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# A Profile of Canadians Over the Age of 65 Years Living with Coexisting Vision and Mobility Impairments: A Sequential Mixed Method Analysis

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A thesis submitted in partial fulfillment of the requirements for the degree in Doctor of Philosophy

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A PROFILE OF CANADIANS OVER THE AGE OF 65 YEARS LIVING WITH  
COEXISTING VISION AND MOBILITY IMPAIRMENTS:  
A SEQUENTIAL MIXED METHOD ANALYSIS

(Spine title: Vision and Mobility Impairments: A sequential mixed method analysis)

(Thesis format: Integrated Article)

by

Jessica G. Huber-Wilhelm

Graduate Program in Health and Rehabilitation Sciences

A thesis submitted in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy

The School of Graduate and Postdoctoral Studies  
The University of Western Ontario  
London, Ontario, Canada

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THE UNIVERSITY OF WESTERN ONTARIO  
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The thesis by

**Jessica G. Huber-Wilhelm**

entitled:

**A PROFILE OF CANADIANS OVER THE AGE OF 65 YEARS LIVING  
WITH COEXISTING VISION AND MOBILITY IMPAIRMENTS:  
A SEQUENTIAL MIXED METHOD ANALYSIS**

is accepted in partial fulfillment of the  
requirements for the degree of  
Doctor of Philosophy

\_\_\_\_\_  
Date

\_\_\_\_\_  
Chair of the Thesis Examination Board

## Abstract

The purpose of this dissertation was (i) to investigate the prevalence of older Canadian adults living with coexisting vision and mobility impairments, and (ii) to describe how disability associated with both impairments relate to health status, activities of daily living, physical activity participation, assistive technology use, and health care services. These goals were achieved by using mixed methodology approach.

The first manuscript was based on secondary analyses of the 2006/2007 National Population Health Survey (NPHS). The results of the secondary analysis of the NPHS revealed that approximately 3% of the Canadian population over the age of 65 was living with coexisting vision and mobility impairments. Also, older adults with both conditions required more assistance with activities of daily living and they reported the lowest levels of physical activity participation compared to those living with one or no impairment.

The second part of the core component was based on secondary analyses of the 2006 Participation and Activity Limitations Survey (PALS). The PALS was specifically designed for individuals who reported they were living with a disability. As a result, a greater proportion of respondents indicated the presence of both target conditions – approximately 15% of older Canadians who reported having a disability were living with coexisting vision and mobility impairments. The analysis of the PALS data revealed that older adults with both impairments required more assistance with activities of daily living and they reported a higher use of assistive technology; however, there was a higher level of unmet needs for vision related assistive technology.

The final manuscript consisted of in-depth interviews conducted to add the personal perspective of older adults with both impairments, and to expand and clarify the quantitative findings. The analyses of the transcripts revealed four main themes among participants:

- (i) the meaning behind vision, mobility, and coexisting impairments;
- (ii) adaptation of desired activities;
- (iii) external support for engaging in activity; and
- (iv) internal support for engaging in activity.

The results of this dissertation contribute knowledge about living with coexisting vision and mobility impairments and offer a starting point to guide rehabilitation services for clients with multiple impairments.

## Keywords

Older and aged individuals, vision limitations, mobility limitations, activities of daily living, physical activities, NPHS, PALS, phenomenology.

## Co-Authorship Statement

The three manuscripts contained in this dissertation were based on research that was designed and analyzed by Jessica G Huber-Wilhelm as a component of her doctoral work. Data used in this dissertation were obtained by special agreement with Statistics Canada to use the National Population Health Survey Master File and the Participation and Activity Limitations Master file. The analyses are the sole responsibility of the author. While the research and analysis are based on data from Statistics Canada, the opinions expressed do not represent the views of Statistics Canada. The advisory committee provided regular feedback throughout the research process. Jessica G Huber-Wilhelm was the primary author of all the manuscripts, with editing provided by the advisory committee.

## Dedication

This work is dedicated to my husband,  
Ryan Wilhelm.

Your love, patience and never ending support made it possible for me to start and finish this work. The completion of this dissertation is coupled with the joy of the next chapter of our lives. Thank you for always making me smile, even when I didn't want to! I love you.

## Acknowledgments

It is impossible for me to pretend that I could have done any of this work on my own. I cannot express enough gratitude to those who have been supporting me throughout this entire process. It is through all of you that I am able to be where I am today.

I must start by thanking my two supervisors – Dr. Jan Polgar and Dr. Bert Chesworth. Thank you for your countless hours in meetings, letters of support, editing, listening, talking, and everything else that you did for me in these past four years. You both have provided me the resources I have needed to finish this project.

I am forever grateful to my supervisory committee. Dr. Graham Strong, you were the person who opened the doors for me to start graduate school. Thank you for giving me the opportunity to work with you and thank you for continuing to support me during my doctoral studies. Dr. Jeffrey Jutai, you taught me that the world is my oyster and research requires patience. Thank you for guiding me the last six years.

Thank you to my examining committee members – Drs. Elsie Culham, Eunice Gorman, Jeff Holmes, and Mary-Beth Jennings. Thank you for taking the time to review my thesis and for your feedback to make this dissertation better than it started.

I cannot express the gratitude I have towards the students, staff, and faculty members of the Health and Rehabilitation Sciences department. As well, I could not have completed the data analysis without the help from the staff at UWO's Research Data Centre (RDC). Thank you for all of your encouragement.

I would not be where I am today without the love of my family. Mom and Dad, you were there from day one of my twenty-four year journey through school. Thank you for your love and your prayers. Thank you for letting me become who I want to be and not pressuring me to be anyone else. Thank you to each of my siblings – Ryan, Sarah, Amy, and Anita – I am so proud of all of you. Thank you to my new family – Mom and Dad Wilhelm, Paul, Stella, Olivia, Danette, and John. Your love and encouragement have meant so much to me.

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## Chapter 1

### 1 Introduction to Thesis

Vision and mobility impairments are two leading types of disability in older adults. Epidemiologists predict with the aging population in Canada that there will be an increase in the number of older adults who report living with both conditions.<sup>1-3</sup> Although studies have been done to determine the separate effects of vision and mobility impairments on daily life, there is limited empirical research that examines the experience of older adults living with coexisting vision and mobility impairments, and, more specifically, from a perspective of Canadian older adults.<sup>4-9</sup>

#### 1.1 Study Objectives

The objectives of this study were to:

1. Identify the prevalence of Canadians over 65 years who are living with coexisting vision and mobility impairments, in accordance with the definition of vision and mobility by the National Population Health Survey (NPHS) and the Participation and Activity Limitations Survey (PALS).
2. Identify the effect of coexisting vision and mobility impairments on self-reported health.
3. Describe the relationship between coexisting vision and mobility impairments and restrictions on activities of daily living.
4. Understand how coexisting vision and mobility impairments affect physical activity participation.
5. Describe the relationship between coexisting vision and mobility impairments and assistive technology use.
6. Use a phenomenological perspective to capture the personal perspective of older adults living with coexisting vision and mobility impairments about the effect of these conditions on activities of daily living, participation, assistive technology use, and health services.

To achieve these objectives, a three-phase project was conducted. The first phase consisted of secondary analysis of the NPHS and was designed to achieve objectives 1–3. The second phase consisted of secondary analysis of PALS, and was designed to achieve objectives 1, 2, 4, and 5. Finally, the third phase was structured to accomplish objective 6 by using semi-structured interviews from persons living with coexisting vision and mobility impairments, who were recruited from the Low Vision Clinic at the University of Waterloo.

Access to NPHS and PALS data from the Research Data Centre (RDC) at the University of Western Ontario (UWO) was granted by Statistics Canada through the Canadian Initiative on Social Statistics (CISS) Access to the RDC Program (see Appendix B). The UWO and the University of Waterloo Research ethics boards approved this project (see Appendices C and D).

## 1.2 Structure of the Thesis

This document is presented in the “Integrated Article” format, as described by the School of Graduate and Postdoctoral Studies at UWO. Chapters 5, 6, and 7 represent the three manuscripts contained in this thesis. A consequence of presenting the thesis in this format is that some repetition exists.

Chapter 2 provides an overview of the problem at study. It presents the current understanding of vision and mobility impairments and the gaps in the current literature pertaining to understanding coexisting vision and mobility impairments. An outline of the theoretical perspectives and health policies that provided a foundation for this dissertation follows this overview.

Chapter 3 reviews the literature pertaining to coexisting vision and mobility impairments using a scoping literature method.

Chapter 4 provides a detailed description of the methods used in this dissertation. This dissertation used a mixed methodology approach to achieve its objectives. Although all three manuscripts provide a summary of the methods, as appropriate for a manuscript

submission, Chapter 4 provides further clarification of the specific details of the NPHS and PALS, and the analysis of the qualitative interviews.

Chapter 5 pertains to the secondary analysis of NPHS data. It presents the results from phase one of this dissertation to accomplish objectives 1-3.

Chapter 6 details the secondary analysis of PALS data, which accomplishes objectives 1, 2, 4, and 5.

Chapter 7 outlines the qualitative analysis of the semi-structured interviews conducted with participants living with coexisting vision and mobility impairments.

Chapter 8 discusses the findings from all three phases of the project. It highlights the major findings of the project, along with the project's contribution to the existing body of literature. This chapter also identifies the implications of the study's findings for health care professionals. Recommendations for future research in understanding coexisting vision and mobility impairments are also outlined.

## 1.3 References

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## Chapter 2

### 2 Introduction

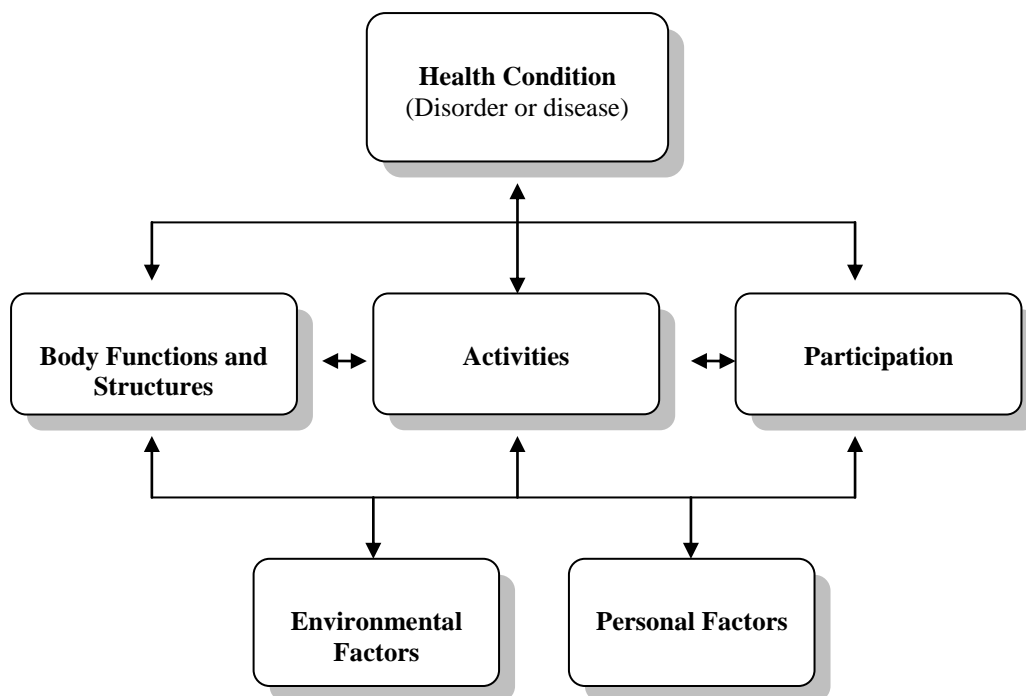
The foundation of this dissertation was based on several theoretical frameworks. The material that follows discusses these frameworks and finishes by commenting on relevant health policies from a Canadian perspective.

#### 2.1 Theoretical Frameworks

The following three theoretical frameworks are discussed: (i) the International Classification of Functioning, Disability and Health (ICF),<sup>1</sup> which provides a framework and definitions related to the description of health and health-related states; (ii) gerontechnology, which provides a cross-fertilization matrix through which to approach assistive technologies best suited for older adults;<sup>2</sup> and (iii) Active Ageing, which is a means of obtaining a higher quality of life for older adults through participation, security, and health.<sup>3</sup>

##### 2.1.1 International Classification of Functioning, Disability and Health (ICF)

The ICF provides “a unified and standard language and framework for the description of health and health-related states” (p. 3).<sup>1</sup> The ICF is organized into a framework to describe situations with regard to human functioning and its restrictions.<sup>1</sup> The first part of the framework deals with “Functioning and Disability” (Body Functions and Structures; Activities and Participation). The second part of the framework addresses “Contextual Factors” (Environmental Factors and Personal Factors). For the purposes of this dissertation, the ICF provides a conceptual framework through which to investigate the lived experience of older adults with coexisting vision and mobility impairments. See Figure 1.



**Figure 1: International Classification of Functioning, Disability and Health**

The first advantage of the ICF is its use of neutral terminology. This neutral terminology includes:

*Functioning*: an umbrella term encompassing all body functions, activities, and participation.<sup>1</sup>

*Disability*: an umbrella term for impairments, activity limitations, or participation restrictions.<sup>1</sup>

*Impairments*: problems in body function or structure such as significant deviation or loss.<sup>1</sup>

*Activity limitation*: includes difficulties an individual may have executing activities.<sup>1</sup>

*Participation restrictions*: include problems an individual may experience with involvement in life situations.<sup>1</sup>

These terms are used frequently in this dissertation as they are closely related to the experiences associated with vision and mobility impairments. For example, a stroke can

cause vision and mobility loss (impairments). The individual is not able to walk to church (activity limitation) and he/she is not able to socialize with his/her friends from church (participation restriction).

Another advantage of the ICF is that “a person’s functioning and disability is conceived as a dynamic interaction between health conditions (e.g., disease, disorder, injuries, traumas) and contextual factors” (p. 8).<sup>1</sup> These contextual factors allow for the description of health with the inclusion of environmental and personal factors. Environmental factors include features of the physical, social, and attitudinal world.<sup>1</sup> Personal factors include an individuals’ background, and include features that are not part of a health condition or health states (e.g., age, race, coping style).<sup>1</sup> The dynamic relationship of environmental and personal factors with coexisting vision and mobility impairments was taken into consideration in the planning and execution of the mixed methods design outlined in this dissertation.

The third benefit of the ICF is the inclusion of the biopsychosocial model of health, which merges the medical model of health and the social model of health. The combined use of these two opposing models captures one of the goals of the ICF in achieving a balanced view of different perspectives.<sup>1</sup> By acknowledging the essential contribution individuals make in achieving their health outcome, the biopsychosocial model validates the individual’s experience.<sup>4</sup> The biopsychosocial model is a useful framework to remind us that individuals are not simply biological machines: they also have psyches and live in a social context.<sup>5</sup> The premise of the biopsychosocial model was part of the reasoning behind incorporating both quantitative and qualitative experiments in the thesis study design, that is, to include the medical and the personal perspective of the individual living with coexisting vision and mobility impairments.

Finally, the universality of the ICF allows for its application across health-related disciplines, policy, culture, and political boundaries. Furthermore, the ICF can be applied to individual, community, or population levels. The principle of universality captured in the ICF describes disablement as occurring for a span of time either permanently or

temporarily.<sup>6</sup> Thus, there is the potential that anyone may experience either a vision or mobility impairment in his/her lifetime.

The ICF is a framework for the description of health and health-related states that continues to evolve. The Institute of Medicine has stated that the ICF needs to be strengthened in the area of personal factors and the inclusion of quality of life.<sup>7</sup> Huber et al.<sup>8</sup> explains that if the ICF is truly a biopsychosocial model, then an individual's personal perspective should be an essential component of the description of the individual's functioning. Huber suggests incorporating a personal perspective in the personal factors in the ICF. It is for this reason, the assertion that the individual perspective is a valuable component, that the mixed method design of this dissertation included a qualitative component to capture an individual's personal perspective of living with coexisting vision and mobility impairments.

### 2.1.2 Gerontechnology

Gerontechnology is the study of technology for older persons. It is geared toward matching the ambitions and needs of aging people with suitable technology in their environments.<sup>2</sup> The focus of gerontechnology is its *cross-fertilization matrix* (see Table 1).



**Table 1: Cross-fertilization Matrix of Gerontechnology<sup>7</sup>**

Life Domain					
	Health Self-esteem	Housing Daily living	Mobility Transport	Communication Governance	Work Leisure
Goals of Aging People	Enhancement & Satisfaction				
	Prevention & Engagement				
	Compensation & Assistance				
	Care support & Care organization				

The first component of the matrix is the goals of aging people.

*Enhancement and satisfaction* aim to enrich daily life by answering and supporting the active and dormant ambitions and needs of aging people.<sup>2</sup>

Technology can be used to return control to older adults.<sup>2</sup> For example, a walker can provide an older adult with the independence he/she desires to travel in his/her community.

*Prevention and engagement* include actions taken earlier in life, since many impairments may be related to risky habits, unhealthy environments, or genetic dispositions.<sup>2</sup> For example, assistive technology, such as a walker, can be used to encourage daily exercises, which can improve mobility function to prevent the onset of further disability.<sup>9</sup> Suggestions such as walking can be a preventative method for mobility function; however, there are limited preventative methods for vision. Fozard<sup>9</sup> suggests decreasing long-term exposure to light and preventing age-related diseases that can result in vision loss (i.e. diabetes). When limitations of either vision or mobility manifest, compensation is required.

*Compensation and assistance* use technology, such as mobility aids, vision and hearing aids, memory aids, and pain alleviators, to augment or replace such shortcomings.<sup>2</sup> Throughout this dissertation, the use of assistive technology will be explored to see how function can be improved; however, further clarification of how assistive devices can enhance outcomes for someone with coexisting vision and mobility aids is needed.

Finally, *care support and care organization* are involved if professional or other carers (e.g., family and friends) become a necessity; technology should be directed toward making the work of carers easier and better organized.<sup>2</sup>

The four goals are coordinated with five main domains of daily life: health and self-esteem, housing and daily living, mobility and transport, communication and governance, and work and leisure.<sup>2</sup> Together, the goals and the domains form the cells of the matrix, which are filled with research results pertaining to the assistive devices, services, methods, and theories to further the multidisciplinary field of gerontechnology.

The cross-fertilization matrix aligns the goals of aging people with the domains of daily life. As Bronswijk<sup>10</sup> says, “only when all matrix cells are equally covered by research, development, design, and distribution (RDD&D) may we hope to reach the ultimate aim of a sustainable high quality of daily life in the knowledge based society for older persons” (p. 171).

### 2.1.3 Active Aging

The Active Ageing Policy framework defines active aging as the process of optimizing opportunities for health, participation, and security in order to enhance quality of life as people age.<sup>3</sup> “Active” refers to continuing participation in social, economic, cultural, spiritual, and civic affairs. Being active is not just the ability to be physically active or being able to participate in the labour force: active aging includes individuals who are frail, disabled, and in need of care. In their definition, “health” refers to physical, mental, and social well-being.

There are eight determinants of active aging: gender, culture, health and social services, behavioural determinants, personal determinants, physical environment, social determinants, and economic determinants. Together, the use of these determinants allow people to realize their potential for physical, social, and mental well-being throughout life and to participate in society according to their needs, desires, and capacities, while providing them with adequate protection, security, and care when they require assistance.<sup>3</sup>

With active aging as the foundation, the World Health Organization (WHO) has developed policies related to participation, health, and security. The key policy for health is “to prevent and reduce the burden of excess disabilities, chronic disease, and premature mortality” (p. 47).<sup>3</sup> Specific to this vision, the WHO aims to reduce and eliminate avoidable blindness by 2020.<sup>3</sup> They also hope to reduce risk factors associated with major diseases and increase factors that protect lifelong health.<sup>3</sup> Indirectly related to mobility, WHO’s policies aim to provide physical activity opportunities for all individuals as they age.

The active aging perspective is essential for this dissertation because it reinforces the importance of activities in the lives of older adults. These activities are not limited to physical exercise. For example, Lie<sup>11</sup> explored formal volunteering as a means of active citizenship in the definition of active aging. Also, the concept of active aging has been shown as useful in making a holistic assessment of the circumstances of older people, such as when they are living with disabilities.<sup>12</sup>

#### 2.1.4 Health Policies

The WHO set global policies regarding health and older adults in their active aging policy, but there are other national policies to improve the health of older adults.

#### 2.1.5 Canadian Health Policies

At the September 2004 First Ministers’ Meeting, Canada’s First Ministers committed to the development of “goals and targets for improving the health status of Canadians through a collaborative process.”<sup>13</sup> In October 2005, Federal, Provincial, and Territorial

Ministers of Health agreed on a set of goals for improving the health of Canadians. This document became known as the Health Goals for Canada. The overarching goal of Health Goals for Canada is to provide a healthcare system for “Canada in which every person is as healthy as they can be – physically, mentally, emotionally, and spiritually.”<sup>13</sup> The goals outlined in the Health Goals for Canada provided a foundation for developing specific health care policies. Table 2 presents a summary of the goals set out in the Health Goals for Canada. For every Canadian to receive appropriate health care, including those with coexisting vision and mobility impairments, the best methods for providing services, including assistive technology, need to be understood.

**Table 2: Health Goals for Canada**<sup>11</sup>

**Canada is a country where:**

*Basic Needs (Social and Physical Environments)*

Our children reach their full potential, growing up happy, healthy, confident and secure. The air we breathe, the water we drink, the food we eat, and the places we live, work and play are safe and healthy - now and for generations to come.

*Belonging and Engagement*

Each and every person has dignity, a sense of belonging, and contributes to supportive families, friendships and diverse communities. We keep learning throughout our lives through formal and informal education, relationships with others, and the land. We participate in and influence the decisions that affect our personal and collective health and well-being. We work to make the world a healthy place for all people, through leadership, collaboration and knowledge.

*Healthy Living*

Every person receives the support and information they need to make healthy choices.

