emotional strain associated with caregiving. Moreover, the associated burdens related to being a family caregiver to someone with frailty can be difficult to deal with and can elicit negative reactions to the role, including anxiety and depression (Aggar, Ronaldson, and Cameron, 2010).

2.3.3. Impacts on the health system

Similar to most developed countries, Canada's per capita health care expenditures rise disproportionality with age. Statistics from the Canadian Institute for Health Information reveal that average health care costs are relatively low and stable until the age of 60 (see Figure 5). Additionally, data on health expenditures reveal that one percentage point of annual growth in public sector health care spending is due to aging (see Figure 6).

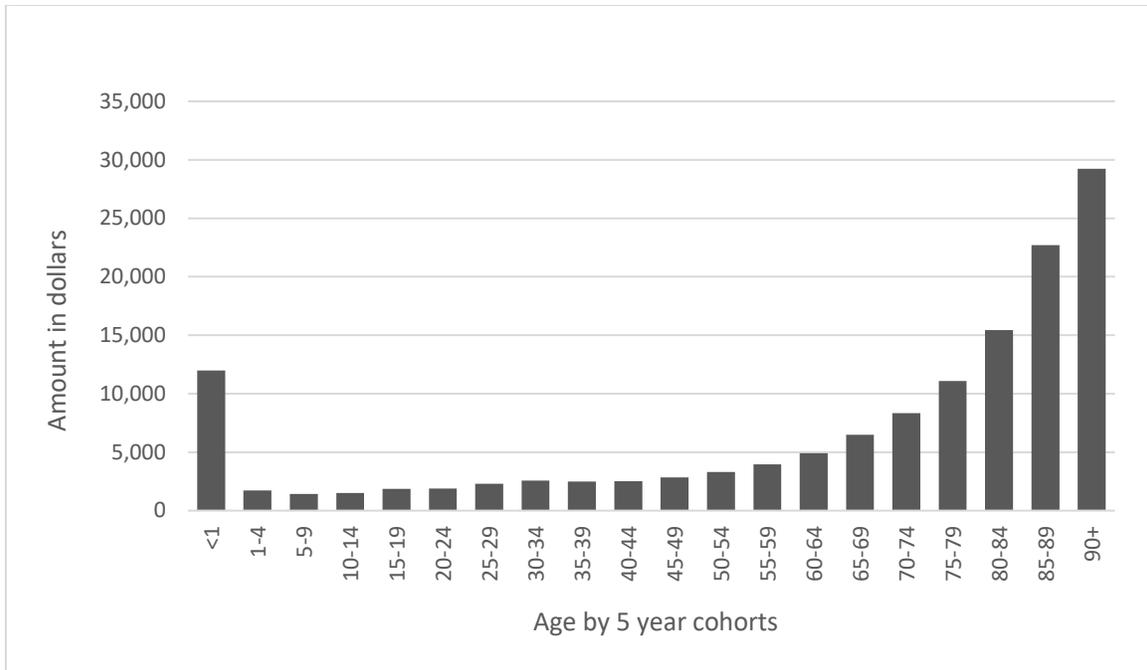


Figure 5 Estimate of total per capita provincial/territorial government health expenditures by age and sex in current dollars, by province/territory and Canada, 2016

Source: National Health Expenditure Database, 1975 to 2018, Canadian Institute for Health Information.

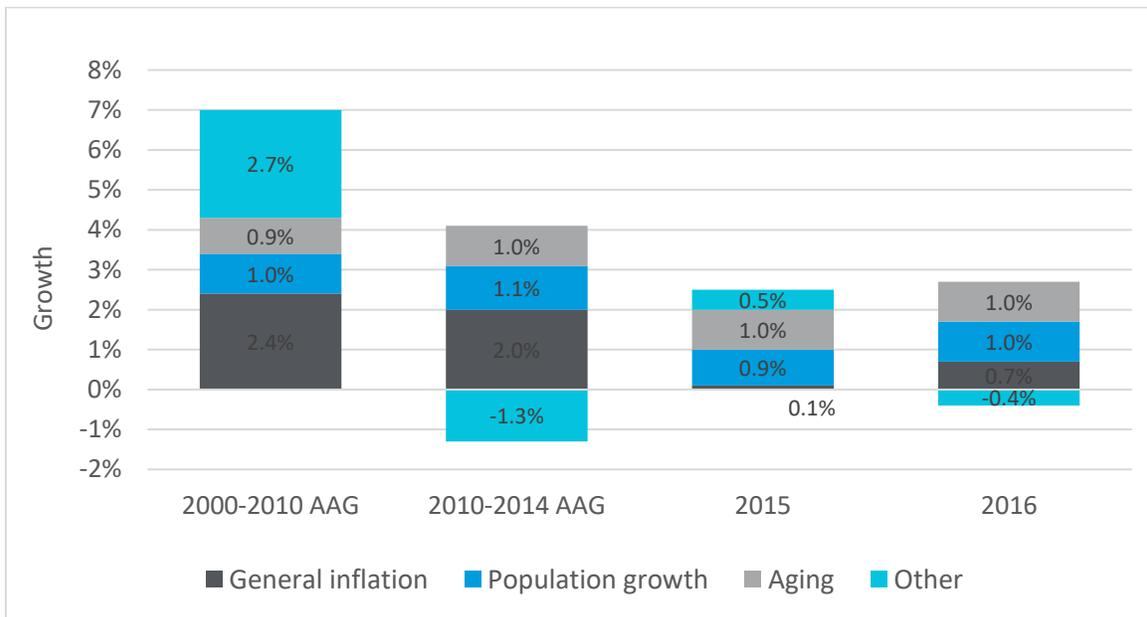


Figure 6 Cost driver shares of average annual growth in public-sector health spending, 2000 to 2010 and 2010 to 2014, compared with annual growth in 2015 and 2016

Source: National Health Expenditure Database, 1975 to 2018, Canadian Institute for Health Information.

The Canadian Frailty Network estimates that of the \$220 billion spent on health care annually in Canada (11% of GDP), 46% is spent on people over 65 years old, although they are only 16% of the population. Canadian seniors account for 40% of acute care services and occupy 85% of acute care beds (Canadian Frailty Network, 2019). The forecast spending on caring for seniors in Canada is projected to increase to \$177.3 billion by 2046 (Hermus, Stonebridge, and Edenhoffer, 2015).

As frail seniors are at increased risk of premature death and adverse health outcomes (Kojima, Liljas, & Iliffe, 2019), it is unsurprising that frailty is linked to greater health care consumption and higher health care costs. Many studies of community-dwelling adults reveal that the health care costs for frail seniors are “several-fold higher than those who are non-frail” (Kojima, Liljas, & Iliffe, 2019). In addition to increased health care services, frail seniors rely on social care services for assistance with daily living and maintaining their autonomy.

As Canadians continue to live longer and live with chronic comorbidities, the number of those living with frailty will increase, having a major impact on the health system. However, the Canadian health system as it currently stands is designed to provide disease-specific care, as opposed to addressing the complex multidimensional needs of patients, including frail seniors. Without recognizing that frailty is a predictor for adverse health outcomes, health care providers may continue to put frail seniors at risk by providing inappropriate and aggressive treatments in an already fragmented and uncoordinated health system, contributing to increased health care costs.

Chapter 3.

Literature Review

In this chapter, I provide an overview of existing research related to the risk factors associated with frailty, many of which are modifiable at either the individual or health system level. Despite the ability to mitigate some of the risk factors linked to frailty and thus delay or prevent it, many seniors will continue to develop elements of frailty as they age. Therefore, the second part of this chapter examines why that is, by exploring the key barriers and challenges to delaying and preventing frailty.

3.1. Risk factors associated with frailty

There are a number of risk factors associated with frailty. The BC Guidelines on Frailty in Older Adults (2017) outlines a number of these risk factors, including “advanced age, polypharmacy, functional decline, poor nutrition and/or weight loss, poverty and/or isolation, and medical and/or psychiatric comorbidity”. A recent longitudinal quantitative study conducted with 262 older adults aged 65 years and over, living at home, confirms that frailty is associated with “increased age, not having a partner, and decreased functional capacity over time” (Fhon et al., 2018).

Feng et al., (2017) conducted a systematic review of longitudinal studies that grouped risk factors associated with frailty into key themes: biological, physical, lifestyle, sociodemographic, and psychological factors. Grouping risk factors by themes is a useful way of exploring these factors in further detail. In the sub-sections below, I explore several key risk factors, particularly those that can be mitigated at an individual or health system level, including lifestyle, socioeconomic, and psychosocial factors.

3.1.1. Lifestyle factors

Lifestyle factors, including physical inactivity, sedentary behaviour, and poor diet contribute to increased risk for frailty (Kehler, 2018). The association between regular physical activity and improved health has been studied for decades. The literature is clear that physical activity helps improve both physical and psychological health, and can help reverse the effects of chronic diseases (da Silva et al., 2019). Despite these

benefits, physical activity levels in Canada have been decreasing over time, as a result of the increased use of technology and sedentary behaviour. As seniors typically have lower levels of physical activity and increased sedentary behaviour compared to those younger, this is a major concern (da Silva et al., 2019).

Research shows that interventions with a focus on physical activity can help pre-frail and frail seniors maintain their independence (Kidd et al., 2019). In particular, targeted interventions that focus on increasing mobility, strength, and balance can not only delay or prevent frailty, but also reverse existing frailty in seniors (Anton et al., 2015).

In addition, nutritional status is a key factor in the development of frailty in seniors. Many studies indicate various associations between nutritional status, nutrient intake, particularly low protein intake, and frailty (Morante, Martinez, and Morillas-Ruiz, 2019). Beasley et al. (2010) conducted a large study involving over 24,000 seniors that revealed those who had the highest protein intake appeared to have the lowest risk of becoming frail.

3.1.2. Socioeconomic factors

Cross-sectional and prospective studies reveal that social position contributes to the risk of older adults becoming frail (Andrew et al., 2018). Social determinants of frailty are increasingly being recognized and discussed in the literature as key risk factors for frailty. These social determinants include variables such as education and income. Research shows that there is an inverse association between education level and prevalence of frailty in older adults (Woo, Goggins, Sham, and Ho, 2005; Hoogendijk et al., 2014). A 13-year longitudinal study in the Netherlands revealed that older adults with lower education levels, such as less than a high school education, have increased chances of being frail compared to those with higher education levels (Hoogendijk et al., 2014). Additionally, lower education levels not only impact being frail, but also contribute to the increased severity of frailty (Chamberlain et al., 2016).

