Impact of Telehealth on Access to Care for Community-Dwelling Older Adults with Chronic Illness

by

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Supervisory Committee

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Abstract

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Telehealth has great potential for providing timely and comprehensive care to community-dwelling older adults while reducing their barriers to healthcare access. The purpose of this study is to understand how older adults with chronic diseases access healthcare services in their community and evaluate the impact of telehealth on access to care from a self-reported survey conducted in British Columbia. About a quarter of older adult participants reported barriers to healthcare access in their community. Participants frequently reported financial barriers to healthcare access regardless of telehealth use. In addition, telehealth users more frequently reported a lack of necessary healthcare services in their community and physical barriers to access to care. Although the findings did not demonstrate a significant difference in access to care between telehealth users and nonusers, telehealth was identified as a meaningful care delivery tool for older adults with barriers to healthcare access. Further efforts are needed to implement a valid tool for ongoing evaluation and optimization of telehealth and integrate telehealth into clinical and community programs to reduce physical and financial barriers to healthcare access for community-dwelling older adults with chronic illnesses.

Keywords: access to care, healthcare needs, older adult care, chronic disease management, telehealth

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Dedication

To my family for everlasting support.

Chapter 1. Introduction

Background

With an aging population in Canada, the burden of chronic disease continues to grow. According to a recent population survey, 86% of Canadians over the age of 65 reported having at least one chronic disease (Canadian Institute for Health Information [CIHI], 2018). Among older adults, the prevalence of chronic diseases further increases with age: Older adults over the age of 85 have a higher prevalence of comorbidities compared to older adults between the age of 65 and 75 (CIHI, 2011). Despite the growing healthcare needs, the majority of older adults manage their health conditions in their own homes and community. The number of community-dwelling older adults continues to grow with 92.1% of adults over the age of 65 living in private dwellings (Statistics Canada, 2016b). In order to support older adults to live healthy and independent lives in the community while reducing the burden of chronic diseases, it is essential to provide timely access to comprehensive healthcare services in community settings.

Barriers to access to care. Although Canada has a publicly funded universal healthcare system under the Canada Health Act (1985), some barriers and disparities still exist in regards to healthcare access. Findings from a population survey show that not everyone has access to adequate healthcare services to meet care needs (CIHI, 2012). According to the National Population Health Survey, individuals over the age of 65 and people with chronic diseases more frequently reported that healthcare was not available when required and transportation was a barrier to healthcare (Wilson & Rosenberg, 2004). Among individuals who reported barriers to necessary healthcare, the majority pointed out healthcare system factors, such as availability of healthcare services and waiting time, as the underlying reasons for their unmet care needs (Ronksley et al., 2014). Additionally, more than half of individuals with unmet care needs reported that their conditions deteriorated due to healthcare not being available when needed (Ronksley et al., 2014). Individuals with greater care needs also experience more barriers to healthcare access (Allin & Masseria, 2010; Clarke, 2016; Sibley & Glazier, 2009). Any barriers to healthcare access can significantly affect individuals' health outcomes and quality of life. Therefore, the healthcare system needs to promote equitable access to care, especially for vulnerable populations with chronic diseases and ongoing care needs.

Lack of easily accessible care services in the community is a significant barrier to health management. Residents of British Columbia and Alberta reported the highest rate of unmet care needs related to accessibility of healthcare services, such as cost and transportation to receive care (Sibley & Glazier, 2009). The barriers to accessibility could be associated with healthcare services concentrated in a few locations, which require extra travel time and costs for individuals to receive necessary care (Sibley & Glazier, 2009). In a study of primary healthcare experience in rural BC communities, the residents reported limited availability of healthcare services in their community and the need to travel to urban cities for necessary healthcare services as major barriers (Wong & Regan, 2009). The residents further expressed difficulty maintaining ongoing relationships with their healthcare providers due to the high turn-over of providers, which in turn makes it harder for individuals to manage chronic health conditions and maintain health (Wong & Regan, 2009). The residents also pointed out a lack of continuity of care and efficient information communication systems, which results in unnecessary visits to healthcare professionals in distant locations (Wong & Regan, 2009). The barriers experienced by older adults with chronic illnesses and rural residents indicate the need for a systemic intervention to facilitate timely and ongoing communication with healthcare providers so that individuals effectively manage their chronic illnesses in their community and prevent deteriorating health conditions and inefficient healthcare utilization.

Technology-enhanced care. Telehealth has been integrated into care as a systemic intervention to enhance care delivery and promote equitable access to care. Telehealth refers to the use of information and communications technology to provide healthcare and facilitate communication between clients and healthcare providers over distance (Demiris, Doorenbos, & Towle, 2009; Edwards et al., 2014; Scott et al., 2007). Telehealth includes real-time clinical consultations, store-and-forward data sharing, remote patient monitoring, and delivery of education sessions for clients and healthcare professionals (COACH, 2015). In Canada, telehealth programs and services are expanding in diverse clinical areas with a goal to "[eliminate] distance barriers" and improve equitable access to care (COACH, 2015, p. 9). In 2014, telehealth programs served 9,729 clients in 280 BC communities (COACH, 2015). By bringing healthcare closer to clients, telehealth improves access to care and thus encourages and supports their participation in care (Po, 2000). Telehealth also facilitates sharing of self-management resources and clinical information, and communication between clients and healthcare providers for effective chronic disease management in the community (Wootton, 2012).

Studies have identified positive clinical and socioeconomic outcomes of telehealth and improved access to healthcare services for individuals in remote communities. From a study in Northern Ontario, Jaglal et al. (2013) concluded that a telehealth-based chronic disease self-management program had positive impacts on individuals' self-efficacy, health behaviours, and health status. Sevean, Dampier, Spadoni, Strickland, and Pilatzke (2008) studied the telehealth experience of residents in Northern Canada. The residents reported improved access to healthcare services in their own community, improved communication with healthcare professionals, and feeling more connected with the healthcare team (Sevean et al., 2008). They were also satisfied that they did not have to travel to other communities for healthcare, which not only relieved some of the burden of time and cost but also significantly improved their quality of life (Sevean et al., 2008). Edwards et al. (2014) also identified that people with chronic diseases are mostly willing to use telehealth, irrespective of their health status, barriers to healthcare access, age, and availability of relevant technology. Thus, telehealth holds promise for providing effective care options and enhancing the delivery of care to improve access to timely and comprehensive health care services in community settings.

Purpose of the Study

The purpose of this study is to evaluate the impact of telehealth on access to care for community-dwelling older adults with chronic diseases. Although telehealth has great potential for improving access to care, it is necessary to examine whether it meets the needs of older adults in their current contexts in order to effectively integrate the technology into their chronic disease management in the community.

The research objectives are:

- To examine how older adults access healthcare services in their community.
- To identify whether the use of telehealth has an impact on older adults' access to care for effective chronic disease management in the community.

In this study, I developed and implemented a survey to understand older adults' access to care in relation to telehealth use. A cross-sectional survey was conducted with older adults in diverse BC communities. The access to care scores were compared between telehealth users and nonusers to identify the impact of telehealth on access to care.

Significance of Research Objectives

Despite its significance in the current healthcare context, little is known about how older adults with chronic diseases access healthcare services in their community and whether telehealth is an effective solution for facilitating their healthcare access and eliminating any barriers or burdens. Although a key objective of telehealth is to improve access to care, Scott et al. (2007) identified that only a small number of telehealth studies have focused on the effects of telehealth on access to care. Glueckauf (2007) also pointed out limited evaluation of telehealth for older adults with chronic illnesses and emphasized the importance of fitting telehealth to the needs of growing older adult populations. Ekeland, Bowes, and Flottorp (2010) further highlighted the need for evaluating the outcomes of telehealth based on the values and needs of various stakeholders, as well as understanding telehealth as an ongoing collaborative process. These studies indicate the importance of evaluating telehealth with healthcare clients in order to provide evidence for telehealth practice and continuously optimize telehealth to meet their needs.

Understanding the needs and contexts of healthcare clients is an important step for collaborative evaluation and delivery of care that fulfills their needs. Studies have cautioned that, without careful attention to the unique needs and contexts of individuals, telehealth can exacerbate disparities or inequities in access to care and health outcomes (Demiris et al., 2008; Kaufman at al., 2006). This view raises a question about whether telehealth is a usable and effective tool for older adults in their current contexts. In particular, access to care is not only determined by the healthcare system factors but also financial and personal factors, such as individuals recognizing the need for care, understanding available services, and making decisions to utilize these services (Gulliford et al., 2002). Thus, it is necessary to understand comprehensive factors associated with older adults' healthcare access and how telehealth can address different access barriers in order to tailor the services to their care needs.

Overview of the Following Chapters

- Chapter 2 provides a synthesis of literature on factors influencing access to care for older adults with chronic illnesses and roles and outcomes of telehealth, including its limitations.
- Chapter 3 outlines the cross-sectional survey method of this study, including the development of a survey questionnaire to measure access to care in relation to the use of telehealth.
- Chapter 4 presents the findings of the self-reported survey, including the access to care scores of telehealth users and nonusers as well as the impact of telehealth on access to care.

- Finally, Chapter 5 discusses the interpretation of study findings to inform telehealth practice and future evaluation for community-dwelling older adults with chronic illnesses.

Chapter 2. Literature Review

Healthcare is evolving with innovative technology to bring healthcare services and resources closer to homes and communities and facilitate timely and ongoing delivery of care and support. A major goal of telehealth is to improve access to comprehensive care without physical and geographic barriers. However, there is a gap in knowledge regarding how the technology-enhanced care facilitates access to care for older adults with chronic illnesses. The purpose of this literature review is to examine factors influencing access to care and roles and outcomes of telehealth, which aims to connect people in the community and their healthcare providers over distance. The key search terms include *access to care, care needs, chronic disease management, community care, health information technology, older adults,* and *telehealth*. The terms were searched on the Academic Search Complete, CINAHL, PubMed, and Google Scholar databases. The terms were also searched on web search engines to include relevant gray literature. I did not specify a date range in order to gather comprehensive information and identify research trends on the study concepts. I also focused on Canadian studies to understand the local contexts. From the synthesis of literature, I identified unique barriers to healthcare access for community-dwelling older adults with chronic illnesses, promising roles of telehealth in facilitating healthcare delivery, and limitations of current technology-enhanced care that need to be further addressed.

This literature review is organized into following sections:

1. Conceptualization of access to care.
2. Chronic disease and access to care.
3. Access to care for community-dwelling older adults.

4. Telehealth as a facilitator of care.
5. Barriers and limitations of technology-enhanced care.

This literature review includes the definition of access to care and discusses access barriers for community-dwelling older adults with chronic diseases and current telehealth solutions for enhanced care delivery. Although studies have identified access to care as a key determinant of health and an indicator for healthcare evaluation, there is a lack of concrete definition and comparable measurement of access to care, which signifies the need for analyzing and clarifying the concept (Cabieses & Bird, 2014; Souliotis, Hasardzhiev, & Agapidaki, 2016). Additionally, it is important to identify the types of barriers experienced by vulnerable populations in order to develop systems that improve their healthcare experiences and eliminate health disparities. Health information systems, including telehealth, need to continuously evolve to meet the needs of diverse population groups in different contexts. Therefore, the review ends with limitations learned from current literature to identify future directions for the systems to promote equitable access to care for all.

Conceptualization of Access to Care

Timely, efficient, and equitable access to care is a contributing factor for health and wellness, as well as a goal in healthcare. Access to care not only represents how the healthcare system functions but also influences the health outcomes and quality of life for individuals (Souliotis et al., 2016). Individuals should be able to easily access necessary healthcare services in order to maintain and improve their health. Thus, access to care is an important determinant of health (Pappa, Kontodimopoulos, Papadopoulos, Tountas, & Niakas, 2013). Providing equitable access to care is an especially important goal and priority of the current healthcare systems (Allin, Masseria, Sorenson, Papanicolas, & Mossialos, 2007; Pappa et al., 2013). In Canada, providing equitable and timely healthcare services is often challenged by the distribution of population and healthcare professionals across large geographic areas with varying environmental conditions (Jennett & Andruchuk, 2001). Thus, the Canadian healthcare system requires efficient and reliable care delivery mechanisms to ensure that everyone has an equitable opportunity to access and receive necessary healthcare services in a timely manner and prevent health disparities. Andersen, Davidson, and Baumeister (2014) also noted the need for examining access to care to understand the potential use of healthcare services, support equity in healthcare, and optimize healthcare delivery. In order to examine access to care and promote equitable healthcare access, it is essential to build comprehensive understanding of its meaning for health.

As Norris and Aiken (2006) pointed out, there is a lack of common conceptual and operational definitions of access to care. Gold (1998) also noted that the conceptual and operational definitions of access to care have been continuously adjusted based on the changes in healthcare policies and systems. Previously, access to care was often defined in terms of entry into care or healthcare coverage and utilization (Gold, 1998). In addition, access to care was viewed interchangeably as the availability of healthcare resources and services (Aday & Andersen, 1974). However, availability and utilization of healthcare services alone cannot fully represent or describe access to care. For example, some individuals experience barriers to healthcare access even when healthcare services are available (Institute of Medicine [IOM], 1993; Gulliford et al., 2002). It indicates that access to care is determined by multiple other factors, rather than merely the presence of healthcare resources. Moreover, healthcare utilization does not demonstrate the quality or appropriateness of care or whether the care meets the needs of individuals (Allin et al., 2007; IOM, 1993; Sibley & Glazier, 2009; Souliotis et al., 2016). When focusing on healthcare use, it is also difficult to understand whether people do not use healthcare services because they have barriers to healthcare access or they simply do not need care (Gold, 1998). Gold further noted that there has been a growing focus on the effectiveness of healthcare services when examining healthcare access. Overall, studies have suggested that access to care encompasses not only the presence and use of healthcare services, but also the outcomes of using the services (Andersen et al., 2014; Gulliford et al., 2002).

Studies present diverse definitions and aspects of healthcare access to understand what it means and how it relates to one’s health. The Institute of Medicine (1993) defined access to care as “the timely use of personal health services to achieve the best possible health outcomes,” emphasizing that healthcare access is not an endpoint or outcome itself but a means of achieving certain care goals (p. 4). On the other hand, Bashshur (1995) focused on the process of gaining access and examined access to care in terms of the ease of receiving care or barriers to necessary healthcare services from the perspective of clients or patients. Levesque, Harris, and Russell (2013) also defined access to care as the opportunity to recognize the care needs and seek and receive appropriate care to meet the needs. Additionally, Andersen et al. (2014) focused on the process and outcome of utilizing healthcare services and defined access to care as any facilitators or barriers in the process of utilizing healthcare and the use of “the right services at the right time” to achieve better health outcomes (p. 34). Although studies provide different conceptualizations of access to care, the overarching view is that access to care is a multidimensional concept with interrelated personal and healthcare system factors and attributes (Andersen et al., 2014; Gulliford et al., 2002; Souliotis et al., 2016).