*A System for Health*

We work to prevent and are prepared to respond to threats to our health and safety through coordinated efforts across the country and around the world. A strong system for health and social well-being responds to disparities in health status and offers timely, appropriate care.

Since the focus of this dissertation is on health care in Canada, specifically from an Ontario perspective, the following outlines health policies from an Ontarian perspective.

The Ministry of Health and Long Term Care (MOHLTC) is the division of the Ontario government in charge of the provincial health insurance plan – Ontario Health Insurance Plan (OHIP).<sup>14</sup> Under OHIP, the ministry only pays for those services deemed medically necessary. Pertaining to vision care, effective in 2004, routine eye examinations for patients aged 20–64 are no longer covered by OHIP.<sup>15</sup> As well, low vision examination fees are not covered by OHIP. The optometry community is concerned that individuals in this age group are not getting the preventative care they need.<sup>16</sup> An additional challenge is that patients who are living with low vision have to pay for their appointment if they wish to receive rehabilitation.

With regard to mobility care, OHIP covers occupational therapy services. Physical therapy services underwent changes in coverage at the same time that eye exams were delisted. Currently, OHIP covers physical therapy services when provided on an in-patient basis, but these services fall outside of the definition of insured health services once they are provided on an outpatient basis.<sup>17</sup> Individual Ontarians are now required to cover health care costs that were previously paid for by the government. While Health Canada proposes overarching goals to improve the health of every Canadian, provincial policies have limited the ability of low-income individuals to do so.

For those patients who obtain vision or mobility services, there may be additional costs for items like assistive devices. Currently, OHIP does not cover the expense of assistive devices; however, the MOHLTC does fund the Assistive Devices Program (ADP). The ADP was designed to help offset the costs of certain assistive devices for Ontario residents who have long-term physical disabilities. In most cases, the government covers 75% of the cost of the device and the patient pays out of pocket (or through alternative insurance programs) for the remaining balance. The ADP includes many vision and mobility related devices which may include closed-circuit televisions (CCTVs), magnifiers, specialized glasses, manual and power wheelchairs, or wheeled walkers. The ADP does not cover all devices. For instance, devices such as wheelchair lifts, wheelchair ramps, talking clocks and calculators, adaptive telephones, raised toilet seats, and grab bars are not covered. Although the ADP provides the majority of funding for many

devices, there are older adults who may not be able to afford the cost associated with a device recommended by a health care provider.

Canadians boast of their universal medicare insurance plans that provide healthcare to man, woman, and child, regardless of race, colour, or financial status. Health Canada promotes their desire that Canadians be the healthiest people in the world. Ontario's health policies allows OHIP to cover several health services; however, changes have been made to delist some areas of care pertaining to vision and mobility impairments. With an aging population, health policies should be reconsidered to fund services and devices that will influence participation and quality of life by alleviating the financial burden associated with these services and devices.

## 2.2 Summary

This research project was founded on the terminology and concepts of the ICF, gerontechnology, and active aging, and has the potential to inform health policy. The ICF provides a conceptual framework for the investigation of the lived experience of older adults with coexisting vision and mobility impairments. Gerontechnology frames the ability of assistive devices to delay a decline in function, compensate for existing impairments in function, and enhance enjoyment and participation in activities in older adults living with coexisting vision and mobility impairments. Active aging provides an activity context that will be used in this dissertation to better understand how increased impairment due to coexisting vision and mobility limitations can be addressed to improve health, participation, and security in older adults. By having a better understanding of the lived experience of older adults living with coexisting vision and mobility impairments, this dissertation will provide further understanding of the strengths and limitations of the health care provided to those living with both impairments.

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## Chapter 3

### 3 A Scoping Literature Review

As introduced in the previous chapter, the Canadian population is experiencing a rising number of older adults living with multiple disabilities, such as vision and mobility impairments. Prior to embarking into the mixed methodology, a scoping literature review was performed to grasp the current perspective in the research literature pertaining to older adults living with coexisting vision and mobility impairments.

The purpose of this scoping literature review was to map current literature related to the impact of living with coexisting vision and mobility impairments, and to explore how these coexisting conditions might influence an older person's daily function.

#### 3.1 Method

##### 3.1.1 Scoping Study

The goals of a scoping literature review are to examine the extent, range, and nature of research activity; to summarize and disseminate research findings; and to identify research gaps in the existing literature.<sup>1</sup> A scoping literature review tends to address broader topics where many different study designs might be appropriate.<sup>1</sup> Since the extent of information related to coexisting vision and mobility impairments was unclear, a scoping literature review method was chosen over a systematic or critical literature review in order to use a broad perspective that allows all research related to both impairments to be accepted into the review. By doing so, the areas of research that are extensively developed will become apparent, while the gaps in the literature will come to the forefront.

The five stages for a scoping literature review, outlined by Arksey and O'Malley<sup>1</sup>, were used in this paper to review the impact of coexisting health conditions on an individual's activities and participation. These stages are: (i) identifying the research question, (ii) identifying relevant studies, (iii) study selection, (iv) charting the data, and (v) collating, summarizing, and reporting the results.

### 3.1.2 Stage 1: Identifying the Research Question

A scoping literature review aims to incorporate a broad spectrum of literature to generate a suitable breadth of coverage pertaining to a research question. Research questions should maintain a wide approach to accommodate a large amount of literature. The research questions for this paper were:

- What estimates exist pertaining to the number of older adults living with coexisting vision and mobility impairments?
- How do coexisting vision and mobility impairments affect function for older adults in their daily living, social participation, and physical participation?

### 3.1.3 Stage 2: Identifying Relevant Studies

Electronic databases were the primary source for capturing current literature for this study. Databases were accessed through UWO's library services. Four primary databases were chosen based on their coverage of relevant material: Excerpta Medica database (EMBASE), Web of Science, CINAHL, and Scopus. Other sources for current literature included reference lists, existing networks, relevant organizations, and articles suggested by other researchers.

The database searches of EMBASE, Web of Science, CINAHL, and Scopus were all limited to studies based on human subjects, written in the English language, and accessible through the UWO library. Three subject headings were reviewed: mobility, vision, and function. Subject headings were then further divided into key concepts. Table 3 presents the terms used in the electronic database search. The "explode" feature of each database was applied to all subject headings and key concepts when possible. To explode a term in a search database means that the database retrieves all references indexed to that term as well as all references indexed to any narrower subject terms. For example, when searching for "vision," the database will search for any reference relating to this term, while the explode feature will look for information related to visual acuity and visual perception, thereby retrieving more references related to the specific subject heading.

Each subject heading was searched individually (i.e. mobility, vision, and function), then they were combined in pairs (i.e. mobility and vision, vision and function, mobility and function), and finally all three topics were combined. All literature was stored in the bibliographic software RefWorks for purposes of managing records, keeping track of articles, and making requests for journal retrieval.

**Table 3: Terms used in electronic database search**

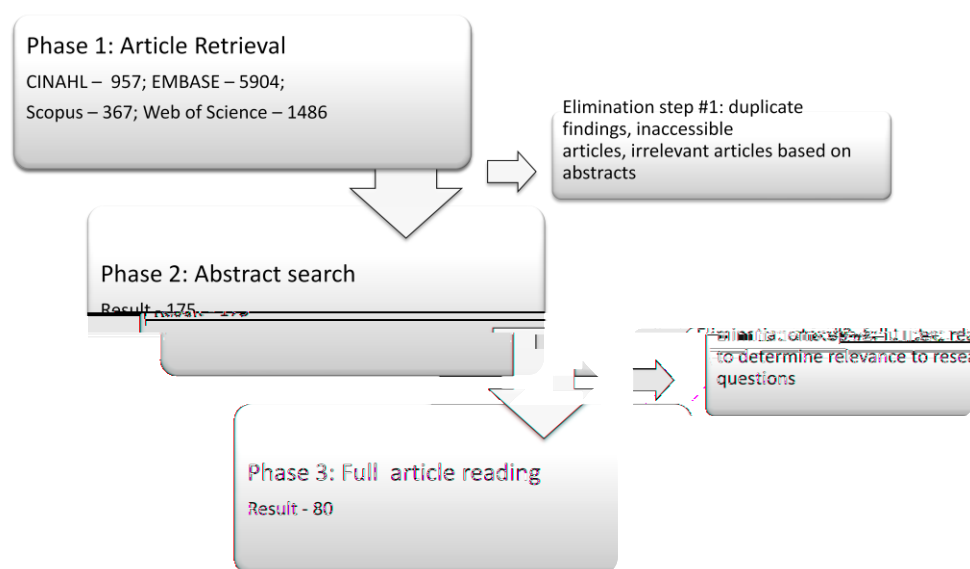
Subject Headings	Key Concepts
Mobility	Mobility, physical mobility, impaired physical mobility, mobility therapy
Vision	Vision, rehabilitation of vision impairment, vision disorders, abnormal vision, visual disorder, visual impairment
Function	Functional status, functional assessment, activity of daily living, instrumental activity of daily living, daily life activity

### 3.1.4 Stage 3: Study Selection

Studies were selected based on their pertinence to the central research question. Like a systematic review, inclusion and exclusion criteria were developed; unlike a systematic review, the criteria were devised *post hoc* as familiarity with the literature increased. These criteria were applied to all the citations to determine their relevance (as in the process outlined by Arksey and O'Malley).<sup>1</sup> The inclusion criteria used in this study related to type of study, type of intervention, and rehabilitation provided. In order to be selected, studies had to be relevant to mobility, vision, and function for people over the age of 65. A study was of particular interest if the intervention addressed treatment of both health conditions.

The selection of articles was conducted in three phases. In Phase 1, all articles were retrieved from the electronic database solely on the terminology outlined in Table 3. Phase 2 consisted of sorting through the journal articles found in the database. This sorting involved the elimination of duplicate findings, inaccessible articles, and irrelevant articles. Irrelevant articles were identified by reading through the abstracts of each article.

A journal article was included if it addressed any of the above-named topics. Since abstracts do not always provide the full scope of the article, articles were excluded only if it was blatantly obvious that they were not relevant (for example, the participants were children). Phase 3 involved requesting copies of full articles of those papers identified as relevant in Phase 2. Full articles were read in order to make a decision about whether they should be chosen for inclusion in the review. Figure 2 illustrates the process for article selections and the number of results found.



**Figure 2: Scoping literature review results**

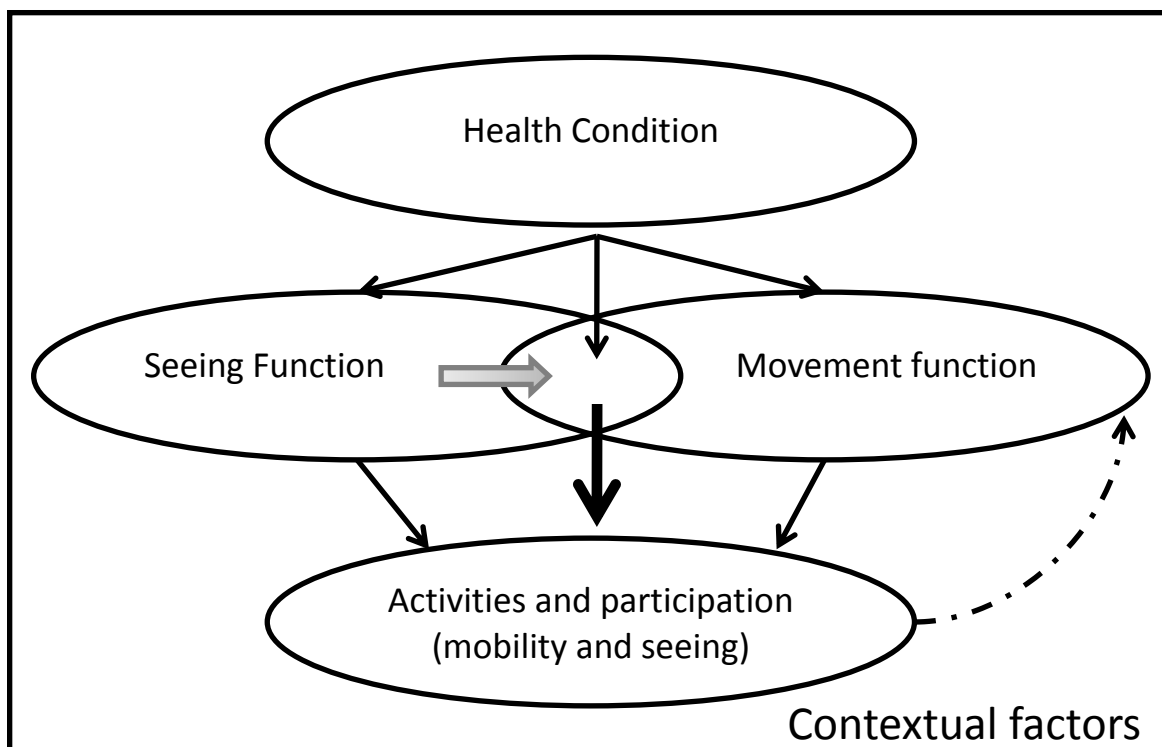
### 3.1.5 Stage 4: Charting the Data

In Stage 4, all of the citations deemed suitable for addressing the central research question were sorted according to key issues and themes. The method applied for this review was a descriptive analytical method, which involved applying a common analytical framework to all of the primary research reports, and collecting standard information from each study.<sup>1</sup> The standard information from each study was recorded in an Excel<sup>®</sup> table, which included: Author(s), year of publication, title of study, purpose/aims of study, intervention type, study population (participants), and important results (see Appendix A).

The analytical framework selected for this scoping literature review was the ICF. As outlined in Chapter 1, the ICF aims to provide a unified and standardized language and framework for the description of health and health-related states.<sup>2</sup> The ICF was chosen as a framework for classifying the literature because it looks past the consequences of diseases and considers the functional capacity related to health conditions.

### 3.1.6 Results - Stage 5: Collating, Summarizing and Reporting the Results

Using the ICF as a basis for categorization, literature was found which related to each domain of the ICF. Unlike a systematic review, the summarization of a scoping literature review does *not* seek to synthesize, aggregate, or weigh findings in studies.<sup>1</sup> Rather, the purpose of the results section is to present an overview of all material reviewed.<sup>1</sup> The scoping literature review of coexisting vision and mobility impairments revealed a relationship that is illustrated in Figure 3. This relationship will first be explained in general and then each level will be explored using the information from the literature.



**Figure 3: Relationship of vision and mobility to function**

First, the solid arrows indicate health conditions that influence seeing and movement function independently, in addition to health conditions that simultaneously affect both vision and mobility function. On its own, vision impairment can have a direct effect on activities and participation, just as a mobility impairment can affect activities and participation. The coexistence of seeing and movement impairments compounds these limitations therefore limiting their ability to participate in daily living activities, which is shown by the overlapping circles.

The dashed line represents the feedback loop between activities/participation and mobility function. Decreased movement function leads to decreased activities and participation; however, decreased activities and participation can lead to decreased movement function. For example, a person may have knee surgery to increase movement function (e.g., gait). The increased movement increases his/her ability to participate in a round of golf. On the other hand, someone who partakes in no activities for a long period

may experience a decrease in movement function (e.g., balance). This mobility feedback loop relationship was not found to be the same for seeing functions.

The shaded arrow from seeing function to movement function represents that a vision impairment can amplify a mobility impairment. This concept will be explained in greater detail with examples from the literature.

All of these constructs are within the concepts of the contextual factors – environmental and personal factors. These relationships will be further explored based on the literature from the scoping literature review.

### 3.1.7 Health Conditions Impacting Vision, Mobility, and Both Functions

Several of the papers identified in the literature review discussed the impact of specific health conditions that affect vision or mobility function, and sometimes both. The purpose of this first section of the review is to briefly introduce a few of the health conditions that may result in vision and/or mobility impairments. This section of the review will be kept brief as the purpose of this dissertation is not from the perspective of pathology; rather, the weight of the review will focus on the relationship between vision and mobility impairments (as a result of health conditions), and activities and participation in the context of personal and environmental factors.

According to the ICF, vision is a sensory function relating to sensing the presence of light and sensing the form, shape, and colour of visual stimuli.<sup>2</sup> There is a distinction between blindness and low vision. The term blindness should be used only for those with little or no residual vision, and who have to rely predominantly on vision substitution skills (e.g., Braille or long canes). Low vision is an appropriate term for those who have residual vision that is no longer correctable by standard glasses, contact lenses, medication, or surgery, so that vision assistive technology can be used to improve the performance of daily living skills.<sup>3,4</sup> There are a number of age-related health conditions that affect vision function.<sup>5</sup> For example cataracts limit the passage of light through the lens, glaucoma damages the optic nerve, and age-related macular degeneration limits central vision. These health conditions affect different elements of vision, including visual acuity,

central vision loss, decreased colour vision, reduced visual fields, and decreased depth perception.<sup>6</sup> Vision impairments can significantly increase the risk of a mobility impairment, thus increasing the consequences of a mobility limitation (e.g., increased risk of falls).<sup>7-9</sup>

The ICF defines mobility as movement by changing body position or location, or transferring from one place to another.<sup>2</sup> Another definition of mobility states that successful personal mobility is the act or ability to move from one's present position to one's desired position in another part of the environment safely, gracefully, independently, efficiently, and comfortably.<sup>10,11</sup> Mobility limitations are associated with risk of falling,<sup>12</sup> hospitalization,<sup>13</sup> decreased independence in activities of daily living,<sup>14</sup> lower self-rated physical and mental health,<sup>15,16</sup> and mortality.<sup>17</sup> A mobility limitation is an early indicator of vulnerability to future disablement.<sup>18</sup> Just as vision function is comprised of visual acuity or contrast sensitivity, mobility function is comprised of muscle power, muscle tone, muscle endurance, movement functions (such as changes in body position and balance), and gait. A variety of health conditions, such as frailty, sarcopenia, stroke, multiple sclerosis, and arthritis, affect mobility functions. For example, a diagnosis of frailty, based on weight loss, exhaustion, physical inactivity, low walking speed, and low handgrip strength, is associated with decreased muscle density, decreased muscle mass, and increased fat mass.<sup>19,20</sup> Sarcopenia, which is a loss of muscle protein mass and loss of muscle function, results in reduced muscle strength and muscle power, which are both strongly related to functional limitations and endurance.<sup>21,22</sup>

The outcome of a stroke is a good example of a health condition that influences both vision and mobility function. Thirty-six percent of right-brain strokes and 25% of left-brain strokes result in a loss of visual field on one side. Additionally, many right-brain strokes (82%) result in unilateral neglect (or visual inattention).<sup>23</sup> A stroke may also affect balance, coordination, and muscle tone. In rehabilitation, balance restoration is an essential focus because it can be used to determine whether the individual is able to maintain functional mobility and independence in activities of daily living.<sup>24</sup> Balance restoration is also fundamental to decreasing falls.<sup>24</sup> For example, with treatment, 55% of stroke survivors who initially were unable to walk achieved partial or full autonomy in



mobility (4.58% climbed stairs independently, 8.70% walked outside without aid, 14.41% walked inside without aid, 27.46% walked with a cane or another aid, and 44.85% remained in a wheelchair).<sup>25</sup> Individuals with a mobility impairment prior to a stroke are three times more likely to be discharged to a skilled caring facility, and are more than twice as likely to die in hospital.<sup>26</sup> Therefore, the outcomes of a stroke can have adverse effects on both mobility and vision function, and can determine whether or not the individual will return to his/her pre-stroke functioning.

Having a general understanding of the health conditions that can affect vision, mobility, or both vision and mobility will set the stage for the remaining discussion on how vision and mobility impairments can affect function.

### 3.1.8 Vision and Function

The literature review generated extensive information on the direct effect of vision impairment on function. When someone has decreased visual function (e.g., acuity, contrast sensitivity, visual fields), he/she is no longer able to assess the environment safely. Vision is an integral part of almost all activities of daily living: shopping, self-care, money management, meal preparation, community activities, or home management. The sense of sight is one of the principal channels of environmental assessment; therefore, vision impairment is predictive of disability.<sup>27, 28</sup> Vision impairment is associated with a decrease in leisure activities as a result of compromised mobility, social function, and morbidity.<sup>29</sup> More inactivity results in greater chances of the development of chronic diseases.<sup>29</sup> Vision impairments are correlated to depression, decreased quality of life, lowered sense of well-being, increased risk of falls and fractures, loss of interest in activities, and fatigue.<sup>30</sup> Visual impairments are high among seniors.<sup>31</sup> In summary, current literature is well developed in the effect of vision impairment on function.