In addition to education, literature related to social determinants of health also indicate a clear association between poverty and poor health (Quesnel-Vallee, Willson, and Reiter-Campeau, 2016). Thus, it is not surprising that research related to income

and frailty shows that having a lower income is a risk factor for becoming frail, regardless of ethnicity (Lang et. al, 2009; Szanton et al., 2010). As the population of older adults with lower levels of education and income is increasing, these are important findings to consider in the development of policy related to delaying and even preventing frailty.

3.1.3. Psychosocial factors

Depression, anxiety, and social isolation are key psychosocial factors that have been studied intensely, as they relate to frailty. As Vaughan, Corbin, and Goveas (2015) outline in their systematic review on depression and frailty in later life, there is a strong relationship between depression and increased risk of frailty. Additionally, having comorbidities that interact with an individual's depression increases the risk for developing frailty.

Another psychosocial factor that influences frailty and its associated outcomes is an individual's living situation, including whether an individual lives alone or with a partner, and the type of community that an individual is living in. Fhon et al. (2018) explain that frailty is associated disproportionately with seniors who do not live with a partner, as having a partner acts as a "protective effect" to an individual developing frailty. Studies have also shown that the more socially isolated an individual is, the more likely he or she will have negative physical and mental health outcomes (Coelho, Paúl, Gobbens, and Fernandes, 2015).

Supportive social networks can play a large role in the prevention of frailty in seniors, as this often means they have more social connections and can remain independent and more resilient for longer. Increased social connections can also help seniors age in place in their communities, as they can turn to the support of neighbours to prevent premature institutionalization, and live longer, healthier lives (Cramm and Nieboer, 2012).

3.2. Barriers to delaying frailty

Despite the fact that many of the risk factors discussed above are areas in which we can make a difference, we are still not doing a good job in delaying frailty among

seniors. The following sections further investigate why this is so, by looking into the barriers and challenges related to delaying frailty.

3.2.1. Culture of aging and ageism

As previously discussed, the public's understanding of frailty is low. Parish et al. (2018) explain that, in addition to knowledge of aging, existing ageist stereotypes, and the culture around aging all contribute to people's beliefs and perceptions about aging and frailty. These negative stereotypes and attitudes, along with misconceptions and assumptions about seniors are significant barriers to the development of good health policy related to aging well (Officer et al. 2016).

Gwwyther et al. (2018) suggest that, to raise awareness of the "malleability and preventability of frailty", it is necessary to increase knowledge about frailty. The hope is that raising awareness of what frailty truly is will help overcome some of the cultural challenges and ageism that currently exist. Parish et al. (2018) call for a "global paradigm shift on aging" that starts with stakeholders paying attention to key areas, such as the heterogeneity of aging, social inequities and the harms associated with ageist stereotypes.

3.2.2. Screening for frailty in primary care

Screening for frailty may help identify those who are pre-frail and allow health care providers to have discussions with seniors to help change their frailty trajectory. Much has been said in the literature regarding the risks and benefits of screening for frailty in the primary care setting. One particular risk of screening is the stigmatization that may occur as a result. A diagnosis or label of 'frailty', especially if not properly explained, may have unintended harms, as it could lead to "destabilizing people's perceptions of their health and autonomy" (Reid et al., 2018). Moreover, if issues related to ageism, as discussed above, are not addressed, screening for frailty could potentially expose seniors to "paternalistic and discriminatory attitudes" (Reid et al., 2018). Other negative implications related to screening for frailty include the potential to add further administrative burden on primary care clinicians by requiring population-based screening, where evidence is limited for its efficacy (British Geriatrics Society, 2014).

Despite the potential risks or unintended harmful effects related to screening, the literature also outlines the potential benefits. Proponents claim that the goals for screening include helping seniors age well by delaying frailty and improving social and medical responses to those with existing frailty (Reid et al., 2018). Identifying those who are frail can assist in providing better and more appropriate care (Kojima, Liljas, & Iliffe, 2019). Additionally, screening for frailty, when done in the appropriate context, can allow health care providers to discuss personalized interventions that may help delay or reverse the effects of frailty. To support health care providers to screen for frailty when appropriate, there is a need to build consensus related to a common language for frailty, measuring frailty, and who should be screened for frailty. Without first acknowledging the lack of consensus around these important issues, the ultimate goals related to screening will not be realized. Additionally, without addressing some of the social determinants of frailty, clinicians may not feel inclined to screen for frailty.

3.2.3. Summary

There is extensive literature on various risk factors associated with frailty. Some risk factors are inevitable, including advanced age and to some extent, functional decline. On the other hand, there are risk factors that can be reduced or eliminated, which will minimize the incidence of, or delay frailty.

Lifestyle factors, particularly being physically active, offer some of the most significant and sustainable results for delaying and/or reversing frailty. As such, this capstone focuses on interventions targeted at seniors that include a physical activity component. The chapters that follow highlight the literature related to how seniors' programs that offer physical activity can have a positive impact on frailty outcomes. Additionally, policies and programs that should be implemented in BC to help seniors remain physically active and prevent frailty are discussed.

Chapter 4.

Methodology

4.1. Research questions and methodology

This capstone is motivated by the following main research question: What physical activity interventions will have the most impact on delaying or reversing frailty among BC's seniors, and hence should be prioritized by the provincial government to fund? To answer this main question, other considerations need to be examined, including: 1) what research currently exists related to physical activity interventions that seek to delay or reverse frailty; 2) how successful have these interventions been at changing frailty outcomes; and 3) how applicable are these interventions in the BC health system context? Thus, my analysis consisted of examining existing research related to physical activity interventions that successfully delay or reverse frailty and exploring how implementing similar interventions in the BC health care system may contribute to positive health outcomes for our seniors.

4.2. Existing research related to physical activity interventions to delay frailty

To understand what research currently exists related to frailty interventions with a physical activity component, a literature search was conducted using the electronic database Ovid MEDLINE. Search terms used included “frailty” or “pre-frail”, “intervention” and “physical activity”, which yielded a total of 180 journal articles. Five studies were then purposefully selected as case studies for this capstone project, based on pre-determined criteria. Studies needed to:

- assess interventions with a physical activity component, aimed at delaying or reversing frailty;
- use well-established frailty measurement tools, such as the Phenotype model and Frailty Index (see definitions in Chapter 2), or another similar tool that can quantify frailty outcomes;
- report a measure of frailty before and after the intervention;

- include research participants who were 65 years of age or older living in the community and who had been identified as pre-frail or frail by a health care provider prior to the start of the study; and,
- be published in the last five years.

It is important to note that a purposeful selection of case studies has limitations. For instance, selecting studies published within the last five years potentially limits the inclusion of seminal studies conducted earlier. Research not selected for inclusion as a case study in this capstone may still provide important insights on the impact of physical activity on frailty outcomes. However, due to the large amount of ongoing research related to frailty prevention, it is also helpful to understand newer research that takes into account the current health climate and aging population challenges.

It should also be noted that there are many studies examining interventions that do not include a physical activity component but also demonstrate improvement in frailty outcomes among seniors. For instance, there is an abundance of research showing benefits for pre-frail and frail seniors using interventions that primarily focus on nutritional programming, social engagement, mental health, and polypharmacy reduction. Due to the specificity of the research question for this project however, these types of studies were not selected for the case study analysis, as they are not within the scope of this capstone.

4.2.1. Data analysis

To answer how successful physical activity interventions have been at changing frailty outcomes, a critical appraisal of the five case studies was undertaken. The appraisal was conducted by extensively reviewing and analyzing the five peer-reviewed research studies for their intervention design and the efficacy and outcome of the intervention. This included an examination of what measurement tool was used to measure frailty levels among research participants and the specific frailty data from the studies, such as participants' frailty status at baseline and data related to the effect the intervention had on frailty outcomes during the post-intervention follow up periods.

4.3. BC context

While peer-reviewed research can provide an understanding of the types of broad programs or interventions that may be effective in delaying or reversing frailty, they face drawbacks. Their results may not be reproducible in the wider health care context. For this reason, it is important to consider the generalizability of the research findings and whether the findings are applicable in the BC context. This was done by looking at BC's existing health care system and where opportunities may exist to implement the programs that were found to be effective in the research. In particular, a grey literature search was carried out using the following sources: 1) BC Government reports and webpages; 2) BC health authority reports and webpages; and 3) stakeholder reports and webpages, including Doctors of BC, the General Services Practitioners of BC, and the Divisions of Family Practice. The search terms used included "seniors", "frailty", and "healthy aging" and additional analysis of report data published by these stakeholders was incorporated to gain an understanding of the feasibility of implementing frailty prevention programs in the BC context.

Chapter 5.

Results: Critical Analysis of Research Case Studies

Due to aging populations, countries around the world are realizing the need to prioritize healthy aging and take steps to delay or prevent frailty among seniors. For instance, in 2015, the government of Japan reformed its Long-term care Insurance Act to focus on prevention services for seniors. In 2017, the National Health Service in the United Kingdom became the first jurisdiction to make frailty screening “a contractual requirement for general practitioners” (Travers et al., 2019).

In addition to high level policy change at the government level, researchers have also been acutely interested in preventing and/or delaying frailty. This can be seen in the proliferation of studies in the last decade related to frailty screening, measurement, treatment, and interventions to delay onset. As outlined in systematic reviews, numerous studies have been conducted to understand what the best interventions are for delaying or preventing frailty (Travers et al., 2019). The range of interventions varies and can include some form of physical activity, home visits, telephone counselling, comprehensive geriatric assessment, and/or nutritional programs. Some interventions target “at risk” seniors who are already mild to moderately frail, while others focus on strategies that target seniors who are pre-frail.

This chapter examines five peer-reviewed research studies that demonstrate how interventions with a physical activity component can have a positive effect on delaying frailty among seniors who are pre-frail or mild to moderately frail. This chapter begins with an overview of each study, including the types of interventions used and a summary of the outcomes, and concludes with a synthesis of key themes from across the studies. A summary of the study interventions and outcomes can be found in Appendix A.