Healthcare access is determined by diverse interrelated factors between individuals and their contexts, including the healthcare system. Penchansky and Thomas (1981) defined access to care as "the degree of fit" between individuals and the healthcare system (p. 128). Aday and Andersen (1974) also noted the interrelationships between personal and healthcare system factors to understand access to care. The personal factors consist of (a) predisposing component or individual characteristics, (b) enabling component or means of accessing care, and (c) need component, such as one's health conditions (Aday & Andersen, 1974). The healthcare system factors include resources and the system structure, which can further influence the personal factors (Aday & Andersen, 1974). Within the unique healthcare and socio-environmental context, access to care is driven by individual healthcare needs and the availability, affordability, and acceptability of healthcare services to meet the care needs (Cabieses & Bird, 2014). Accordingly, Andersen et al. (2014) emphasized the importance of understanding both the contextual factors, such as the healthcare system and community attributes, and the personal factors to enhance access to care for all population groups.

As a multidimensional concept associated with personal, financial, and structural factors, access to care is determined by *acceptability, affordability, availability, accommodativeness, accessibility, approachability, appropriateness,* and *adequacy* of healthcare services (see Figure 1). At the personal level, access to care is determined by the acceptability of services from individual perspectives, which include one's values, beliefs, circumstances, and previous experiences to recognize the care needs and seek and accept care (Gulliford et al., 2002; Levesque et al., 2013; Sibley & Glazier, 2009). At the financial level, healthcare should be affordable in terms of resources and time for individuals to receive proper healthcare services (Levesque et al., 2013). The structural or organizational factors are related to the healthcare system design and environmental contexts, as well as the supply and quality of healthcare resources (Goins, Williams, Carter, Spencer, & Solovieva, 2005; Gulliford et al., 2002). Therefore, at the structural level, healthcare services should be accessible, available, and accommodative, which indicate the presence of and the timely entry into relevant and sufficient healthcare services to fulfill one's care needs (European Patients Forum [EPF], 2016; Levesque et al., 2013; Penchansky & Thomas, 1981). In addition, healthcare services should be approachable, which means information about the services are readily available to individuals and they are aware of necessary care services (Levesque et al., 2013). In relation to the health outcomes, access to care further encompasses the appropriateness and adequacy of healthcare services, which indicate the fit between one's needs or values and the quality of healthcare services (EPF, 2016; Levesque et al., 2013; Norris & Aiken, 2006). Individuals have access problems when they do not gain the opportunity to achieve better health due to personal, financial, and structural barriers (IOM, 1993). Therefore, it is essential that healthcare services and resources are in place at the right time and place for individuals to recognize their care needs, gain appropriate and adequate level of care without experiencing barriers or burdens, and achieve positive health outcomes and well-being.

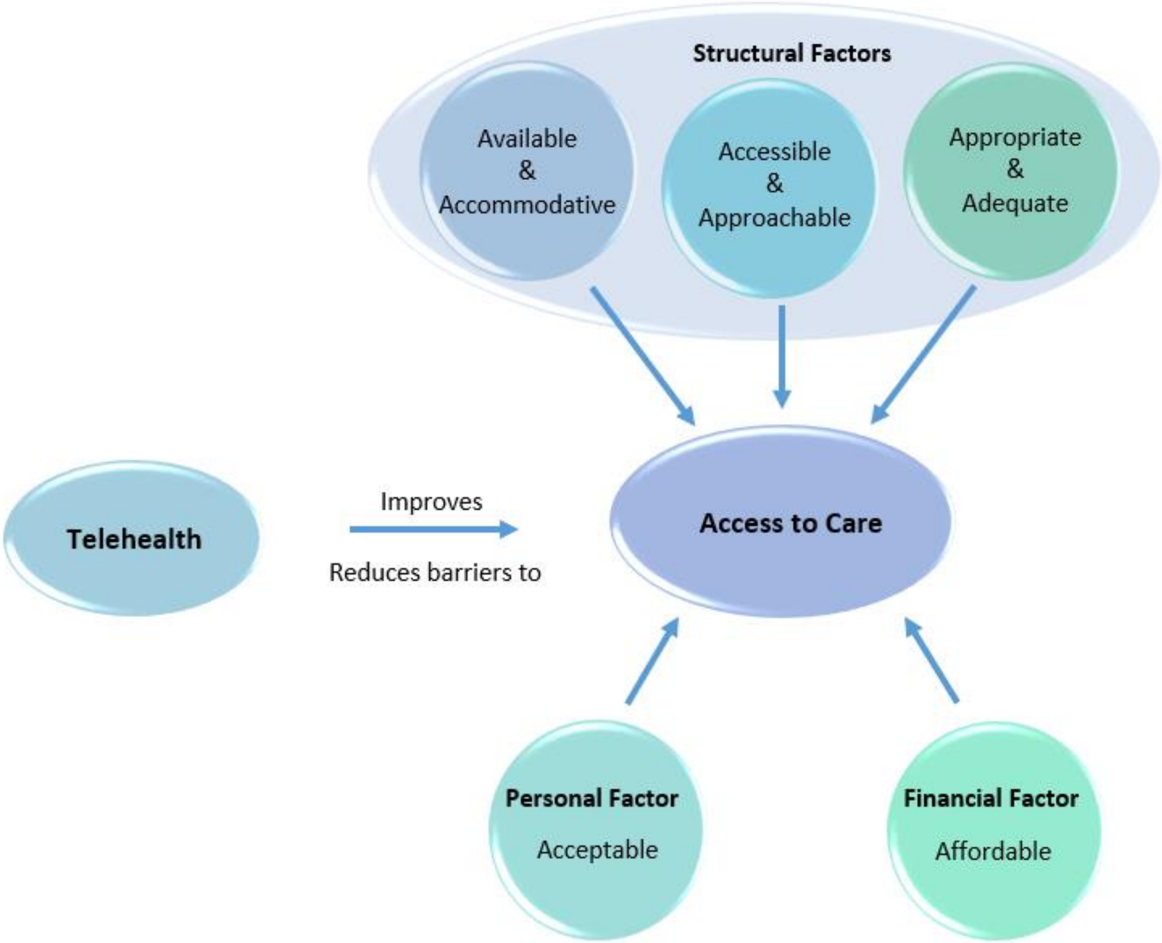

Figure 1. Conceptual diagram: Factors affecting access to care.

Chronic Disease and Access to Care

The presence of chronic diseases increases individual healthcare needs and demands. According to CIHI (2014), 62% of overall visits to primary healthcare were made by individuals with at least one chronic disease. Healthcare needs also increase with the number of chronic diseases. Individuals with multiple chronic diseases more frequently use primary care services and visit emergency departments for conditions treatable in primary care (CIHI, 2012). People with multiple chronic diseases also have more hospitalizations and emergency department visits than people with no or one chronic disease (Agborsangaya, Lau, Lahtinen, Cooke, & Johnson, 2013; Weaver et al., 2014). In general, people with three or more chronic diseases and older adults over the age of 65 more frequently use healthcare services (CIHI, 2014). From a study in Ontario, Muggah, Graves, Bennett, and Manuel (2012) also identified that both the number of chronic disease and age increase the number of visits to primary healthcare for prevention and management of chronic diseases and the associated complications. Therefore, older adults with multiple chronic conditions are an especially vulnerable population.

The underlying reasons for increased care needs and healthcare utilization of people with chronic diseases can be explained by the complex nature of chronic diseases that requires ongoing and rigorous management in daily living. Daily management of chronic diseases involves participating in health promotion activities, interacting with healthcare professionals and following care plans, monitoring health status and making appropriate care decisions, and managing the effects of health conditions on the overall functioning (Bayliss, Steiner, Fernald, Crane, & Main, 2003). Any barriers in these daily self-care activities hinder effective management of chronic diseases (Bayliss et al., 2003). Ineffective management of chronic diseases further affects individuals' healthcare utilization and quality of life (Lee & Heckman, 2012). Therefore, people with chronic diseases require timely and ongoing access to comprehensive care in order to fulfill their unique care needs and effectively manage complex health conditions.

Despite the greater care needs and healthcare utilization, people with chronic diseases are more likely to experience barriers to access to care. Based on the data from the Canadian Community Health Survey (CCHS), Ronksley et al. (2012) studied the association between chronic diseases and individuals' perceived unmet care needs, which represent inadequate access to care to meet their needs. The findings indicated that people with chronic diseases were more likely to report unmet care needs compared to people without chronic diseases (Ronksley et al., 2012). Unmet care needs were also positively associated with the number of chronic diseases: People with more than three chronic diseases had a higher chance of reporting unmet care needs than people with one or two chronic diseases (Ronksley et al., 2012). Compared to individuals without chronic diseases, individuals with chronic diseases were more likely to report issues related to accessibility and availability of healthcare resources as the reason for their unmet needs and less likely to report personal decisions as the underlying factor (Ronksley et al., 2012). Harrington, Wilson, Rosenberg, and Bell (2013) also found that people with chronic diseases were more likely to experience difficulty accessing specialist care than people without chronic diseases. People with more than four chronic diseases were four times more likely to experience difficulty accessing specialist care than people without chronic diseases and they also reported barriers related to availability of care services (Harrington et al., 2013). These findings demonstrate that although people with chronic diseases require ongoing care to manage their health conditions, they experience greater challenges in accessing and receiving care to meet their needs due to a lack of easily accessible healthcare resources.

In addition to systemic level barriers, such as a lack of available and accessible healthcare resources, individuals with chronic diseases also experience personal and financial barriers to healthcare access. Jerant, von Friederichs-Fitzwater, and Moore (2005) identified that the major barriers to accessing self-care resources for individuals with chronic diseases included limited knowledge or information about available services, physical symptoms restricting activities, and cost and transportation issues. In a study by Ho, Kuluski, and Im (2017), individuals with multiple chronic diseases reported not only systemic barriers to healthcare access, such as a lack of available care resources that fit their needs, but also personal barriers, including physical difficulties and transportation issues as well as financial barriers to paying out-of-pocket healthcare costs. These systemic and personal barriers often led individuals with chronic conditions to put extra efforts to gain access or seek alternatives, or even forgo the care they need (Ho et al., 2017).

Transportation and physical barriers to healthcare access are commonly identified challenges for individuals with chronic illnesses. From an analysis of the National Population Health Survey (NPHS) data, Wilson and Rosenberg (2004) identified that individuals with chronic diseases and those with physical limitations more frequently reported cost and transportation as barriers to healthcare access than individuals without chronic diseases or physical limitations. In addition, individuals with chronic diseases, especially those with physical barriers to travel, often decide not to access care due to transportation barriers (Ho et al., 2017; Jerant et al., 2005). Transportation is essential for ongoing access to healthcare services and the consequences of transportation barriers include missed clinical appointments, which can lead to poor management of chronic diseases and delayed care that further result in complications (Syed, Gerber, & Sharp, 2013). Therefore, having a means of easy and timely access to care is especially important for people with chronic diseases who require ongoing visits to multiple healthcare providers despite physical symptoms or barriers.

The studies overall indicate that people with chronic diseases require comprehensive healthcare resources, yet they experience greater challenges in accessing healthcare services due to personal and socio-environmental factors, such as physical limitations, a lack of accessible transportation, and limited information and expert resources in the community to meet their care needs. People with chronic diseases require ongoing access to multiple healthcare services to monitor and manage the long-term effects of their health conditions. Any barriers to healthcare access can place them at risks of detrimental health outcomes, which further increase their care needs and burden. Thus, the findings suggest the need for a systemic approach to improve care delivery and access to care for the vulnerable populations with chronic diseases in order to support their daily management of health conditions in the community.

Access to Care for Community-Dwelling Older Adults

As most older adults live in community settings with one or more health conditions, having access to appropriate care when and where it is needed is essential for their health management in the community. Access to comprehensive care is especially important for older adult populations because many community-dwelling older adults have complex healthcare needs that require ongoing interactions with multiple healthcare professionals (J. Thorpe, C. Thorpe, Kennelty, & Pandhi, 2011). However, older adults may experience unique challenges in accessing healthcare services due to their health conditions, physical or functional limitations, and greater care needs that require frequent visits to healthcare professionals (Syed et al., 2013). It is also crucial to note that older adults with barriers to healthcare access often experience multiple coexisting issues (Thorpe et al., 2011). Thorpe et al. (2011) further noted that older adults with multiple barriers to healthcare access tend to have the greatest potential care needs. Thus, it is critical to understand diverse factors associated with older adults' access to care and identify strategies for reducing their access barriers to care.

Studies have indicated that older adults are vulnerable to access barriers to care in community settings. From a study of the community-based primary care services for older adults in Ontario, Lafortune, Huson, Santi, and Stolee (2015) identified that limited access to care is a major barrier for older adults in addition to ineffective communication and integration of care and inconsistent services across communities. Although healthcare services were available in the community, older adults living outside the community centre experienced difficulty using the services (Lafortune et al., 2015). In a study of accessibility of healthcare services for residents of the Montreal Island, Paez, Mercado, Farber, Morency, and Roorda (2010) also identified that older adults had a relatively lower accessibility to healthcare services even when they had access to vehicle and healthcare services available within a reachable distance. The accessibility of care was also particularly lower in communities with a large older adult population (Paez et al., 2010). These findings suggest that older adults experience unique challenges to healthcare access even when healthcare services are available.

For older adults, access to care is greatly affected by their local contexts, including the availability of relevant healthcare services and transportation, due to their difficulties with mobility (Ryvicker, Gallo, & Fahs, 2012). Goins et al. (2005) studied the perceived barriers to healthcare access for older adults living in rural communities. The older adult participants identified a lack of transportation and a long travel distance to receive care in urban areas, especially for specialist care, as barriers to accessing healthcare services (Goins et al., 2005). They also pointed out a lack of healthcare providers, care options, and quality care in their community as barriers (Goins et al., 2005). Lafortune et al. (2015) further identified that transportation is a frequently reported barrier to healthcare access, especially for older adults living in rural communities with limited public transportation. Ryvicker et al. (2012) also noted that the use of primary care services of urban older adults differed by their environmental and socio-demographic factors, such as available primary care services, community characteristics and support, usual place of care, and access to public transportation. As older adults rely on healthcare services available in their community for ongoing management of health conditions, the availability and accessibility of relevant healthcare services in the local community can make a greater impact on their health management.

Older adults' access to care is also determined by their physical and living conditions, such as the presence of a support person or caregiver. For example, living alone in the community may act as a barrier to healthcare access, especially for those who need assistance outside their home settings. Henning-Smith, Gonzales, and Shippee (2016) studied the barriers to healthcare access for community-dwelling older adults in relation to their disability and living conditions. Henning-Smith et al. identified that older adults living alone more frequently experienced delayed care resulting from healthcare cost and transportation issues than individuals living with their spouse. Additionally, older adults with disabilities who live alone had a higher chance of experiencing delayed care (Henning-Smith et al., 2016). As the focus of care is shifting to community and home settings, older adults living alone, especially those with physical limitations, are becoming more vulnerable to financial and structural barriers to healthcare access (Henning-Smith et al., 2016). Thus, it is particularly important to support older adults with limited care resources and resolve any barriers and gaps in their local contexts, such as a lack of easily accessible healthcare services and transportation in the community.

Telehealth as a Facilitator of Care

By reaching clients in their homes and communities, telehealth has potential for reducing barriers to healthcare access and supporting effective health management, especially for community-dwelling older adults with chronic health conditions. Having a source of healthcare services and resources close to home is difficult for people in rural communities due to a lack of healthcare professionals in the regions (van den Berg, Schumann, Kraft, & Hoffmann, 2012). The long distance makes regular visits to healthcare professionals particularly challenging for older adults with limited mobility (van den Berg et al., 2012). Jennett and Andruchuk (2001) noted that telehealth reduces barriers to timely and equitable access to care, such as a shortage of healthcare providers in rural communities. Syed et al. (2013) also noted that transportation and access barriers can be reduced by telehealth, which incorporates remote monitoring and healthcare support. While traditional healthcare services require individuals to come to the care sites, telehealth facilitates the delivery of ongoing care by bringing the services to where individuals are and thus reducing the time and transportation barriers.