### 3.1.9 Mobility and Function, and the Feedback Loop

As mentioned earlier, mobility function is related to muscle power, muscle tone, muscle endurance, movement functions (such as body position and balance), and gait. In fact, Dodge et al.<sup>32</sup> found declines in activity scores among older elderly persons (85+ yrs) compared to younger elderly persons (65–71 yrs) in three types of leisure activities:

physical, non-physical, and social. They found that gait speed consistently explained this age-associated reduction in level of activities.<sup>32</sup> Why does gait speed have an effect on activity participation? Gait is highly related to control systems such as neurological, vestibular, visual, and musculoskeletal systems, which are critical to postural control.<sup>29</sup> A decline in these physiological systems can result in reduced gait velocity, decreased stride length, and reduced single-support stance time, thereby making it difficult to perform activities.<sup>29</sup> Mobility loss can make performing activities of daily living slow, demanding, and exhausting; as a result, older adults have reported lowered quality of life and depression.<sup>10, 33</sup> For example, lower limb power is important for walking speed and stair-climbing ability, and, as such, a decline in lower limb power causes declines in functional ability.<sup>29</sup> Another example is a test in which individuals are asked to walk backwards while counting (dual task) – those with a mobility impairment experienced increased walking time and number of steps compared to those with no mobility impairment.<sup>34</sup>

Gait and balance limitations in older adults increase the risk of falls, which can then result in injuries such as hip fractures.<sup>29, 35-37</sup> Postural control is considered a complex motor skill comprised of multiple sensorimotor processes.<sup>38</sup> Important resources for postural control include biomechanical constraints, movement strategies, sensory strategies, orientation in space, control of dynamics, and musculoskeletal and cognitive processes.<sup>38, 39</sup> Rubenstein et al.<sup>40</sup> found that seniors in nursing homes have a higher prevalence of mobility impairments due to aging, prolonged bed rest, limited physical activity, and chronic conditions. Nursing home falls were related to gait/balance/weakness (26%) compared to falls in the community that tended to be related to accidents or environmental factors (41%).<sup>40</sup> The outcomes of a fall can vary, but hip fractures are high on the list of fall injuries. Individuals with hip fractures (after 2 years of follow-up) were found to be almost four times more likely to be completely immobile, almost three times more likely to be functionally dependent, and they spent about 20% less time on their feet compared to those without a hip fracture.<sup>41</sup> In a one year follow-up with individuals over 65 years of age, those who experienced a new fall (26.4%) had a decline in gait speed (7.2%) and balance (5.3%).<sup>36</sup>

In Figure 3, a dashed line was drawn between activities and participation feeding back into mobility function. During the review of the literature, a *mobility feedback loop* relationship was found between mobility and activities/participation. This relationship is seen with an example where decreased mobility function results in decreased activities and participation; however, this relationship can be inverted, as in the examples found where decreased activities and participation results in decreased mobility function. The first half of the mobility feedback loop (decreased mobility = decreased activities/participation) has been explained in the earlier paragraphs in this section. The second half of the relationship can be demonstrated with the work of Farley<sup>42</sup>, who found that declines in mobility are more a consequence of a reduction in levels of physical activity associated with aging. A decrease in muscle mass and strength due to decreased levels of physical activity will further contribute to an overall decline in mobility.<sup>42</sup> Those who engage in regular physical activity tend to participate in life activities more frequently than those who are less physically active. Active seniors experience greater reports in successful mobility.<sup>43</sup> In summary, the literature shows a connection between mobility function affecting activities/participation and activities/participation affecting mobility function.

### 3.1.10 Coexisting Vision, Mobility and Function

The elderly are disproportionately affected by multiple disabilities.<sup>44</sup> What begs to be further clarified is how coexisting vision and mobility impairments affect function. The scoping literature review found that the relationship between coexisting vision and mobility impairments and function can be explained through two scenarios (represented by the overlapping ovals and the shaded arrow in Figure 3).

The first scenario is when an individual is living with two separate health conditions that affect his/her ability to perform activities of daily life. For example, individuals living with age-related macular degeneration (vision, health condition 1) and decreased lower limb muscle strength (mobility, health condition 2) will likely experience increased difficulty with daily functions. Due to both of their impairments, they may have greater difficulty going up or down stairs. They cannot see the stairs to assess stair height, depth, and colour safely; additionally, they have increased difficulty lifting themselves up and

down the stairs. By having both impairments, they have an increased level of impairment (i.e. they cannot use their vision to decrease their mobility impairment, and vice versa).

The second scenario is when a person's mobility limitation occurs or is enhanced *as a result* of visual impairments that then affect function. For example, someone living with age-related macular degeneration who experiences decreased depth perception is likely, therefore, to have decreased gait speed to accommodate for the vision loss, which affects daily functions. As in the example above of going up and down the stairs, these individuals cannot see the stairs to assess stair height, depth, and colour safely; in this case they accommodate for the vision loss by taking stairs much slower. They may feel an increased fear of falling and take longer to go up and down the stairs. Therefore, they may not have a mobility impairment as a direct result of a health condition, but their vision loss decreases their mobility function.

Each of these situations will be explored in relation to the literature.

There was limited research that discussed the phenomenon of two separate vision and mobility impairments affecting function; however, the few papers that acknowledge this relationship are worth mentioning. For example, during vision rehabilitation, Weih<sup>45</sup> found that 85% of elderly clients reported having disabilities other than vision loss, and many (47%) reported multiple other health conditions. In researching older adults with vision limitations who also reported having a mobility impairment, Ellexson<sup>27</sup> distinguished the mobility impairments due to stroke (residual weakness), arthritis (joint stiffness), hearing loss, cardiac precaution, tremor, or physical mobility issues. When someone reports both a vision and mobility impairment, research shows both impairments affect gait, and balance; also, visual disorders contribute to increased falls.<sup>40</sup>

Conversely, mobility limitation *as a result* of visual impairment was discussed in depth in a number of papers. Vision disorders among the elderly are associated with mobility problems, limitations in physical and social functioning, difficulties with activities of daily living, reduced well-being, falls, and mortality.<sup>11, 27, 29, 46-48</sup> Mobility problems as a result of visual impairments were found to be associated with lower levels of quality of life, depression, loneliness, cognitive dysfunction, fair or poor health, hip fracture,

disability, institutionalization, and mortality.<sup>11</sup> Long et al.<sup>49</sup> reported older adults who are visually impaired travel, on average, to 0.3 destinations per week, whereas sighted older adults travel to an average of 1.4 destinations per week.

Specific health conditions related to vision impairment affect mobility function. For example, individuals with age-related macular degeneration walk more slowly, have a longer swing phase of the gait cycle, look down more often when walking, and move more slowly to avoid slipping.<sup>50, 51</sup> Individuals with retinitis pigmentosa and glaucoma also have slower walking speeds.<sup>52, 53</sup>

There are multiple discussions in the literature on how measures of visual function (such as visual acuity, contrast sensitivity, residual visual field, differential velocity sensitivity, and scanning ability) are predictive of mobility performance.<sup>9, 46, 54-67</sup> Marron and Bailey<sup>9</sup> conducted one of the most important studies undertaken to relate visual function performance with mobility performance. Their breakthrough study indicated that visual field and visual contrast, when combined, accounted for 53% of the variance in mobility performance.<sup>9</sup>

Brower<sup>10</sup> found in his qualitative study that decreased vision and mobility affect daily life in five different areas:

- 1) Reduced mobility range brings about negative feelings caused by a diminishing occupational space (not being able to go about in the way in which you would normally, e.g., making trips to the shopping mall, or experiencing a persistent fear of knocking things over);
- 2) Frustrations and fears over both daily life and the future, and feeling stigmatized because of diminishing vision;
- 3) Adjustment to continuing activities requiring mobility (e.g., learning to slow one's pace or to only go out at certain times of the day);
- 4) Experiences of changes in daily activities (e.g., relying on others to prepare meals, decreased social activities outside the home, or increased difficulties with personal care); and

- 5) Lack of understanding from others leading to difficulties in social interactions (or reduction of social contact).

It can be concluded from the current literature that whether a person has two separate health conditions that result in a separate vision and mobility impairment, or an increased mobility impairment due to a vision disorder, both situations result in increased disability affecting daily function.

### 3.2 Relationship to Rehabilitation

All factors affecting functional performance are interrelated and influence one another in a continuous and dynamic process. As such, it is important to enable participation in activities older adults wish to engage in.<sup>27</sup> When considering function, two questions must be considered:<sup>3</sup>

- 1) What are the tasks that must be accomplished so that societal participation is enhanced?
- 2) What resources are available for accomplishing these tasks?

On its own, the rehabilitation of functional ability related to mobility should focus on improving strength, endurance, and balance, where possible. For example, Rubenstein et al.<sup>40</sup> reviewed an eight-week exercise program for older adults that showed an increase in muscle strength (9% in midthigh muscle and 48% in mean tandem gait speed). The conclusion of Rubenstein et al.<sup>40</sup> was that this increase in muscle strength resulted in a 15% increase in mobility, which reduced the number of assistive technologies required and indicated that patients were more functionally independent.

To improve functional ability related to vision, the use of assistive technology is typically the resource for rehabilitation, since individuals living with low vision have vision at a level that is no longer correctable by standard optometric care, surgery, or medications. Assistive technology for vision impairments includes closed-circuit television (CCTVs), magnifiers, glare reduction devices, improved lighting, or large font.

The literature review did not reveal research related to vision and mobility services collaborating to improve function in older people. The only field related to coexisting

vision and mobility impairments is orientation and mobility training. With training in the use of visual and nonvisual information, including assistive devices, visually impaired persons gain a better understanding of their environment, enabling them to travel more comfortably, efficiently, and safely.<sup>11</sup> Orientation and mobility training is often accompanied by the use of assistive devices such as identification canes and long canes. Appropriate training may decrease mobility limitations and contribute positively to societal participation and quality of life.<sup>11</sup> Kuyk et al.<sup>68</sup> found that after rehabilitation, subjects rated their self-perceived functional mobility as significantly improved in a variety of mobility situations. Although the benefits of orientation and mobility have been reported by a few authors, it has been reported that orientation and mobility training does not enhance mobility performance.<sup>69</sup> More research is required to determine whether orientation and mobility training is effective in improving mobility function.

Also related to health care services, further evidence is needed to show the positive outcomes of communication between vision and mobility service providers. The literature indicates positive responses for vision rehabilitation and positive responses for mobility rehabilitation. The next goal of health care is to join forces, allowing communication between practices, to improve the rehabilitative experience for older adults with coexisting vision and mobility impairments.

### 3.3 Discussion and Conclusion

#### 3.3.1 Summary of Findings

This scoping literature review was successful in presenting evidence related to coexisting vision and mobility limitations and their impact on function.

The results of the review can be grouped into four themes: (i) the impact vision has on function; (ii) the impact mobility has on function; (iii) the impact of coexisting vision and mobility impairments on function; (iv) and treatment relating to vision and mobility separately.

Two gaps in the literature were found. First, there is limited evidence pertaining to the joint effect of both a vision and mobility impairment on activities and participation. Also,

there is a lack of discussion on how to properly assess, treat, and measure successful outcomes for people experiencing both vision and mobility impairments. It is concluded that there is a strong relationship between vision and mobility impairments and their effect on function, but there are unanswered questions of how to provide services and technology to aid individuals living with both of these impairments.

### 3.3.2 Relation to Other Studies

Since this is the first review to examine coexisting vision and mobility impairments on function, no comparison can be made directly to other published work; however, similar findings have been reported in other studies that have looked at how two other impairments affect function. For example, Crews and Campbell<sup>70</sup> investigated the influence of having both a hearing and a vision impairment on activities and participation. They also used the ICF model and its definitions to assist in their analysis. Similar to the current review, they found that people with *both* a vision and hearing impairment reported higher levels of difficulties with activities and participation (e.g., walking, getting outside, getting in or out of bed, managing medication, and meal preparation) compared to those with only a vision impairment and those with only a hearing impairment.<sup>70</sup> Whitson et al.<sup>71</sup> studied the risk of disability in individuals with coexisting visual and cognitive impairment. Their results found that coexisting visual and cognitive impairments in older adults were associated with a three to six times greater odds of disability.<sup>71</sup> These studies emphasize that living with coexisting impairments results in a greater level of difficulty compared to living with one impairment.

### 3.3.3 Strengths and Weaknesses of the Study

It is appropriate to discuss the limitations of this scoping literature review, but first: a highlight of the strengths of this study. This study is the first of its kind to present an overview of the literature pertaining to two health conditions (vision and mobility limitations) and their impact on activities and participation. This study does not attempt to appraise the quality of the research presented; therefore, the research quality may be variable for some studies. Given the quantity of studies identified and coordinating results between studies, this review has sufficient evidence to support the findings



presented. As well, the use of the ICF framework is a strength because of its holistic approach to understanding the disability experience. The literature mapped by the ICF maintains a biopsychosocial perspective. The ICF framework and terminology demonstrates the intimate relationships among all components related to disability (i.e. the same themes were carried through each ICF domain). The overlap of information between studies made it possible to capture the general knowledge pertaining to each domain. The dynamic design of the framework allowed for a dynamic relationship to exist between the different domains.

One of the limitations of the study is that there was only one reviewer. While the literature was reviewed by only one person, the extensive number of reviews and the general exclusion criteria allowed for all relevant literature to be included in this review.

In conclusion, this review extends the knowledge surrounding the implications of older adults living with coexisting vision and mobility impairments and the effect of these impairments on function.

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## Chapter 4

### 4 Methods

#### 4.1 Mixed Methods Overview

The research conducted for this dissertation used a mixed methods design. A mixed methods design incorporates one or more methodological strategies, or techniques, drawn from a second method into a single research study. It is used in order to access some part of the phenomenon of interest that cannot be accessed by the use of the first method alone.<sup>1</sup> A mixed methods design is distinguished by its use of a primary or core method, combined with strategies from a second, different method for addressing the research question. The central premise of mixed methods research is that “the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone”(p. 5).<sup>2</sup>

More specifically, the type of mixed methods design used in this dissertation is a *sequential* mixed methods design.<sup>1</sup> “Sequential” means the research in the supplemental component is conducted *after* the core research has been completed. Creswell<sup>2</sup> describes a similar technique as an Explanatory Design, whereby the qualitative adds explanation to the quantitative. A sequential mixed methods design was chosen for this dissertation in order to provide richness to the secondary data analysis of the NPHS and PALS by adding testimonial evidence of the lived experience of older adults with coexisting vision and mobility impairments. These qualitative data were collected via semi-structured interviews.

##### 4.1.1 Components of Mixed Methods

According to Morse and Niehaus<sup>1</sup>, a mixed methods design is composed of a core component, a supplemental component, pacing, theoretical drive, and a point of interface. Each of these elements of the mixed methods design is introduced in turn.

*The core component* of the research paper is always dominant and complete in its research methods. If all else were to fail, this section could be published on its own.<sup>1</sup> For

the purposes of this dissertation, the core component is the quantitative secondary data analysis of two Statistics Canada health-related surveys. The specific methods used are discussed in detail in the next two sections.

*The supplemental component* of the research is conducted alongside the core component. It is relatively independent, but joins the main project at the point of interface, or where the two methods come together.<sup>1</sup> In this dissertation, the supplemental component is semi-structured interviews with older adults living with coexisting vision and mobility impairments, as explained below.

*Pacing* is the mode in which the core and complementary components are synchronized.<sup>1</sup> This study used a *sequential* pace (the supplemental component follows the core component), since the results of the data analysis helped to determine the structure of the supplemental component interviews. In a simultaneous or concurrent pace, both the core and the supplemental components are conducted at the same time.<sup>1</sup> A concurrent pace would not be possible for this project because the supplemental component is dependent on the results of the core component.

*Theoretical drive* is the overall conceptual direction of the project and is identified from the research question.<sup>1</sup> Since this project is based on a core component that is quantitative (QUAN) followed sequentially ( $\rightarrow$ ) by a qualitative supplemental component (*qual*), Morse and Niehaus<sup>1</sup> would designate this project with the symbol: QUAN  $\rightarrow$  *qual*.

As a QUAN  $\rightarrow$  *qual* research method, the theoretical drive is *deductive*, meaning the analysis proceeds from the general to specific. The deductive method is different from inductive (moving from specific to general) or abduction (moving back and forth between induction and deduction).<sup>1</sup> Morse and Neihaus<sup>1</sup> indicate that there are two main “rules” to the theoretical drive of a mixed methods design:

- 1) The theoretical drive ALWAYS dictates the core method used for conducting the core component of the project.
- 2) The researcher must ALWAYS keep in mind the theoretical drive. **That is, the findings of the core component, driven by the overall theoretical drive, are the base (or structure) into which the supplementary findings must fit.**



*The point of interface* is the position at which the core and supplemental components meet during the conduct of the research.<sup>1</sup> For a sequential pace, the point of interface is in the results. That is, in the writing of the research results, the findings from the core component form the theoretical base of the results, and the results from the supplemental project embellish and add to the description of the core results.<sup>1</sup>

Figure 4 presents a diagram of the methods used in this dissertation and how all the components of the mixed methods design are incorporated into the overall research project.

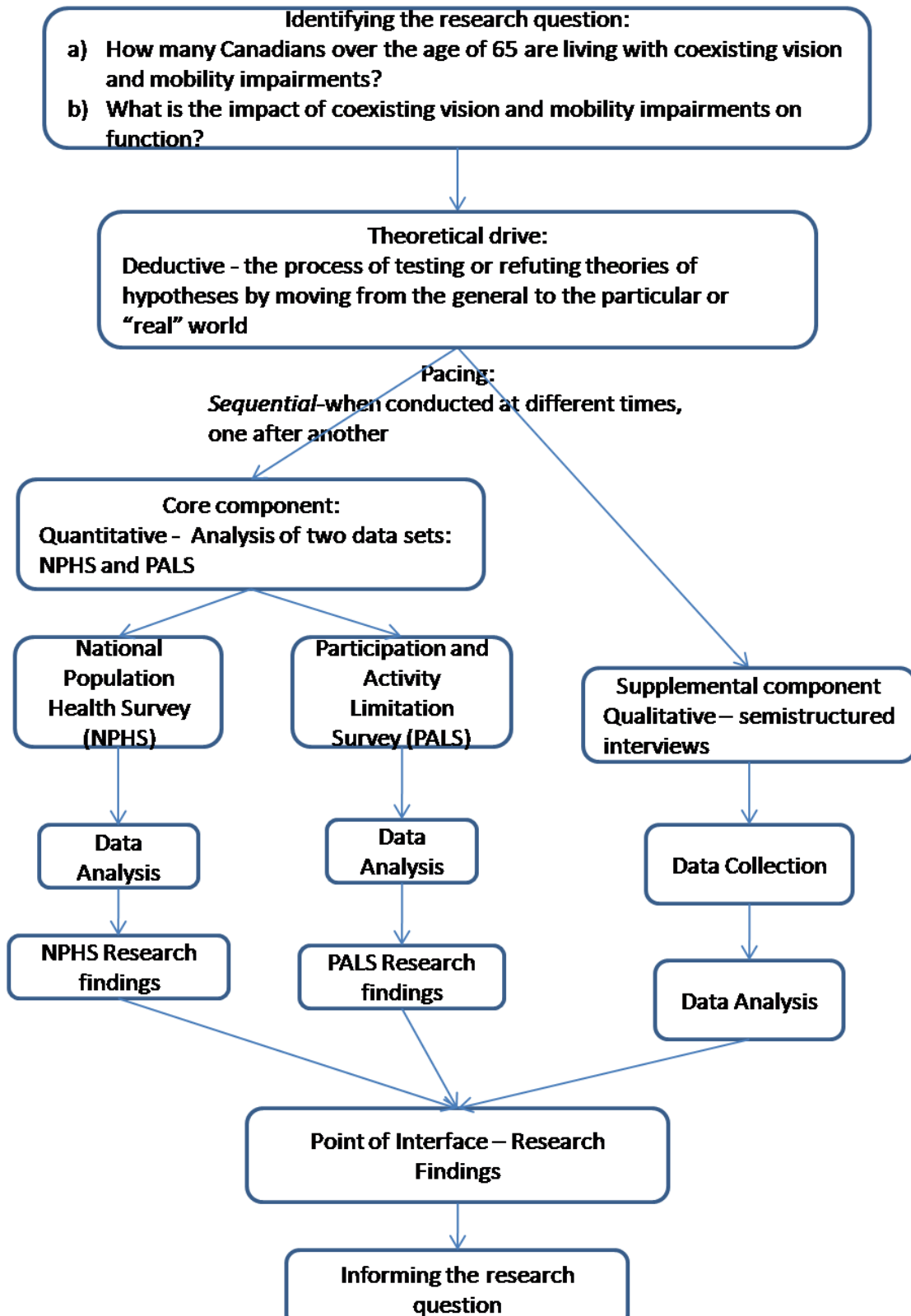


Figure 4: Research project methods

## 4.2 Core Component – National Population Health Survey (NPHS)

### 4.2.1 Overview

Due to economic and fiscal pressures on the health care system and the need for information to improve the Canadian population's health, the National Health Information Council (NHIC) requested that Statistics Canada develop an ongoing national survey of population health.<sup>3</sup> Statistics Canada created the NPHS to fulfill this request. The NPHS was designed to collect longitudinal information on the health of the Canadian population, as well as related socio-demographic information.<sup>3</sup> The first cycle of the NPHS started in 1994 where a sample of 17,276 individuals from ten provinces was surveyed. The individuals have been sampled every two years since, providing current and in-depth information on their physical and mental health status, use of health care services, physical activities, work life, and social environments.<sup>4</sup> Each cycle consists of a core component (questions that are asked in each cycle), focus content (special content asked in a specific cycle and integrated into the NPHS questionnaire), and supplemental content (additional content purchased by a client outside Statistics Canada).<sup>5</sup> For the purposes of this dissertation, Cycle 7 (2006/2007) was used for data analysis as it is the most recently released cycle from Statistics Canada.

### 4.2.2 Sample Design

The target population for the NPHS household component included household residents in the ten Canadian provinces in 1994/1995, excluding persons living on Indian Reserves and Crown Lands, residents of health institutions, full-time members of Canadian Forces Bases, and some remote areas in Ontario and Quebec.<sup>3</sup> Aside from Quebec, the sampling strategy was a *stratified two-stage design* based on the Labour Force Survey (LFS). In Stage 1, the homogeneous geographic and/or socio-economic strata were formed by dividing each province into three types of areas (major urban centres, urban towns, and rural areas), and independent samples of clusters, usually Census Enumeration Areas, or EAs, were drawn from each stratum. Statistics Canada uses EAs, small areas composed of one or more neighbouring blocks, for distributing Census questionnaires to households

and dwellings. In Stage 2, a dwelling list was prepared for each chosen cluster and participants were selected from the list.