5.1. Study interventions and outcomes

5.1.1. Reference Study 1

The study conducted by Behm et al. in 2016 was part of a larger RCT, *Elderly Persons in the Risk Zone*. The larger study used two intervention groups and a control group with follow-ups at 3 months, 12 months, and 24 months. Behm et al. explored the outcomes from the 12 and 24 month follow-up periods. All participants in the study were 80 years of age or older. Participants were randomly assigned to one of the three research groups, where the break down was as follows: 174 participants in the preventive home visit (PHV) group, 171 participants in the senior meetings (SM) group, and 114 participants were enrolled in the control group. To study whether the interventions had an effect, there were no significant differences between the three study groups in baseline characteristics.

The PHV intervention aimed to support participants to age in place by maintaining health and independence, in addition to preventing disability and hospital care. As such, participants in this group received a single home visit from a member of a multidisciplinary care team, which included a registered nurse, physiotherapist, social worker, and an occupational therapist. The care team member provided information related to home exercises, medications, and local community resources available for seniors, including information on transportation and mobility services, group activities, and home care services. Home visits lasted between one and half to two hours.

The SM intervention consisted of small group meetings once per week for four weeks. Meetings lasted for approximately two hours and focused on various topics related to the aging process and tools and strategies for solving problems arising in the home environment. Similar to the PHV intervention, the SM intervention was led by the same multidisciplinary care team that provided advice and resources to SM participants; however, where PHV participants only met with one of the care team members during the home visit, SM participants received the benefit of meeting with all of the multidisciplinary care team members at some point during the intervention. Additionally, SM participants received one follow-up home visit from a care team member. The control group received the usual primary care, and if requested, participants in the

control group were provided information related to services available for seniors in their local community.

As indicated in the table below, the results of the Behm et al. (2016) study revealed that there were no statistically significant differences between the three study groups when it came to the deterioration in frailty from baseline and at the one- and two-year follow-up periods. Moreover, there was an increase in the number of participants who were identified as frail (≥ 3 frailty indicators) in all three study groups during the two-year study period. The percentage of participants in the control group who were identified as frail went from 19% at baseline to 59% at the end of the two-year study period. During the same time period, frailty increased from 20% to 52% for those in the PHV group, and from 16% to 47% for the SM group. The only statistically significant finding was that participants in the PVH and SM interventions were less tired while performing daily activities compared to the participants in the control group; however, this finding was specific to the follow-up at one year and not at the two year follow-up period.

Table 2 The Proportion (%), Odds Ratio (OR) and 95% Confidence Interval (CI) for Frailty Measured as Deterioration in the Number of Frailty Indicators from Baseline to the 1- and 2-year Follow-Ups and a Cross-Sectional Measure of Frailty at 1 and 2 years

	Control group (n = 114)		A preventive home visit (n = 174)			Senior meetings (n = 171)		
	%	OR	%	OR (CI)	p-value	%	OR (CI)	p-value
Deterioration in frailty (sum of indicators) from baseline								
(1-year)	38	1	44	1.28 (0.79-2.08)	.31	49	1.56 (0.96-2.52)	.07
(2-year)	68	1	58	0.64 (0.39-1.05)	.07	60	0.68 (0.4-1.12)	.13
Frail (≤ 3 indicators)								
1-year	39	1	34	0.79 (0.49-1.28)	.33	34	0.79 (0.48-1.29)	.33
2-year	59	1	52	0.77 (0.48-1.24)	.28	47	0.63 (0.39-1.02)	.06
Deterioration in frailty (tiredness in daily activities) from baseline								
1-year	33	1	19	0.47 (0.27-0.81)	.006	22	0.55 (0.32-0.94)	.029
2-year	39	1	30	0.65 (0.40-1.07)	.093	32	0.73 (0.44-1.19)	.206

Bold values indicate statistically significant p-value $\leq .05$

Odds of increase in frailty is measured in tiredness in daily activities in the PHV and SM groups.

Source: Behm et. al. (2016). Health Promotion can Postpone Frailty: Results from the RCT Elderly Persons in the Risk Zone. *Public Health Nursing*, 33(4): 303-315.

5.1.2. Reference Study 2

In 2017, Chan et al. (2017) conducted a follow up study on a previous three-month pilot RCT on frailty that ended in 2008. This extension study was a six month RCT with a 12 month follow-up that compared the effectiveness of high-level and low-level integrated care on frailty, sarcopenia, and other patient outcomes. Their study included seniors aged 65 to 79 years who scored between 3-6 (managing well to moderately frail) using the Canadian Study of Health and Aging Clinical Frailty Scale Chinese In-Person Interview Version and seniors who scored ≥ 1 using the Cardiovascular Health Phenotypic Classification of Frailty. Participants were assessed prior to randomization to either the low-level care or high-level care groups to obtain baseline data. Frailty outcomes were measured during the intervention at 3 months, at the end of the intervention at 6 months, and 12 months after initiation of the physical activity programs.

146 individuals were allotted to the low-level care (LLC) group, which received a two-hour education session that provided information on frailty, depression, healthy diets, and self-coping strategies, followed by an exercise program that included a warm up, brisk walk, and gentle stretching. Brief physical activity training, including resistance and balance training were also provided, along with an education booklet for participants to read and a CD outlining exercises for participants to follow at home. Bi-monthly follow ups were conducted to check on how much of the educational material was read and whether participants complied with the suggested diet and physical activity programming.

143 individuals were allotted to the high-level care (HLC) group, which received the same two-hour education session, but were also invited to participate in a 6 month group exercise course that consisted of 48 exercise sessions and six problem-solving therapy sessions. Participants were also invited to ask questions related to their diet and healthy eating during the exercise sessions.

Overall results from the Chan et al. (2017) study demonstrated that both the low-level and high-level interventions contributed to an improvement in frailty status for participants. In particular, the differences in improvement were statistically significant ($p = 0.026$) between the 3 and 6 month periods, where both groups demonstrated a 40%

improvement rate (see Figure 7). While both groups saw improvements in overall frailty status, the high-level care group saw more improvements in specific frailty outcomes related to physical activity levels, gait speed, and grip strength.

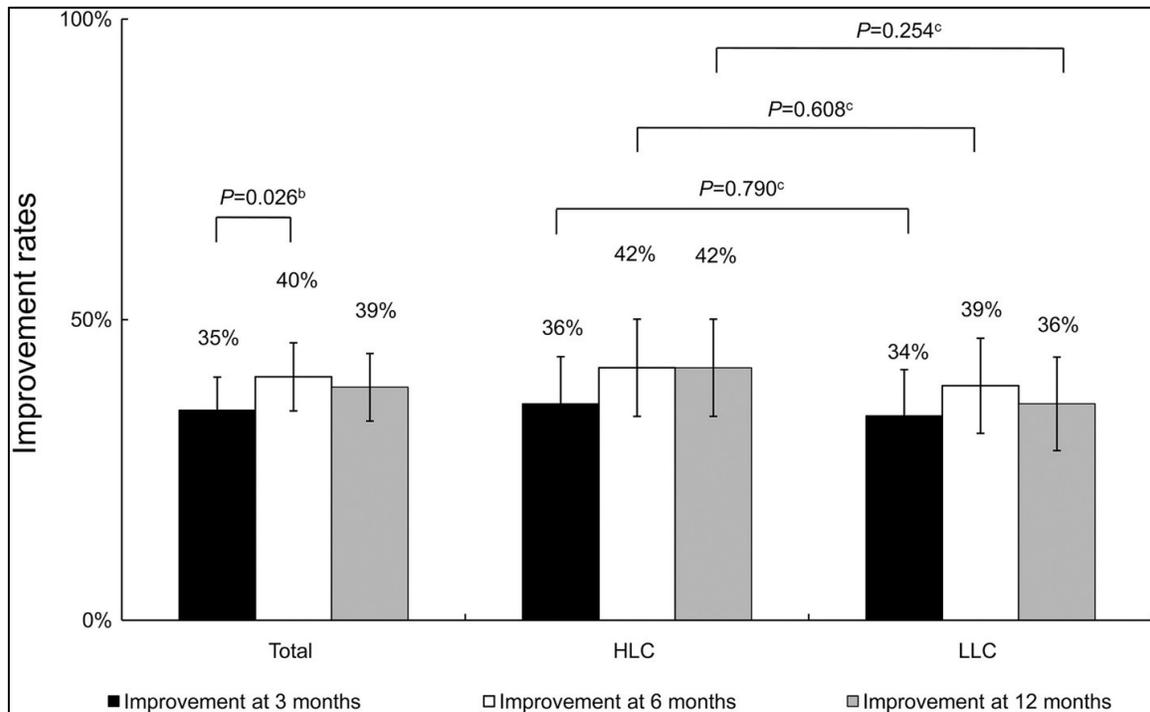


Figure 7 Primary outcome: change from pre-frail to robust or from frail to pre-frail or robust

Source: Chan D-C. et al. (2017). Integrated Care for Geriatric Frailty and Sarcopenia: A Randomized Control Trial. *Journal of Cachexia, Sarcopenia and Muscle*, 8: 78-88.

5.1.3. Reference Study 3

The Seino et al. (2017) study was a six month, RCT that compared frailty outcomes between an immediate intervention group (IIG) and a delayed intervention group (DIG). This study included seniors aged 65 to 84 years who scored 2 or higher on the Check-List 15, where a person with a score of 2 or 3 using this measurement tool is considered pre-frail. Unlike the Chan et al. (2017) study where randomization occurred prior to baseline assessment, participants were randomly allocated to the study groups after baseline assessments were conducted. Frailty outcomes were measured at baseline and at the 3 and 6 month periods.

Both groups received a multifactorial intervention that consisted of 3 programs: resistance exercise training, nutritional information, and a psychosocial program. The

resistance exercise training focused on maintaining or improving strength and mobility. The nutritional program focused on improving dietary variety and protein intake. The psychosocial program that consisted of group activities to discuss participants' hobbies, experiences in the community, and available community resources, including health promotion activities. The main difference between groups was that the delayed intervention group ($n = 39$) received the interventions three months after the immediate intervention group ($n = 38$).