Studies have demonstrated the benefits of telehealth in reducing barriers to self-care for people in remote and underserved communities. Telehealth is considered an effective solution for providing chronic disease management resources and education to individuals in remote communities who are more vulnerable to chronic diseases and having a lack of relevant resources (Ciemins, Coon, Peck, Holloway, & Min, 2011). Jaglal et al. (2013) evaluated the impact of a telehealth-based chronic disease self-management program (CDSMP) on self-efficacy, health behaviours, and health status of individuals living in rural Canadian communities. The program leaders delivered the CDSMP to a group of clients in remote locations via telehealth because telehealth could effectively resolve difficulties having program leaders in each community or having them travel to different communities to deliver the program and gathering a sufficient number of clients in each community to organize group sessions (Jaglal et al., 2013). After four months of telehealth participation, the clients demonstrated improved self-efficacy to manage their health conditions, positive health behaviours, and improved health status (Jaglal et al., 2013). Young et al. (2014) also examined the effects of a telehealth diabetes management program for individuals in rural communities and identified continuous improvement in the self-efficacy level of the intervention group who received telehealth services compared to the control group who received the usual diabetes care. Ciemins et al. (2011) further identified that a telehealth-based interdisciplinary diabetes program was as effective as in-person diabetes care for individuals in remote communities. Therefore, telehealth enables the delivery of healthcare programs and services to communities with limited resources, which in turn promotes effective chronic disease management for the underserved populations.

Telehealth also supports self-management of chronic diseases in individuals' home settings. The shift of care setting from hospital to individuals' homes and community decreases their reliance on a higher level of care and supports them to be more involved in their self-management and take responsibility for their health (Po, 2000). Home telehealth monitoring involves communication of current health status between clients at home and healthcare professionals in order to support remote assessment and treatment (Fitzsimmons, Thompson, Bentley, & Mountain, 2016). In a study by Fitzsimmons et al. (2016), a home telehealth program was provided to clients with chronic obstructive pulmonary disease (COPD) in order to support their self-management and prevent readmission due to exacerbation of the condition. From the program, the clients reported feeling secured that their health status was monitored and timely support was provided by the clinicians (Fitzsimmons et al., 2016). They also reported that checking their own health status helped them gain better understanding about their health (Fitzsimmons et al., 2016). Moreover, the clients identified that the home telehealth services were “more integrated, personalized, and timely” than their usual primary care services, which are often difficult to access in time (Fitzsimmons et al., 2016, p. 427). Hunting et al. (2015) also evaluated a telehomecare program in Ontario for people with COPD and heart failure. The participants and their care givers generally perceived the benefits of the home telehealth program, such as becoming better informed about the management of their health conditions and having timely access to healthcare when needed, which further brings “a sense of security” especially for those experiencing barriers to healthcare access (Hunting et al., 2015, p. 551). These studies indicate that home telehealth supports individuals’ active participation in care and improves their competence in managing chronic illnesses by allowing ongoing monitoring of health status and timely communication with healthcare providers.

Studies have also demonstrated clinical benefits and positive outcomes of telehealth for older adults with chronic illnesses. From a randomized controlled trial with community-dwelling older adults with chronic diseases, Gellis, Kenaley, and Have (2014) identified that clients receiving a home telehealth intervention had a significantly lower depression level, improved problem-solving skills and self-efficacy, and fewer emergency department visits than the control group. In addition, the telehealth program allowed more timely delivery of interventions compared to the usual home care programs (Gellis et al., 2014). Moreover, Shah et al. (2015) identified that older adults receiving telehealth services had a 34% decrease in emergency visits for ambulatory care sensitive conditions, which suggested telehealth effectively supported older adults to receive timely care without visiting emergency departments. In other words, telehealth facilitates timely delivery of appropriate interventions and care for community-dwelling older adults, which not only promotes effective management of their health conditions but also reduces their need for a higher level of care.

Telehealth also has potential for facilitating the delivery of more coordinated and comprehensive care from multiple healthcare professionals. Care coordination is especially essential for individuals with multiple chronic diseases. Telehealth systems incorporate multimedia communication and computer supported cooperative work (CSCW), including both real-time and asynchronous communication and data sharing (Huang et al., 2007). The telehealth systems with the videoconferencing function and medical peripheral devices for health monitoring enable “virtual collaboration” for clinicians to monitor clients in their own environment and share clinical information and expertise with the interdisciplinary healthcare teams in different locations for clinical decision making (C. Porumb, S. Porumb, Orza, & Budura, 2010, p. 75). With the real-time communication function, telehealth also promotes the delivery of timely support from expert clinicians without transferring patients to other healthcare facilities (Huang et al., 2007). By providing a platform of collaborative communication and information sharing among clinicians, as well as between clients and clinicians, telehealth can improve timely access to more comprehensive healthcare services without geographic gaps.

Barriers and Limitations of Technology-Enhanced Care

Although innovative technology has great potential for enhancing the delivery of care and providing comprehensive care in the community, without careful consideration of the individuals' unique needs, it can pose significant challenges and limitations. From a systematic review, Jacelon, Gibbs, and Ridgway (2016) identified that current health information systems for chronic disease management are mostly focused on specific disease process and management, requiring clients to monitor disease-specific health data and follow specific medication regimens. Such care model requires individuals to comply with a standardized protocol based on any changes in their clinical data (Greenhalgh et al., 2013). However, each person has unique health experience and care needs, which may not be well captured by the standardized technological interventions (Greenhalgh et al., 2013).

Technological interventions that fail to meet individuals' unique needs and circumstances often create more burden for them and do not lead to effective outcomes. From a study of barriers to telehealth adoption, Sanders et al. (2012) identified that respondents who refused telehealth often viewed the monitoring requirements and commitment as a burden in their daily lives. In a study about older adults' experiences of using technology for healthcare, Greenhalgh et al. (2013) also identified that the regular use of a home telehealth system was low because the telehealth equipment was inconvenient and challenging to use, thus requiring help from others, and the automatic feedback were difficult to understand or not useful. Hunting et al. (2015) also found that patients were less motivated to participate in a telehomecare program when the self-care information was not relevant to meet their care needs. Thus, studied have highlighted the need for fitting or tailoring the systems to the needs of individual contexts (Jennett & Andruchuk, 2001; Sanders et al., 2012). In brief, telehealth should be both usable and useful for individuals to meet their care needs in their circumstances and contexts in order to result in long-term benefits.

Without proper attention to the users' unique needs and contexts, there is a risk of exaggerating health disparities result from "digital divide," which refers to a form of inequity between people who can and cannot access or afford technology (Demiris et al., 2008, p.11). Demiris et al. (2008) further pointed out that health information systems, such as telehealth, can "paradoxically reduce access to care" (p.11). First, the cost of care can be increased in order to equip telehealth systems and monitoring devices (Demiris et al., 2008). Within a tightly budgeted healthcare environment, the technology-enhanced care might be only available to a small number of clients (Demiris et al., 2008). Additionally, complex structural requirements should be met in order to integrate technology into care, which can further lead to digital divide between people and communities who can and cannot afford the requirements (Demiris et al., 2008). If the systems are only available to certain populations, the adoption of health information systems can worsen inequities in healthcare (Kaufman et al., 2006). It is an important issue to consider because vulnerable populations tend to have the limited use of health information systems (Hall, Bernhardt, Dodd, & Vollrath, 2015). For example, older adults are often vulnerable to digital divide because they experience challenges to accessing healthcare and technology in addition to having multiple health conditions (Hall et al., 2015). Although a major goal of telehealth is to reduce access barriers and disparities, without careful consideration of the user contexts, it can pose a risk of exacerbating disparities and inequity in access to care.

The contextual factors and challenges to telehealth practice may further limit the potential benefits of telehealth for the rural populations. Peddle (2007) examined the factors associated with limited adoption of telehealth in remote Labrador communities and identified several contextual factors responsible for its limited effects on access to care. The local contexts, including the high staff turnover and changes in their workload, privacy and confidentiality issues, and lack of telehealth policies and understanding of healthcare needs of the population acted as barriers to telehealth adoption in the remote communities (Peddle, 2007). Moreover, clinicians' different levels of knowledge on the telehealth system and frequent technical problems inhibited the successful implementation of telehealth in clinical practice (Peddle, 2007). Therefore, Peddle stressed the importance of considering the practice context for the development of telehealth programs and policies in order to successfully implement telehealth systems and achieve positive outcomes. As Hunting et al. (2015) highlighted, there is a need for ongoing evaluation of telehealth programs with diverse stakeholders in order to understand their perspectives and examine how the programs actually work in the local contexts.

In addition to different contextual factors that determine the outcome of telehealth, questions arise as to whether virtual care from telehealth brings the same quality care and outcomes as the traditional face-to-face care. Hawkins and Neustaedter (2016) examined the use of telehealth for clinical consultations and identified limitations related to privacy issues and difficulty sharing emotions and support. Due to the limited camera view that does not capture the whole telehealth room, telehealth clients often expressed concerns about the privacy of their conversation with the clinicians (Hawkins & Neustaedter, 2016). Moreover, the system setting limited the view of individuals and created difficulty capturing or monitoring body movements or providing demonstration or instructions (Hawkins & Neustaedter, 2016). Hawkins and Neustaedter further noted that healthcare providers had difficulty recognizing the clients’ emotional responses and providing appropriate support. Therefore, there are some challenges and limitations of virtual care using technology to substitute the real presence of healthcare professionals with clients and provide appropriate interventions and support. As frequently emphasized, telehealth needs to complement or enhance, rather than replace or substitute, the traditional healthcare interactions and care delivery (Demiris et al., 2009; Jaglal et al., 2013; Peddle, 2007).

Current studies have also showed conflicting effects as well as limited evidence to support the implementation of telehealth. Based on a systematic review of the effects of telehealth on chronic disease management, Wootton (2012) concluded that current studies provide inconsistent and inconclusive outcomes of telehealth for chronic disease management. Ekeland et al. (2010) also pointed out a lack of quality evidence to understand the effects of telehealth and inform telehealth practice. The current gaps in knowledge and practice necessitate further evidence to demonstrate how telehealth supports and complements the patient-provider interactions and timely delivery of appropriate and reliable care, especially for those experiencing barriers to healthcare access. Individuals have different needs, perspectives, and competencies, as well as different circumstances, to effectively understand and utilize health information systems, which can further determine the usefulness and effectiveness of the systems for their health management. Therefore, studies need to involve diverse client populations in order to provide the systems that are appropriate to use in their contexts as well as prevent the consequences of digital divide and promote equity in healthcare.

Conclusion

Although telehealth has great value and potential for facilitating healthcare access, further efforts are needed to optimize telehealth services to the needs of community-dwelling older adults with chronic diseases. Older adults with chronic diseases may experience unique barriers to healthcare access due to personal factors, such as increased care needs and physical limitations, as well as their socio-environmental factors, such as the availability of healthcare services or public transportation in their local community. The goal of telehealth is to connect clients and healthcare providers in different locations for timely and efficient healthcare delivery. However, findings from current literature indicate that telehealth can bring varying results without careful understanding of the process and context of the telehealth practice and the unique needs and conditions of individuals and communities. Without careful attention to the unique needs and contexts of older adults with complex care needs, the innovative technology can pose greater challenges for them, rather than eliminating their current barriers.

Therefore, it is necessary to evaluate technology-enhanced care from the perspective of older adults with ongoing care needs in order to effectively deliver care based on their needs and contexts.

Chapter 3. Methods

In this study, I developed a survey questionnaire and conducted a study with community-dwelling older adults with chronic diseases in order to answer (a) how older adults access healthcare services in their community and (b) whether the use of telehealth has an impact on their access to care for effective chronic disease management in the community.

Study Design

The cross-sectional survey design was used to collect information from older adults in the Fraser Health and Vancouver Island Health regions of British Columbia to study the impact of telehealth on their healthcare access. According to Gold and Stevens (1998), a survey is the most appropriate method to understand individual attributes related to access to care and "systematically monitor and compare access" for healthcare clients in diverse settings (p. 614). A cross-sectional survey is an appropriate method to collect information from participants in multiple locations over a short period of time and learn about their access to care in relation to telehealth use.

The study involved a self-administered mail survey, which was distributed over two study phases, including a pilot period to test the survey questionnaire and the final survey period. Each phase ran for four weeks, from June 5, 2017 to July 4, 2017 for the pilot phase and from September 11, 2017 to October 10, 2017 for the final phase. The participants in both pilot and final phases received and completed the same version of questionnaire. For this study, it was not feasible to conduct personal interviews with participants in different communities. The study could provide limited understanding of individuals in diverse contexts if it was conducted with a small group of participants in one or two communities. In addition, it was unknown whether potential participants have access and competency to self-administer an online survey. During the pilot phase, it was also identified that participants often explained or elaborated their responses in writing and made additional comments, which could be difficult to capture in online surveys with a structured format. Thus, a mail survey was chosen as the most feasible method to invite individuals in different communities to participate in the study and gather a wide breadth of information.

Sampling Strategy and Participant Selection

The target population of the study is both urban and rural community-dwelling older adults over the age of 65 who have one or more chronic diseases. The accessible population was clients registered in the Consent to Contact for Research program at the Fraser Health Authority (Fraser Health) and the Permission to Contact for Research (PTC) program at the Vancouver Island Health Authority (Island Health). The convenience sampling method was used to invite a sample of older adults with chronic illnesses to participate in the study.

The inclusion criteria were:

1. Community-dwelling adults with one or more chronic diseases.
2. Aged 65 and older.
3. Using telehealth or other healthcare services.

The exclusion criteria were:

1. Living in a residential care facility.
2. Having cognitive disorders defined as conditions affecting memory and thinking, such as dementia and Alzheimer’s disease.

Upon approval from the Consent to Contact for Research program at Fraser Health, I identified eligible participants from the Researchers' Report that provides personal and medical information of clients who have consented to be contacted for research purposes. Then, I mailed the study invitation letter, survey consent, and questionnaire to potential participants (see Appendix A, Appendix B, and Appendix C). In Island Health, the PTC program manager selected a sample of clients from the program registry and emailed the study invitation to potential participants (see Appendix D). Then, I provided the survey consent and questionnaire to individuals who contacted me and expressed interest in taking part in the study (see Appendix E).

The study participants were competent adults capable of providing informed consent on their own behalf. The study invitation and consent document included information about the study purpose and procedures, and the rights of study participants. In order to protect the privacy and anonymity of study participants, the return of completed survey was considered their implied consent to participate in the study. The participants had up to four weeks to make an informed decision and return the survey. As the principal investigator, I provided additional information and responded to questions from participants via phone and email.