For residents of Quebec, the NPHS sample was selected from households already being interviewed by Santé Quebec for the 1992-1993 Enquête sociale et de santé (ESS). The ESS sampling methodology was also a two-stage design similar to LFS.<sup>3</sup>

The NPHS had an initial target sample size of 19,600 respondent households.<sup>3</sup> It was agreed that each province needed a minimum of 1,200 households. Since the survey content primarily focused on one member in each sample household, Statistics Canada adopted the *rejective method* in order to compensate for the under-representation of persons from large households. The rejective method used an “under-25-year-old” rule: those households that had no member less than 25 years of age were eligible for rejection and dropped from the survey. Typically, children and parents were under-represented since they had fewer chances of being chosen, while the elderly were over-represented because they typically belong to small households.<sup>3</sup> Households to which the rejective technique was applied were usually limited to 25% to 30% in Ontario, 37.5% to 40% in urban areas elsewhere, and 25% to 30% in rural areas.<sup>4</sup> To maintain required sample sizes, the number of households visited in each province was increased by the anticipated number of households screened out in this way.<sup>3</sup> In the end, the longitudinal sample was composed of 17,276 persons selected in Cycle 1, and who completed at least the General component of the questionnaire in Cycle 1.<sup>3</sup> The longitudinal sample is not renewed over time. For Cycle 7, all longitudinal panel members were at least 11 years of age, and the longitudinal sample did not include anyone who immigrated to Canada after 1994/1995.<sup>3</sup>

#### 4.2.3 Attrition and Response Rate

The number of people answering the survey slightly decreases from one cycle to the next due to attrition caused by *non-response* (for example, refusals and individuals who were untraceable). To decrease the rate of non-response, interviewers were trained to make all possible attempts at contacting panel members. For example, they made multiple phone calls or visits, and used local telephone directories, Canada-wide telephone directories, and reverse directories. The cumulative non-reponse rate due to failure to trace the

respondent is 5.4% of the total panel, which is low for the seventh cycle of the survey.<sup>3</sup> Refusals were followed up by senior interviewers, project supervisors, or by other interviewers to try to convince respondents to participate in the survey. Also, a letter from the Regional Office to the respondent was sent to stress the importance of the survey and the respondent's co-operation.<sup>3</sup> The cumulative non-reponse rate due to refusal is 13.2% of the total panel.<sup>3</sup> Despite non-response, the longitudinal sample is still representative of the 1994/1995 population.<sup>3</sup> Attrition should not lead to large increases in variance estimates.<sup>3</sup>

Panel members who died (2032, of which 1773 were confirmed with the Canadian Vital Statistics Database) and panel members who moved to a health institution are still part of the longitudinal sample, therefore they do not contribute to the attrition of the longitudinal panel.<sup>3</sup> The response rate for Cycle 7 is based on the 17,276 members of the longitudinal panel. Table 4 contains the 2006/2007 sample sizes and response rates for the NPHS longitudinal panel.

**Table 4: 2006/2007 NPHS response rates**

	Sample Size/Response Rate
Number of complete	11119
Number of deceased	2032
Number of institutionalized	148
Number of non-respondent	3977
Response rate	$\frac{11119 + 2032 + 148}{17276} = 77.0\%$

#### 4.2.4 Data Collection

Data collection for NPHS questions used Computer-Assisted Interviewing (CAI). The advantage of the CAI system is that the associated logical flow in and out of the questions is specified, along with the type of answer required, the minimum and maximum values, online edits associated with the question, and instructions on what to do in the case of

item non-response.<sup>6</sup> Also, data editing was first performed through the CAI system. It was not possible for participants to enter out-of-range values, and contradictory responses had to be resolved. The skip pattern programmed in the CAI system ensured that questions that did not apply to the respondent were not asked. Prior to using the questionnaire, extensive testing was conducted including field tests and focus groups to ensure the CAI system was working properly.

Cycle 7 data collection took place in June, August, and October 2006, and January 2007. The majority of the interviews (99%) were conducted by telephone.<sup>3</sup> The interview typically took one hour. Proxy reporting for respondents aged 12 and over was allowed only for reasons of illness or incapacity. Proxy reporting accounted for 5.7% of the information collected for respondents aged 12 years and older.<sup>3</sup> All interviews for respondents under 12 years of age were conducted by proxy.

#### 4.2.5 Weighting

The value of the NPHS questionnaire is that the data collected can be used to provide estimates of the Canadian population, but this can only be done accurately if weights are assigned to responses. Statistics Canada explains in their methods for the NPHS that “the principle behind estimation in a probability sample, such as the NPHS, is that each person in the sample ‘represents,’ besides himself or herself, several other persons not in the sample” (p. 16).<sup>3</sup> The weighting phase calculates each person’s associated weight, which must be used to derive meaningful estimates from the survey. For the purposes of this dissertation, the subset of respondents used for estimation were those panel members with a complete response (full) in Cycles 1 to 7 (n = 10,992).

For Cycle 1 (1994/1995), a basic weight was initially derived for each individual. The longitudinal weighting procedure is based on the weighting conducted for Cycle 1.<sup>3</sup> Cycle 1 weights were obtained using the LFS basic weights as a starting point for all provinces except Quebec, where the basic weight from Enquête sociale et de santé was used.<sup>3</sup> Several adjustments were made to these weights to take into account the nature of the NPHS and to ensure that the weights accurately represented the true probability of selection for each panel member. These adjustments were kept for all future cycles since

the longitudinal sample always refers to the sample population of 1994/1995. The longitudinal full weight excludes anyone classified as non-response or partial response at some point during the seven cycles of the survey. There are two adjustments made to the Cycle 7 weights: non-response adjustment and post-stratification adjustment. The non-response adjustment consisted of the 11,619 records with full responses after six cycles. Those respondents labelled as institutionalized or deceased were not adjusted for non-response since their weight in Cycles 2, 3, 4, 5, and 6 had already been adjusted. To adjust for longitudinal members who did not respond in Cycle 7, the following adjustment is applied to the weight of respondents:

Sum of weights for Cycles 1 to 6 responding longitudinal members

Sum of weights for Cycles 1 to 7 responding longitudinal members

The weight of the units that are part of the full subset was post-stratified to the 1994/1995 population estimates based on 1996 Census counts by age group (0–11, 12–24, 25–44, 45–64, 65 and older) and sex within each province. This step was done to ensure that the 1994/1995 population is accurately represented in any estimates produced from the longitudinal file. The final longitudinal weight is calculated by taking the Cycle 1 weight and multiplying that value by the adjustments of Cycles 1 to 7.

#### 4.2.6 Data Analysis

NPHS data are available in public microdata file (PUMF) format.<sup>6</sup> PUMF files are created in such a way that individual respondents cannot be identified.<sup>5</sup> As such, the PUMF files do not provide access to the complete survey data due to confidentiality concerns. As the full datasets were required for this study, the PUMF files were insufficient. Master dataset files for Statistics Canada are housed in Research Data Centres (RDCs). The RDCs were set up to strengthen Canada's social research capacity and to support the policy research community.<sup>3</sup> Researchers are permitted to access the microdata at RDCs if they have appropriate clearance and have been sworn in as "deemed employees." The full NPHS master dataset is not publically released; therefore, clearance was applied for and granted on September 14, 2009 by CISS-Access to the RDC Program, a joint initiative between Statistics Canada, the Social Sciences and

Humanities Research Council, and the Canadian Institutes of Health Research (see Appendix B for contract). Initial analyses began on October 6, 2009. All data analyses were completed at the UWO's RDC, using SPSS Version 17.0.

Since this dissertation focuses on individuals who are over the age of 65, the NPHS master dataset file was filtered for individuals in that age group. Those 64 years and younger were removed from the master dataset file. Raina et al.<sup>7</sup> found that the use of health status questions based on established scales and items from national and provincial population surveys result in reasonably good internal consistency and test-retest reliability when used in a population of seniors. Based on their responses to vision and mobility filter questions, individuals were then divided into four groups: no vision or mobility impairment, vision only impairment, mobility only impairment, or vision and mobility impairment. Unweighted cross-tabulations were completed between each group and outcome measure (e.g., self-reported health or physical activity participation). Cell sizes were examined to ensure Statistics Canada disclosure guidelines were not violated. This examination was followed by cross-tabulations using rescaled weights. Since this study is primarily descriptive and makes numerous comparisons, tests of statistical significance were not conducted; however, non-overlapping 95% confidence intervals were calculated to identify potential statistically significant differences. Statistics Canada guidelines for tabulation, analysis, and release were strictly followed. Table 5 presents a summary of these guidelines.



**Table 5: Statistics Canada Guidelines for Tabulation, Analysis, and Release NPHS**

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**Rounding Guidelines**

Estimates in the main body of a statistical table should be rounded to the nearest hundred units

Marginal sub-total, totals, sums, and differences should be derived from their corresponding unrounded components and then are to be rounded themselves to the nearest hundred units

Averages, proportions, rates, and percentages should be computed from unrounded components and then they are to be rounded to one decimal

**Sample weighting guidelines for tabulation**

Users must apply the proper sampling weight in order for estimates to be considered representative of the 1994/1995 target population

**Release guidelines**

Users must first determine the number of sampled respondents having the characteristic of interest. If this number is less than 10, the weighted estimate should not be released

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## 4.3 Core Component – Participation and Activity Limitations Survey (PALS)

### 4.3.1 Overview (intro)

The PALS is a post-censal survey designed to collect information on adults and children with disabilities, that is, those whose everyday activities are limited because of a condition or health problem.<sup>8</sup> The 2006 PALS was funded by Human Resources and Skills Development Canada (HRSDC). The questions for PALS were developed based on a review of the 1991 Health and Activity Limitation Survey (HALS) questionnaires and input consultation with the client (HRSDC).<sup>8</sup> The PALS was first conducted in 2001. Comparisons between the 2001 and 2006 PALS may be undertaken, but caution should be taken due to changes in sample design.<sup>9</sup>

### 4.3.2 Sample Design and Response Rate

The target population of PALS consists of individuals 15 years of age and older living in private households, and some non-institutional collective dwellings, who answered “yes” to either question 7 or 8 in the 2006 Census.<sup>8</sup> The 2006 Census asks the following:

7) Does this person have any **difficulty** hearing, seeing, communicating, walking, climbing stairs, bending, learning or doing any similar activities?

8) Does a physical condition **or** mental condition **or** health problem **reduce the amount or the kind of activity** this person can do: at home? At work or at school? In other activities, for example, transportation or leisure?<sup>10</sup>

The PALS used a *stratified two-stage* sample design. The first stage was the 2006 Census long form. If an individual answered “yes” to the above question 7 or 8, they were classified as “individuals with disabilities.”<sup>8</sup> Statistics Canada selected a sample of individuals from respondents to the Census long form who reported a positive response to at least one of the filter questions. The strata are defined by cross-classification of the ten provinces and three territories, four age groups, and the Census severity of disability (defined by the response categories “often” and “sometimes”).<sup>8</sup> Each Primary Sampling Unit (PSU) is made up of one or more Census EAs and is defined within a severity and age group stratum.<sup>8</sup> Although a given EA can be selected for more than one severity and age group combination, a PSU is defined in only one stratum.<sup>8</sup>

The PSU size comes from the projection of a population that is Census-disabled for the combination of EAs, age group, and severity of PSU.<sup>8</sup> First, PSUs are sampled using probability proportional-to-size (PPS) sampling. Second, all Census long form respondents in a selected PSU are included in the 2006 PALS sample. The second step is, therefore, the 2006 Census long form, which is, in most EAs, a systematic sample of one in five households.

The original size of the PALS 2006 sample totalled 47,793 individuals, including 38,839 adults and 8,954 children, living in private households and collective dwellings.<sup>8</sup> An overall response rate of 74.9% was obtained. Analysis is based on the adult questionnaire, which consists of 28,632 people aged 15 and over who responded to the survey.

### 4.3.3 Data Collection

As with the NPHS, interviews were conducted over the telephone by interviewers using the computer-assisted telephone interviewing (CATI) method.<sup>8</sup> This method improves accuracy by allowing interviewers to move more easily to the next appropriate question within a complex format, based on answers provided by the respondent.<sup>8</sup> Interviews by proxy were allowed. Data collection began October 30, 2006 and continued until February 28, 2007.<sup>8</sup>

### 4.3.4 Weighting

Estimation weights were adjusted by post-stratification to bring them into line with Census-based population estimates for the strata and groups based on province, age, and sex.<sup>8</sup> The weight used in PALS was determined in three stages. First, it was necessary to calculate the initial weight, that is, the inverse of the probability of inclusion in the sample. This weight was composed of the inverse of the sampling ratio of the PSU, the Census weight, and the subsampling weight.<sup>8</sup> Second, adjustments were made for non-response, which included persons not contacted and persons who were contacted but who did not respond.<sup>8</sup> The non-response adjustment was determined by forming non-response adjustment classes in such a way that the records in each class had similar response probabilities.<sup>8</sup> Estimated response probabilities were obtained by developing a logistic regression model to predict the response probability using explanatory variables.<sup>8</sup> The initial weights were adjusted accordingly. Finally, the last step was post-stratification. This adjustment was implemented to ensure that the sum of the final weights for the respondents is equal to the population counts obtained from the Census.<sup>8</sup> This adjustment was made for groups (called post-strata) defined by the combinations of geography, sex, age group, and severity of the activity limitation(s) reported in the Census.<sup>8</sup> The weights corrected for non-response were adjusted accordingly. These final weights were used to produce estimates for the population. For example, 22,513 adults reported having at least one limitation in PALS. By using weights, it can be estimated that 4,215,530 people aged 15 and over in the Canadian population reported having at least one activity limitation.

### 4.3.5 Data Analysis

PALS data are available in PUMF format.<sup>8</sup> Again, PUMF files are created in such a way that individual respondents cannot be identified.<sup>8</sup> The PALS PUMF files do not have the complete survey data due to confidentiality concerns. Similar to the NPHS, permission was granted for access to the microdata files, and data analysis of PALS proceeded at the same time as the NPHS data analysis.

Since this dissertation focuses on individuals who are over the age of 65, the PALS 2006 master dataset file was filtered for individuals over the age of 65. Those 64 years and younger were removed from the master dataset file. Based on their responses to the vision and mobility filter questions, individuals were divided into four groups: no vision or mobility impairment, vision only impairment, mobility only impairment, or vision and mobility impairment. Unweighted cross-tabulations were completed between each group and outcome measure (e.g., self-reported health or physical activity participation). Cell sizes were examined to ensure Statistics Canada disclosure guidelines were not violated. This examination was followed by cross-tabulations using rescaled weights. Since this study is primarily descriptive and makes numerous comparisons, non-overlapping 95% confidence intervals were calculated to identify potential statistically significant differences. Chi-square tests were used to determine significance between groups reporting receiving assistance for activities of daily living with coexisting vision and mobility impairments and those groups living with only a vision or mobility impairment. Statistics Canada guidelines for tabulation, analysis, and release were strictly followed. Table 6 presents a summary of these guidelines.

**Table 6: Statistics Canada Guidelines for Tabulation, Analysis, and Release PALS**

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**Rounding Guidelines**

Estimates in the main body of a statistical table should be rounded to the nearest ten

Marginal sub-total, totals, sums, and differences should be derived from their corresponding unrounded components and then are to be rounded themselves to the nearest ten

Averages, proportions, rates, and percentages should be computed from unrounded components and then they are to be rounded to one decimal

**Sample weighting guidelines for tabulation**

Users must apply the proper sampling weight in order for estimates to be considered representative of the target population

**Release guidelines**

Users must first determine the number of sampled respondents having the characteristic of interest. If this number is less than 10, the weighted estimate should not be released

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## 4.4 Supplemental Component

### 4.4.1 Qualitative Component

Following the completion of the quantitative data analysis, the supplemental component of the mixed methodology was conducted. This component consisted of semi-structured interviews with older adults living with coexisting vision and mobility impairments. The broad topics of interest are: (i) participation (social and physical), (ii) assistive technology, and (iii) service delivery.

The purpose of the qualitative component was to provide further insight and to compensate for the inadequacies in understanding results drawn solely from the quantitative core. That is, the core component, the data analysis of the NPHS and PALS, is an area in which patterns of behaviours are statistically clear, but reasons for these

patterns cannot be fully appreciated without a subject's accounts of his/her own behavior.<sup>11</sup> Learning directly from older adults living with coexisting vision and mobility impairments provides insight into how they experience living with two limitations, the meaning they give their situations, and how they interpret what they experience.<sup>11</sup>

#### 4.4.2 Research Process

As Crotty<sup>12</sup> explains, in qualitative research, it is necessary to justify the choice and particular use of methodology and methods, which is to ask about the theoretical perspective. Four questions are set forth:

- What methods are proposed to be used?
- What methodology governs the choice and use of methods?
- What theoretical perspective lies behind the methodology in question?
- What epistemology informs this theoretical perspective?<sup>12</sup>

For the purposes of this study, the definitions outlined by Crotty<sup>12</sup> were used:

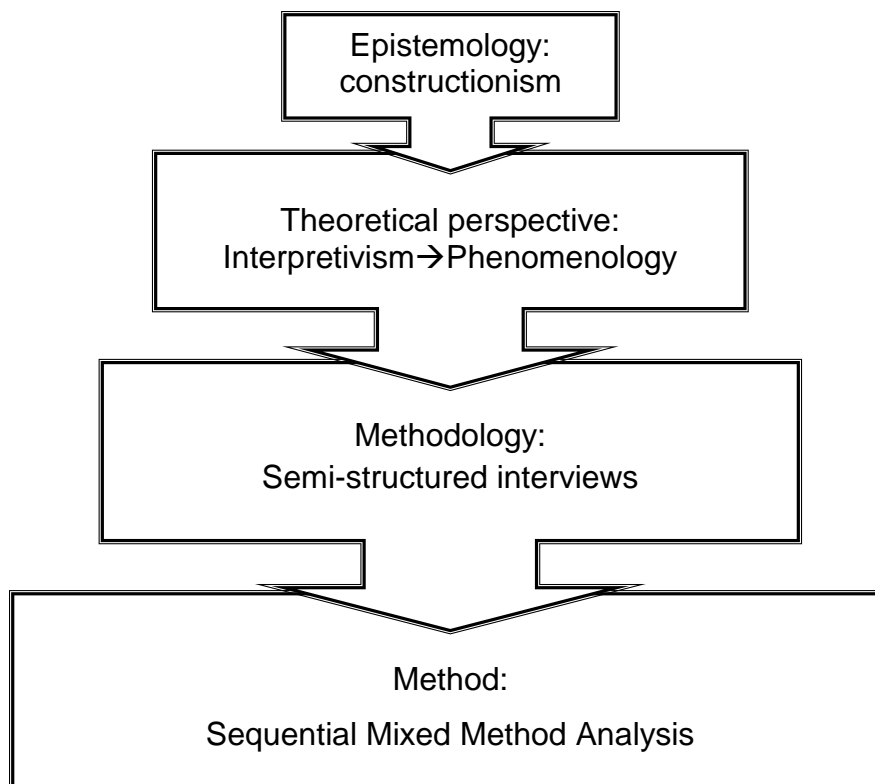
*Methods* – the techniques or procedures used to gather and analyze data related to some research question or hypothesis.

*Methodology* – the strategy, plan of action, process, or design lying behind the choice and use of particular methods, and linking the choice and use of methods to the desired outcomes.

*Theoretical perspective*– the philosophical stance that informs the methodology, provides a context for the process, and grounds its logic and criteria.

*Epistemology* – the theory of knowledge embedded in the theoretical perspective and, thereby, in the methodology.<sup>12</sup>

To answer the previous four questions, each of these terms is explained in the context of this dissertation as illustrated in Figure 5.



**Figure 5: Overview of qualitative research process**

#### 4.4.3 Epistemology – Constructionism

The epistemology of the qualitative study is based on constructionism, which is a view that all knowledge and, therefore, all meaningful reality as such, being constructed in and out of interaction between human beings and their world, and developed and transmitted within an essentially social context, is contingent upon human practices.<sup>12</sup> To better understand the lived experience of individuals living with coexisting vision and mobility impairments, the reality of living with both impairments had to be discovered. How do these impairments affect his/her daily life? How do they impact his/her ability to participate in the activities in which he/she used to find pleasure? Only these individuals can answer these questions because they are living with the impairments and they have an active role in understanding the effect of coexisting impairments.

The other point to notice during the interview is that each individual has his/her own perspective of truth. There are overlapping themes, but each individual has his/her own

experience and, therefore, his/her own perspective of meaning. This concept exists in and out of our interaction with the world to create our own realities, and constructivists study the implications of those constructions of reality.<sup>12, 13</sup> As Crotty<sup>12</sup> states, one does not have a preset truth, but one develops a meaning when he/she interacts with what is around them.

This study could not use the epistemology of objectivism or subjectivism. Objectivism holds that meanings, and, therefore, meaningful reality, exist as such apart from the operation of any consciousness.<sup>12</sup> Subjectivism is when meaning comes from anything except the interaction between the subject and the object we wish to ascribe.<sup>12</sup> The NPHS and PALS surveys are based on objectivism to come to the truth of what it is like to live with disabilities. These studies hold some value as they provide a better understanding of the impact of living with coexisting vision and mobility impairments; however, the studies' results lack the personal experience of older adults living with coexisting vision and mobility impairments. This lack of the personal perspective is the reason for having the qualitative component of the study to better enhance our understanding of the NPHS and PALS results. This understanding comes from interactions with older adults (subjects) who are living with coexisting vision and mobility impairments (object). These interactions are key to better understanding their experiences; therefore, constructionism is the most appropriate epistemology to use here.

#### 4.4.4 Theoretical Perspective – Interpretivism: Phenomenology

Interpretivism is situated in constructionism, and phenomenology emerges from interpretivism as a philosophical and methodological approach. Following the concepts of constructionism in how one constructs truth, the theoretical perspective that directs the methodology in this study is based on interpretivism. Interpretivism looks for culturally derived and historically situated interpretations of the social lifeworld.<sup>12</sup>

Coming out of interpretivism is the concept of phenomenology. Phenomenology's goal is to investigate phenomena from the perspective of the individuals who experience the phenomena first-hand.<sup>13-15</sup> Phenomenology was first defined by Sonnemann<sup>13</sup> and emphasized "a descriptive recording of immediate subjective experience as reported."



Phenomenology applies meaning and understanding to these phenomena.