Comparison between the two groups showed that the immediate intervention group had significant reductions in frailty scores and improved functional health in the initial 3-month period, the period where the delayed group had not yet received the interventions (see Table 2). When the delayed group was assessed 3 months after receiving the interventions, this group also demonstrated similar improvements in frailty score and functional health. This revealed the reliability of the intervention, as both groups had similar outcomes. In addition to these findings, the Seino et al. (2017) study also revealed that while physical activity interventions have a positive impact on pre-frail and frail seniors, poor nutritional status during prolonged resistance exercises may result in overall muscle mass atrophy. As such, the combination of both physical activity and nutritional programs is key to yielding improvements in frailty outcomes among seniors.

Table 3 Check-List 15 score, and prevalence of pre-frailty/frailty and frailty only in the IIG and DIG

Variables	IIG ($n = 38$) Mean \pm SD or n (%)			DIG ($n = 39$) Mean \pm SD or n (%)		
	0 months (baseline/ pre- intervention)	3 months (post- intervention)	6 months (follow-up)	0 months (baseline)	3 months (pre- intervention)	6 months (post- intervention)
Continuous variable CL15, score (0-15)	3.00 \pm 1.23	2.05 \pm 1.35	1.68 \pm 1.49	3.05 \pm 1.56	2.46 \pm 2.04	1.59 \pm 1.77
Dichotomous variable Pre-frailty or frailty, n (%)	38 (100)	25 (65.8)	19 (50.0)	39 (100)	24 (61.5)	15 (38.5)
Frailty only, n (%)	12 (31.6)	5 (13.2)	5 (13.2)	9 (23.1)	11 (28.2)	6 (15.4)

Source: Seino et al. (2017). Effects of a multifactorial intervention comprising resistance exercise, nutritional and psychosocial programs on frailty and functional health in community dwelling older adults: A randomized, controlled, cross-over trial. *Geriatrics Gerontology International*, 17: 2034-2045.

5.1.4. Reference Study 4

The Serra-Prat et al. (2017) study randomly assigned participants to either an intervention group, which received nutritional and physical activity programming, or a control group that received their usual primary care. Unlike the previous studies in this chapter, all of the participants in the Serra-Prat et al. (2017) study were aged 70 years and older. Frailty status was measured at baseline and during the follow-up at 12 months.

Participants in the intervention group ($n = 80$) were screened for malnutrition using a standard nutritional assessment questionnaire. Any participants who were identified as “at-risk” for malnutrition were then referred for further assessment, follow-up, and dietary recommendations. The intervention group also participated in a physical activity program that consisted of aerobic exercise for 30-45 minutes per day, at least 4 days per week, and a set of 15 mixed exercises that included strength, balance, and coordination training. The mixed exercises were to be completed at home for 20-25 minutes per day, at least 4 days per week. To ensure participants understood the exercises, an initial training session was held and illustrated booklets summarizing the exercises to be completed at home were provided. Participants were also contacted by a nurse to monitor and enhance adherence to the program. Participants in the control group ($n = 92$) did not receive any special intervention.

Serra-Prat et al. (2017) used the Phenotype model to measure the prevalence of frailty between the intervention and control groups at the 12-month follow-up period. The study revealed that at the 12-month follow-up, only 4.9% of the intervention group had progressed to a frail phenotype, whereas 15.3% of the control group progressed to frailty. While no other effect was observed on specific frailty indicators, such as weight loss, exhaustion or weakness, participants in the intervention group also demonstrated higher levels of outdoor walking that was measured in hours/day. The authors of the study attribute the lower incidence of frailty to an improvement in physical activity among the intervention group. It is interesting to note that the intervention did not have a significant effect in changing participants' pre-frailty status to a robust status.

5.1.5. Reference Study 5

In 2016, the Fraser Health Authority implemented a project called Community Action and Resources Empowering Seniors (CARES), that sought to decrease the impact of frailty on at-risk seniors by using health coaches to follow up and support these seniors in their self-management of healthy behaviours, including physical activity and healthy diets. Theou et al. (2017) sought to evaluate the effectiveness of the CARES model using participants residing in BC and Nova Scotia.

In this study, 51 participants aged 65 and older living in the community were recruited; 33 seniors were from the Fraser Health Authority region and 18 were seniors from the Nova Scotia Health Authority. All participants were identified as “at-risk”, which meant they were between 3-6 when screened by a health care provider using the Clinical Frailty Scale. Participants received a Comprehensive Geriatric Assessment (CGA), which generated a Frailty Index score and was used to develop individual care plans that promoted exercise, socialization, and proper nutrition. Additionally, each participant was paired with a health coach for six months, at no cost to them, and received follow up phone calls from their coach to support and track their progress related to physical activity, nutrition, and other health goals. Coaches also provided connections to community-based resources to support participants in achieving their health goals (Theou et al., 2017). At the end of the six month period, another CGA and frailty screening was conducted by a primary health care provider.

The CARES model demonstrated that conducting a CGA in a primary care setting using an electronic medical record system and implementing a telephone health coaching model are associated with frailty level improvements. At baseline, mean electronic frailty index (eFI) CGA scores were 0.24 +/- 0.08 (standard deviation). At the six-month follow up, mean scores were 0.21 +/- 0.08 (standard deviation), suggesting that there was an improvement in frailty scores between baseline and the six-month follow up. This data revealed that 61% of participants showed improvements in their eFi-CGA scores. Female participants and those over the age of 80 appeared to show the most improvement. Additionally, participants who had a higher level of frailty were more likely to show improvements in their overall health through the program. Lastly, health care providers found that by embedding the CGA into electronic medical record systems

made the assessment process more efficient and effective for tracking and evaluating participants' frailty levels.

5.2. Analysis

The five studies included in this chapter used different approaches to examine the effects of physical activity interventions on frailty outcomes. Some approaches appear to be more successful at improving frailty status than others. While improving frailty outcomes, including delaying or preventing frailty, is the ultimate goal for implementing any intervention, other factors such as costs, ease of implementation, and long-term sustainability also need to be considered before introducing a new program in BC. This section provides an in-depth analysis of the outcomes of the five studies by first looking at the design and implementation of the interventions, followed by how well study participants adhered to the programming in place. A summary of the key themes can be found in Appendix B.

5.2.1. Intervention design and implementation

In the Behm et al. (2016) study, multidisciplinary care teams were used to provide information related to healthy aging and community resources for seniors during in-person small group meetings, and also to conduct preventive home visits. The cost of implementing this type of programming would be quite high, as it would involve salaries and costs associated with the multidisciplinary care team (in this case, a registered nurse, physiotherapist, occupational therapist, and social worker) carrying out the duties of meeting with seniors in person and conducting home visits. Additionally, there would be costs associated with renting a meeting space to host in-person meetings. As revealed in the Behm et al. (2016) study however, both preventive home visits and seniors meetings did not demonstrate any significant differences in the progression of frailty relative to the control group that did not receive any additional preventive care.

The Behm et al. (2016) study had the least rigorous physical activity component as part of the intervention, compared to the other four studies included in this analysis. In the study, multidisciplinary care team members only needed to provide information on exercises appropriate for seniors, as well as information related to where participants could find physical activity programs in their communities. Unlike the other studies,

participants in the Behm et al. (2016) study were not expected to participate in walking activities or strength and resistance training. This lack of a rigorous activity component also likely contributed to the poorer frailty outcomes related to grip strength, gait speed, balance, and physical activity levels shown in the study.

It is also important to note that the participants in the Behm et al. (2016) study were 80 years of age and over. Similarly, in the Serra-Prat et al. (2017) study, older seniors (70 years of age and over) were recruited. In comparison, the participants recruited for the Chan et al., (2017), Seino et. al (2017), and Theou et al. (2017) studies were 65 years and over. The fact that the participants were older to begin with, in both the Behm et al. (2016) and Serra-Prat et al. (2017) studies, likely had an impact on the frailty outcomes for those studies, as advanced age is a risk factor for developing frailty. This is an important factor to keep in mind when it comes to who should be targeted when developing and implementing prevention programs to delay frailty.

While the costs associated with having a multidisciplinary care team carry out preventive home visits in the Behm et al. (2016) study did not appear to be effective, the use of multidisciplinary teams should not be ruled out when it comes to implementing frailty interventions. As revealed in the Seino et al. (2017), and Theou et al. (2017) studies, team-based care can provide good results when it comes to delaying and reversing frailty outcomes.

While participants in the Seino et al. (2017) study received nutritional and psychosocial programming, similar to that provided in the Behm et al. (2016) study, participants also received a physical activity program that focused on aerobic exercises, in addition to strength and balance training carried out by a multidisciplinary care team. The Seino et al. (2017) study appeared to demonstrate that the costs of using a multidisciplinary team to implement the intervention were associated with positive frailty outcomes.

Unlike the Seino et al. (2017) study, participants in the Theou et al. (2017) study did not receive formal exercise training. Instead, this study used a team-based care approach to conduct comprehensive geriatric assessments that were then used to help design interventions specific to the individual participants. As the study focused on goal setting for individuals, this allowed for participants to receive appropriately tailored care,

based on their needs. This included helping participants find existing exercise programs in their local communities, as opposed to designing a new physical activity program. While the study included a health coach who followed up participants to help keep them motivated, these follow ups were conducted by phone, which likely contributes to lower costs than conducting home visits, as used in the Behm et al. (2016) study. It should be also noted that while there may have been cost savings by not introducing a new physical activity program in the Theou et al. study, there would be costs to seniors, who may have to pay out of pocket to participate in physical activity programs run at their local community centre.

5.2.2. Adherence to physical activity programming

Adherence is a key factor when considering the implementation of any new intervention to delay or reverse frailty. High adherence rates are necessary to sustain long-run positive results. While adherence rates were not reported in two of the five studies (Behm et al., 2016 and Theou et al., 2017), both studies did provide some comments that are related to adherence. One key highlight from the Theou et al. study is that health coaching may work best for individuals who are highly motivated in learning more about managing their own health, in addition to those who are interested in actually taking more ownership over their own health. Similarly, in the Behm et al. study, participants in the PHV intervention reported that having a health care professional, who was interested and took the time to listen, made them feel valued and that they were still important people in society, despite their older age. Both the Theou et al. and Behm et al. studies revealed that empowering seniors is key to helping them make good health care decisions that are sustainable.