Sample Size

The study involved a non-probability sampling and required a minimum of 30 participants to assume a normal distribution of continuous data (Krithikadatta, 2014). Following the sample size rule of thumb that recommends 10 cases per variable, the study required a total of 160 participants because the survey contains 16 questions measuring the study variables. Studies suggest that 30 participants are a reasonable sample size for a pilot study (Johanson & Brooks, 2010). For the pilot test, 50 Fraser Health and 100 Island Health clients were initially contacted and 19 Fraser Health and 6 Island Health clients responded to the survey (see Table 1). For the final data collection, 150 Fraser Health and 100 Island Health clients were initially contacted and 58 Fraser Health and 13 Island Health clients responded to the survey (see Table 1). Data were collected from participants responding to the survey within a four-week data collection period. A total of 96 individuals participated in the study.

Survey Development

As the principal investigator, I developed the survey questionnaire for the study purpose. Despite the growing studies on telehealth, there is a lack of consistent evaluation framework, outcome indicators, and tools to evaluate its outcome (Scott et al., 2007). Additionally, there is a lack of consistent and comprehensive indicator to measure different aspects of access to care (Allin et al., 2007; Thorpe et al., 2011). Current population surveys, such as the Canadian Community Health Survey (Statistics Canada, 2016a) and the National Population Health Survey (Statistics Canada, 2011), include indicators to measure access to care and utilization of healthcare services. Those questions focus on the use of specific healthcare services and barriers to healthcare access but do not address comprehensive aspects that determine the quality and outcome of access to care. Moreover, studies on access to care for older adult populations have mostly focused on healthcare utilization to measure access to care (Thorpe et al., 2011). However, individuals' perceived access to care is a more reliable method to identify "their true access," than focusing on healthcare utilization because lack of utilization does not always indicate a problem in access to care (Thorpe et al., 2011, p. 182). Therefore, a questionnaire was developed on the basis of population surveys and current literature in order to capture comprehensive aspects of older adults' access to care in relation to telehealth use.

The newly developed survey questionnaire included three sections: telehealth, access to care, and demographics (see Appendix C). The telehealth section included one question about the use of telehealth services. The access to care section included one question about the ease of receiving healthcare services (Bashshur, 1995; Hollander, Miller, & Kadlec, 2010) and 14 questions about the personal, financial, and structural attributes of healthcare access. Thus, the access to care section included a total of 15 questions. The perceived ease of receiving care was measured on a Likert scale ranging from score 1 (*mostly difficult*) to 5 (*mostly easy*). The participants' level of agreement with the attributes of healthcare access was also measured on a scale from score 1 (*strongly disagree*) to 5 (*strongly agree*). The questions about attributes of healthcare access identified availability of healthcare services where and when care is needed, as well as availability of a regular healthcare provider for easy and ongoing contact (Statistics Canada, 2011; Statistics Canada, 2016a). In addition, approachability and acceptability of services were identified by individuals' knowledge about how to access care and their decision to seek care (Levesque et al., 2013; Sibley & Glazier, 2009). The questions further referred to accommodation of services in terms of waiting time, affordability of services related to healthcare cost, and accessibility of care in terms of transportation (Penchansky & Thomas, 1981). The appropriateness and adequacy of care were evaluated from whether healthcare services meet individuals' needs and values and make a positive impact on their health, and whether individuals are satisfied with the overall quality of care (Levesque et al., 2013; Souliotis et al., 2016). A pilot test was conducted to assess the psychometric properties of the questionnaire, which are presented in the result section. Finally, the demographics section included information on age, chronic illness, living condition, community type, and usual mode of transportation in the community.

Measures

Telehealth. The independent variable (IV) of the study is *telehealth*. Telehealth refers to the use of information and communications technology for the delivery of healthcare services and information (Scott et al., 2007). Telehealth was measured at the nominal level by asking participants whether they have used telehealth services provided by BC health authorities (i.e., Fraser Health and Island Health).

Access to care. The dependent variable (DV) of the study is *access to care*. Access to care is comprehensively defined as the opportunity to identify healthcare needs and receive timely and appropriate care, without barriers or burdens, to fulfill the care needs and achieve healthcare goals (Levesque et al., 2013; Scott et al., 2007). Access to care was measured based on (a) the participants' perceived ease of receiving care and (b) their agreement with personal, financial, and structural attributes of healthcare access. The total access to care scores ranged from minimum 15 to maximum 75. Therefore, the DV was measured at the interval level and a higher score means a better access to care.

Data Collection

The study included two data collection periods and each period ran for four weeks. The first period of data collection involved 25 participants to pilot test the survey questionnaire developed for this study. After the pilot test, the second period of data collection continued with 71 participants. The self-administered survey was mailed to participants' home addresses. The participants returned the completed questionnaire in a pre-stamped envelope enclosed with the survey.

Statistical Analysis

Descriptive statistics were calculated to describe the participants' demographic information and responses to the self-reported survey questions. In addition, the Mann-Whitney *U* test was used to identify whether there is a statistically significant difference in the access to care scores between telehealth users and nonusers. The nonparametric test was used because the sample size was too small to assume a normal distribution of data and the sample sizes differed between the two participant groups. The two participant groups were independent from one another because each participant selected between two categories about telehealth use. Additionally, access to care was measured at the interval level. Thus, the study met the assumptions for the Mann-Whitney *U* test. The statistical tests were conducted at the significance level of .05 using the IBM SPSS Statistics software version 25. There were less than 2% random missing values. For the reliability and validity tests, any missing data were excluded listwise. In addition, any missing data were imputed with person mean values for the calculation of access to care scores.

Ethical Considerations

The study received a harmonized research ethics approval from the Fraser Health, Island Health, and University of Victoria Research Ethics Boards in May 2017 (see

Appendix F). The study involved minimal risks to participants and participation in the study was voluntary. The study information and consent document was provided to participants with the survey and the return of completed questionnaire was considered as implied consent to participate in the study. The study was conducted and data were stored in accordance with the policies of above stated Research Ethics Boards to respect the rights, privacy, and confidentiality of study participants.

Chapter 4. Results

Survey Response Rate

As shown in Table 1, a total of 150 individuals were invited for the pilot test and 25 participants (16.7% response rate) responded to the survey. For the final data collection, 250 individuals were invited and 71 participants (28.4% response rate) responded to the survey. In total, 96 individuals participated in the study with an overall response rate of 24.0%. One survey was omitted from the analysis because more than 50% of data were missing. Therefore, 95 responses were analyzed for this study.

Table 1

Survey Response Rate

Source	Total[a]	Frequency	%
	Pilot		
Fraser Health	50	19[b]	38.0
Island Health	100	6	6.0
Total	150	25	16.7
	Final		
Fraser Health	150	58	38.7
Island Health	100	13	13.0
Total	250	71	28.4
Cumulative total	400	96	24.0

[a] The total number of individuals invited to participate in the survey.
[b] Including one incomplete and unanalyzable response.

Pilot Test

The newly developed survey questionnaire was pilot tested with 25 participants. A Cronbach’s alpha of .973 supported internal consistency reliability of the 15-item questionnaire measuring access to care. Construct validity was tested by examining the correlation between two different indicators of access to care: “ease of receiving care” and “attributes of healthcare access.” Spearman’s rho was used to test the correlation between the two indicators because the sample size was small and variables were not normally distributed. Construct validity was supported by a significant positive correlation between the two indicators, $r_s = .61$, $p = .002$.

Participant Responses to Telehealth Use

As shown in Table 2, twenty-one participants (22.1%) responded that they have used telehealth services and 74 participants (77.9%) responded that they have not used telehealth services provided by BC health authorities. There was twice higher rate of telehealth users among the Island Health participants (36.8%), compared to the Fraser Health participants (18.4%).

Table 2

Participant Responses to Telehealth Use

		Telehealth user		**Nonuser**	
Source	*N*	Frequency	%	Frequency	%
Fraser Health					
Pilot period	18	2	11.1	16	88.9
Final period	58	12	20.7	46	79.3
Total	76	14	18.4	62	81.6
Island Health					
Pilot period	6	2	33.3	4	66.7
Final period	13	5	38.5	8	61.5
Total	19	7	36.8	12	63.2
Cumulative total	**95**	**21**	**22.1**	**74**	**77.9**

Participant Demographics

Table 3 demonstrates the participant demographics, including age group, number of chronic diseases, living condition, community type, and usual mode of transportation. Overall, the telehealth and nonuser groups had similar demographic characteristics. The majority of participants were under the age of 85, having two or more chronic diseases, and living with others, such as spouse, in a private dwelling. More than 85% of the participants were from urban or suburban communities in BC, while 14.3% of telehealth users and 9.5% of nonusers were from rural communities. In addition, the majority of participants reported that driving is the major mode of transportation. Among the participants, 23.8% of telehealth users and 25.7% of nonusers reported that they mostly travel with family or friends. One respondent also specified the use of “costly taxi” due to mobility difficulties.

Although the sample size was small, the telehealth user group showed some distinct characteristics, which might be associated with their use of telehealth services. Compared to the nonuser group (4.1%), the telehealth group (14.3%) included a higher rate of older adults over the age of 85 and participants living in rural communities. In addition, the majority of telehealth users (81.0%) reported a single mode of transportation while almost one third of nonusers (32.4%) reported the use of multiple modes of transportation, including electric wheelchairs or scooters and public transportation.

The majority of participants also reported having comorbidities: 76.2% telehealth users and 67.6% of nonusers reported having more than one chronic disease. The nonuser group (31.1%) was more likely to have four or more chronic diseases than the telehealth group (14.3%) although the severity of conditions was not assessed.

Table 3

Participant Demographics

	Telehealth user (*N* = 21)		**Nonuser (*N* = 74)**	
Demographics	Frequency	%	Frequency	%
Age				
65 – 74	11	52.4	43	58.1
75 – 84	7	33.3	28	37.8
85 and older	3	14.3	3	4.1
Number of chronic diseases				
1	5	23.8	20	27.0
2 – 3	13	61.9	27	36.5
4 or more	3	14.3	23	31.1
Unknown[a]	0	0	4	5.4
Living condition				
Alone	4	19.0	20	27.0
With others	16	76.2	54	73.0
Assisted living	1	4.8	0	0
Community				
Urban	10	47.6	33	44.6
Suburban	8	38.1	34	45.9
Rural	3	14.3	7	9.5
Mode of transportation[b]				
Walk	4	19.0	17	23.0
Drive	14	66.7	57	77.0
Electric wheelchair/ scooter	0	0	2	2.7
Public transportation	2	9.5	8	10.8
With family or friends	5	23.8	19	25.7
Other (Taxi)			1	1.4

[a] Participants did not provide information about chronic diseases.

[b] Participants selected multiple responses.

As shown in Figure 2, the most commonly reported chronic diseases by participants were cardiovascular or circulatory diseases, hypertension, and musculoskeletal or rheumatic diseases, including arthritis. The participants also frequently reported diabetes and respiratory diseases, such as COPD. Compared to nonusers (14.5%), telehealth users (20.8%) more frequently reported arthritis and musculoskeletal diseases.

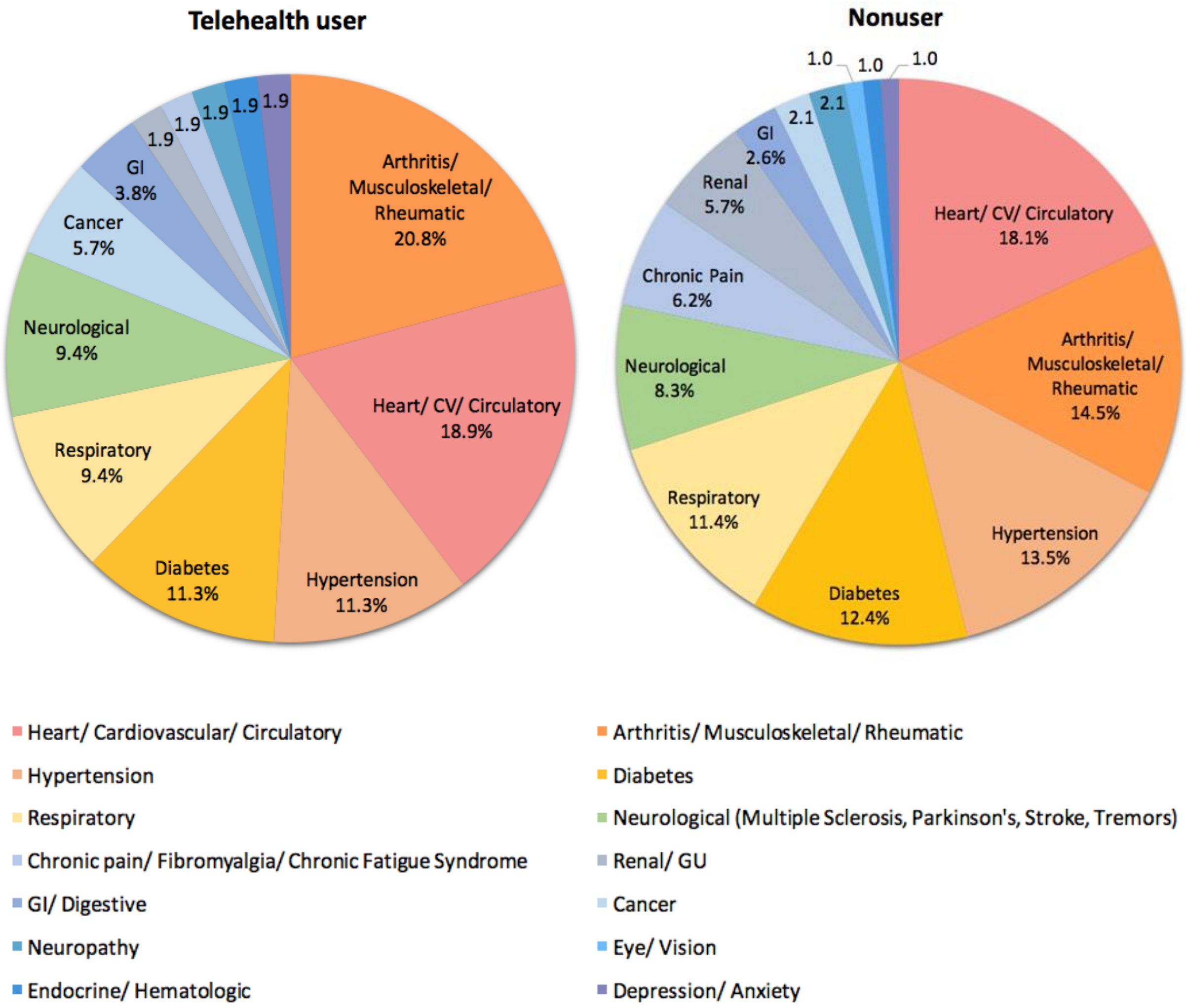

Figure 2. Types of chronic diseases reported by participants. Individual chronic diseases were grouped into related systems and functions.

Access to Care between Telehealth Users and Nonusers

In Table 4, the mean access to care scores are compared between telehealth users and nonusers. Regardless of telehealth use, the participants overall provided moderately high scores of access to care (*M* = 59.76, *SD* = 12.07 for telehealth users; *M* = 58.16, *SD* = 10.90 for nonusers). Figure 3 illustrates the percentage frequency of participant responses to the ease of receiving care in the community. On average, both telehealth users (*M* = 3.81, *SD* = 1.36) and nonusers (*M* = 3.72, *SD* = 1.37) reported that it is moderately easy to receive healthcare services in their community (see Table 4). About 76% telehealth users and 73% of nonusers responded that it is fair or easy to receive healthcare services in their community (see Figure 3). On the other hand, 24% of telehealth users and 27% of nonusers reported that it is sometimes or mostly difficult to receive necessary healthcare services in their community to maintain or improve their health conditions.