Phenomenology suggests that if we lay aside the prevailing understanding of phenomena, as best we can, and revisit our immediate experience of them, possibilities for new meaning emerge or we witness at least an authentication and enhancement of former meaning.<sup>12</sup>

The semi-structured interviews used in the qualitative study provided an understanding of the lived experiences of older adults living with both impairments from the theoretical perspective of phenomenology. This perspective coincides with two assumptions of phenomenology:

- (i) Perceptions present us with evidence of the world – not as it is thought to be, but as it is lived. The lived world, or the lived experience, is critical to phenomenology.
- (ii) Human existence is meaningful and of interest in the sense that we are always conscious of something. Existence as being in the world is a phenomenological phrase acknowledging that people are in their worlds and are understandable only in context.<sup>11</sup>

#### 4.4.5 Methodology – Semi-structured Interviews

An understanding of the lived experience of older adults living with coexisting vision and mobility impairments was captured through semi-structured interviews. Using constructionism as an epistemology and phenomenology as a theoretical perspective, the design behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes was semi-structured interviews. Semi-structured interviews allowed the participant to answer as freely as he/she pleased.<sup>1</sup> Interview questions were based on the results from the quantitative phase of this research study. Appendix G has a list of the questions asked of each participant, as well as potential probe questions. From the statistical analysis, it is understood that individuals over the age of 65 have decreased physical activity participation, lowered self-perceived health, and increased requirement for assistance with activities of daily living. Furthermore, increased level of impairment due to two health conditions has mixed effects on assistive technology use. These conclusions provided the basis for the development of questions.

#### 4.4.6 Participants

Approval from the UWO and the University of Waterloo ethics boards allowed for seven participants from the University of Waterloo's Low Vision Clinic to be recruited (Appendices C and D). The sample size is consistent with the 6–12 participants generally recommended for phenomenological inquiry.<sup>16</sup> The sampling procedure is based on purposeful sampling, which means that participants were intentionally selected from older adults living with coexisting vision and mobility impairments.<sup>17</sup> Patients were identified through patient files at the Low Vision Clinic at the University of Waterloo using the following inclusion criteria:

- over the age of 65 years
- required assistive devices prescribed by a health care professional for long-term vision and mobility impairments
- able to communicate in English

Patients were approached at the start of their low vision appointment to see if they would be interested in participating in the study to provide their perspective on living with two health conditions. If they indicated that they were interested, they were asked to sign the consent form and agree to be contacted within one week of their appointment to arrange an interview time. Participants were asked if they would like a copy of the interview questions prior to the interview. These were provided by email, mail, or whatever means of communication the participants preferred. The interview took place in the participants' homes, and took 1–2 hours.

#### 4.4.7 Data Collection

As previously indicated, interviews were conducted in the homes of the participants. The face-to-face style of interviewing offered the interviewer the possibility of modifying her line of enquiry, following up on interesting responses, and investigating underlying motives in ways that postal and other self-administered questionnaires cannot. The participants' non-verbal cues may help in understanding verbal responses, possibly changing or, in extreme cases, reversing their meanings.<sup>18</sup>

The interview guide (Appendix G) was used to conduct the interview process; however, for all the interviews, the participants directed the interview through their own dialogue. The interviews concluded when the interview questions had been addressed.

Another advantage of the interviews being conducted in the homes of the participants is that it allowed the interviewer greater perspective of the participants' living situations, such as who they lived with, and the relationship they had with children or their spouse. Observations were recorded through field notes and reflective journaling.

#### 4.4.8 Data Analysis

Data analysis involved detailed reflective analysis to identify significant factors in the participants' experience of living with coexisting vision and mobility impairments. To help direct data analysis, the step-by-step manner outlined by Hycner<sup>19</sup> was used:

*Transcription* – all interviews were typed verbatim and any identifiers were removed.

*Bracketing and the phenomenological reduction* – the research data were approached with an openness to whatever meaning emerged. This required suspending (bracketing) the researcher's meanings and interpretations as much as possible, and entering the world of the unique interviewee. During this time, the researcher reflected on how she felt the entire interview proceeded, what her perspective of the participant was, and what they wanted her to learn.

*Listening to the interview for a sense of the whole* – the researcher should get a sense of the whole interview. During the first detailed reading of the interviews, no writing was done. The researcher used this first reading as a time to reflect on the main message of the interview and potential sub-messages.

*Delineating units of general meanings* –this is a process of going over every word, phrase, sentence, and paragraph, and getting at the essence of the meaning expressed in the text. The second reading of the interviews highlighted text related to main messages and sub-messages (e.g., talking about assistive

technology related to vision impairment, or talking about mobility impairment) without any formal terminology.

*Delineating units of meaning relevant to the research questions* – the researcher applied the research question to the units of general meaning to determine whether what the participant has said responds to and illuminates the research question. The interviews were evaluated to see how they coincide with the research question and revised the research question as needed.

*Training independent judges to verify the units of relevant meaning*—a second researcher was brought in to assure that the same meanings were being found as the primary researcher.

*Eliminating redundancies* – the researcher looked over the list of units of relevant meaning and eliminated those which were clearly redundant. The transcripts were read again to eliminate data that were not pertinent to the research question.

*Clustering units of relevant meaning* – the researcher determined if any of the units of relevant meaning naturally clustered together. The transcripts were rearranged based on the story they told. For example, any texts related to the concept of reading were grouped together.

*Determine themes from clusters of meaning* –the researcher reviewed all the clusters of meaning to determine if there were one or more central themes that expressed the essence of these clusters.

With the themes summarized, each interview was read slowly, word by word, and common themes between interviews were grouped together. For example, all seven interviews were read, and any time a story regarding reading came up, it was grouped into one main document under the heading “reading.” In the end, there was one main document that summarized all seven interviews by stories. With the help of a third researcher, these main themes were agreed upon.

## 4.5 Point of Interface

The point of interface in mixed methodology is the position in which the core and supplemental components meet during the conduct of the research.<sup>1</sup> After the completion of the semi-structured interviews, all of the qualitative interviews and quantitative data were analyzed to determine if the two sets of data complemented each other or if they were contradictory (see Chapter 8).

### 4.5.1 Summary

The combination of quantitative and qualitative studies will provide an in-depth analysis of older adults living with coexisting vision and mobility impairments. The first two studies of the NPHS and PALS analyses will quantify the number of older Canadians living with both conditions and the effect of these conditions on physical activity participation, activities of daily living, and assistive technology use. The qualitative interviews will be based on the quantitative analyses, and will provide further understanding of the statistics by adding the lived experience of older adults living with coexisting vision and mobility impairments. The combination of both quantitative and qualitative approaches is expected to provide a fuller understanding of the experiences of individuals who live with both a vision and mobility impairment.

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## Chapter 5

### 5 Self-reported Health, Restriction of Daily Activities, and Participation in Physical Activity among Canadian Older Adults with Coexisting Vision and Mobility Impairment

Despite the benefits of maintaining an active lifestyle, older individuals are the least physically active of any age group and they create the highest expenditures for medical care.<sup>1-3</sup> The WHO stated that older people who have disabilities are the most likely to be inactive, and that “policies and programmes should encourage inactive people to become more active as they age and to provide them with opportunities to do so”(p. 23).<sup>4</sup>

Throughout this paper, both physical activities and activities of daily living are considered because an activity is not necessarily structured physical exercise. Providing older adults with the opportunity to participate in *any* activities is known to have therapeutic benefits.<sup>1</sup>

Vision and mobility impairments are two disabilities associated with age that may influence older adults’ ability to participate in physical activity; however, there is no population-based report that documents the prevalence of older adults who are living with both a vision and mobility limitation in Canada. In addition, while there is widely available information on how these impairments individually affect participation and health,<sup>5,6,7</sup> there is no population-based information on the health status of older adults with both a vision and mobility limitation, and their ability to perform activities of daily living and to participate in physical activities. The purpose of this study was to estimate the number of Canadians over the age of 65 who are living with both vision and mobility impairments and to determine the influence of these coexisting health conditions on Canadian older adults’ self-perceived health and their ability to be physically active in activities of daily living.

#### 5.1 Methods

Secondary analyses were conducted on the 2006/2007 cycle of the NPHS. As previously mentioned, the NPHS, which began in 1994/1995, is designed to collect longitudinal



information on the health of the Canadian population and related socio-demographic information. A complete description of the methodology used in this survey is outlined in the NPHS Public Use Microdata Files documentation.<sup>8-10</sup> Because of increased reports of vision and mobility impairments that occur with age, analysis was restricted to residents of Canada who were aged 65 or older. The final sample for estimation consisted of 10,992 individuals over the age of 65 across the Canadian provinces (excluding those living on Indian reserves or Crown lands, residing in institutions, or living in certain remote regions, or those who are full-time members of the Canadian Forces). All NPHS data are based on self-reports by the respondents. All estimates were weighted to represent the Canadian household population aged 65 and older and significant differences were determined from non-overlapping 95% CIs.

*Variables of Interest and Definitions (adapted from Statistics Canada):<sup>11</sup>*

*Vision impairment*– unable (even with corrective lenses) to read newsprint or to recognize a friend on the other side of the street, or unable to see at all.

*Mobility impairment*– activities which need mechanical aids (braces, cane, crutches, or wheelchair) to get around (with or without help of another person), or unable to walk at all.

*Physical activities* –activities not related to work, that is, leisure time activities, such as gardening or yard work, walking for exercise, swimming, bicycling, popular or social dance, home exercises, ice hockey, ice skating, in-line skating or rollerblading, jogging or running, golfing, exercise class or aerobics, downhill skiing or snowboarding, bowling, baseball or softball, tennis, weight-training, fishing, volleyball, or basketball. Physical activities involve the integration of a number of functional components (e.g., vision and mobility).

*Frequency of physical activity* – derived variable in the NPHS questionnaire that classifies respondents based on their monthly frequency of physical activities lasting more than 15 minutes. There are three ordinal categories: regular physical activity is 12 or more times per month, occasional physical activity is 4 to 11

times per month, and infrequent physical activity is 0 to 3 times per month.<sup>11</sup> The variable was initially created in the Ontario Health Survey 1990.<sup>12</sup>

*Restriction of activities* –a limitation at work, home, or elsewhere, or a long-term disability or handicap. Those who were identified as “restricted” were then asked “because of any condition or health problem, do you need the help of another person: in preparing meals; in shopping for groceries or other necessities; in doing normal everyday housework; in doing heavy household chores such as washing walls or yard work; in personal care such as washing, dressing, or eating; in moving about inside the house; in going outdoors in any weather.”

*Health status (general health)* – participants were asked to rate how they perceived their health to be in general.

## 5.2 Results

Of the respondents in the NPHS, 2,459 individuals were 65 years and older in 2006/2007. At that time, population estimates indicated that 20% of these Canadians were living with either coexisting vision and mobility impairments, or only vision or only mobility impairments. Table 7 shows the breakdown of prevalence by impairment group. Table 8 shows this prevalence by age and gender. It also shows, for both men and women, the number of older adults reporting coexisting vision and mobility impairments increased by age. Ten percent of the population over the age of 81 reported living with coexisting vision and mobility impairments. This is a tenfold increase compared to those in the younger age group of 65–80 years. The table also shows that females reported a higher percentage of coexisting vision and mobility impairments (4.3%) and mobility impairments (16.8%) compared to their male counterparts – 1.2% and 10.6% respectively. Significant differences between impairment groups and age were determined through non-overlapping 95% CIs.

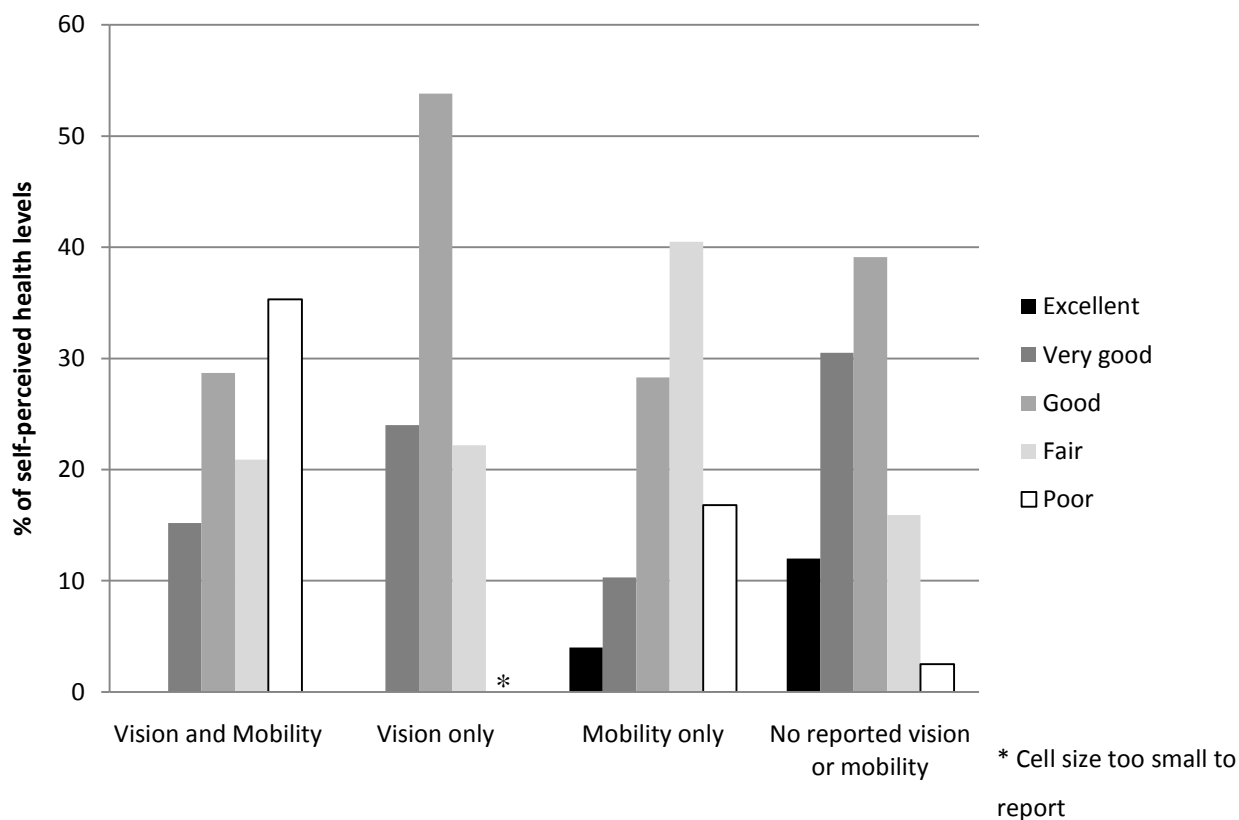
**Table 7: Prevalence of vision and mobility impairments by impairment group;  
NPHS household population aged 65 and over, Canada, 2006/2007**

<b>Impairment Group</b>	<b>n</b>	<b>%</b>
Vision and mobility	127,000	3.0
Vision only	104,600	2.5
Mobility only	594,700	14.2
No reported vision or mobility	3,352,100	80.2

**Table 8: Prevalence of vision and mobility impairments by age and gender; NPHS household population aged 65 and over, Canada, 2006/2007**

Impairment group	Male:						Female:					
	Total 65+		Age subcategories				Total 65+		Age subcategories			
	n	%	n	%	n	%	n	%	n	%	n	%
Vision and Mobility	21500	1.2	*	*	15200	5.2	105500	4.3	21900	1.2	83600	12.4
Vision only	45900	2.6	30900	2.2	*	*	58800	2.4	35900	2.0	22900	3.4
Mobility only	186200	10.6	100200	7.0	86000	29.2	408500	16.8	179200	10.2	229300	34.1
No reported vision or mobility	1495600	85.5	1302000	90.9	193591	65.7	1856600	76.4	1520800	86.5	335700	50.0
% Total				81.9		16.9				72.4		27.6

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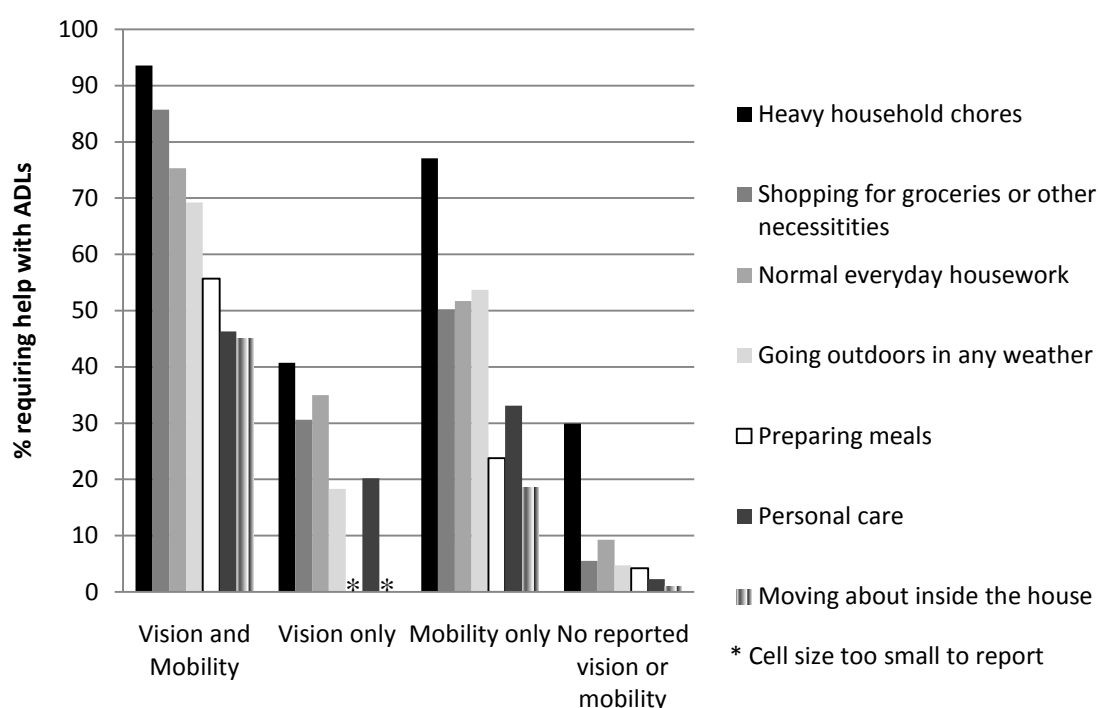


**Figure 6: Self-perceived health; NPHS household population aged 65 and over, Canada, 2006/2007**

Figure 6 shows the group with coexisting vision and mobility impairments had the highest proportion of respondents (35.3%) with “poor” self-perceived health. In contrast, individuals with no reported vision or mobility impairment had the highest proportion of persons with “excellent” self-perceived health (12.0%). Significant differences between impairment groups and self-perceived help were determined through non-overlapping 95% CIs.

Of all the participants with coexisting vision and mobility impairment, 97% were identified as being restricted in their daily activities. In comparison, only 33% of individuals with no vision or mobility impairment identified having a restriction in their daily activities. Looking at the impact of coexisting vision and mobility impairment on

restriction of daily activities, Figure 7 shows that those with coexisting vision and mobility impairment had the greatest number of respondents who needed help with activities of daily living compared to someone living with one or no limitation. Most of the older adults who identified a restriction in activities reported they needed the greatest assistance with heavy household chores. Significant differences between impairment groups and requiring assistance with activities of daily living were determined through non-overlapping 95% CIs..



**Figure 7: Restrictions of activities – prevalence requiring help with activities of daily living; NPHS household population aged 65 and over, Canada, 2006/2007**

Table 9 shows the percentage of older adults who participated in various leisure time activities in the past three months. From a list of 20 choices, older adults with vision and/or mobility impairment reported any participation in only four physical activities: walking for exercise, gardening or yard work, home exercises, and exercise class or aerobics. Individuals with coexisting vision and mobility impairment participated in the

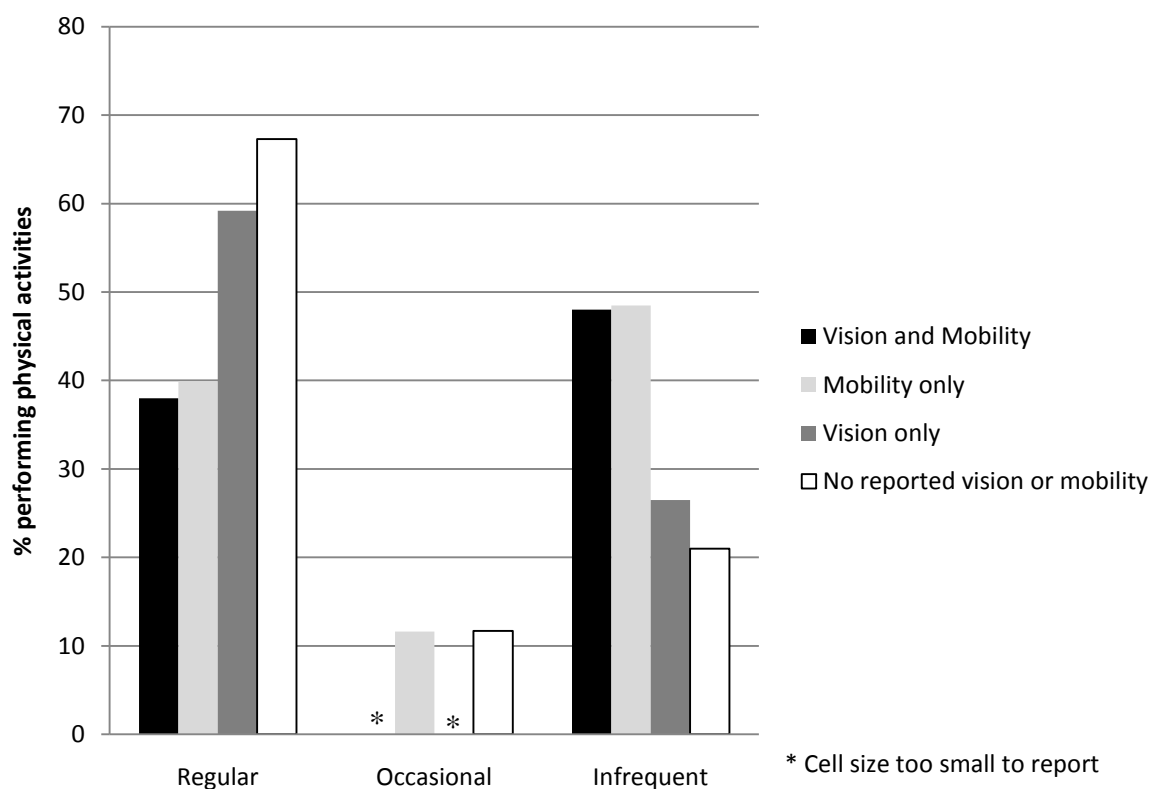
fewest number of activities (walking for exercise only) and they have the highest percentage of no activities in the last three months. Significant differences between impairment groups and physical activity participation were determined through non-overlapping 95% CIs.