Examination of the three studies that did report on adherence shows variation in adherence rates between the studies and between the intervention groups within the studies. For instance, in Chan et al. (2017), the low-level care group that received information on physical activity and were then expected to carry out the exercises at home had very low adherence rates (20%). In comparison, the high-level care group in the same study, that received 48 in-person group exercise sessions, had a 60% adherence rate during the study.

When comparing the Chan et al. study to the Serra-Prat et al. study, intervention group participants in the latter study had an adherence rate of only 47.5%. These variations are likely due to the difference in how each study defined adherence. In the Chan et al. study, adherence was defined as practising at least 50% of the recommended exercises during the intervention period. In comparison, the Serra-Prat study defined adherence as completing at least 70% of the recommended exercises. These differences could have been due to the difference in the average age of the participants in the two studies, as Serra-Prat et al. study recruited older participants. However, another factor could have been the length of the intervention. In the Chan et al. study, the intervention included two exercise sessions per week for six months. In the Serra-Prat et al. study, the intervention included four exercise sessions per week for 12 months. This longer timeframe for the intervention could have resulted in a higher participant dropout rate.

The Seino et al. study appeared to demonstrate the highest adherence rates among the three studies that reported on adherence. In this study, adherence was defined as having completed all of sessions involved in the intervention, including resistance exercise, nutrition and psychosocial programming. The immediate intervention group in this study reported 90.4% adherence. Even the delayed intervention group that received the intervention three months after the immediate intervention group reported a high adherence rate of 88.9%. Note, however, that the intervention included two exercise sessions per week, but only for three months. The study reveals that adherence rates after three months appears to diminish. After the 12 month period, fewer than half of the participants adhered to the physical activity programming. Finding ways to encourage seniors to remain physically active as they age will be a key consideration in choosing programs that will have the most impact on improving frailty outcomes for seniors. Lessons learned from the Theou et al. and Behm et al. studies related to empowering seniors should be considered, in addition to other factors that may contribute to improving adherence to physical activity, such as promoting other aspects of active aging, including social engagement and adequate nutrition.

5.2.3. Summary

As outlined in the figure below comparing interventions from the five studies included in this analysis, there are several key factors to consider when introducing new programs to delay and/or reverse frailty among seniors in BC. These can be summarized as follows:

- Preventive home visits are more costly and difficult to implement compared to telephone follow ups and do not necessarily yield better results when it comes to frailty outcomes.
- The use of multidisciplinary care teams to carry out frailty-related programs can provide good results when it comes to frailty outcomes.
- Empowering seniors can help them make good health care decisions that include proper nutrition and long term participation in physical activity programs.
- A one-size-fits-all approach does not work: people who are highly motivated will likely do well with telephone coaching and unsupervised home exercises, while others may need more encouragement and will benefit from participating in group exercise programs.
- As advanced age is a risk factor for frailty, prevention interventions, including frailty screening should target seniors in their 60s, as opposed to seniors in their 70s.

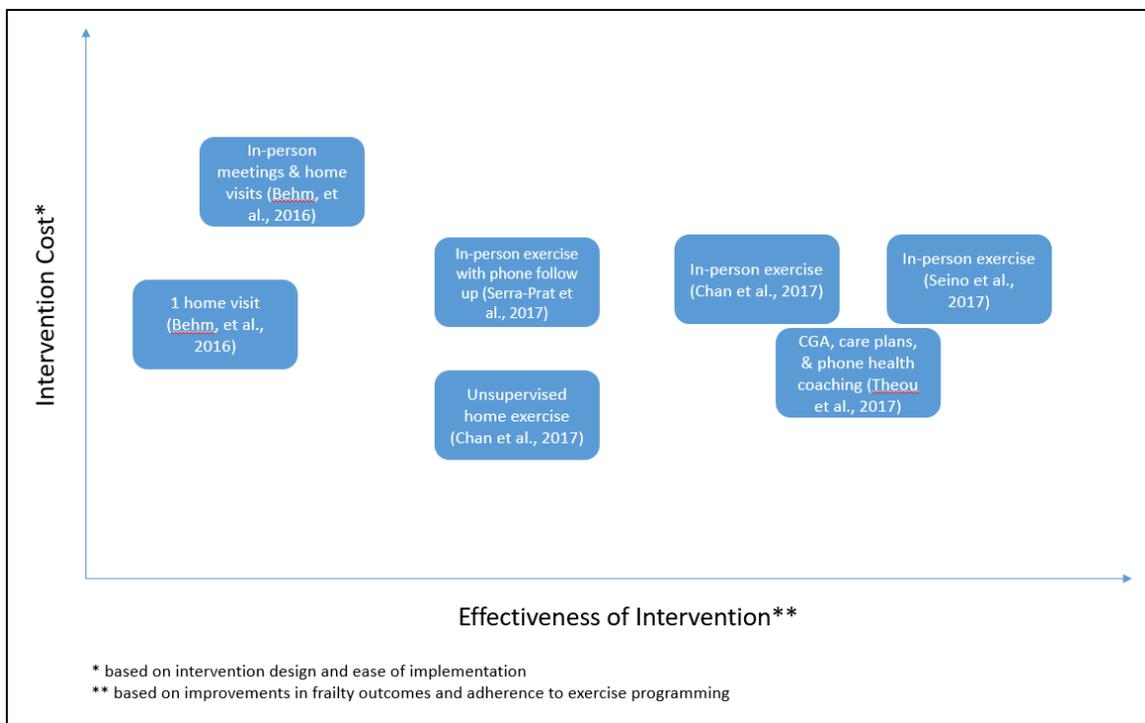


Figure 8 Comparison of Case Study Interventions

5.3. Limitations

While all studies included in this analysis used standardized tools to measure frailty, including the Phenotype Model and the Frailty Index, or some variation of those models, it can be difficult to compare frailty outcomes when the way in which frailty is measured can substantially vary. This can be seen in the Theou et al. study where participants appeared to show greater improvements in post intervention frailty scores when assessed using the more comprehensive Frailty Index tool, compared to when they were assessed using the Clinical Frailty Scale. Variation in outcomes due to differences in measurement tools is not a new problem in frailty research. As the National Institute on Aging argues, “we cannot address what we do not measure consistently” (National Institute of Ageing, 2018). While there is a need for consensus on how to measure frailty and who should be screened for frailty, discussion related to these issues is not within the scope of this capstone.

Chapter 6.

Policy Options

This chapter outlines policy options to address sedentary behaviour among seniors in BC. The options discussed below stem from the literature review and critical analysis of research case studies looking at effective interventions for delaying frailty. These options are not all mutually exclusive; however, they are different tactics for reaching the same goal of preventing premature frailty among seniors. A high level summary of policy options is outlined in Table 4 on page 38.

6.1. A Seniors Prescription for Health Program

Currently in BC, the Prescription for Health program is part of the broader provincial Prevention and Health Improvement Strategy. The program began in 2011 and was developed in partnership with the General Practice Services Committee, a joint collaborative committee between the BC Ministry of Health and Doctors of BC. Currently, the Prescription for Health program is targeted to all British Columbians who have one or more of the following risk factors: smoking, unhealthy eating, physical inactivity, and medical obesity (Healthy Families BC, 2012). Patients can request a Personal Health Risk Assessment to be conducted by their family physician, or family physicians who identify patients who have one or more of the identified risk factors can initiate an assessment.

The Personal Health Risk Assessment is intended to help patients identify a lifestyle change goal with their physician. Free telephone-based support services run by HealthLink BC, QuitNow Services, Self-Management BC, and programs by the Canadian Mental Health Association, along with other resources based in the community may be recommended by the patient's physician to help the patient achieve their lifestyle change goal. An example of a Prescription for Health goal may be quitting smoking.

A Seniors Prescription for Health Program would replace the Personal Health Risk Assessment with a Comprehensive Geriatric Assessment (CGA) to help identify key frailty indicators that should be a focus for the individual. Once the geriatric assessment has been completed, the clinician would then prescribe physical activity

programming, such as unsupervised at-home exercises or group activities at a local community centre, based on the goals set together by the individual and clinician. Follow ups would be conducted at subsequent clinic visits to monitor progress and support adherence to the prescribed goal.

6.2. Expansion of the CARES Program

As briefly discussed in the Theou et al. study in chapter 5, the CARES program is an existing primary health care program supported by the Fraser Health Authority. It aims to help seniors age well and age in place, in addition to decrease the impact of frailty on health care resources (Park et al., 2018). The program uses active case finding methods to identify appropriate seniors who would benefit from frailty interventions. At-risk seniors who score between 3 and 6 on the Clinical Frailty Scale receive a geriatric assessment. This assessment uses the eFI-CGA tool developed by the CARES program. The tool, embedded in electronic medical record systems, allows for a sensitive and predictive measurement of frailty using a Comprehensive Geriatric Assessment to generate a frailty index score. Once the assessment is completed, the individual and clinician working together create a wellness plan and embark in goal setting. Individuals are also matched with a community health coach who follows up by telephone to support individuals to achieve their health goals, including increased physical activity. This policy option would call for an expansion of the existing CARES program to be implemented across all of the BC regional health authorities.

6.3. Preventive Home Visits

Integrated home health services to support frail seniors already exist in BC. For instance, Vancouver Coastal Health's Home Visiting Vancouver's Elders program supports home-bound frail older adults living in Vancouver to "live out their final years as comfortably as possible on their own terms, according to their own values and priorities" (Vancouver Coastal Health, 2017). However, these home visits are targeted primarily for seniors who have mobility challenges and are already moderately to severely frail. This policy option would use active case finding techniques through the use of Comprehensive Geriatric Assessments to target pre-frail seniors and those who are mild to moderately frail who would benefit from a preventive home visit. Allied health care

providers, such as those used in the Behm et al. study, would conduct home visits with a focus on helping seniors age well and remain in the community. Health care providers conducting home visits would assist seniors with goal setting related to increasing physical activity and maintaining proper nutrition, as well as providing seniors with self-management techniques.