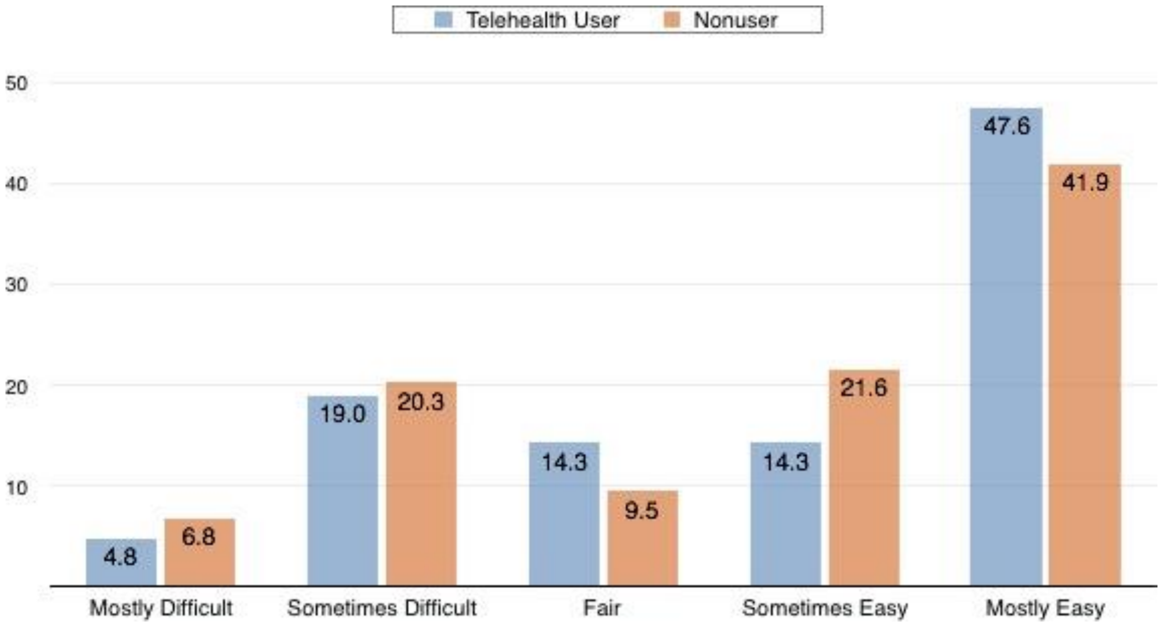

Figure 3. The percentage frequency of participant responses to the ease of receiving care in the community.

Table 4

Mean Access to Care Scores between Telehealth Users and Nonusers

	Telehealth user (*N* = 21)		**Nonuser (*N* = 74)**	
Access to care	*M (SD)*	95% CI	*M (SD)*	95% CI
Ease of receiving care	3.81 (1.36)	[3.19, 4.43]	3.72 (1.37)	[3.40, 4.03]
Availability and Accommodativeness				
Available when needed	3.90 (1.09)	[3.41, 4.40]	3.73 (0.94)	[3.51, 3.95]
Available in community	**3.67** (1.35)	[3.05, 4.28]	3.74 (1.02)	[3.51, 3.98]
Regular care provider	4.24 (1.04)	[3.76, 4.71]	4.34 (0.69)	[4.18, 4.50]
Easy to contact provider	4.00 (1.05)	[3.52, 4.48]	4.14 (0.67)	[3.98, 4.29]
Waiting time not long	4.00 (1.00)	[3.54, 4.46]	3.96 (0.88)	[3.76, 4.16]
Acceptability and Approachability				
Know how to seek care	4.33 (0.80)	[3.97, 4.70]	4.15 (0.81)	[3.96, 4.34]
Seek care when needed	4.29 (0.90)	[3.88, 4.70]	4.14 (0.80)	[3.95, 4.32]
Affordability				
Healthcare affordable	**3.52** (1.08)	[3.03, 4.01]	**3.24** (1.27)	[2.95, 3.54]
Accessibility				
Travel without difficulty	**3.48** (1.40)	[2.84, 4.11]	3.70 (1.13)	[3.44, 3.96]
Appropriateness and Adequacy				
Receive necessary care	4.10 (1.04)	[3.62, 4.57]	3.86 (0.98)	[3.64, 4.09]
Receive appropriate care	4.10 (1.00)	[3.64, 4.55]	3.77 (0.99)	[3.54, 4.00]
Care respects values	4.14 (0.85)	[3.75, 4.53]	3.80 (0.99)	[3.57, 4.03]
Positive impact on health	4.29 (0.78)	[3.93, 4.64]	4.09 (0.86)	[3.89, 4.29]
Satisfied with care	3.90 (1.30)	[3.31, 4.50]	3.78 (1.02)	[3.55, 4.02]
Total Score (Max. = 75)	59.76 (12.07)	[54.27, 65.26]	58.16 (10.90)	[55.64, 60.69]

Note. CI = confidence interval. The relatively lower average scores are shown in boldface. This table presents the average scores of each participant group. For the Mann Whitney *U* test, the total access to care scores were compared between telehealth users and nonusers.

Availability and accommodativeness. Both telehealth users (*M* = 3.90, *SD* = 1.09) and nonusers (*M* = 3.73, *SD* = 0.94) generally reported that healthcare services are available when needed (see Table 4). As highlighted in Table 4, the telehealth user group (*M* = 3.67, *SD* = 1.35) reported a slightly lower average score on the availability of healthcare services in the community compared to the nonuser group (*M* = 3.74, *SD* = 1.02). About 24% of telehealth users and 15% of nonusers disagreed that necessary healthcare services are available in their community (see Figure 4). On the other hand, 90.5% of both telehealth users and nonusers agreed that they have a regular healthcare provider. Although the participants generally identified that it is easy to contact their healthcare providers, telehealth users (*M* = 4.00, *SD* = 1.05) were more likely to report difficulty contacting their healthcare providers than nonusers (*M* = 4.14, *SD* = 0.67). About 14% of telehealth users and none of nonusers disagreed that they can easily contact their healthcare providers. Overall, healthcare is considered accommodative because both telehealth users (*M* = 4.00, *SD* = 1.00) and nonusers (*M* = 3.96, *SD* = 0.88) generally identified that they can see their healthcare providers without waiting too long. About 71% of telehealth users and 76% of nonusers agreed that the waiting time is reasonable.

Acceptability and approachability. As shown in Table 4, participants were generally positive that they know how to seek care (*M* = 4.33, *SD* = 0.80 for telehealth users; *M* = 4.15, *SD* = 0.81 for nonusers) and they seek care when needed (*M* = 4.29, *SD* = 0.90 for telehealth users; *M* = 4.14, *SD* = 0.80 for nonusers). The majority of telehealth users (90.5%) and nonusers (89.2%) either agreed or strongly agreed that they know how to access care and they seek care when needed (see Figure 5).

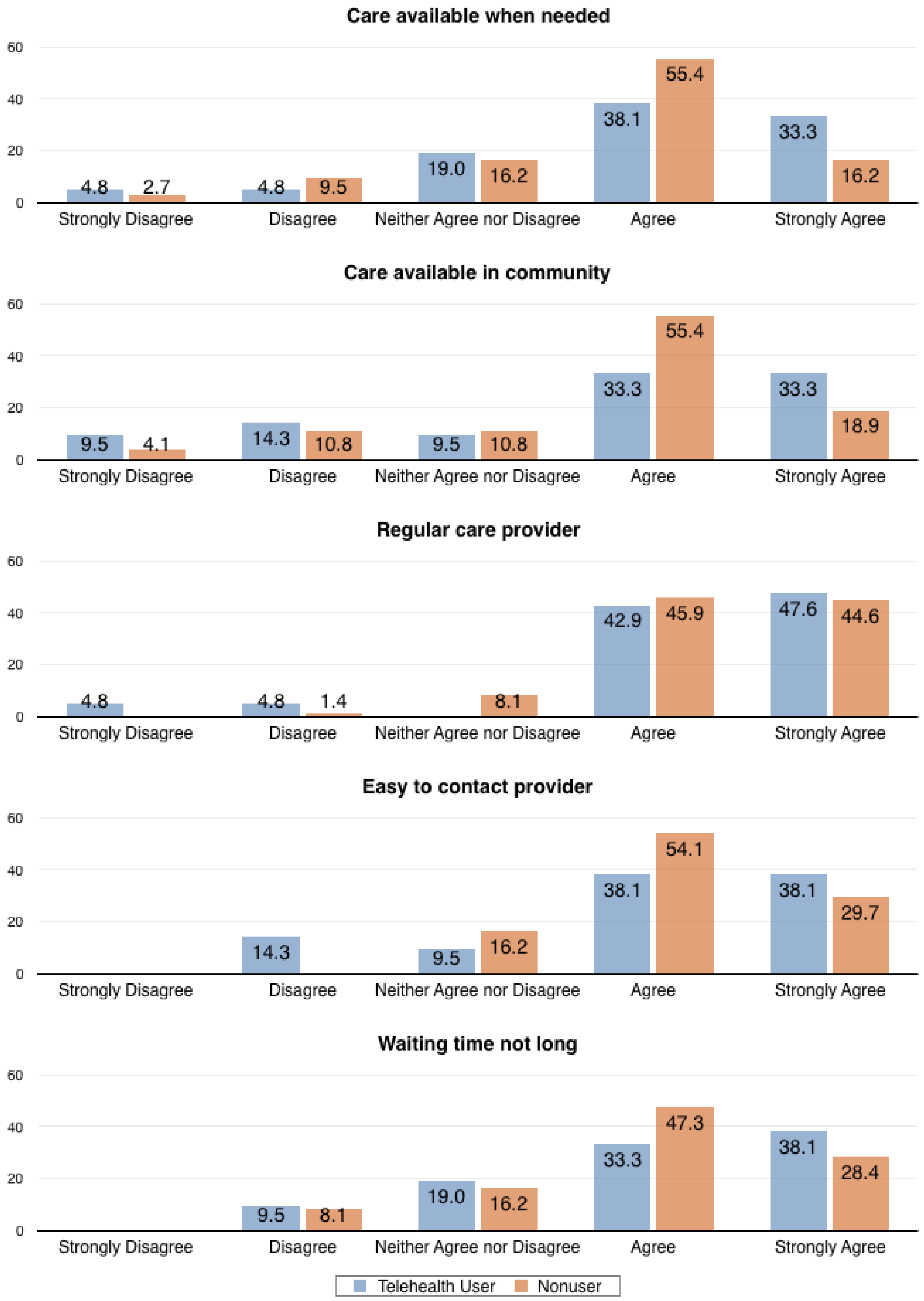

Figure 4. The percentage frequency of participant responses to availability and accommodativeness of care.

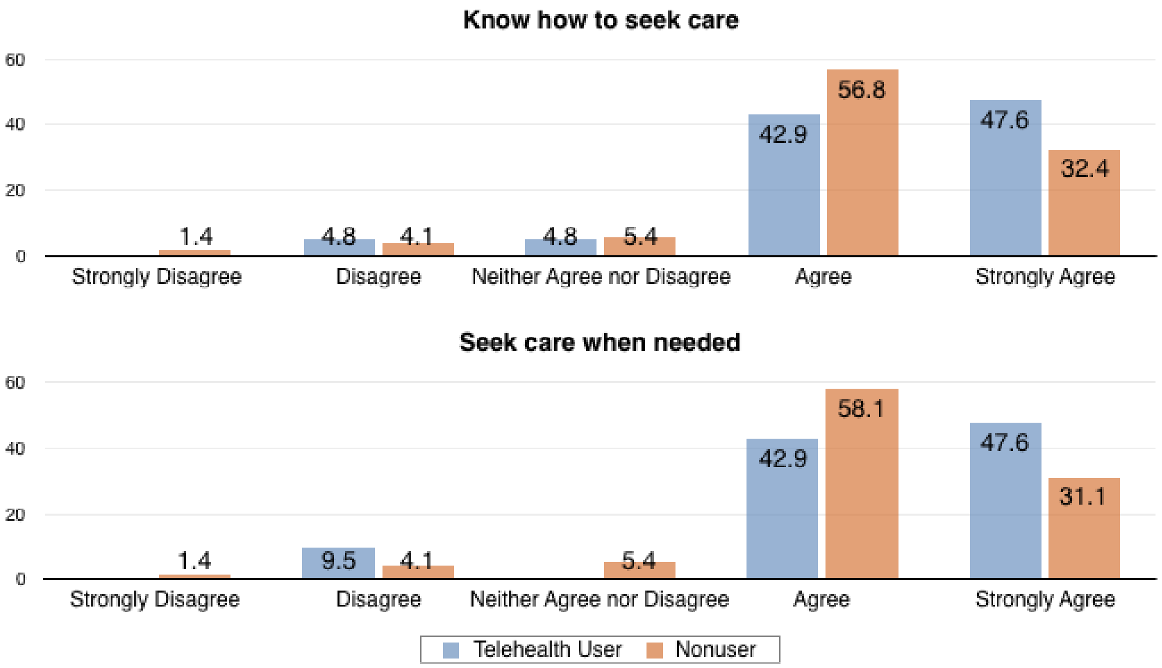

Figure 5. The percentage frequency of participant responses to acceptability and approachability of care.

Affordability. As highlighted in Table 4, both telehealth users (*M* = 3.52, *SD* = 1.08) and nonusers (*M* = 3.24, *SD* = 1.27) provided relatively lower average scores on the affordability of healthcare, which indicate cost can be a barrier to their healthcare access. As shown in Figure 6, about 24% of telehealth users and 31% of nonusers disagreed that healthcare costs are affordable while about 19% of telehealth users and 20% of nonusers provided a neutral response (i.e., neither agree nor disagree). Overall, about 43% of telehealth users and 51% of nonusers did not report that healthcare costs are affordable.

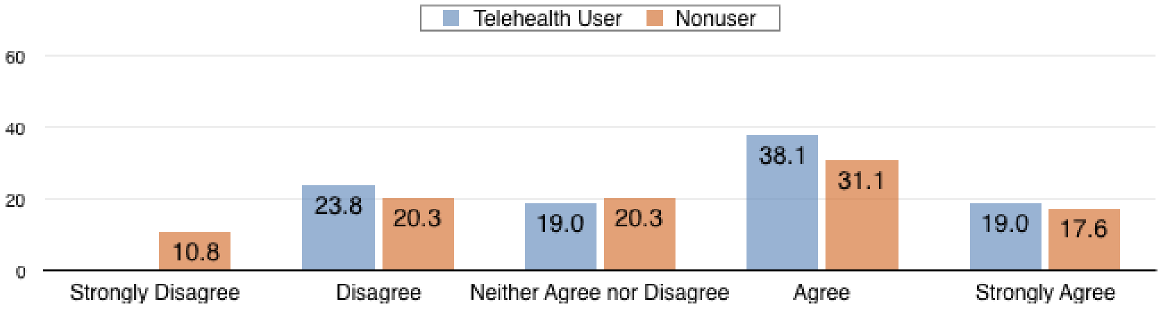

Figure 6. The percentage frequency of participant responses to affordability of care.