**Table 9: Percentage of participation in physical activity; NPHS household population aged 65 and over, Canada, 2006/2007**

	<i>Walking for exercise</i>		<i>Gardening or Yard work</i>		<i>Home exercises</i>		<i>Exercise class or aerobics</i>	
	n	%	n	%	n	%	n	%
Vision and Mobility	21300	31.7	*	*	*	*	*	*
Vision only	53800	73.1	27000	36.7	19000	25.9	*	*
Mobility only	193200	48.4	79800	20.0	135700	34.0	13200	3.3
No reported vision or mobility	2256800	74.8	1592800	52.8	1028000	34.1	203200	6.7

\*cell size too small to report

Figure 8 shows participation in physical activity that lasted more than 15 minutes. It shows that persons with coexisting vision and mobility impairments reported the least frequent involvement in this form of physical activity (i.e. zero to three times per month). Significant differences between impairment groups and frequency of physical activity participation were determined through non-overlapping 95% CIs.



**Figure 8: Frequency of all physical activities lasting more than 15 minutes; NPHS household population aged 65 and over, Canada, 2006/2007**

### 5.3 Implications

This is the first report known to the authors that describes the prevalence of coexisting vision and mobility impairments among Canadians 65 years and older. The results show the overall prevalence is low, but the impact on these Canadians is high. This is because they need the most assistance with activities of daily living, they have the lowest participation in physical activities, and the low rate of participation is linked to low self-perceived health. People with lower health status use the health care system most; therefore, integrated health care service that recognizes the influence of both vision and limited mobility is needed.

The study also showed that reliance on others for assistance with activities of daily living is most prevalent among older adults with coexisting vision and mobility impairments. More persons living with coexisting vision and mobility impairments identified



themselves as restricted in daily activities, because their level of impairment is higher due to the effects of these coexisting limitations. There are several activities of daily living that are not included in the NPHS, such as taking medications, using the telephone, money management, and reading. It is possible that additional more detailed questions related to activities of daily living would reveal further activity restrictions.

The NPHS results indicate that individuals over the age of 65 with coexisting vision and mobility impairments reported lower levels of physical activity participation. Similar results of declining physical activity participation with age have been reported in other national population-based cross-sectional studies.<sup>2,3</sup> Consistent with this, these persons have the highest reports of infrequent physical activity participation lasting more than 15 minutes. Also consistent with the results, Bryan and Katzmarzyk<sup>13</sup> found that walking was the highest reported activity among older adults.

## 5.4 Conclusion

In summary, this analysis of NPHS data has identified a vulnerable group of Canadians, those aged 65 and older who are living with coexisting vision and mobility impairments, who therefore may be at higher risk for falls, diminished quality of life, and other less than desirable outcomes.<sup>5,14-19</sup> This vulnerability leads to the notion that rehabilitation needs to address the health outcomes resulting from these coexisting limitations, rather than focusing on the effects of only one limitation, as is often the experience. The findings from this study reinforce the importance of the WHO recommendation that rehabilitation services should be structured to serve the needs of individuals with multiple conditions.<sup>4</sup> Integrated interventions that promote physical activity could improve the self-perceived health of older adults with coexisting vision and mobility impairments by enabling them to perform more activities of daily living independently.

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## Chapter 6

### 6 Assistive Technology Use among Canadians Over 65 Years of Age with a Vision and Mobility Impairment

Rehabilitation clinicians regularly prescribe assistive technology for either a vision or mobility impairment in order to improve function. Assistive technology refers to a broad range of devices, services, strategies, and practices that are conceived and applied to ameliorate problems faced by individuals who have disabilities to help them carry out functional activity.<sup>1</sup> About 23% of older adults in the community use some type of assistive technology, mobility devices being the most popular device, while 8% of older adults use multiple devices.<sup>2</sup> The majority of individuals who use assistive devices are over 65.<sup>2</sup> Assistive technology has the potential to delay age-associated declines in functioning, compensate for such declines when possible, and replace function of individuals for whom compensation is not possible.<sup>3</sup> From 1992–2001, the Medicare Current Beneficiary Survey (MCBS) showed that among older adults (65 years and older) who reported difficulty with one or more activities of daily living, the chances of using technology increased from 26% in 1992 to 32% in 2001,<sup>4</sup> demonstrating that technology is constantly changing and the number of assistive devices is increasing.

#### 6.1.1 Assistive Technology and Vision

At present, treatments are available to slow the progression of age-related vision diseases, but there are limited treatments that reverse the effects of the diseases.<sup>5</sup> As a result, much of rehabilitation focuses on compensation for age-related vision loss. Interventions for vision loss include improving the quality of the visual image, changing the lighting arrangements, adjusting for accommodative loss, and adjusting for time requirements for tasks requiring visual attention, search, and visual guidance of manual ballistic and tracking movements.<sup>5</sup>

Vision impairment can contribute to increased need for assistance with tasks such as washing, dressing, preparing meals, shopping, and other activities of daily living. Brezen<sup>6</sup> found that 10.4% of older adults with low vision and 37.6% of older adults with

blindness needed help performing activities of daily living. On average, one in five adults at age 70 and almost half at age 76 had assistive devices.<sup>7</sup> In their study of visually impaired individuals over the age of 85, Dahlin-Ivanoff and Sonn<sup>8</sup> found that 77% of those over the age of 85 had assistive devices for basic daily activities. These studies showed an increased use of assistive technology with increasing age. Among older adults with vision impairment, on average, a person had 14.5 assistive devices, which included 8.9 vision devices and 2.1 devices for physical disabilities.<sup>9</sup> Assistive devices for vision impairments can include magnifiers, large print reading materials, an adaptive computer, CCTVs, or glare control.

Another factor associated with vision loss is depression. Horowitz<sup>10</sup> found that receiving low vision services and skills training was significantly associated with fewer depressive symptoms, as was using a greater number of optical and adaptive aids. These studies demonstrate that vision rehabilitation and assistive devices for vision impairments are important in combating the physical and psychological effects of vision disability in older adults.

### 6.1.2 Assistive Devices and Mobility

There are several opportunities for preventative care regarding mobility function. For example, bone density and thickness decrease with age. Most authorities agree that the best defence against age-related bone loss is a reserve acquired during the period of life when the density gain exceeds the loss in the bone turnover process.<sup>5</sup> Therefore, exercise that involves strength training is a preventative measure that is gaining popularity. It improves neural control of muscle and increases muscle mass.<sup>5</sup> Walking speed is another indicator of mobility function. Age, sex, social class, obesity, co-morbidity, self-reported walking ability at baseline, and smoking were all found to be independent long-term predictors of walking speed.<sup>11</sup> Preventative measures that target the modifiable predictors (e.g., not smoking) may prevent subsequent mobility impairment.

If preventative measures, such as strength training, are not able to alleviate the limitations caused by mobility impairment, then assistive devices can be used as compensation. In a US community population study of older persons, 23% were found to use some type of

assistive technology, and mobility devices were the most common type reported.<sup>2</sup>

Mobility devices can include canes, crutches, manual and power wheelchairs, walkers, scooters, or other supportive devices for moving around. In a national report from the US, 46.5% of elderly persons reported using mobility devices.<sup>12</sup>

There can be a number of reasons for an older adult to start using mobility devices. In their study of older Canadians who use wheelchairs, Clarke et al.<sup>13</sup> found that individuals with a greater number of chronic health conditions and who experience more difficulty with activities of daily living are more likely to use wheelchairs. These devices provide support to an individual if he/she is experiencing mobility limitations.

### 6.1.3 Unmet Needs

What happens if someone is living with both vision and mobility impairments? Are devices for vision or mobility loss capable of providing compensation for someone with both limitations? In his discussion of assistive technology disuse, Fuhrer<sup>14</sup> stated that there is a lack of understanding regarding underuse of potentially effective devices (e.g., devices that could be used for someone with both a vision and mobility impairment to improve function) and consumer dissatisfaction with devices that they continue to use because more suitable alternatives are lacking (e.g., consumers have not been presented with suitable devices for someone living with both a vision and mobility impairment).

In their analysis of the National Health Interview Surveys (NHIS), Kennedy and colleagues<sup>15</sup> found that 10 to 20% of respondents who reported a need for assistance with an activity of daily living or instrumental activity of daily living also said that help with the activity was unavailable or inadequate. They estimated that 3.2 million adults in the US have one or more unmet or undermet needs for personal assistance.<sup>15</sup> Therefore, some individuals with disabilities are not receiving the care they require.

The Human Activity Assistive Technology (HAAT) model maintains that assistive technology needs to align with the lives of persons with disabilities.<sup>1</sup> The combined interaction of the individual, activity, and assistive technology, and the context in which these three integrated factors exist need to be considered for the design, selection,

implementation, and evaluation of appropriate assistive technology for individuals with coexisting vision and mobility impairments.<sup>1</sup> Using the HAAT model as a guide, the purpose of this study was to estimate the number of individuals who indicated in the Census that they had difficulty with vision and mobility function, determine significance between reports of receiving help with activities of daily living, and determine the influences of these coexisting health conditions on assistive technology use and the possibility of unmet needs.

## 6.2 Methods

Secondary analyses were conducted of the PALS dataset of Statistics Canada. A complete description of the methodology used in this survey is outlined in the PALS PUMF documentation.<sup>16</sup> The PALS is a post-censal survey which surveys adults and children whose day-to-day activities may be limited because of a condition or health problem. To be considered for the PALS, participants must answer “yes” to question 7 or 8 of the Census long form. The 2006 Census asks the following:

- 7) Does this person have any **difficulty** hearing, seeing, communicating, walking, climbing stairs, bending, learning or doing any similar activities?
- 8) Does a physical condition **or** mental condition **or** health problem **reduce the amount or the kind of activity** this person can do: at home? At work or at school? In other activities, for example, transportation or leisure?<sup>17</sup>

If a participant was selected to participate in the PALS based on their answer to the Census, they were asked a number of questions to identify the difficulties and barriers they face. The PALS categorized participants as having a disability related to seeing, communication, mobility, agility, pain, learning, or memory. For the purposes of this study, participants were selected only if they have a vision, mobility, or both a vision and mobility impairment; however, it is important to note that all PALS respondents have indicated they have some sort of disability.

The population covered by the survey included persons living in private and some collective households in the ten provinces and three territories of Canada.<sup>16</sup> Those excluded included people living on Indian reserves [SIC]; residents of institutional

collectives, military bases, Canadian Armed Forces vessels, merchant vessels, and coast guard vessels; and those living in campgrounds and parks.<sup>16</sup> Because the incidence of vision and mobility impairment increases with age, analysis was restricted to only residents of Canada who are aged 65 or older. All PALS data are based on self-reports by the respondents.

All estimates were weighted to represent the Canadian household population aged 65 and older, and significant differences were determined from non-overlapping 95% CIs. Analyses of the PALS sample (individuals who indicated on the Census they are living with an impairment that limits their activities of daily living) revealed: the prevalence of older adults living with coexisting vision and mobility impairments; reports of self-perceived health; reports of groups receiving help for activities of daily life; assistive technology use; and unmet needs pertaining to assistive technology. Chi-square tests were used to determine significant differences in reported levels of receiving help for activities of daily living between the group with coexisting vision and mobility impairments and that with only a vision impairment or only a mobility impairment.

*Variables of Interest and Definitions (as adapted from Statistics Canada):*

*Mobility impairment*– has difficulty walking three city blocks, difficulty walking up or down a flight of stairs, unable to carry an object of 10 pounds for 10 metres, difficulty standing for 20 minutes or more, difficulty moving from one room to another, or unable to walk at all.

*Vision impairment* – unable (even with corrective lenses) to read newsprint or to recognize a friend on the other side of the street, or unable to see at all.

*Health status (general health)* – participants were asked to rate how they perceived their health to be in general. The participants could answer excellent, very good, good, fair, or poor.

*Other visual aids* – magnifiers, Braille reading materials, large print reading materials, talking books, recording equipment or portable note-takers, closed-circuit devices, a computer with Braille, large print, or speech access, or a white



cane. There are two categories of glasses or contacts for near and distance visual needs. All participants were asked whether or not they have glasses or contacts, but only those with a seeing limitation were asked about their use of other visual aids.

*Mobility aids* – orthopaedic footwear, a cane or walking stick, crutches, a manual wheelchair, an electric wheelchair, a walker, a scooter, braces or supportive devices, grab bars or bathroom aids, bath or bed lifts or other lift type devices, or an adapted motor vehicle.

*Unmet needs* – individuals who were identified as having an impairment proceeded to the question regarding assistive technology. In each assistive technology section, they were asked about devices they need but do not have.

*Help with everyday activities* – all participants were asked about receiving help with everyday activities. Individuals who reported *receiving* help with everyday activities were indicating that, because of their condition, they received help from their spouse or partner, family members, friends, or neighbours, and from organizations, whether paid or unpaid.<sup>16</sup>

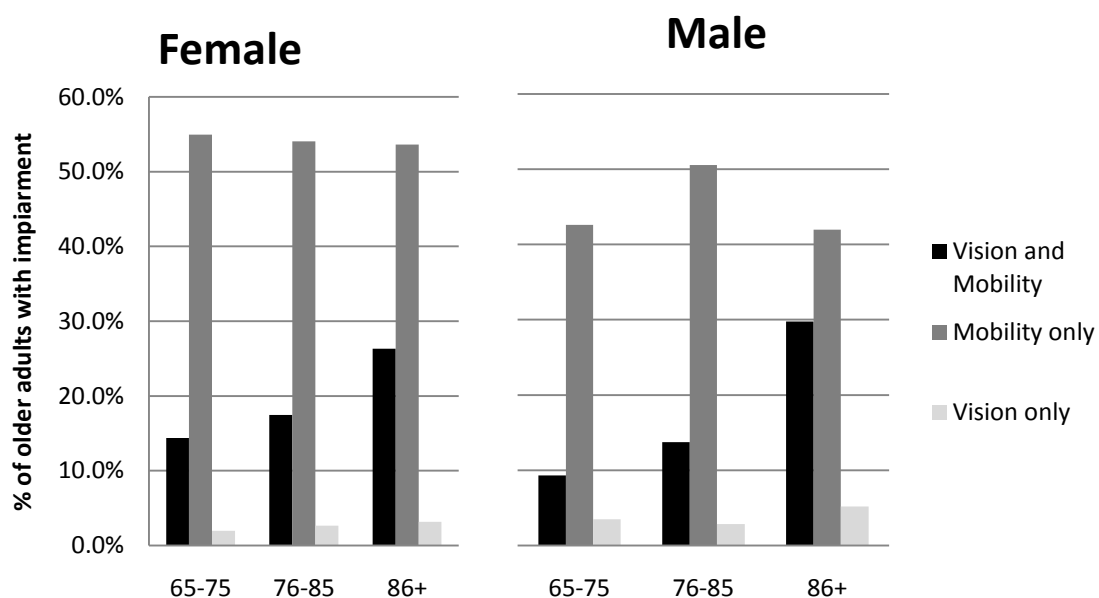
*Everyday activities* – meal preparation, housework, heavy chores, shopping, finances, personal care, medical care, and moving inside the home.

## 6.3 Results

Of the PALS respondents, 8,484 individuals 65 years and older in 2006/2007 were living with some form of disability. At that time, population estimates indicated that 68.9% of these Canadians living with a disability lived with a vision, mobility, or coexisting vision and mobility impairment (see Table 10). Of those individuals, 15% of older adults reported living with coexisting vision and mobility impairments. Figure 9 shows that with increasing age (86+) there was an increase in the number of older adults reporting coexisting vision and mobility impairments, regardless of gender. Significant differences between impairment groups and age were determined through non-overlapping 95% CIs.

**Table 10: Frequency of vision and mobility impairments; PALS aged 65 and over, Canada, 2006**

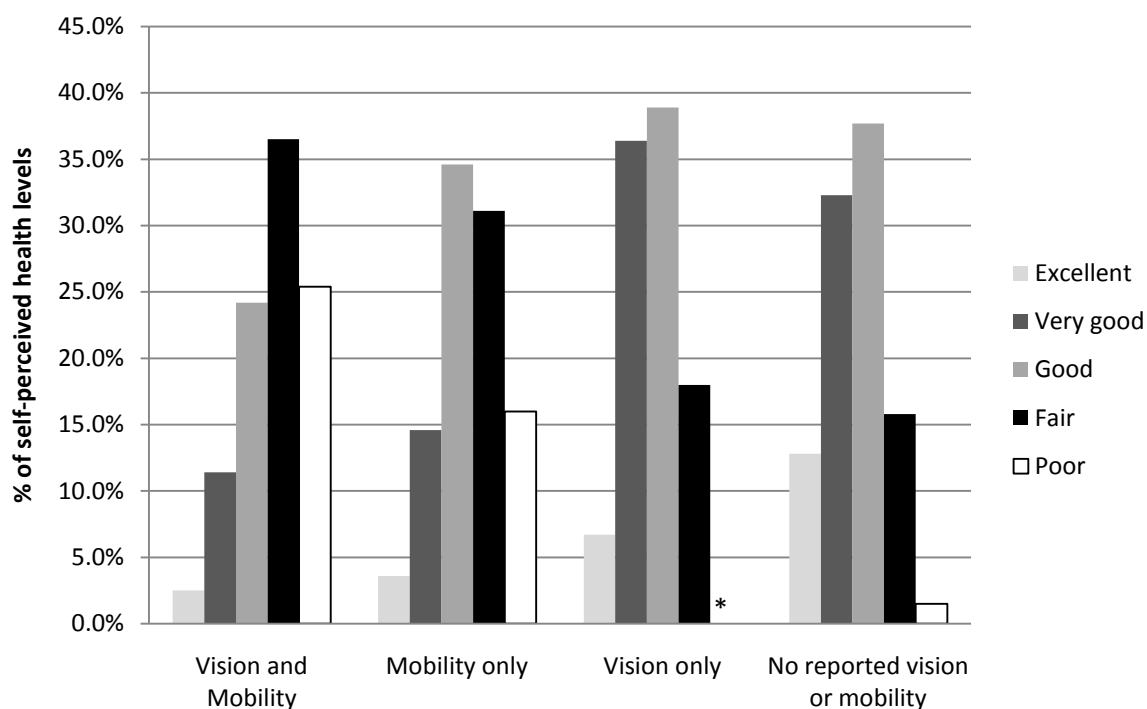
Impairment group	n	%
Vision and mobility impairment	310398	15.4
Mobility impairment only	1023905	50.7
Vision impairment only	57336	2.8
No vision or mobility impairment	629770	31.2



**Figure 9: Prevalence of vision and mobility impairments by age and gender; PALS aged 65 and older, Canada, 2006**

The highest ratings of “poor” self-perceived health (25%) were from individuals who were living with coexisting vision and mobility impairments (see Figure 10), whereas the

highest reports of “excellent” self-perceived health (12%) were from the group with no reported vision or mobility impairments. Significant differences between impairment groups and self-perceived health were determined through non-overlapping 95% CIs.



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**Figure 10: Self-perceived health; PALS aged 65 and over, Canada, 2006**

Participants were asked to indicate if they were receiving help from another individual in activities of daily living. Table 11 shows the results of participants receiving help with activities of daily living for three groups: all older adults over the age of 65, those who indicate using vision aids, and those who indicate using mobility aids. For all older adults over the age of 65, those who are living with coexisting vision and mobility impairment had the highest report of receiving help from another individual in all of the potential activities of daily living. Significant differences between impairment groups and receiving help with activities of daily living were determined through non-overlapping 95% CIs.

In comparing individuals who use vision aids, chi-square tests revealed that survey respondents with coexisting vision and mobility impairments had significantly higher reports of receiving help with activities of daily living compared to those with just vision impairments (chi-square with four degrees of freedom = 5222.58,  $p < 0.001$ ). The same results were found when comparing individuals using mobility aids. Chi-square tests revealed respondents with coexisting vision and mobility impairments reported significantly higher frequency of receiving help with activities of daily living compared to those with just mobility impairments (chi-square with seven degrees of freedom = 22147.69,  $p < 0.001$ ).