6.4. Holistic Frailty Prevention Programs

Studies show that engaging in physical activity programs that include components related to strength training, resistance exercises, and aerobic activity have a positive effective on delaying and reversing frailty (Chan et al., 2017; Seino et al., 2017; Serra-Prat et al., 2017). Currently, there are many physical activity programs available in BC for seniors. These programs often take place at local community recreation and seniors' centres at either no cost or a low cost to seniors. However, holistic frailty prevention programs that provide tailored exercises in addition to nutritional counselling, psychosocial programming, polypharmacy reduction, and self-management guidance for seniors do not exist. This policy option would explore development of holistic frailty prevention programs that can be delivered at local community and seniors' centres across the province at no cost to seniors.

Holistic frailty prevention programs would require a referral from a clinician as a result of a senior being identified as pre-frail or mild to moderately frail and who would benefit from this type of intervention. Research reveals that receiving a prescription from a health care provider to exercise can help alleviate fears that exercising is potentially harmful in older age and can help inform seniors on how to engage in physical activity safely to prevent falls (Heath and Stuart, 2002).

Table 4 Summary of Policy Options

Option 1	Option 2	Option 3	Option 4
<p>Seniors Prescription for Health Program</p>	<p>Expansion of CARES Program</p>	<p>Preventive Home Visits</p>	<p>Holistic Frailty Prevention Programs</p>
<ul style="list-style-type: none"> • Replace Personal Health Risk Assessment with Comprehensive Geriatric Assessment. • Prescribe physical activity programming. • Schedule follow up visit to assess progress. 	<ul style="list-style-type: none"> • Incorporate eFI-CGA tool to support clinicians to complete Comprehensive Geriatric Assessment. • Complete wellness plan & goal setting. • Telephone health coaching to support seniors. 	<ul style="list-style-type: none"> • Conduct Comprehensive Geriatric Assessment. • Conduct home visits to discuss goal setting and support seniors to be physically active and maintain proper nutrition. 	<ul style="list-style-type: none"> • Clinician referral to a holistic frailty prevention program. • Seniors attend programming (at no cost to them) and participate in tailored exercises, nutrition counselling, polypharmacy reduction, and psychosocial programming.

Chapter 7.

Criteria for Assessment

This chapter outlines the criteria used to guide the evaluation of the four policy options outlined in the previous chapter. Criteria were developed based on the analysis of the research case studies discussed in chapter 5, in addition to an examination of grey literature related to healthy aging and frailty in BC.

As frailty is multidimensional, there is a need to consider physical, psychological, and social elements to help seniors delay and/or reverse frailty. As such, broader societal objectives that look at reducing functional and cognitive decline, as well as helping seniors integrate in their local communities are paramount to helping seniors delay frailty, age well, and age in place. Additional considerations for policy evaluation include government operations, such as budget and administrative ease, and stakeholder acceptance.

Table 5 Evaluation Criteria

Objective	Criteria	Measure
<i>Societal Objectives</i>		
Protection & Security	Delaying frailty	Degree to which the policy prevents further functional and cognitive decline.
Community Development	Social integration	Degree to which the policy helps integrate seniors in their local community.
Equity	Accessibility	Degree to which the policy is accessible to BC seniors.
<i>Government Objectives</i>		
Budget	Frailty Index scores relative to cost of intervention	Measure of health outcome improvement relative to health care expenditure.
Administrative Ease	Administrative simplicity	Simplicity related to implementing and sustaining programs.
Stakeholder Acceptance	Key stakeholder acceptance	Whether key stakeholders support programs/government direction.

7.1. Delaying frailty

The primary objective of frailty prevention programs is to prevent or slow further functional and cognitive decline in seniors. Functional decline is often measured by “a reduction in an individual’s ability to perform both basic and instrumental activities of daily living” (Abdulaziz et al., 2016). Basic activities include walking, dressing, bathing, and feeding, among other activities. Examples of instrumental activities of daily living include being able to live independently at home and going to get groceries (Abdulaziz et al., 2016).

The BC Guideline (2017), *Frailty in Older Adults – Early Identification and Management*, indicates that delirium and dementia are psychological warning signs of frailty. Both functional and cognitive decline have tremendous impacts on an individual’s independence, autonomy related to decision making, and mobility. These types of declines are associated with reduced quality of life, social isolation, and even death (Abdulaziz et al., 2016; Asakawa et al., 2000). This criterion focuses on delaying frailty, which is measured by how well the policy options prevent further functional and cognitive decline in seniors.

7.2. Social integration

Social isolation is a key risk factor for poor physical and mental health (Courtin and Knapp, 2015). In 2019, the BC Centre for Disease Control released a report on whether BC municipalities are prioritizing mitigating social isolation. The report reveals that social isolation is on the rise in Metro Vancouver (Lubik and Kosatsky, 2019). While there are programs aimed at combatting social isolation among seniors, the Union of BC Municipalities has adopted resolutions calling for provincial funding to assist communities in age-friendly community planning and development (Union of BC Municipalities, 2017).

Building better support services not only benefits seniors, it also contributes to positive outcomes at a societal level. Research reveals that low social connectedness is associated with broader societal issues including increased crime, alcohol abuse, and suicide (Rohde et al., 2016). Developing programs that enhance social networks, address barriers to social participation, and foster social inclusion will have long term

positive impacts for communities (Federal/Provincial/Territorial Ministers Responsible for Seniors, 2007). These programs can help build more socially cohesive communities, which can have positive effects on the physical and mental health of community members (Almedom, 2005; Bassett and Moore, 2013).

Ensuring seniors remain an integral part of their communities will also help combat ageism, (the “stereotyping, prejudice, and discrimination against individuals based on their chronological age”) and transform the way in which we understand aging and health (World Health Organization, 2017). As seniors become more frail, they are more likely to become socially isolated. This criterion measures how well the policy options help integrate seniors into the community.

7.3. Accessibility

Equity is a key consideration in all policy development. BC seniors currently live in all parts of the province. Challenges related to accessibility differ between urban and rural areas. For instance, while seniors living in rural areas often face challenges related to programming availability, seniors living in urban areas may face difficulties related to adequate transportation to get to programs that are available. Additionally, low income seniors face additional challenges related to programming affordability. Ensuring that policies aimed at delaying and/or reversing frailty are available and easily accessible to all seniors, regardless of location and income is an important consideration.

7.4. Improvement in Frailty Index scores relative to intervention costs

Implementing policies can be very costly for governments in charge of a limited budget to run a publicly funded health care system. A comprehensive way of assessing health outcomes is by studying the “burden of disease” by looking at both mortality and morbidity. Studying the burden of disease can be measured by using disability-adjusted life years (DALYs) as the metric (Roser and Ritchie, 2019). DALYs measure lost health as a result of the burden of a particular disease or disability. One DALY is the equivalent of losing one year in good health due to premature death or disease/disability (Roser and Ritchie, 2019). While DALYs are a good way to measure health outcomes when there is comprehensive population-level data related to the incidence of disease, it may

not be the best method for capturing the health problems that increase with age that go beyond looking at disease (Kehler, 2019). For instance, impairments including cognition, mood, and physical performance are relevant health outcomes associated with frailty, even when not disabling (Kehler, 2019). As such, for the purpose of this capstone, the Frailty Index is used to measure health outcomes.

The Frailty Index looks at a long list of physical, cognitive, and clinical conditions that an individual may have and assumes the more deficits a person has, the greater the level of frailty. This approach is more specific to health outcomes associated with frailty and thus more appropriate to use than DALYs in this capstone. Policies that score well with this criterion will be those that show improvement in Frailty Index scores, relative to the costs associated with each proposed policy intervention.

7.5. Administrative simplicity

Administrative simplicity is a key consideration for any government when assessing policy proposals for implementing new programs. Ensuring that programs are relatively easy to implement and maintain will increase the likelihood of success for programs in the long run. This includes examining what organization will oversee the program, which stakeholders are involved, where the program will take place, and advertising the program so that the target audience is aware. Programs that are the most straightforward to implement and maintain will score the best on this criterion.

7.6. Stakeholder acceptance

In addition to administrative simplicity, stakeholder acceptance is crucial to the implementation and success of any new program. For the purpose of this analysis, the views of two key stakeholder groups are important: health care providers and seniors. As health care providers play a large role in screening for frailty and identifying seniors who may benefit from prevention programs, understanding their views is key to getting their support when it comes to implementation. Additionally, understanding whether the policies will benefit seniors and address their concerns will also help ensure their buy-in and support for new programs.

Chapter 8.

Evaluation of Policy Options

This chapter analyzes the four policy options outlined in chapter 6, using the criteria defined in chapter 7. As part of the analysis, research studies and grey literature were drawn on to determine how each policy option performed relative to the others. Scores of high, medium, and low were assigned using numeric values of 3, 2, and 1 as part of the evaluation process to illustrate the relative strengths and weaknesses of each policy option. Since delaying frailty among seniors is the most important outcome, this criterion was weighted more heavily compared to the other criteria. A summary of the results from the evaluation of policy options can be found in Table 6 on page 48. Appendix C outlines approximate calculations of program costs for each policy option.

8.1. A Seniors' Prescription for Health Program

A Seniors' Prescription for Health program is essentially a "status-quo, plus" option in that it is very similar to the Prescription for Health program that already exists in BC. Adding the "seniors" component by substituting the Personal Health Risk Assessment with a Comprehensive Geriatric Assessment may remind clinicians of the importance of screening for frailty, when appropriate. However, upon completion of the assessment, developing care plans with patients may not necessarily lead to improvements in functional or cognitive decline. Whether part of the care plan includes a physical activity component to be completed at home or done as part of a seniors exercise program at a community/seniors' centre, the onus would be on the individual to carry out that behavioural change. The Chan et al. (2017) and Serra-Prat et al. (2017) studies illustrate that while unsupervised home exercises may have some positive effects on improving frailty outcomes, they are also associated with very low adherence rates. As such, this type of intervention will likely not contribute to the prevention of functional and/or cognitive decline in the long run.

If individuals are prescribed unsupervised home exercises, this policy option would score low in terms of helping seniors integrate into the community. On the other hand, if individuals are encouraged to attend group physical activity classes at their local

community or seniors' centre, this would help reduce social isolation. Attending group physical activity classes may come at a financial cost. As such, it may be a barrier for low income seniors. It is also important to keep in mind, that putting the onus on seniors to seek out community-based programs adds another barrier to social participation, compared to programs they are referred to. Having to seek out programs also likely impacts adherence to the exercise prescription. As clinicians often wish they had the time to help direct patients to available community-based resources, this option does not rate well in terms of clinician acceptance, compared to the other options that offer a referral to specific programs.