Accessibility. As highlighted in Table 4, telehealth users (*M* = 3.48, *SD* = 1.40) provided a lower average score on the accessibility of care than nonusers (*M* = 3.70, *SD* = 1.13). Compared to nonusers (16.3%), one third of telehealth users (33.3%) disagreed that they can travel for medical appointments without difficulties (see Figure 7).

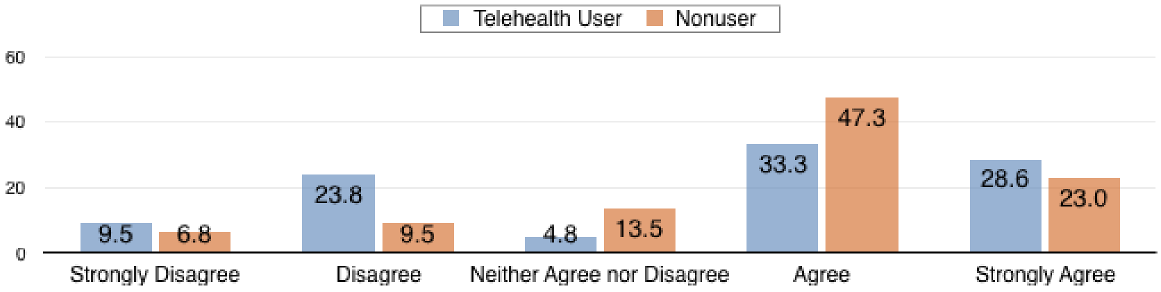

Figure 7. The percentage frequency of participant responses to accessibility of care.

Appropriateness and adequacy. On average, participants were moderately positive about the quality and outcome of care regardless of telehealth use. Both telehealth users (*M* = 4.10, *SD* = 1.04) and nonusers (*M* = 3.86, *SD* = 0.98) generally responded that they receive important and necessary care (see Table 4). About 76% of both telehealth users (*M* = 4.10, *SD* = 1.00) and nonusers (*M* = 3.77, *SD* = 0.99) also reported that they receive adequate and appropriate care (see Figure 8). In addition, 81% of telehealth users (*M* = 4.14, *SD* = 0.85) and 72% of nonusers (*M* = 3.80, *SD* = 0.99) agreed that care respects their values and beliefs.

Both telehealth users (*M* = 4.29, *SD* = 0.78) and nonusers (*M* = 4.09, *SD* = 0.86) were also generally positive about the outcome of healthcare (see Table 4). The majority of telehealth users (90.5%) and nonusers (83.8%) agreed that healthcare makes a positive impact on their health (see Figure 8). Overall, both telehealth users (*M* = 3.90, *SD* = 1.30) and nonusers (*M* = 3.78, *SD* = 1.02) were also moderately satisfied with healthcare. About 76% of telehealth users and 69% of nonusers agreed that they are satisfied with the quality of care they receive (see Figure 8). On the other hand, 23.8% of telehealth users and 10.9% nonusers were dissatisfied with the quality of care while about one in five (20.3%) nonusers provided a neutral response (i.e., neither agree nor disagree).

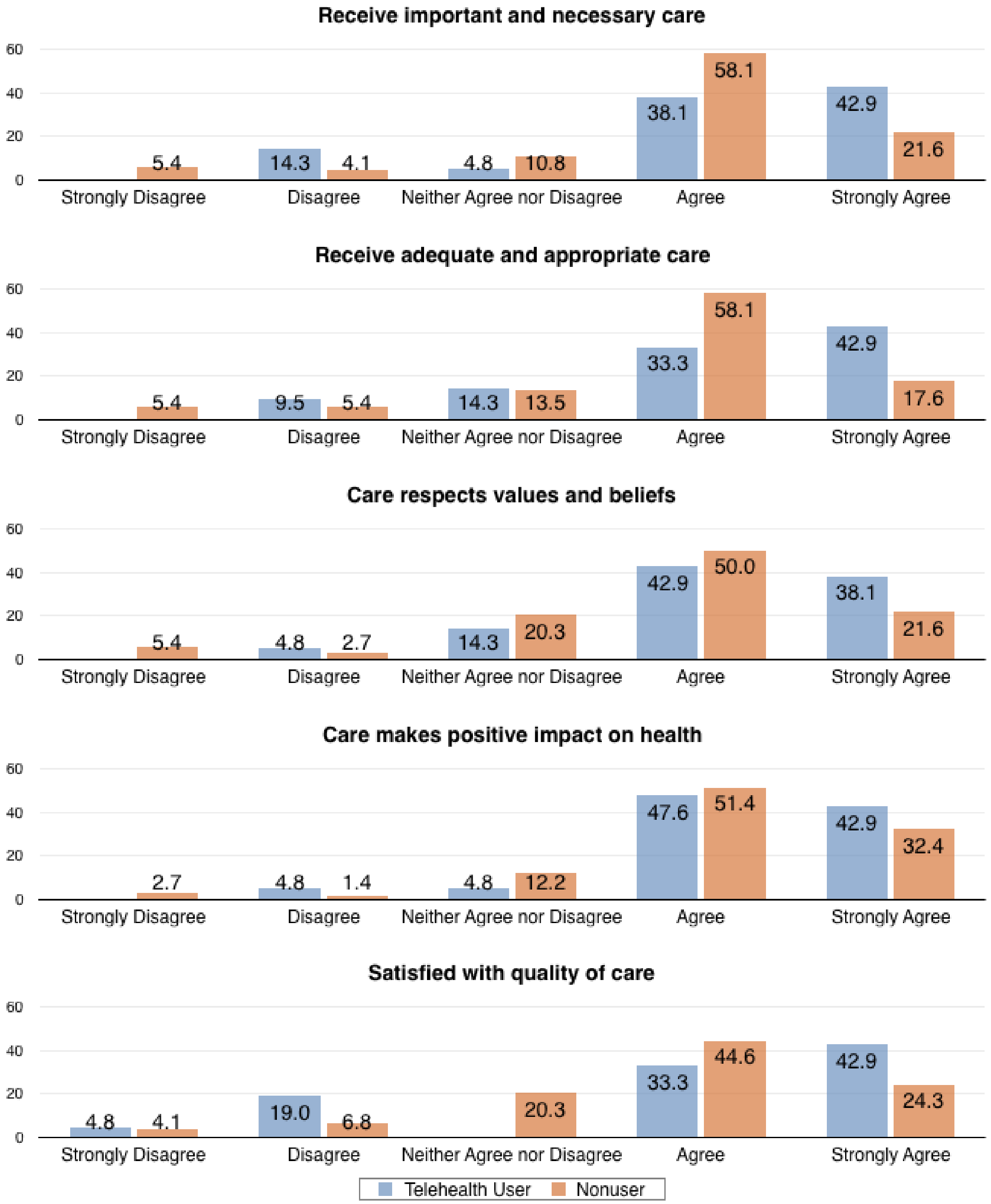

Figure 8. The percentage frequency of participant responses to appropriateness and adequacy of care.

Impact of Telehealth on Access to Care

Although the sample sizes differed between the telehealth and nonuser groups, the two groups had equal variances, $F = .846$, $p = .360$. According to the Mann Whitney *U* test, there was not a significant difference in the total access to care scores between telehealth users (*Mdn* = 60.00) and nonusers (*Mdn* = 59.50), $U = 702.50$, $z = -.669$, $p = .504$, $r = -.07$.

Additional Participant Comments

The participants made additional comments about factors affecting their access to care. Specifically, two participants commented that the expense of medications or pharmaceutical products is a major barrier associated with the affordability of care. One participant also commented on the difficulty "[moving] to a more affordable area" in relation to health. In addition, one participant stated that it is not easy to contact healthcare providers on weekends.

Several participants commented that they have never heard of telehealth services and required more information about the services. One participant stated "seniors often have no opportunity to utilize technology." On the other hand, participants who have used telehealth services highlighted the importance of telehealth for their healthcare access. One participant who joined a telehealth patient education session stated:

> *I found the teleconference to be an effective way to communicate medical information to patients, and for medical personnel to respond to questions and anxieties of patients* (Age group B, Urban resident).

Additionally, participants who regularly use telehealth services commented:

> *Telehealth is an important component to my health care allowing me easier access to highly trained medical specialists located several hours away* (Age group A, Rural resident).
>
> *[Telehealth] has been first class since I am no longer able to travel to Victoria for appointments* (Age group A, Urban resident).

The findings highlighted that access to care is determined by not only the availability of quality healthcare services but also physical accessibility and affordability of care. From the participant comments, it was also identified that telehealth is currently offered by specific clinical programs. Thus, the use of telehealth might depend on individuals' health conditions and area of living.

Chapter 5. Discussion

This study aimed to evaluate the impact of telehealth on access to care based on the perspective of community-dwelling older adults with chronic illnesses. The results from the self-reported survey showed that telehealth did not have a significant impact on access to care for community-dwelling older adults with chronic illnesses. However, the survey findings and participant comments provided important information about how older adults access healthcare services in their community and the value of telehealth, especially for individuals with barriers to healthcare access. Although the majority of older adult participants did not identify significant difficulty accessing healthcare services in their community, they often reported physical and financial barriers to healthcare access. These findings are noteworthy as a dearth of studies have looked into comprehensive factors associated with access to care for older adults and how telehealth can influence different factors of access to care in current healthcare contexts.

Impact of Telehealth on Access to Care

Based on the survey developed for this study, the access to care scores were not significantly different between telehealth users and nonusers, which indicated telehealth did not significantly influence individuals' access to care. Although telehealth is not widely available across communities and care settings at this time, it has demonstrated its value for facilitating healthcare access for community-dwelling older adults. Compared to the nonuser group, the telehealth user group included a higher rate of older adults over the age of 85 and rural residents. In addition, telehealth users were more likely to report a lack of available healthcare services in their community and difficulty traveling for medical appointments. Despite the barriers related to availability and accessibility of care, their overall ease of receiving care and satisfaction with care were relatively positive compared to the nonuser group. Although it is difficult to discern the direct impact of telehealth on positive access to care, the telehealth users frequently commented on the benefits of telehealth for their healthcare access.

The telehealth users particularly appreciated the positive impact of telehealth on the physical accessibility of specialist care in their own community. Previous studies have also identified that older adults perceive improved access to specialist care using telehealth (Kehle, Greer, Rutks, & Wilt, 2011). Rural residents especially appreciate the value of telehealth, including access to quality healthcare services in their community and reduced burden of travel for healthcare (Sevean et al., 2008). The participants from the Island Health region were more likely to use telehealth services compared to the participants from the Fraser Health region. Accessing necessary healthcare services for individuals living in remote island communities may involve hours of drive or ferry trips to urban communities. The long trips to visit healthcare providers increase the physical burden as well as the time and cost of traveling. For some individuals, telehealth is essential and almost the only option to get in contact with healthcare providers in different communities. Some participants commented that telehealth is integral to their care because it is a great burden for them to travel to a different community for specialist care, especially with physical symptoms restricting their activities. From the participant comments, it was identified that telehealth not only supports efficient healthcare delivery but also, more important, provides a means to link individuals and care providers and improves the availability and accessibility of care for people with mobility difficulties and those living in communities with limited care resources.

Access to Care for Older Adults

The findings demonstrated that the majority of community-dwelling older adults do not experience significant systemic and personal barriers to healthcare access. Clarke (2016) also noted that more than 70% of the overall Canadian healthcare clients do not find difficulty accessing healthcare services. The participants in this study generally agreed that healthcare services are available and accommodative when needed. The vast majority of participants also had knowledge and readiness to access healthcare services as needed. They also identified that healthcare services are mostly approachable and appropriate to meet their care needs. In addition, the majority of participants were positive about the quality and outcome of healthcare.

Process of receiving care. Most community-dwelling older adults have a regular healthcare provider and they generally do not find difficulty contacting their healthcare providers. These findings are consistent with other population surveys. According to CIHI (2011), 94% of Canadian older adults have a regular healthcare provider. In addition, older adults are more likely to have a regular healthcare provider or place of care compared to younger populations (CIHI, 2011; Weaver et al., 2014). In a study by Ronksley et al. (2012), respondents with chronic diseases were also more likely to have a family physician and the rate of having a family physician increased with the number of chronic diseases. Thus, older adults with chronic diseases generally have a regular source of care to manage their chronic health conditions.

Although having a regular source of care does not always guarantee timely access to healthcare services, older adults in this study identified that healthcare is moderately accommodative. Barriers to timely access to care and after-hours care are commonly identified problems for Canadian adults and those with chronic diseases (CIHI, 2017; Weaver et al., 2014). The difficulty contacting healthcare providers in after hours was also identified in this study. However, older adult participants in this study generally reported that waiting time is not a significant concern. Previous studies have found that older adults are less likely to report unmet care needs than younger adults, which could be related to different life circumstances and expectations (Chen & Hou, 2002; Clarke, 2016; Hoogendijk et al. 2014; Sibley & Glazier, 2009; Ronksley et al., 2014). For example, younger adults tend to have a higher expectation about healthcare than older adults (Clake, 2016; Kasman & Badley, 2004). Compared to older adults, younger adults are also more likely to report personal barriers, such as having busy schedules or deciding not to seek care, as the reason for not receiving necessary care (Chen & Hou, 2002; Wilson & Rosenberg, 2004). Thus, older adults with more flexible schedules may not identify time as a significant barrier to healthcare access.

In addition, older adults may receive more timely healthcare services because they already have an ongoing care relationship with healthcare providers for the management of long-term health conditions. According to CIHI (2011), older adults tend to have the same healthcare providers for more than seven years. An ongoing relationship between patient and healthcare provider allows more timely delivery of coordinated care based on the patient’s medical history (Schoen, Osborn, How, Doty, & Peugh, 2009). Harrington et al. (2013) also found that younger adults were more likely to report difficulty accessing specialist care than older adults and one possible reason is because older adults tend to have ongoing appointments while younger adults tend to seek initial appointments. Overall, findings support that most older adults with chronic diseases do not find difficulty accessing care because they have a regular source of care and ongoing care relationship with healthcare providers for the management of their long-term conditions and have less conflicting schedules or circumstances that prevent them from seeking and receiving necessary care.

Personal knowledge and readiness. Most participants in this study did not identify barriers related to personal attributes, such as a lack of knowledge or information about healthcare services or a lack of care-seeking. Almost every participant in this study clearly reported their health conditions. The vast majority of participants also identified that they know how to seek care and they seek care when needed. CIHI (2011) reported that the majority (86%) of older Canadians with chronic diseases have knowledge about healthcare interventions for their health conditions. Additionally, their demographic factors, such as education, gender, or age, did not significantly affect their knowledge about healthcare for chronic disease management (CIHI, 2011). A Canadian study by Gould, West, and Mancuso (2009) also identified that younger and older adults have similar knowledge and beliefs about when to use different healthcare services, which further supports that older adults have appropriate knowledge to navigate and access healthcare. Older adults are also less likely to report barriers related to acceptability of care (Chen & Hou, 2002), which means they generally do not find personal barriers to seek and receive care. These findings demonstrate that older adults have personal knowledge and readiness to identify their care needs and access relevant healthcare services to meet their needs. It is important that older adults have knowledge and information about their health conditions and healthcare services because their active participation in care is essential for effective chronic disease management and prevention of complications. As older adults have knowledge about their health conditions and they know when and how to access care, the continued role of healthcare is to provide diverse care options and health information, invite them to decision-making, and support them to become more active participants in their health management.