**Table 11: Percentage of individuals in each sub-group receiving help with activities of daily living; PALS, aged 65 and older, Canada, 2006**

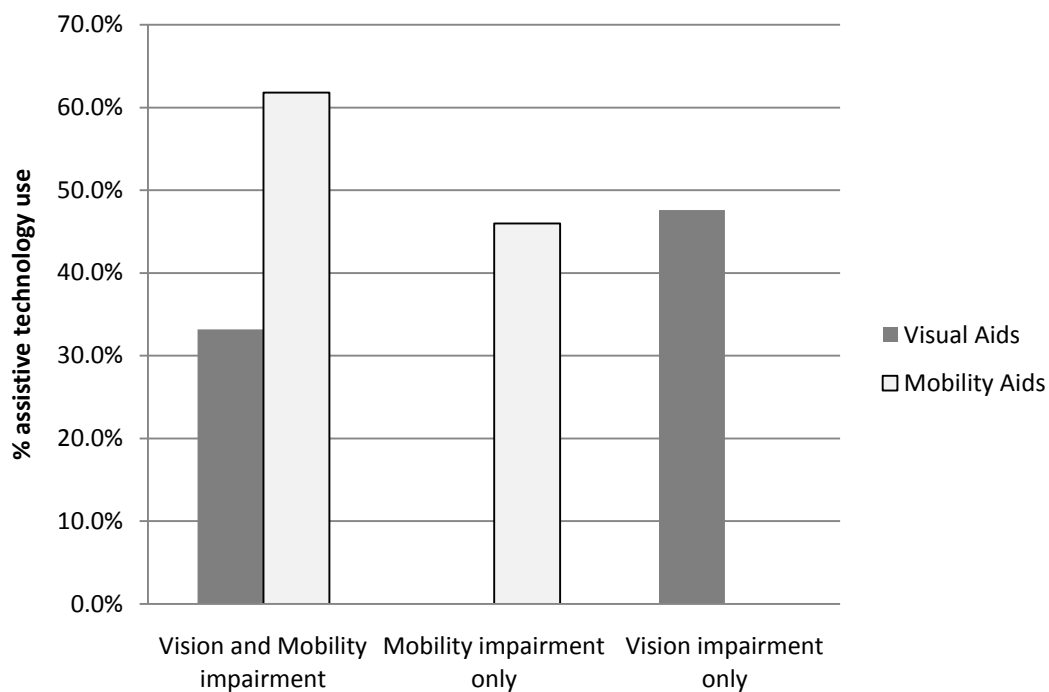
	Preparing meals	Housework	Personal Care	Heavy chores	Moving inside home	Shopping	Finances	Medical Care
<i>A) Total Population 65 years and older</i>								
Vision and Mobility	38.0	55.4	30.4	61.0	15.6	64.6	43.2	15.0
Mobility only	22.8	39.6	14.3	54.5	5.3	41.9	21.2	8.6
Vision only	9.4	1.9	4.3	26.0	*	36.1	19.3	2.0
None	3.9	7.1	1.8	13.0	0.3	7.1	3.8	0.7
<i>B) Total Population 65 years and older using visual aids</i>								
Vision and Mobility	29.5	53.6	19.1	56.0	6.3	56.4	37.4	10.9
Vision only	7.8	13.8	*	20.6	*	44.5	16.5	*
<i>C) Total Population 65 years and older using mobility aids</i>								
Vision and Mobility	48.0	66.2	40.7	65.7	20.3	73.9	50.8	19.7
Mobility only	32.1	53.5	24.0	63.9	9.0	56.9	26.8	15.0

\*cell size too small to report

Focusing on older adults who already have vision aids, the coexisting vision and mobility group indicated consistently receiving the most help with activities of daily living.

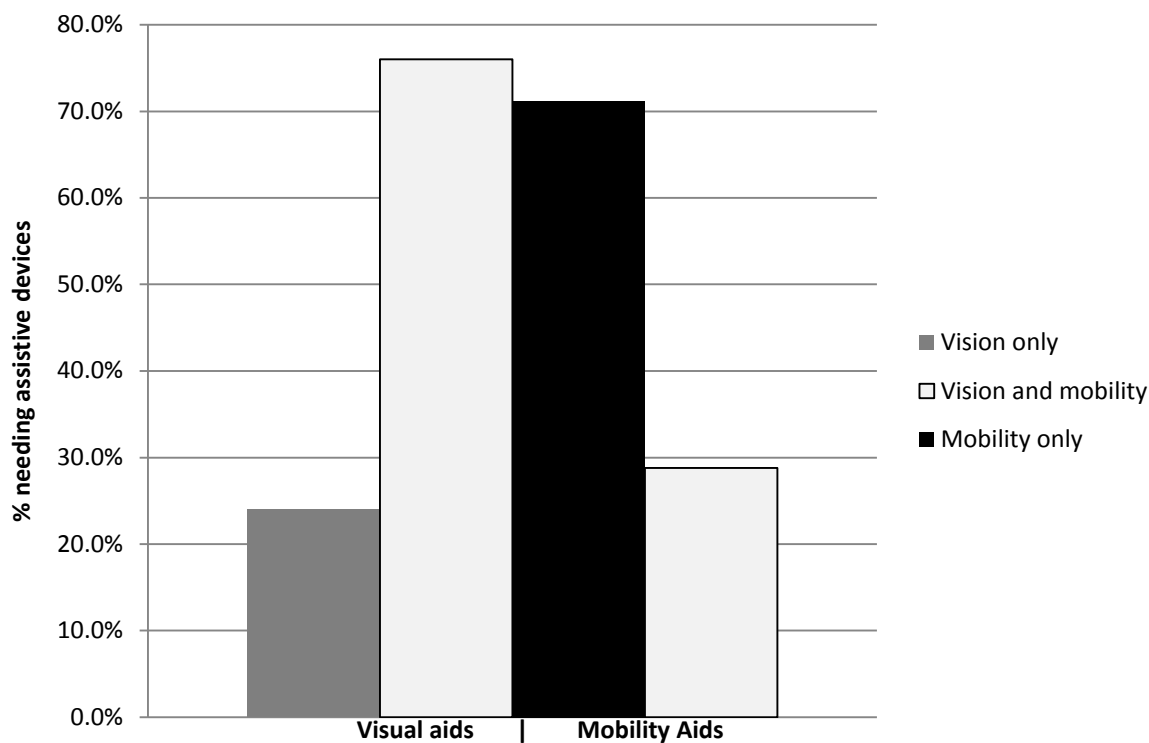
For those who have mobility aids, those with coexisting vision and mobility impairments indicated they are consistently receiving the most help with their activities of daily living. Compared to the previous two groups (group using visual aids and total population), the group using mobility aids had the highest report of receiving help from another individual.

Figure 11 shows the results of participants' use of assistive technology related to vision and mobility aids. Individuals with coexisting vision and mobility impairments indicated a higher use of mobility aids compared to individuals reporting only a mobility impairment. In contrast, those with coexisting vision and mobility impairments reported fewer visual aids compared to those reporting vision impairments only. Significant differences between impairment groups and assistive technology use were determined through non-overlapping 95% CIs.



**Figure 11: Assistive technology use; PALS aged 65 and over, Canada, 2006**

Participants were also asked if there were devices they require due to their health condition, but did not currently have. The results indicated that those with coexisting vision and mobility impairments reported the highest need for other visual aids compared to those with just a vision impairment (see Figure 12). Those with only a mobility impairment had the highest report of needing mobility aids compared to older adults with coexisting vision and mobility impairments. Significant differences between impairment groups and unmet needs regarding assistive technology were determined through non-overlapping 95% CIs.



**Figure 12: Unmet needs; PALS aged 65 and over, Canada, 2006**

## 6.4 Discussion

According to the analysis of PALS, approximately 15% of older adults in Canada who reported having a disability are living with coexisting vision and mobility impairments. As expected, the prevalence of coexisting vision and mobility impairments increases with age and results in lowered self-perceived health status.

The reports of assistive device use, receiving help for activities of daily living, and unmet assistive technology needs provide new information regarding the relationship of coexisting vision and mobility impairments. According to the assistive device use statistics, participants with coexisting vision and mobility impairments reported using more mobility devices and fewer vision devices compared to individuals with only a mobility or vision impairment. This result leads to unanswered questions as to why someone with coexisting vision and mobility impairments has different reports of



assistive device use. What changes with the presence of both impairments to change the outcomes of device use?

One potential reason why individuals with coexisting vision and mobility impairments reported higher levels of mobility aid use compared to vision aids is due to the relationship of vision impairments to mobility function. The literature suggests that vision disorders among the elderly are associated with mobility problems, limitations in physical and social functioning, difficulties with activities of daily living, reduced well-being, falls, and mortality,<sup>18-23</sup> meaning that, when both vision and mobility impairments are present, the vision impairment *amplifies* the mobility impairment. The fact is that individuals with both impairments who had mobility aids received more help for their activities of daily living, since the individuals could no longer rely on their sense of vision to assist with moving around, demonstrates this suggestion. These individuals are more likely to receive mobility aids to treat what appears to be a higher level of need pertaining to mobility function; however, as this study indicates, when the need for mobility devices has been at least partially met, there remains a need for vision devices. These conclusions can be verified by the statistics pertaining to unmet assistive device needs that indicate older adults with coexisting vision and mobility impairments had a higher report of unmet visual aids needs compared to mobility aids needs. It can be concluded that someone who is living with both impairments requires both vision and mobility aids.

This current study extends the understanding of the HAAT model by informing rehabilitation professionals about the interaction between the individual and assistive technology. Specifically, when a rehabilitation professional is thinking about the interface between the patient and assistive technology they must understand that, when considering a mobility device, the visual component needs to be considered. For example, a wheeled walker is prescribed primarily to provide assistance with mobility; however, for someone with coexisting vision and mobility impairments, a walker can also help with vision function. While moving in their environment, the person can sense changes in the floor material (e.g., carpet to tile) or they can use their walker to sense objects that may be a tripping hazard. Therefore, in this case, the assistive technology can be prescribed to

accomplish activities that are hindered by both conditions. This relationship needs to be taken into consideration when prescribing assistive technology for someone living with both impairments. As per the HAAT model, to be successful at completing an activity when using an assistive technology there must be a complete understanding of the whole person, which involves acknowledging the relationship between coexisting vision and mobility impairments.

## 6.5 Conclusion

In summary, a group of older adults who are living with coexisting vision and mobility impairments has been identified as receiving more help with activities of daily living compared to older adults with one or no disability. In particular, those with both conditions who reported using mobility devices reported the most help received for activities of daily living. The increased level of impairment related to both limitations results in more varied assistive technology use compared to that among older adults with one or no impairment. Older adults with coexisting vision and mobility impairments indicated a higher use of mobility aids compared to individuals reporting only a mobility impairment. In contrast, those with coexisting vision and mobility impairments reported fewer visual aids compared to those reporting vision impairments only.

There needs to be a shared understanding and increased communication across professions in order to understand the interaction of these two impairments and their implications on activities of daily living and device use. This study indicates that a vision impairment amplifies a mobility impairment, and thus, older adults reported using more mobility devices; however, unmet visual aids needs remained. Further research is needed, in particular with a qualitative perspective, to answer the questions that are not possible to answer from this study alone. What in particular makes a vision impairment amplify a mobility impairment? Is one condition considered “worse” than the other? What is the reality associated with coexisting vision and mobility impairments? Only when these questions are answered will we start to build a foundation for rehabilitative care that is capable of meeting the needs of older adults with coexisting vision and mobility impairments. The work presented here brings to the forefront the challenges older adults

meet living with coexisting vision and mobility impairments, and encourages health care professionals to take both of these needs into consideration during rehabilitation.

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## Chapter 7

### 7 A Phenomenological Inquiry into the Lived Experience of Older Adults Living with Coexisting Vision and Mobility Impairments

Vision and mobility function are two common areas of disability among older adults.<sup>1</sup> With an aging population living longer in Canada, there is an expected increase in the number of older adults living with both vision and mobility impairments. Chapter 5 established that the prevalence of persons living with coexisting vision and mobility impairment increases with age. Furthermore, both Chapters 5 and 6 demonstrated that living with these coexisting impairments is associated with lower self-perceived health.

Although the survey data analyzed in Chapters 5 and 6 provide valid population-based information about coexisting vision and mobility impairments, this validity comes with a concomitant inability to reveal the personal experience of older adults living with coexisting vision and mobility impairments. To compensate for this limitation, the purpose of this third paper was to understand the personal perspective and reality associated with living with both vision and mobility impairments. The broad topics of interest are: (i) participation (social and physical), (ii) assistive technology, and (iii) service delivery. Interviews with older adults living with coexisting vision and mobility impairments provide insight into how they experience living with two limitations, the meaning they give their situations, and how they interpret what they experience.<sup>2</sup> The research questions that were asked included: What changes in performing activities when vision and mobility function are compromised? Is one health condition viewed as “worse” than the other? What is “lost” or changed when a second condition presents itself? How does assistive technology help (or not) with both conditions? And, most importantly, what should be understood about living with both conditions?

## 7.1 Methods

Semi-structured interviews were used to investigate the lived experience of older adults living with coexisting vision and mobility impairments. Phenomenology was used as the theoretical perspective for the semi-structured interviews. Phenomenology's goal is to investigate phenomena from the perspective of the individuals who experience them first-hand.<sup>3-5</sup> Semi-structured interviews allowed the participant to answer as freely as he/she pleased.<sup>6</sup> Interview questions were based on the conclusions drawn from the quantitative results of coexisting vision and mobility impairments. For example, the quantitative results indicate that older adults living with coexisting vision and mobility impairments reported receiving more assistance with activities of daily living. The questions in the qualitative study wanted to establish what areas in particular needed assistance and why. What is lost when both conditions are present? The quantitative study also illustrates that older adults living with both conditions repeatedly reported lowered participation in activities. The qualitative study wanted to understand what activities have stopped, changed, or continued in the presence of coexisting vision and mobility impairments. Were these activities changed due strictly to their vision and mobility impairments or were there other factors (e.g., money, desire) that affected their participation?

Interview questions were designed to guide participants to talk about their experience with their health conditions. Based on the statistical analysis, individuals over the age of 65 have decreased physical activity participation and lowered self-perceived health, and require assistance with activities of daily living. The increased level of impairment due to two health conditions has mixed effects on assistive technology use. These conclusions provided the basis for the development of questions. The questions were asked in an open-ended fashion in order to obtain responses from participants reflecting their own opinions rather than the interviewer's preconceived notions.

### 7.1.1 Interview

Each interview began with introductions and simple questions to help the interviewer and the participant get comfortable with each other. Questions included: Who lives with them? How long have they lived in their current residence?

The interview proceeded to have participants discuss their perspective of their impairments. They were asked if they could describe their vision and mobility impairment. How long have they lived with each? Are either of the conditions getting worse with time?

With an understanding of their impairments, the interviewer then asked the participants questions pertaining to the activities they participate in. What activities have they stopped because of their vision and mobility impairments? What activities have they changed because of their conditions? Are there activities that their impairments have not affected?

The interview continued with questions regarding their use of assistive devices. What devices do they use? How and when do they use their devices? Do these devices help with the activities they wish to perform? Are there devices they wished they had?

Participants then answered questions about their perspective of the health care system, especially from the perspective of someone living with two impairments.

Finally, the interviewer asked participants to answer the question: if they could teach people anything about living with coexisting vision and mobility impairments, what would they want to say?

## 7.2 Participants

Approval from the University of Western Ontario and the University of Waterloo ethics boards allowed for seven participants from the University of Waterloo's Low Vision Clinic to be recruited (Appendices C and D). The sample size is consistent with the 6–12 participants generally recommended for phenomenological inquiry.<sup>7</sup> The sampling procedure is based on purposeful sampling, which means that participants were intentionally selected from older adults living with coexisting vision and mobility



impairments.<sup>8</sup> Patients were identified through patient files at the Low Vision Clinic at the University of Waterloo using the following inclusion criteria:

- over the age of 65 years
- required assistive devices prescribed by a health care professional for long-term vision and mobility impairments
- able to communicate in English

Patients were approached at the start of their low vision appointment to see if they would be interested in participating in the study to provide their perspective on living with two impairments. If they indicated that they were interested, they were asked to sign the consent form and were notified that they would be contacted within one week of their appointment to arrange an interview time. Participants were also asked if they would like a copy of the interview questions prior to the interview. These were provided by email, mail, or whatever means of communication the participants preferred. The interview took place in the participants' homes, and took 1–2 hours. Table 12 provides a summary of the descriptive information about the participants.

**Table 12: Participant information**

Pseudo- nym	Gender and marital status	Age	Living situation	Independent /Dependent	Diagnosis:		Assistive devices:		Other health conditions
					Vision	Mobility	Vision	Mobility	
<b>Linda</b>	Female &Married	90 (1921)	Assistive care living – apartment	Depends on husband, services offered through home, and daughter	AMD, cataract	Fell and fractured hip	-Spectacle mounted monocular telescope	-Walker -Emergency call button	-undiagnosed stroke -smoker -hearing loss
<b>Frank</b>	Male  Married, wife not present	83 (1928)	Detached home, 3 floors	Depends on wife and caregiver who comes in	AMD**	Arthritis in left knee	-enhanced lighting -magnifying glass -glasses	- wheelchair -walker	hearing loss diabetes hypertension
<b>Susan</b>	Female  Husband passed away	86 (1925)	Assistive care living – apartment	Very independent, has children who help to take her out, the home offers a lot of services	AMD**	Uses walker for fear of falling. When she was living in her own home she was dependent on the walker, but now only uses outdoors	- CCTV - MaxTV spec. mounted telescope -Daisy -+4.5 bifocal specs	-walker -Emergency call button	None

<b>John</b>	Male Married	78 (1933)	Detached home, 3 floors	Depends on wife	Cataract Glauco ma**	Parkinson's	-CCTV -hand magnifier -Daisy -enlarged calendar -white cane -glasses	-scooter -handrails	None
<b>Mary</b>	Female  Husband present	94 (1917)	Attached home in retirement village, 2 floors	Depends on daughter, husband also helps	AMD	Parkinson's, muscle weakness	-magnifier -CCTV -glasses	-walker -Emergency call button	Hearing loss
<b>Betty</b>	Female  Husband passed away	89 (1922)	Apartment	Independent, has strong family support	Cataract s AMD**	Falls	-glasses w arm for eyelid -enlarged font on computer -magnifying glasses	-walker -support pole	-hearing loss
<b>Alex</b>	Male  Wife passed away	91 (1920)	Nursing home, room	Depends on services through the home, daughter helps a lot	Cataract AMD**	Muscle weakness	-CCTV -glasses -Daisy -Cocoons (sunglasses) -large button phone -large clock	-wheelchair -walker -support pole	TIA's Hearing loss

\*\*indicates health condition they've lived with for a longer period of time

### 7.3 Data Analysis

Data analysis involved detailed reflective analysis to identify significant aspects in the participant's experience of living with coexisting vision and mobility impairments. To help direct data analysis, the aforementioned step-by-step manner outlined by Hycner<sup>9</sup> was used:

- Transcription
- Bracketing and the phenomenological reduction
- Listening to the interview for a sense of the whole
- Delineating units of general meanings
- Delineating units of meaning relevant to the research questions
- Eliminating redundancies
- Clustering units of relevant meaning
- Determining themes from clusters of meaning

With the themes summarized, each interview was read slowly, word by word, and common themes between interviews were grouped together. For example, all seven interviews were read, and any time a story regarding reading came up, and it was grouped into one main document under the heading "reading." During this time, a code book was developed to assist with the description of the themes. In the end, there was one main document that summarized all seven interviews by stories. A second researcher read the transcriptions and confirmed the themes that were concluded. After the primary and secondary researcher finalized the main document, a third reader was brought in. This reader had not read any of the transcripts until this time. They read the transcripts and the main document to assure that the conclusions drawn reflected the original transcripts.

### 7.4 Findings

Analysis of the interviews revealed four main themes related to the lived experience of having coexisting vision and mobility impairments. Participants described (i) the meaning behind vision, mobility, and coexisting impairments, (ii) adaptations of desired

activities,(iii) external support for engaging in activity, and (iv) internal support for engaging in activities.

#### 7.4.1 The Meaning Behind Vision, Mobility, and Coexisting Impairments

All of the participants expressed negative outcomes from both impairments, but each participant dealt with these negative outcomes in a different manner. This section specifically examines the meaning that participants expressed for their vision impairment, mobility impairment, and the two impairments coexisting.

##### 7.4.1.1 *Vision impairment harder to live with compared to mobility*

Participants expressed that a vision impairment was the worst impairment compared to mobility. The participants expressed this opinion from the perspective that their vision would continue to deteriorate, and even with assistive devices they would not be able to use their vision as they had in the past. There was a lot of frustration with using the devices because there were continued difficulties with their vision loss. Their vision impairment was seen as permanent.

I think it's one of the worst things to have. But maybe I'm wrong. I'm not totally blind, I pray that I never will be. And I'm appreciative that I've been so long without losing a lot of vision. But it's so hard, it just changes your life entirely. It's really rough. I guess they never will do anything for macular degeneration by the sounds of it. But there's so many other eye problems, aren't there? Hundreds of them. (Susan)

The Parkinson's hasn't been that great a problem to me really. But we'll see what he [*referring to Parkinson's specialist*] has to say if we ever get in again. It's the vision that has been the hardest. There's no changing the vision. At least with the walking there's the walker. But I'm managing. (Mary)

*When asked about using the CCTV, Alex's daughter commented:* he [father] did use it when he first came in but there's a glare on that one. And even with the curtain down and we've put it in different spots in the room and it seems that the glare is still there. (Alex's daughter)

##### 7.4.1.2 *Good vision function equals security*

Participants also viewed vision as a security. When respondents could see properly, they could assess and travel safely in their environment; without proper vision, participants

felt there was an increased risk of falling. When Susan was recruited into the study, she was using her walker all the time, but she moved to a retirement home where she was more active in her life and did not require her walker. Although she did not need her walker, Susan continued to use it for safety.

But when it's been nice I've gone out and walked all around, but I take the walker. Just in case. Mostly I like it because I can't see. And if I run into something it won't be me running into it. It's for the protection. I just feel safer with it when I'm alone, but other than that, I don't really need it. We have a therapist that checks us out all the time and he says I could go without it. But it's more a security. (Susan)

Betty originally obtained her walker because of her daughter's suggestion, and also commented on the walker being useful for security.

I didn't need a walker too bad, you see, but my daughter thought it might not be a bad idea to have one. For security purposes, you see. Plus, I was finding I was getting tired from all the walking around I do, so this gave me a little bit of a rest. I didn't use it all the time when I first got it until I had that fall. Now I use it all the time. (Betty)

#### 7.4.1.3 *Sense of loss with decreased reading ability*

The greatest loss participants expressed was reading. It had allowed them a way to acquire new knowledge – even if it was for entertainment. Alex loved to read, but because of his vision impairment, he could no longer do so. For him, reading was a daily pastime. His daughter explained that she had a basement full of his old books, some of them classics, but he could not use them anymore. Alex said “I want to read like I used to, but I can't. It's like someone is putting the brakes on the things I used to like to do.” For Alex, the loss of his ability to read meant losing hours of entertainment.

For other participants, the thought of losing their ability to read was unimaginable. Betty went so far as to say, “They can shoot me if I can't read.” Reading was a favourite pastime for many of the participants, and for those who had to give up reading, there was a sense of loss associated with increased vision impairment. Many of the participants kept coming back to the occupation of reading throughout the course of the interview, highlighting its importance to them.