Implementing a Seniors' Prescription for Health Program may be administratively simple, since BC already has a similar program in place for adults with lifestyle-associated risk factors. As such, this type of program would not require new provincial resources. For instance, family physicians would continue to bill for an assessment fee, after identifying that the senior patient fell into one of the risk factor groups, and a regular visit fee for the follow up appointment to check in on how well the patient was adhering to the goals identified in the care plan. However, those costs may not be offset by significant improvements in frailty outcomes, particularly if the individual is not adhering to the physical activity goals. Additionally, since the risk factors for this program would be the same as those included in the existing Prescription for Health program (smoking, unhealthy eating, physical inactivity, and medical obesity), a "seniors' version" of the program would fail to identify many seniors who would benefit from a comprehensive assessment. To see the most improvement in frailty outcomes, an effective program needs to consider cognitive factors associated with aging that are outlined in the Frailty Index, such as low mood, depression, anxiety, motivation, and health attitude.

8.2. Expansion of the CARES Program

Similar to option one, this option also looks at frailty prevention programs that have already been developed. To date, the CARES program has only been piloted in the Fraser Health Authority region. Option two calls for expansion of the program to the remaining regional health authorities in BC. Research demonstrates that the CARES program has been successful in improving frailty outcomes in seniors (Theou et al., 2017; Park et al., 2018). A "proof of concept" model evaluation of the program revealed

that progression of frailty in seniors was delayed and their functional ability was improved by using telephone health coaching for individuals (Park et al., 2018).

The evaluation also found the program helped seniors integrate into their communities, as the program helped develop capacity in self-management and provided navigational support of available community resources (Park et al., 2018). In addition to demonstrating improvements in seniors and the community, an evaluation of the CARES program shows benefits for physicians and nurse practitioners, who received enhanced frailty education and access to an evidence-based frailty assessment tool in their electronic medical record systems. As such, this policy option has been given high ratings for criteria related to delaying frailty, social integration, and stakeholder acceptance.

Where this policy rates low is in relation to administrative ease. While the CARES program was designed to be “culturally adaptable and easily expandable across urban and rural health care settings” (Park et al., 2018), there are significant challenges related to EMR systems in BC. While the vast majority of BC primary care clinicians have moved to an electronic system, interoperability between systems remains a significant issue. Additionally, introducing new tools for inclusion in an EMR system can be time intensive and costly, as clinicians must request new tools to be added and often bear the cost associated with these requests.

The CARES program uses health coaches made available by Self-Management BC, an existing initiative to provide British Columbians with chronic health conditions self-management programs in their communities. As this service is available at no cost to the user, expansion of this program ranks high in terms of the accessibility criterion. If challenges related to incorporating the electronic Frailty Index tool in community-based EMR systems can be overcome, the CARES program has potential to see good value for the costs associated with expanding the program, as evaluations of the program demonstrate significant improvements in frailty index scores.

8.3. Preventive Home Visits

Home care programs already exist in BC; however, they are currently geared to home-bound frail seniors. While there may be an opportunity to expand home and

community care to target seniors who are mild to moderately frail to prevent them from further declining, the Behm et al. (2016) study that used preventive home visits showed little improvements to functional or cognitive decline among participants. Additionally, there was no significant difference in frailty status between the intervention and control groups after the study concluded. As such, this policy option ranks low in terms of its ability to demonstrate improvements in delaying frailty among seniors.

Implementing a preventive home visit program can be quite costly, as it would require hiring additional allied health providers, such as registered nurses, nurse practitioners, and physiotherapists to conduct home visits. As these providers would be traveling throughout various communities, they would not be able to see as many seniors per day, compared to the traditional method of the patient going to see a care provider at a community clinic. These high costs would not be offset by improvements in health outcomes, as preventive home visits do not appear to show significant improvements in frailty indicators.

Preventive home visits may rank high by the criteria on accessibility and stakeholder acceptance. Having allied health providers visit seniors at home makes it easier for seniors to receive more timely and appropriate patient-centred care. Additionally, preventive home visits have the potential to empower seniors and strengthen their self-esteem. Interviews of participants in the preventive home visits study by Behm, Ivanoff, and Ziden (2013) revealed that patient satisfaction rates were high because they felt that they were heard and they were still valuable in society, despite their older age.

8.4. Holistic Frailty Prevention Programs

Unlike the previous three policy options discussed in this chapter, which are a variation of an existing program in BC, the development and implementation of holistic frailty prevention programs would be a new policy direction. Developing prevention programs that focus on various dimensions of frailty risk factors has the potential to reduce frailty and improve the quality of life of seniors. For instance, the Chan et. al (2017) and Seino et al. (2017) studies discussed in chapter 5 reveal that tailored physical activity exercises and education related to proper nutrition have a positive impact on preventing further functional decline among seniors. However, as illustrated in

both studies, adherence to such programs are highest between the 3 and 6 month period and begin to drop after 12 months. Without follow up to monitor adherence, such as the use of health coaches in the CARES program, even a referral from a clinician to a prevention program may only have short term positive impacts on delaying frailty among seniors.

While holistic frailty prevention programs can be carried out in existing community recreation centres, developing and implementing these types of programs is a costly endeavor, as it requires hiring program coordinators and managers to develop and oversee the programs in each health authority to ensure availability in all areas of the province. Additionally, health care providers would need to be hired to run the program, including registered nurses, nurse practitioners, pharmacists, registered dietitians, and physiotherapists. Lastly, as seniors need to be referred to the program by a clinician, there would be costs associated with patient assessments to ensure they are a good candidate for the program and subsequent visits to see whether the program is having an impact on frailty status. As such, due to the costs associated with the development and implementation of these programs and the potential for short lived improvements in frailty index scores due to problems with adherence, this policy option may be more costly than other options discussed in this chapter.

Where this option ranks high are areas related to social integration and stakeholder acceptance. Developing programs tailored for seniors and having clinicians refer seniors to these programs will help integrate seniors in their local communities and help motivated seniors become more physically active.

8.5. Discussion

Table 6 below provides a summary of the expected results of how each policy performed across the criteria and outlines a high-level assessment of the benefits and trade-offs associated with the various policies. The scoring is based on “low” = 1, “medium” = 2, “high” = 3. Delaying frailty is doubled weighted; hence its score ranges from 2 to 6.

A few key themes emerge from this evaluation. First, there are existing interventions in BC that aim to help seniors age well. Enhancing the existing Prescription

for Health program by including a seniors' component and expanding home and community care programs to include a preventive component would not necessarily lead to better frailty outcomes. While these may be easier to implement, the cost of such enhancements to existing programs may not be worthwhile, given that both options will likely not contribute to frailty prevention. Appendix C compares the policy options by looking at health outcomes and estimated program costs.

While expanding the CARES program and developing holistic frailty prevention programs are the hardest to implement because of complexity, they also have high stakeholder acceptance rates, and an ability to delay frailty among seniors by reducing further functional and cognitive decline. These two options also contribute to community development by helping address barriers to social participation, such as putting the onus on seniors to research and find community-based resources.

When it comes to the issue of equity, some policy options rank higher than others. For instance, since health coaching would be available to seniors by telephone and at no cost to them, expansion of the CARES program ranks high under this criterion. In comparison, since home visits can be more difficult to conduct in rural and remote areas, this policy option may not necessarily be available to all seniors.

Table 6 Evaluation Overview

Criteria	Rx for health		Expand CARES		Home visits		Holistic frailty program	
	Low	2	High	6	Low	2	Medium	4
Delaying frailty (x2)	Low	2	High	6	Low	2	Medium	4
Social integration	Low	1	High	3	Medium	2	High	3
Accessibility	Medium	2	High	3	Medium	2	High	3
FI scores relative to program cost	Low	1	Medium	2	Low	1	Medium	2
Administrative simplicity	High	3	Low	1	Medium	2	Low	1
Stakeholder acceptance	Medium	2	High	3	High	3	High	3
Total		11		18		12		16

Note: For all criteria, policies that perform well are given a high rating and those that perform the worst are given a low rating.

Chapter 9.

Recommendation and Implementation

Analysis of the policy options using the criteria outlined in chapter 7 reveals that expansion of the CARES program is likely to make the largest positive impact on the quality of life for seniors in BC. As the CARES program has already been piloted successfully in local communities within Fraser Health Authority, expanding the program to other regional health authorities is the primary recommendation in this report. As discussed in chapter 8, many of the systems are already in place to carry out the CARES program, such as the eFI-CGA screening tool and telephone health coaching through Self-Management BC. Health coaching remains an integral aspect of helping seniors sustain lifelong behavioural changes, such as being physically active. As demonstrated in the research case studies in this capstone, some seniors require more “nudging” and support than others. By providing telephone health coaching to these individuals, there is an opportunity to improve their overall health outcomes.

Expansion of the CARES program requires prioritizing the incorporation of the eFi-CGA tool into all community-based EMR systems. In BC, community-based EMR systems are paid for and operated by medical clinics that are often run by family physicians. As there are many different EMR systems in primary care in BC, incorporating a new screening tool can be challenging. Physicians can request that their EMR vendor add the eFI-CGA tool to their EMR; however, this often takes time and EMR vendors may also charge for physicians for providing this service.

To help speed this process along, several steps can be taken. At a local level, Divisions of Family Practice and communities that have Primary Care Networks can request that vendors prioritize the inclusion of the eFI-CGA tool in their EMR systems. At a provincial level, having the BC Health Information Standards Standing Committee support the integration of the eFI-CGA tool may also prompt EMR vendors to add the tool to community-based EMRs. This committee oversees the adoption of health information standards and specifications to enable information technology solutions in the province, making it an influential stakeholder.

In addition to expanding the CARES program, seniors in BC would benefit from holistic frailty prevention programs that help them age well. These programs could not only help delay and/or reverse frailty, but also contribute to helping seniors integrate in their communities and reduce the issue of ageism in the health care system. Thus, as a secondary recommendation, resources should also be dedicated to developing holistic frailty prevention programs in BC. Similar to the initiation of the CARES program, it is recommended that these types of projects start small at the community level before being scaled up. As such, encouraging several Divisions of Family Practice in both urban and rural communities to pilot these programs would be a good start.