Outcome and satisfaction with care. In relation to the appropriateness and adequacy of care, both telehealth users and nonusers were overall satisfied with the care they receive. CIHI (2011) addressed that although the majority of older adults have a regular healthcare provider, they often do not receive adequate healthcare services to prevent chronic diseases, comorbidities, or complications. However, the participants in this study generally agreed that they receive important and appropriate care. The majority of participants also agreed that care respects their values and beliefs and makes positive impact on their health. On the other hand, about 30% of participants in this study were either not satisfied with or neutral about the quality of care, which signifies the need for improvement in care delivery.

In fact, participants who were not satisfied with care often reported difficulties accessing healthcare services in their community, not having a regular care provider, and not receiving important and appropriate care. A recent report by CIHI (2018) showed that 67% of Canadian older adults were satisfied with the overall care they received, which is below the international average, and the satisfaction rate was even lower among older adult residents in BC (64%). Although their overall satisfaction with care was below average, the majority of older adults (74%) were satisfied with the care they received from their regular healthcare providers and 72% of older Canadians agreed that their regular healthcare providers know their important medical history (CIHI, 2018).

Thus, having an ongoing care relationship with a regular healthcare provider helps older adults with chronic diseases to receive more satisfactory care that meets their care needs and values. Although the findings indicate that community-dwelling older adults generally have satisfactory experiences and outcomes with healthcare to manage their chronic health conditions, there is an ongoing need to improve the current healthcare delivery and overall quality of care to support those experiencing barriers to healthcare access.

Barriers to Access to Care

Although the majority of participants did not identify significant barriers to healthcare access, about one in four participants reported that it is difficult to access healthcare services in their community to maintain or improve their chronic diseases. The participants in this study most frequently reported barriers related to physical availability and accessibility of care and affordability of care. Lack of available healthcare services as well as cost and transportation issues are commonly identified barriers to healthcare access for Canadians (Chen & Hou, 2002; Clarke, 2016; Sibley & Glazier, 2009; Wilson & Rosenberg, 2004). These persisting barriers raise questions about whether the current systemic interventions are effectively addressing the recognized barriers to healthcare access.

Availability of care. Compared to nonusers, telehealth users more frequently reported that necessary healthcare services are not available in their community, which implies that telehealth is targeted to resolve a lack of healthcare resources in community settings. About one third of telehealth users did not agree that necessary healthcare services are available in their community. Additionally, telehealth users were more likely to disagree that they can easily contact their healthcare providers. The telehealth group also had a higher rate of rural residents. The relative lack of available healthcare services in the community may explain their use of telehealth services to contact healthcare providers. Studies have identified that rural residents and people with chronic diseases are more likely to find barriers to availability and accessibility of care (Harrington et al., 2013; Thorpe et al., 2011). Individuals with chronic diseases require access to multiple healthcare services, including specialist care usually concentrated in urban centres (Afshar et al., 2014). Thus, community-dwelling older adults with chronic diseases, especially those with comorbidities and older rural residents, may identify a lack of comprehensive healthcare services that they need in their local community.

Accessibility of care. About one in five participants reported difficulty traveling for medical appointments, which indicates barriers associated with mobility, transportation, or distance to healthcare sites. Telehealth users more frequently reported barriers to traveling for medical appointments, which may have been their reason for using telehealth services instead of visiting healthcare providers in person. In addition, the nonusers with barriers to travel all reported that it is sometimes or mostly difficult to access healthcare services in their community although they scored relatively positive about the availability, acceptability, and quality of care. More than 40% of participants with barriers to accessibility live in urban communities, which indicates their barriers may not be necessarily related to a lack of healthcare services or a long distance to care sites. However, almost half (47.4%) of participants with barriers to accessibility reported that they rely on others, such as family members, to travel in their community. Thus, their barriers are most likely related to difficulties with mobility or transportation.

Previous studies have addressed transportation as a major barrier to healthcare access, especially for vulnerable populations, such as older adults or people with low socioeconomic status (Syed et al., 2013). Lack of easily accessible transportation can be a more significant barrier than long distance to care sites. For example, individuals living in a suburban community can overcome the distance barrier, if they have access to vehicles or transportation, while individuals living close to the care sites can have difficulty accessing the services if they have no means of transportation, such as having difficulty walking or taking public transit (Syed et al., 2013). From a systematic review, Corcoran, McNab, Girgis, and Colagiuri (2012) also identified that lack of transportation hinders older adults from accessing necessary healthcare in both urban and rural communities. In Canada, most older adults live in communities where driving is the major mode of transportation (Turcotte, 2012). Older adults who do not drive thus experience significant barriers to healthcare access because they have to rely on family or friends or take public transportation, which is often not available or involving longer trips (Finta et al., 2017). For older adults with mobility difficulties and comorbidities, improving transportation and physical accessibility of care can reduce their overall barriers to healthcare access.

Affordability of care. Despite the publicly funded healthcare system in Canada, healthcare costs are often identified as a barrier to healthcare access. Both the telehealth and nonuser groups in this study provided relatively lower average scores on the affordability of care and about half of the participants did not report that healthcare costs are affordable. Although almost all necessary medical services are covered by the public healthcare system in Canada, individuals are still responsible for about 30% of healthcare costs, which are paid either from out of their pockets or private insurance (Health Council of Canada, 2011). Individuals are responsible for direct costs of some services, such as medications or non-medical services, and indirect costs for receiving care, such as the cost of transportation or time loss from work (Haggerty & Levesque, 2015). In fact, quite a few Canadians, especially those with greater care needs, experience cost barriers to filling prescription medications, visiting physicians, or receiving follow-up treatments (Health Council of Canada, 2011). A Canadian study by Haggerty and Levesque (2015) also showed that about one third of the respondents did not access prescribed care services due to cost barriers irrespective of their income levels. Thus, the cost barriers affect individuals' decision and ability to access and receive necessary care.

Both direct and indirect costs of care are barriers for older adults with chronic diseases. Thorpe et al. (2011) also found that older adults with barriers to healthcare access commonly experience financial barriers, which indicated the need for resolving the financial burden of care to facilitate their access to care. Although healthcare costs were not examined in detail, some participants in this study pointed out the costs of prescription medications and transportation as barriers. The cost of medications can be a burden for older adults who take multiple medications for chronic health conditions. Older adults with chronic diseases also require frequent visits to healthcare providers in different locations, which involve the cost and time of traveling. For older adults with mobility difficulties, the indirect cost of accessing healthcare services further increases due to the need for assistance or special transportation.

The cost barriers are particularly significant concerns for vulnerable populations. Canadians with chronic diseases and poor or fair health status more frequently experience barriers to affordable care than the general population (Health Council of Canada, 2011). In Australia, whose healthcare system is similar to Canada, individuals with multiple chronic diseases or having chronic diseases for a long period of time were more likely to have difficulty paying out-of-pocket healthcare costs (Carpenter, Islam, Yen, & McRae, 2015). Specifically, individuals with three or more chronic diseases were about three times more likely to have difficulty paying for healthcare costs than individuals without chronic diseases (Carpenter et al., 2015). In a study by Parikh et al. (2013), the financial barriers alone led to limited access to care for individuals with multiple chronic diseases, which further resulted in inadequate chronic disease management and negative health outcomes. Therefore, affordability of care is an important issue to consider in order to promote equitable access to care for vulnerable populations with chronic diseases.

Limitations of the Study

One major limitation of this study is the sampling of study participants. The study sample was selected from the participant recruitment programs in Fraser Health and Island Health. Thus, the survey was not available to individuals who have not used either Fraser Health or Island Health services or clients who have not provided consent to be contacted for research purposes. Due to the convenience sampling method and small sample size, participants of this study are not a representative sample of the older adult population in BC. The majority of participants might not have reported significant barriers to healthcare access because they are already healthcare users. Moreover, the survey was provided in written English and delivered to participants' home addresses. The study missed marginalized populations, such as individuals with low English literacy skills or those without a fixed address, and failed to understand their difficulties and barriers to healthcare access. The small sample size could have also limited the statistical power to detect a significant difference between the two study groups. In addition to the small sample size, there is a risk of response bias from the low response rate and the self-reported nature of the survey.

Moreover, only a small number of telehealth users participated in the survey partially because telehealth services are not widely available at this time. In addition to the small telehealth sample size, the definition of telehealth might differ depending on the health authority. For example, Fraser Health offers televisit, which refers to a telephone conversation between clients at home and healthcare providers, whereas Island Health's telehealth refers to a videoconferencing between clients and healthcare providers in a designated telehealth clinic. Therefore, telehealth users do not necessarily mean that they have used the same telehealth modalities.

Due to the lack of reliable tools to measure and compare comprehensive aspects of access to care, a survey was developed for this study. The psychometric properties of the survey were tested from a pilot survey. However, the pilot survey involved a small sample size. In addition, this study only tested the internal consistency reliability and construct validity, which led to limited understanding of the overall reliability and validity of the survey. Thus, a more extensive follow-up study is necessary to demonstrate comprehensive psychometric properties of the survey and present a rigorous tool for evaluating access to care.

Strengths of the Study

Despite these limitations, this study was the first local study that examined the impact of telehealth on different aspects of access to care from the perspective of older adults with chronic diseases. The study identified not only the older adults' use of telehealth services and how the services influence their access to care but also diverse factors associated with healthcare access for older adult residents in BC. The study also presented a new indicator to measure access to care. The survey was designed to capture comprehensive aspects of access to care, including the process and outcome of healthcare access in current contexts, rather than focusing on the utilization of healthcare services. The survey was developed based on a synthesis of current literature in order to capture comprehensive information about access to care and enhance its psychometric value for healthcare evaluation.

Implications for Telehealth Practice and Future Evaluations

In order to meet the needs of community-dwelling older adults with chronic illnesses, telehealth needs to be targeted to overcome barriers to physical availability and accessibility of care and affordability of care. The telehealth users in this study reported barriers related to availability and accessibility of care as well as affordability of care, which leave questions about whether telehealth makes meaningful impact on each aspect of access to care and brings in positive health outcome for older adults in different communities and contexts. As one major role of telehealth is to link clients and healthcare providers without geographic gaps, telehealth needs to be adopted to complement the limited resources in community settings, especially for older rural residents with chronic illnesses. With the potential to reach clients at home or in their community, telehealth also needs to focus on reducing physical barriers to healthcare access for older adults with mobility difficulties or lack of transportation.

In particular, it is important to demonstrate financial benefits of telehealth for older adults' ongoing access to care. Regardless of telehealth use, participants in this study reported the affordability of care as a major area for improvement. Telehealth aims to reduce healthcare costs and improve efficiency and equity of healthcare access. Recent studies have shown that telehealth resulted in a significant reduction in the distance, time, and cost of traveling for outpatient care, as well as a reduction in individual healthcare spending (Baker, Johnson, Macaulay, & Birnbaum, 2011; Dullet et al., 2017). Although telehealth has demonstrated a reduction in indirect costs of care for clients, depending on the telehealth practice settings, it has not resulted in comparable benefits to healthcare costs or patient outcomes (Wade, Karnon, Elshaug, & Hiller, 2010). Specifically, previous studies have not identified cost benefits of telehealth in relation to long-term patient outcomes, providing limited understanding of its value compared to usual care (Mistry, 2012; Polisena, D. Coyle, K. Coyle, & McGill, 2009). Although nonusers were more likely to disagree that healthcare costs are affordable, more than 40% of telehealth users in this study did not report that healthcare costs are affordable. Based on current evidence, it is premature to conclude that telehealth effectively reduces the financial barriers to healthcare access for older adults with chronic illnesses. Thus, telehealth professionals need to address the role of telehealth in resolving financial barriers to access to care and demonstrate its long-term effectiveness to support older adults with ongoing care needs.

Telehealth services also need to fit to the needs and contexts of healthcare clients because the success of telehealth depends on the users. From this study, it was identified that telehealth services are mostly provided by specific clinical programs, such as cardiology or neurology. Individuals have different care needs depending on their health conditions. For example, older adults with symptomatic chronic diseases not only require routine healthcare interventions but also experience greater barriers to healthcare access because the symptoms often restrict their activities. From the participant comments, it was identified that telehealth is an essential tool especially for older adults experiencing the physical burden of traveling for healthcare. Telehealth needs to be carefully targeted to these vulnerable populations and provide them a better opportunity to engage with healthcare providers, including specialists in different communities. Therefore, it is beneficial to integrate telehealth services into specific clinical or community programs in order to effectively reach the target populations and meet their unique care needs while maintaining ongoing care relationships between clients and healthcare providers.

In order to fit telehealth programs to the needs of clients or patients and inform telehealth practice, it is necessary to have ongoing collaborative evaluation with diverse populations. Although this study invited older adult clients to telehealth evaluation in order to inform telehealth practice based on their needs, it did not incorporate a standardized evaluation tool to provide comparative findings. For effective evaluation of different telehealth programs, it is essential to develop a standardized evaluation tool, which can be applied to diverse contexts and population groups. Studies have addressed not only a lack of evidence to demonstrate the effectiveness of telehealth but also a lack of fundamental or standardized evaluation mechanisms (Chang, 2015; Maeder, Gray, Borda, Poultney, & Basilakis, 2015). Inconsistent evaluation tools hinder effective comparison and integration of findings to inform various stakeholders (Maeder et al., 2015). Therefore, future studies need to focus on developing and implementing a comprehensive and rigorous evaluation mechanism for ongoing collaborative evaluation and optimization of telehealth.

Conclusion

Telehealth is an effective care delivery tool to facilitate access to care for older adults with barriers to mobility and transportation and a lack of healthcare services in their community. Equitable and reliable access to care is an essential determinant of health for older adults with chronic illnesses so that they can live healthy and independently in their community. The barriers experienced by older adults thus signify the need for reaching vulnerable populations and providing a systemic intervention, such as telehealth services integrated into clinical and community programs, in order to reduce physical and financial barriers to receiving ongoing care. Telehealth is a new intervention in many care settings and communities. There is still insufficient evidence to assess whether telehealth effectively supplements and facilitates healthcare delivery for older adults in different contexts. As the implementation and use of telehealth involves a collaborative process between clients and the healthcare system, there is a need for ongoing formative and summative evaluations with clients as well as long-term evaluations of its outcomes. Future studies need to focus on developing and validating a standardized tool or framework to evaluate and compare the impact of telehealth on different aspects of healthcare access and inform telehealth policy and practice based on the specific needs and contexts of healthcare clients.

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Appendix A
Participant Invitation – Fraser Health

Hello,

My name is Kyoung Lee and I am a Fraser Health researcher and a graduate student at the University of Victoria. I am writing to invite you to a survey study about older adults' access to care and Telehealth, which refers to the use of technology to communicate with health care providers.

While registering for your appointment at _____ Hospital, you gave consent for a Fraser Health researcher to contact you and review your medical records to determine if you might be eligible to participate in a research study.

Your consent allowed me to determine that you are a potential candidate for participation in the study I am conducting at Fraser Health.

Your participation must be free and voluntary. If you are interested in learning more about participating in this research study, please review the study information and consent form enclosed with this letter and contact me by phone (   ) or email (   ).

If you do not wish to receive calls or mails like this again, and would like to withdraw your consent to be contacted for research purposes, you may do so at any time. Next time you speak to a registration clerk at Fraser Health, ask to have your consent removed from your file or you can send an email to consenttocontact@fraserhealth.ca stating you wish to have your name removed from the database.

Thank you for your time and consideration.

Sincerely,

Kyoung Lee
Registered Nurse, Surgical Services
Fraser Health Authority

Appendix B
Study Information and Consent – Fraser Health

Survey/ Questionnaire: **Impact of Telehealth on Access to Care for Community-Dwelling Older Adults with Chronic Illness**

You are invited to participate in this survey if you are a community-dwelling adult over the age of 65 who has one or more chronic health conditions and has been using Fraser Health Telehealth or other health care services. The results are collected anonymously and participation is voluntary. It will take about 10 to 15 minutes of your time to complete the survey. If you wish to participate in this survey study and are comfortable with the procedures described in this letter, please complete the attached questionnaire and mail it back to the survey administrator in the enclosed pre-stamped envelope. The survey will be open for four weeks.

As a patient of Fraser Health, you are invited to participate in this survey to be administered by Kyoung Lee, a registered nurse at Fraser Health and a graduate student in the School of Nursing and the School of Health Information Science at the University of Victoria. The study is being conducted under the supervision of Dr. Anastasia Mallidou in the School of Nursing and Dr. Abdul Roudsari in the School of Health Information Science at the University of Victoria.

This study is designed to examine how older adults access health care services in their communities and whether the use of technology for health care, known as Telehealth, influences their health care access for effective chronic disease management.

There are no direct benefits or risks to you from taking part in this study. It is hoped that findings from this study will guide further development of telehealth services to meet the unique needs of older adults in our communities.

Your personal information is subject to protections under the BC Freedom of Information and Protection of Privacy Act (FIPPA). To participate in this study as a survey respondent, you are being asked to consent to provide the following information for use by the survey administrator:

1. Personal views/opinions as expressed in the survey. These views and opinions are considered personal information.

Access to your information is limited to the survey administrator. The survey administrator will maintain the survey, and provide a report based on the survey results.

As a participant in this survey, the information you choose to provide will be stored in the survey administrator’s secure drive for 5 years. All data collected and stored will not contain personal identifiers.

Participation in the survey is voluntary. There will be no consequences to you if you choose not to participate. This survey is completely anonymous and individual responses cannot be linked back to the survey respondent. You do not have to answer any question that you do not want to.

Questions about your information and this survey study may be directed to the Survey Administrator: Kyoung Lee, phone, email

Consent:

I have read and understand the Consent for Collection, Storage and Use of Participant Information. I voluntarily consent to the survey administrator collecting, using and disclosing the information I provide as a participant in this survey.

I consent (Proceed to survey)

I do not consent (Please disregard the survey)

Please retain a copy of this letter for your reference.

Appendix C
Survey Questionnaire

University of Victoria

fraserhealth
Better health. Best in health care.

island health

I. Telehealth

1. Have you used Telehealth provided by BC health authorities?
    a. Yes
    b. No

❖ **Telehealth** refers to the use of technology to communicate with your health care provider in a different location.

More questions at the back ➔

II. Access to Care

1. How easy is it for you to receive health care services you need to maintain and improve your health conditions in your community?

Mostly difficult	Sometimes difficult	Fair	Sometimes easy	Mostly easy
○	○	○	○	○

2. Please rate your agreement with the following statements:

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1. Health care is available when I need it.					
2. The health care services I need are available in my community.					
3. I have a regular health care provider.					
4. I can easily contact my health care provider.					
5. I know how to seek care.					
6. I seek care when I need it.					
7. I can see my health care provider without waiting too long.					
8. Health care costs are affordable.					
9. I can travel for my medical appointments without difficulties.					
10. I receive care that I think important or necessary.					
11. I receive adequate and appropriate care that I need.					
12. I receive care that respects my values and beliefs.					
13. Health care makes a positive impact on my health.					
14. I am satisfied with the quality of care I receive.					

III. Demographics

1. Your age is:
    a. 65 – 74
    b. 75 – 84
    c. 85 and older

2. Please list any chronic illnesses you have.
    - **Chronic illness** refers to any health condition that affects you for a long time, such as diabetes, hypertension, arthritis, heart disease, COPD, or chronic kidney disease.

    ____

    ____

3. Your current living condition is:
    a. Alone in a private dwelling
    b. With others in a private dwelling
    c. Assisted living

4. Which community do you live in?
    a. Urban
    b. Suburban
    c. Rural

5. How do you mostly travel around in your community?
    a. Walk
    b. Drive
    c. By electric wheelchair or mobility scooter
    d. By public transportation
    e. With family or friends

Appendix D
Participant Invitation – Island Health

Subject line – Research study opportunity – Telehealth technology to access health care

Hello,

By deciding to participate in the Vancouver Island Health Authority (Island Health) Permission to Contact for Research Program, you have indicated that you want to be notified of research studies for which you may be eligible. The purpose of this email is to let you know about one specific research study.

This is a research study designed to evaluate how older adults access health care services in their communities and whether the use of technology for health care, known as Telehealth, influences their health care access.

You are invited to participate in this study if you are:

- Community-dwelling adult over the age of 65
- Having one or more chronic health conditions
- Using Island Health Telehealth or other health care services

You are not qualified to participate in this study if you are:

- Living in a residential care facility
- Having cognitive disorders that affect memory and thinking

Participation in this study involves a written survey that is self-administered by mail. It will take about 10 to 15 minutes to complete the survey. Your participation is voluntary. If you are interested in learning more about this study to decide if you want to participate, please contact the researcher: Kyoung Lee, phone, email.

Please note that whether or not you choose to participate in the research study, the level of care you receive from Island Health will not change. We may contact you again in the future regarding other research study opportunities, unless you withdraw your participation in the Island Health Permission to Contact for Research Program. You may withdraw at any time by contacting Island Health's Research and Capacity Building department by phone at (250) 370-8261 (collect calls will be accepted), or email to research@viha.ca.

Sincerely,

Rebecca Barnes
Manager, Public and Patient Research Engagement

Appendix E
Study Information and Consent – Island Health

IMPACT OF TELEHEALTH ON ACCESS TO CARE FOR COMMUNITY-DWELLING OLDER ADULTS WITH CHRONIC ILLNESS

PARTICIPANT INFORMATION & CONSENT FORM

PRINCIPAL INVESTIGATOR:

Kyoung Lee, Graduate Student, University of Victoria
phone, email

Background and purpose of the study

You are invited to participate in a research study. Your participation must be free and voluntary. You are free to withdraw from the study at any time.

The purpose of this study is to evaluate how older adults access health care services in their communities and whether the use of technology for health care, known as Telehealth, influences their health care access for effective chronic disease management.

You are being asked to participate in this study because you are a community-dwelling adult over the age of 65 who has one or more chronic health conditions and has been using Island Health Telehealth or other health care services.

Who is conducting the study?

This survey is administered by Kyoung Lee, a graduate student in the School of Nursing and the School of Health Information Science at the University of Victoria. The study is being conducted under the supervision of Dr. Anastasia Mallidou in the School of Nursing and Dr. Abdul Roudsari in the School of Health Information Science at the University of Victoria.

What is required if I participate?

The study involves a written survey that asks about your health care access and telehealth use. It will take about 10 to 15 minutes of your time to complete the survey. If you wish to participate in this survey and are comfortable with the procedures described in this letter, please complete the attached questionnaire and mail it back to the principal investigator in the enclosed pre-stamped envelope. The survey will be open for 4 weeks.

What are the possible benefits and risks of participating?

There are no direct benefits or risks to you from taking part in this study. It is hoped that findings from this study will guide further development of telehealth services to meet the unique needs of older adults in our communities.

Do I have to take part?

Participation in this survey is voluntary. There will be no consequences to you if you choose not to participate. This survey is completely anonymous and individual responses cannot be linked back to the survey respondent. You do not have to answer any question that you do not want to.

Confidentiality & How my personal information will be used

Your personal information is subject to protections under the BC Freedom of Information and Protection of Privacy Act (FIPPA). To participate in this study as a survey respondent, you are being asked to consent to provide the following information for use by the principal investigator:

1. Personal views/opinions as expressed in the survey. These views and opinions are considered personal information.

Access to your information is limited to the principal investigator. The principal investigator will maintain the survey, and provide a report based on the survey results.

As a participant in this survey, the information you choose to provide will be stored in the principal investigator's secure drive for 5 years. All data collected and stored will not contain personal identifiers.

Sharing of study results

It is anticipated that the results of this study will be presented in the principal investigator's thesis. The thesis will be posted on the UVicSpace website (http://dspace.library.uvic.ca).

Who should I contact if I need more information or help?

Questions about your information and this survey study may be directed to the Principal Investigator: Kyoung Lee, phone, email

For questions or concerns about your rights as a research participant, please contact the Island Health Research Ethics Office in Victoria at (250) 370-8620 or email: researchethics@viha.ca.

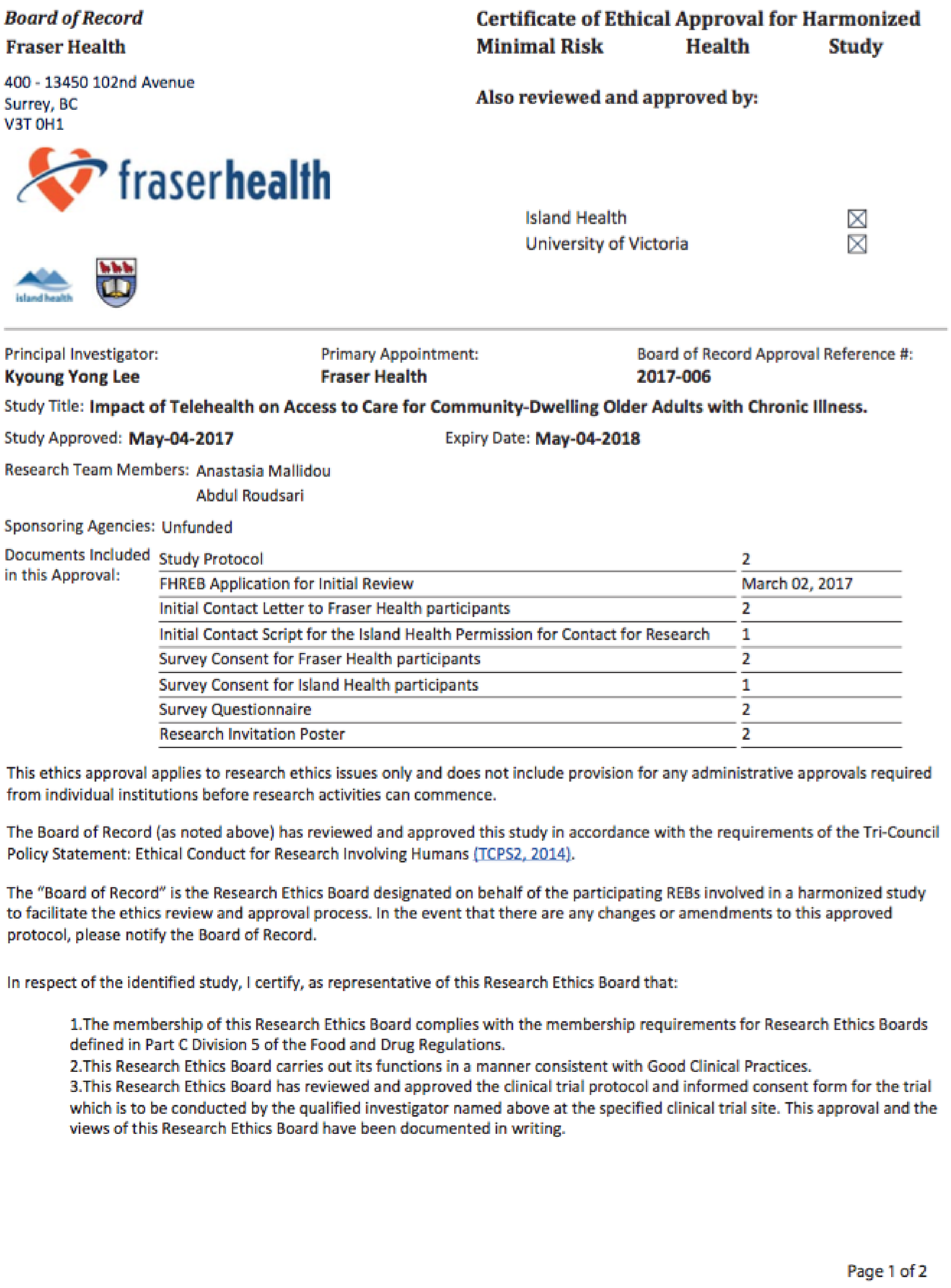
CONSENT

I have read and understand the Consent for Collection, Storage and Use of Participant Information. I voluntarily consent to the principal investigator collecting, using and disclosing the information I provide as a participant in this survey.

I consent (Proceed to survey)
I do not consent (Please disregard the survey)

Please retain a copy of this letter for your reference.

Appendix F
Research Ethics Approval



Board of Record
Fraser Health

400 - 13450 102nd Avenue
Surrey, BC
V3T 0H1

Certificate of Ethical Approval for Harmonized Minimal Risk Health Study

Also reviewed and approved by:

Island Health ☒
University of Victoria ☒

Principal Investigator:	Primary Appointment:	Board of Record Approval Reference #:
Kyoung Yong Lee	**Fraser Health**	**2017-006**

Study Title: **Impact of Telehealth on Access to Care for Community-Dwelling Older Adults with Chronic Illness.**

Study Approved: **May-04-2017** Expiry Date: **May-04-2018**

Research Team Members: Anastasia Mallidou
Abdul Roudsari

Sponsoring Agencies: Unfunded

Documents Included in this Approval:

Study Protocol	2
FHREB Application for Initial Review	March 02, 2017
Initial Contact Letter to Fraser Health participants	2
Initial Contact Script for the Island Health Permission for Contact for Research	1
Survey Consent for Fraser Health participants	2
Survey Consent for Island Health participants	1
Survey Questionnaire	2
Research Invitation Poster	2

This ethics approval applies to research ethics issues only and does not include provision for any administrative approvals required from individual institutions before research activities can commence.

The Board of Record (as noted above) has reviewed and approved this study in accordance with the requirements of the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2, 2014).

The "Board of Record" is the Research Ethics Board designated on behalf of the participating REBs involved in a harmonized study to facilitate the ethics review and approval process. In the event that there are any changes or amendments to this approved protocol, please notify the Board of Record.

In respect of the identified study, I certify, as representative of this Research Ethics Board that:

1.The membership of this Research Ethics Board complies with the membership requirements for Research Ethics Boards defined in Part C Division 5 of the Food and Drug Regulations.
2.This Research Ethics Board carries out its functions in a manner consistent with Good Clinical Practices.
3.This Research Ethics Board has reviewed and approved the clinical trial protocol and informed consent form for the trial which is to be conducted by the qualified investigator named above at the specified clinical trial site. This approval and the views of this Research Ethics Board have been documented in writing.

Page 1 of 2

Board of Record Research Ethics Board Representative

Name: Sarah Flann

Title: Research Ethics Coordinator

Signature:

Date: May-04-2017