Chapter 10.

Conclusions

The research is clear that frailty can be delayed and even reversed among seniors. Despite this evidence, the provincial government has not yet prioritized frailty prevention. While BC has developed policy documents that support healthy aging, include the Healthy Aging through healthy Living discussion paper and Seniors in BC: Healthy Living Framework, these documents require updating, as they are both over ten years old. There are opportunities to make concrete changes to programming for seniors that will support them to age well and live a good quality of life. In order to make these changes, the BC Ministry of Health should update its strategic direction to include frailty prevention as part of its broader healthy aging strategy. With frailty prevention as a strategic priority for the province, there is a higher chance that seniors can see an expansion of the CARES program and the availability of holistic frailty prevention programs in their local communities.

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Appendix A.

Case Study Frailty Interventions and Outcomes

Study	Sample size (<i>n</i>)	Intervention	Frailty status at baseline (%)	Effect of intervention on frailty outcomes
Behm et al. (2016)	<p>Seniors meetings: <i>n</i> = 171</p> <p>Preventive home visit: <i>n</i> = 174</p> <p>Control group: <i>n</i> = 114</p>	<p>Seniors meetings:</p> <ul style="list-style-type: none"> • Provision of information related to healthy aging • Provision of tools and strategies for problem solving • Single follow-up home visit <p>Preventive home visit:</p> <ul style="list-style-type: none"> • Provision of information related to home exercises, medication management, local community activities, transportation and mobility services, and home care services <p>Control group:</p> <ul style="list-style-type: none"> • Usual primary care 	<p>Seniors meetings: Robust (14), pre-frail (70), frail (16)</p> <p>Preventive home visit: Robust (13), pre-frail (67), frail (20)</p> <p>Control group: Robust (11), pre-frail (70), frail (19)</p>	No statistically significant change in frailty status between seniors meetings, preventive home visit and control groups.

Study	Sample size (n)	Intervention	Frailty status at baseline (%)	Effect of intervention on frailty outcomes
Chan et al. (2017)	<p>High-level care: n = 143</p> <p>Low-level care: n = 146</p>	<p>High-level care:</p> <ul style="list-style-type: none"> • 48 in-person exercise classes • 6 psychosocial therapy sessions • Provision of education booklets and CD on exercises to be performed at home <p>Low-level care:</p> <ul style="list-style-type: none"> • Single 2-hr education session on frailty, healthy eating, and self-management strategies • Provision of education booklets and CD on exercises to be performed at home 	<p>High-level care: Pre-frail (80), frail (20)</p> <p>Low-level care: Pre-frail (78), frail (22)</p>	<p>High-level care:</p> <ul style="list-style-type: none"> • Improvement in overall frailty status. • Improvements specifically related to in physical activity, gait speed, and grip strength. <p>Low-level care:</p> <ul style="list-style-type: none"> • Improvement in overall frailty status.
Seino et al. (2017)	<p>Immediate intervention: n = 38</p> <p>Delayed intervention: n = 39</p>	<p>Immediate intervention:</p> <ul style="list-style-type: none"> • In-person resistance exercise training • Nutrition and diet program • Psychosocial program <p>Delayed intervention:</p> <ul style="list-style-type: none"> • Usual primary care during non-intervention phase 	<p>Immediate intervention: Pre-frail (68.4), frail (31.6)</p> <p>Delayed intervention: Pre-frail (76.9), frail (23.1)</p>	<p>Immediate intervention:</p> <ul style="list-style-type: none"> • Reduction in frailty scores using CheckList 15 to measure frailty.

Study	Sample size (n)	Intervention	Frailty status at baseline (%)	Effect of intervention on frailty outcomes
Serra-Prat et al. (2017)	<p>Intervention group: n = 80</p> <p>Control group: n = 92</p>	<p>Intervention group:</p> <ul style="list-style-type: none"> Screened for malnutrition and provided with dietary recommendations if malnutrition detected In-person exercise program <p>Control group:</p> <ul style="list-style-type: none"> Usual primary care 	<p>Intervention group: Pre-frail (100)</p> <p>Control group: Pre-frail (76.9), frail (23.1)</p>	<p>Intervention group:</p> <ul style="list-style-type: none"> Progressed to frailty.
Theou et al. (2017)	<p>Intervention group: n = 51</p> <p>Control group: n/a</p>	<p>Intervention group:</p> <ul style="list-style-type: none"> Comprehensive geriatric assessment Development of wellness plans, including exercise and healthy eating goals Telephone health coaching 	<p>Intervention group: Very fit (16), well (27), managing well (31), vulnerable (22), mildly frail (4)</p>	<p>Intervention group:</p> <ul style="list-style-type: none"> Improvements in frailty score (by 61% using Frailty Index to measure frailty and by 38.5% using Clinical Frailty Scale to measure frailty).

Source: Liu, X., Ng, D.H-M., Seah, J.W-T., Munro, Y.L., Wee, S-L. (2019). Update on Interventions to Prevent or Reduce Frailty in Community-Dwelling Older Adults: A Scoping Review and Community Translation. *Current Geriatrics Reports*. 8:72-86.

Appendix B.

Case Study Key Themes

Study	Implementation	Adherence
Behm et al. (2016)	<p>Senior meetings group:</p> <ul style="list-style-type: none"> • multidisciplinary care team <p>Preventive home visit group:</p> <ul style="list-style-type: none"> • multidisciplinary care team <p>Control group: n/a</p>	Not reported
Chan et al. (2017)	<p>High-level care group:</p> <ul style="list-style-type: none"> • professional fitness trainer <p>Low-level care group:</p> <ul style="list-style-type: none"> • Unsupervised home exercise 	<p>High-level care group: 60%</p> <p>Low-level care group: 20%</p> <p>Adherence defined as practicing at least 50% of the recommended exercises during the intervention period.</p>
Seino et al. (2017)	<p>Immediate intervention group:</p> <ul style="list-style-type: none"> • multidisciplinary care team <p>Delayed intervention group: n/a</p>	<p>Immediate intervention group: 90.4%</p> <p>Delayed intervention group: 88.9%</p> <p>Adherence defined as completing 100% of the programming during the intervention period.</p>

Study	Implementation	Adherence
Serra-Prat et al. (2017)	Intervention group: <ul style="list-style-type: none"> • multidisciplinary care team Control group: n/a	Intervention group: 47.5% Control group: n/a Adherence defined as practicing at least 70% of the recommended exercises during the intervention period.
Theou et al. (2017)	Intervention group: <ul style="list-style-type: none"> • multidisciplinary care team 	Not reported

Source: Liu, X., Ng, D.H-M., Seah, J.W-T., Munro, Y.L., Wee, S-L. (2019). Update on Interventions to Prevent or Reduce Frailty in Community-Dwelling Older Adults: A Scoping Review and Community Translation. *Current Geriatrics Reports*. 8:72-86.

Appendix C.

Calculation of Program Costs

Policy Option	Components Involved	Estimated Cost
1. Seniors Prescription for Health Program	<ul style="list-style-type: none"> • Personal Health Risk Assessment Visit • Comprehensive Geriatric Assessment & development of care plan • Follow up geriatric re-assessment <p>These fees are based on the 2018/2019 MSP fee-for-service payment analysis (BC Ministry of Health, 2019).</p>	<ul style="list-style-type: none"> • Personal Health Risk Assessment: \$51.73/visit. (Expenditure in 2018/2019 = \$10.5 million). • Comprehensive Geriatric Assessment fee: \$291.14. (Expenditure in 2018/2019 = \$3.2 million). • Follow up geriatric re-assessment: \$101.04. (Expenditure in 2018/2019 = \$877,726).
2. Expansion of the CARES Program	<ul style="list-style-type: none"> • Clinic visit to complete Comprehensive Geriatric Assessment & develop care plan • Telephone health coaching. <p>Based on salary of a community program officer. Data available from BC Public Service Salary Information (BC Government, 2020).</p>	<ul style="list-style-type: none"> • Comprehensive Geriatric Assessment fee: \$291.14. (Expenditure in 2018/2019 = \$3.2 million). • Entry level salary of community program officer: \$50,000 – \$56,000.

Policy Option	Components Involved	Estimated Cost
3. Preventive Home Visits	<ul style="list-style-type: none"> • Clinic visit to complete Comprehensive Geriatric Assessment & develop care plan • Allied health care provider costs associated with the provision of home and community care <p>Based on salary data available from BC Public Service Salary Information (BC Government, 2020).</p>	<ul style="list-style-type: none"> • Comprehensive Geriatric Assessment fee: \$291.14. (Expenditure in 2018/2019 = \$3.2 million). • Entry level salary of community services nurse: \$60,000 - \$79,000. • Entry level salary of physiotherapist: \$59,000 – \$74,000. • Entry level salary of social worker: \$48,000 - \$55,000.
4. Holistic Frailty Prevention Programs	<ul style="list-style-type: none"> • Clinic visit to complete Comprehensive Geriatric Assessment & develop care plan. Referral to holistic frailty prevention program. • Initial costs associated with prevention program design, implementation, and evaluation (based on piloting the program in one community) 	<ul style="list-style-type: none"> • Comprehensive Geriatric Assessment fee: \$291.14. (Expenditure in 2018/2019 = \$3.2 million). • Estimated initial cost: \$258,000. <ul style="list-style-type: none"> • This estimate is based on previous grants provided for similar initiatives in BC. In 2014, the Jump Step research team received a grant for \$236,996 to design, implement, and evaluate the Jump Step program. The program intended to support adults suffering from anxiety/mood disorders to engage in physical activity as a mechanism for promoting and sustaining holistic wellness and healthy lifestyles (Vancouver Foundation, 2014).

Policy Option	Components Involved	Estimated Cost
		<ul style="list-style-type: none"> • Future expansion: <ul style="list-style-type: none"> • It is estimated that expanding holistic frailty prevention programs across BC would be similar to the expansion of the childhood obesity management program Shapedown BC. In 2016, the provincial government dedicated \$970,000 to expand Shapedown BC to other areas across the province (CBC News, 2016).