#### 7.4.1.4 *Mobility devices give back mobility function, therefore independence*

Participants reported that their mobility impairment resulted in fatigue, decreased balance, changed gait, and a greater fear of falling. Although there were many negative outcomes associated with mobility impairment, participants expressed that their assistive devices (walkers, wheelchairs, scooters) allowed them to regain mobility function to overcome the negative outcomes. Many participants indicated their assistive devices allowed them independence. Betty liked to promote the use of her walker to other older adults. This excerpt shows that she knew the importance of moving:

You're bound to slow down. But at least you are moving. The main thing with the walker is that it helps you to move. And you need to move because of the joy of moving. You go out and you meet people. Otherwise, you're just sitting indoors. I take a great joy in going out and moving...I've had people ask me how the walker is, if I like it. "Are these things good?" And I always tell them "we've got our independence." Because that is so important. If people can't walk and get out or do things for themselves then what have they got to live for?(Betty)

#### 7.4.1.5 *Confounding effect of coexisting vision and mobility impairments*

If vision is associated with security and the acquisition of knowledge and mobility is associated with independence, what does it mean for someone who is living with coexisting vision and mobility impairments? Having both impairments meant that participants had to discontinue activities they once performed. Mary expressed this idea with her crocheting, housework, and reading with her magnifying glass. Because of the compounded impact of the two impairments, she was not able complete these tasks.

Yes, see I can't hold anything steady enough now. See with crocheting, I have the wool in one hand but it's not steady. Same thing applies to the sewing machine. I couldn't thread a needle in there because of both the vision and mobility. They try to give me a magnifying glass but what they don't understand is that I have the Parkinson's there, you see, and I can't hold it still enough to read anything.

It [*referring to vacuuming*] was hard for me to move around and reach all the different areas and then I couldn't see what I was reaching for. Afterwards, it didn't look any different from where I started because I couldn't see any of the dust. Plus, I would get so tired. I couldn't lift anything like the vacuum and I couldn't see where I was going. (Mary)

Betty explained her difficulty reading street signs when using her walker: “When I’m holding a walker and looking up trying to read the sign I can lose my balance very easily.”

Likewise, Alex believed living with both types of impairment was challenging because activities that involved both functions could either not be done, or be done with an increased level of difficulty.

Living with both makes life that much harder. I want to see where I’m going but I can’t. I want to read like I used to, but I can’t. It’s like someone is putting the brakes on the things I used to like to do. I know that I can do them, but I just can’t because of the vision and the wheelchair. Even when I go for my little walks with the recreation ladies, I have to be careful of where I’m going because I can’t see...But like I said before, it’s hard having more than one thing wrong with you. It’s like each time you find out about something new it gets a little worse and a little harder. (Alex)

#### 7.4.1.6 *Vision impairments amplify mobility impairment*

Another concept that appeared throughout the interviews was that vision impairment amplifies the impairments associated with mobility. For example, Alex talked about how it was the vision impairment that made getting around that much harder. If you already have challenges with mobility function, and you cannot see where you are going, your mobility is compromised that much more.

Alex: I think I limit my mobility because of my vision. I don’t want to go anywhere I don’t know what it looks like. I can’t see, so I don’t want to go somewhere where I don’t know where things are. If I could see, I would probably try new places. But it’s too much for me now with my vision gone. I am not willing to be a daredevil anymore. I was in my younger days, but I play it safe now. I would like to go further but I need to know where to go first. Also, if [daughter] is around, she can help me. But I don’t go far because of my vision.

Interviewer: Okay, that makes sense. Is there a time that your mobility interferes with your vision, does it ever make it harder?

Alex: I don’t think that’s possible. The wheelchair doesn’t stop my vision, the vision stops my going places.

In summary, these participants expressed that a vision impairment was the more difficult impairment to live with because it was seen as the more permanent disability and it



amplified the mobility impairment. A loss of vision meant there was a loss of security pertaining to safety concerns, and there was a sense of loss associated with declining reading ability. Mobility impairment was primarily associated with loss of independence.

Although a mobility device would normally provide a sense of independence, and a vision device would normally provide a sense of security, these interviews revealed that when both conditions are present, there is a greater loss of security and independence due to the confounding effect of the combined conditions. Participants limited their mobility activities, even with a device, because of their vision impairment.

#### 7.4.2 Adaptations of Desired Activities

Some participants continued with selected activities they did before their functional decline, while others either changed or discontinued their involvement. There were a few activities, such as playing card games, listening to music, and going to the cinema, that a few of the participants continued to do as they did before their impairments. For example, Alex explained he continued to listen to music throughout his day: “I have fallen back on my love of music. I would never want to give that up. Anyway, that’s the only thing I’ve retained.” Betty said, “I go to the cinema and I have been known to go by myself. They’ve had this opera program that they’ve had on Saturdays. I’ve seen every one!”

The majority of activities in which these participants chose to engage, however, had to be modified to accommodate the impairments associated with vision and/or mobility. For instance, Frank commented, “I used to read quite a lot, I like to read. But now you get fed up because you have the disadvantage of not reading. You have to use other means or you get tired.”

A number of the participants commented that they have had to change their whole life because of their impairments. Linda felt her impairments “completely changed the way we do things.”

Although they have had to make a lot of changes to how they go about their activities, John and his wife felt that older adults have a lot of options to help them.

Well I don't think seniors can really complain. There is a lot out there for them.  
(John's wife)

There is so much help that I can get for my eyesight now and for Parkinson's.  
I've got the bus, I've got the taxi, I've got the scooter to scoot downtown. (John)

Another example of how participants had to change their activities was Mary and her husband talking about going to church. Both were avid churchgoers, but because of their mobility impairments, they have had to change when and where they go to church.

Our mornings are not very great here health wise, so we don't get to our own church for the morning services. But there's an evening service here on Sundays, and we try to get to that because evening is better for us to get out than in the morning. (Mary)

All of the participants described several activities that they had to change due to their health conditions, but there are certain activities they could no longer continue.

#### 7.4.2.1 *Discontinued activities*

Another way participants adapted to their impairments was by discontinuing certain activities. For example, participants may have participated in an activity put on by residence staff, but they could no longer attend because they were not able to walk to the building.

The years prior to this, when we'd go to some program over in the main building, we would just enjoy that walk before we got there and now that's a hindrance. You know we're not well enough to walk there now. And it's taking a chance whether or not we're going to make it. And well, it's just the inconvenience of getting somewhere. (Mary)

One particular activity, driving, was an upset for many participants when they learned they could no longer have a driver's licence.

That was a hard thing when I couldn't drive anymore. I think that's the worst thing, for any reason, if you have to stop driving. It's hard to give up your independence. (Susan)

Since a number of participants were still active in the community or they had appointments to attend, they had to find other transportation methods. Many relied on their children for rides, but some made adaptations by learning to use the public transport

system. Betty was very positive about her experience with the bus and taxi service in her town when she commented, “I found the drivers very, very helpful. They are very amusing sometimes. And the taxi drivers are a joy!”

In summary, for participants of this study, there were activities that they continued to perform as they did prior to living with their impairments, but because of vision and/or mobility impairments, all participants commented on changes they made to continue performing their activities of interest. Unfortunately, there were those activities they had to discontinue, such as driving, but some were able to substitute new interests for these activities.

### 7.4.3 External Support for Engaging in Activity

Just as the ICF includes environmental factors (contextual factors) as a component of health and health-related states, participants also identified external factors which contributed to their ability to participate in activities.<sup>10</sup>

#### 7.4.3.1 *Spouse and family*

A large resource for the participants was social contacts, most notably spouse and family. Four out of the seven participants had spouses who were still living. These couples had been together for many years. For example, one couple had been married for more than 60 years. In their relationship, they relied on each other for help in their everyday activities. John’s wife commented, “We’re so blessed to have each other.”

All of the participants relied on their children. Every participant had at least one child living in the same city. They needed their children for support, transportation, and family events. Mary’s daughter lived with her and her husband to help around the house. Mary said, “[*daughter*] does so much for us. It’s just a blessing. It’s hard to explain everything that she does. She’s a real daughter.”

Although these parents relied on their children, all of them made comments that they do not want to be a burden to their children. John’s wife commented, “Sometimes you feel you’re such a burden.”

### 7.4.3.2 *Assistive technology*

A major external resource for the participants was the use of assistive technology. As per the inclusion criteria for recruitment, all participants had at least one assistive device for vision and one to help mobility impairments. All participants said they needed their assistive devices to perform activities in their daily life. It was amazing to hear the joy Susan experienced with her new spectacle-mounted telescope when she was sitting in a large auditorium to watch a play.

Listen, I didn't think they'd work, but they were absolutely sensational. We were back, but not too far. But with these I could see the whole thing! I could actually see her face and I cannot see anybody else's face. I was so thrilled. It was wonderful. (Susan)

On the day of his appointment at the low vision clinic, Alex's daughter recalled the day Alex used a new CCTV: "It was kind of like Christmas that day, because we put on a picture that he hadn't seen before and he was able to identify who the people were."

### 7.4.3.3 *Health care system*

Another important concept that emerged when discussing external influences relates to the health care system. No participant complained about the health care system. They all had good experiences, but one idea that was apparent for all participants was that there was disjointedness among the health care services.

Alex and his daughter both had comments related to the separation of the health care system:

Interviewer: I know you mentioned you see a therapist for your walks. Do they ever ask about your vision?

Alex: No, she wouldn't know about that. I don't think so. Nobody asks you about that stuff.

Daughter: I don't know if there is anything they can do to help with the vision. They just work on the walking.

Interviewer: And when you were at the low vision clinic, did they ask about the wheelchair?

Alex: No

Daughter: Actually, I was a little surprised they didn't ask about the wheelchair for setting up the machine to make sure it was the right height. That's something I've had to do on my own with the last one.

#### 7.4.3.4 *Services and systems*

The last notion related to external influences was the services available to participants, such as public transportation, community centres, programs and resources at residences, and other organized events. One man enjoyed participating in his city council:

And sometimes he'll contribute but he's like a fixture. He's been going for years. I always find on Tuesday he's more talkative. He's heard what the meeting is about and he tries to tell me about the meeting. (John's Spouse)

Alex was one of the original members of an accounting group that started over 40 years ago. He continued to participate in the monthly meetings.

Many of the other participants frequented local community centres. Betty mentioned, "I love that centre. It's really a nice centre for anything. It's really nice for everything."

Another example of the services used was when Susan discussed how she loves the activities and services provided by the residence that she was living in:

They have a bistro down there. It's not licensed. We can take wine down to the table. They'll bring us the glasses. They're not allowed to serve us, you see, and once a month they have a cocktail down in the bistro. We sit around and drink wine –cheap wine!!

In summary, all of the participants expressed they had some type of external support in their life: their spouse, children, assistive technology, health care services, or other organized services. These external factors contributed to the participants' ability to engage in activities.

#### 7.4.4 *Internal Support for Engaging in Activity*

The ICF outlines another contextual factor, that contributes to the understanding of health and health-related states: personal factors. The current study also found there were internal supports that participants relied on to engage in their daily activities. These

included coping and motivation. As with any studies looking at human beings, there are always variables between participants due to age, gender, culture, or past experiences. Recruiting methods allowed for participants to be of the same age group (mean 87 years) and within South-western Ontario; however, there are still those elements of an individual that influence perspective.

#### 7.4.4.1 *Coping skills*

One such difference noticed between participants was how they coped with their daily life. For a few of the participants, the changes in their life resulting from their impairment significantly changed their perspective of themselves. For Susan, her moment of change happened when she moved from living on her own in a small town to moving into a retirement building.

I was isolated in the house, I really was...But, I became really sick. I lost my sort of muscle strength because I didn't go anywhere. I was so depressed that in winter the kids said you've got to leave. I really didn't want to. But this was good, because now I go to exercises three times a week and I go for exercises in the pool three times a week. And now I don't need my walker. I had to get a walker and now I don't. I'm a different person. (Susan)

John's relationship with his wife improved once he understood his health condition and why he was experiencing difficulties. His wife recalled the challenges between them:

I used to think, what's the matter with him? Because that's not his nature. For him to be ugly and to be cross with me when I go work so hard and make good healthy meals. He was mad at himself because he'd mow the lawn and he couldn't do the things, you know? And then with the eyesight as well and he was more or less taking it out on me. Until he found out that there is a name for this. After he got on the medication, he started to be himself again.

Some of the participants expressed a sense of lost dreams and disappointment because of the impairments they were living with. Frank explained that he had dreams of what his retirement would be like, but they could no longer come true:

Yes, after working thirty years in [*city name*], I hoped when I retire that I will enjoy myself right now. I had this urge to go back to university and listen to lectures. Especially of philosophy and religion. But so happens that I cannot do either of them because of my low vision and my mobility. And that bothers me very much because you lost something that I was expecting which such happiness

in my mind. Oh, you are now finished looking after patients, you are going to educate yourself the way you want to gain, and so on and so on, which I cannot do it. And I wanted to very much.

Many of the participants compared their situation to that of others. They explained that there were people who were worse than they were, so they should be grateful for what they have.

He does really good. When I think of a lot of his friends, younger than him, who've passed away already. (John's wife)

Well, it's not easy. That's for sure. But I manage. Generally speaking, health wise, you hear of people who are far worse off than what we are so we have to be happy with what we've got. (Mary)

Well yes, and there are other people, you know, how should I say, they are worse than I am. (Betty)

#### 7.4.4.2 *Motivation*

Another personal factor that was different between participants was their level of motivation. Some of the participants had given up on their lives.

There's a lack of will. It's understandable at this stage in our lives. It's hard to understand for a young person. There just comes a point where you don't want to try anything else. (Linda's husband)

On the opposite end of the spectrum were participants who were incredibly motivated with their lives. They were trying to live the best they could. When Betty was asked about what motivates her, she responded with the teaching of her father:

My father used to teach us that whatever happens in life, you've got to get on with it. You might get friends to help you, but you've got to do it for yourself. You can't have people doing it for you, they can help you a bit but you've got to sort things out yourself. And it will have an end, everything has an end. So I've always been very independent...It's so important for people to take charge of their lives and learn what is out there for them. There is so much help out there, but you do have to do a little digging, but it's there. And yes, along the way you might have to give up a few things.

In summary, participants expressed different levels of coping and motivation as internal factors contributing to their ability to engage in activities. For some, their coping skills changed at a specific time in their life; some expressed a sense of loss; and many

compared themselves to others. There were different motivation levels among participants: either they had stopped trying or they were trying very hard to realize their full potential.

## 7.5 Discussion

This study's findings illustrate the complex phenomenon of living with coexisting vision and mobility impairments. Interviews with the seven older adults living with coexisting vision and mobility impairments revealed four main themes: (i) the meaning behind vision, mobility, and coexisting impairments, (ii) adaptation of desired activities, (iii) external support for engaging in activity, and (iv) internal support for engaging in activity.

The participants believed vision and mobility impairments were a negative aspect of their lives. Vision has been shown to be a source of security, as a decrease in visual acuity results in an increase in falls.<sup>11, 12</sup> It is no wonder that participants expressed the importance of their mobility devices to help them avoid falls. Vision can also be seen as a means of acquiring further knowledge. Increased vision impairment makes reading more difficult, and there is a sense of loss associated with losing the ability to read. Activities such as reading are important for mental stimulation, which can increase cognitive function.<sup>13</sup> As discussed in the literature, Bouma<sup>14</sup> describes mobility as "independence in pursuing one's ambition and activities" (p. 72). Also, a loss in mobility function is associated with a loss of independence, which is confirmed by the interviews with participants living with coexisting vision and mobility impairments.<sup>15</sup> These interviews further the knowledge associated with the reality of coexisting vision and mobility impairment. Both impairments impede security, acquisition of knowledge, and independence.

Listening to participants describe their adaptations of desired activities revealed older adults had to find ways to change how they perform these activities. When participants talked about activities, they referred to all types of activities, not just the ones for pleasure. In a sense, activities can be defined by the same definition as occupation: all that people need, want, or have to do.<sup>16</sup> These activities or occupations may be for



pleasure, but they may also entail: functional purposes; social, physical, mental, and spiritual reasons; health purposes; meeting obligations; choice or habit; or for finding meaning and purpose.<sup>16</sup> Wilcock<sup>16</sup> explained that when faced with impairment, older adults demonstrated an ability to change their occupation.

Klinger<sup>17</sup> explored this phenomenon in her work with people with traumatic brain injury. She described this change in occupation as an occupational adaptation where changes are made so that, when faced with an internal or external stressor, people are able to preserve occupational participation.<sup>17</sup> With these occupational adaptations, they participants in this study experienced a change in their perspective of themselves, which their coping skills and levels of motivation reflected.

Participants expressed that external and internal factors influenced their ability to engage in activities. The importance of social interactions with family members and through organizations such as community centres, programs, and meetings all contributed to meaningful relationships. As discussed in the literature, Power et al.<sup>19</sup> explained the importance of meaningful relationships for improvement in older adult's health and well-being. These instances of interaction with others are important for meaningful relationships as well as function. This confirms the work of Buchman<sup>20</sup> who in their study of over 900 participants, found that decreased participation in social activity was associated with a more rapid rate of motor function decline.

Another external factor is assistive technology. Assistive technology is effective for both vision and mobility rehabilitation in the overall goal of reducing the impact of limitations from impairment.<sup>21-24</sup> Assistive technology allows older adults with coexisting vision and mobility impairments the ability to regain function to perform desired activities using residual vision and mobility function. Participants in the current study talked about their ability to travel in their environment with their mobility devices and they were able to read, albeit with challenge, with their vision devices.

All of the participants commented about the disjointedness of the various services provided for persons with vision and mobility impairments. Participants commented that their health care providers focused on their specific speciality (e.g., their mobility

therapist did not ask about their vision impairment, but strictly focused on their mobility rehabilitation). By focusing on a specific area, the health care providers may not readily see the influence of one impairment on function when they are focused on a second one.

Fleet et al.<sup>25</sup> researched models of interdisciplinary collaboration from a Canadian perspective. All the studies they reviewed demonstrated that interdisciplinary health care services allowed providers an opportunity to learn about the different role of other health professionals and therefore provide improved care to patients.<sup>25</sup> If there could be better communication between services for individuals who require assistance for vision limitations and mobility limitations, then individuals with coexisting vision and mobility impairments could experience improved care.

In this study, internal factors contributing to engaging in activities were associated with different coping mechanisms and different levels of motivation. Lindo<sup>26</sup> has explained different adaptation strategies for individuals with low vision. His suggestions could also apply to someone coping with declined mobility. Different participants in his study demonstrated positive and negative aspects of living with a disability. The positive adaptations allowed the individual to move forward and continue to engage in activities, and those who expressed negative adaptations limited their participation.<sup>26</sup>

The participants in this current study also had varying levels of coping skills and motivation, which either allowed them to continue participation in activities with a positive perspective, or limited their ability to participate with their negative perspective of disability.

The strength of this study is that a phenomenological perspective provided a deeper understanding of the lived experience of older adults living with coexisting vision and mobility impairments. The rigorous analysis of the data provided a deeper understanding of the phenomenon. Due to the in-depth analysis, this study has provided a reflection of older adults living with coexisting vision and mobility impairments. A limitation of this study is that it involved individuals living in a small geographic area served by an optometry school's low vision clinic, which is somewhat unique in Canada.

## 7.6 Conclusion

This study explored the lived experience of older adults with coexisting vision and mobility impairments. The interviews identified four themes: (i) the meaning behind vision, mobility, and coexisting impairments, (ii) adaptation of desired activities, (iii) external support for engaging in activity, and (iv) internal support for engaging in activity. These interviews are the first reports that reveal the lived experience of older adults with coexisting vision and mobility impairments. Due to the combined effect of both conditions, participants expressed having to change how they performed activities. What is better understood from these interviews is that these individuals had to change their activities with respect to both conditions. The effects of their vision impairment amplified the effects of their mobility impairment. As a result, participants limited their mobility function due to their vision function. Assistive devices that would normally work for a vision or mobility impairment on their own were no longer sufficient in the presence of the other impairment. As a result, better communication is needed between health care providers in order to provide rehabilitation that is capable of accommodating both vision and mobility impairments.

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## Chapter 8

### 8 Discussion

#### 8.1 Study Overview

Despite the vast literature on vision and mobility impairments, little literature exists on the effect of coexisting vision and mobility impairments on function. By combining both quantitative and qualitative aspects in this mixed methods study, the current research was intended to describe the prevalence of older Canadian adults living with coexisting vision and mobility impairments, and to demonstrate the effect of both impairments on activities of daily living, self-perceived health, assistive technology use, and health care services. The quantitative aspect of the study was the secondary data analysis performed on both the NPHS and PALS. This analysis revealed that a small percentage of the Canadian population is living with coexisting vision and mobility impairments; however, although only a small percentage lives with both conditions, individuals with both conditions reported a significant influence on their activities of daily living. Results from the secondary analyses of the NPHS and PALS revealed individuals with both conditions required more help with activities of daily living, and had decreased participation in activities and an increased use of assistive technology compared to older adults living with one or no vision or mobility impairment.

The qualitative aspect of the study used a phenomenological perspective, and consisted of interviews with older adults living with both conditions. The results of the interviews enhanced, confirmed, and clarified the results of the NPHS and PALS analyses.

As per the requirements of mixed methodology, the final step of this dissertation is the point of interface. The point of interface is the position at which the core (quantitative) and supplemental (qualitative) components meet.<sup>1</sup> This research project used the secondary analyses of the NPHS and PALS as the core component. The results of the semi-structured interviews acted as a supplemental component embellishing and adding description to the core results.

A summary and interpretation of the findings across the three manuscripts is provided below. First, the three studies are discussed to summarize the relationship of coexisting vision and mobility impairments and function, assistive technology, and activities, and there is a discussion of the prevalence of vision and mobility impairments. Also, the strengths and weaknesses of this study are discussed. Finally, the future direction of this research is presented.

## 8.2 Relationship of Coexisting Vision and Mobility Impairments

According to the literature, vision impairment poses greater challenges when performing activities compared to mobility impairment. For example, Wahl et al.<sup>2</sup> surveyed elderly patients to compare those with vision impairment and those with mobility impairment. They found that compared to those living with a mobility impairment, older adults living with a vision impairment had greater difficulty performing activities because of the requirement for visual capacity in many daily activities.<sup>2</sup> Their study is indicative of the comparison of vision impairments to mobility impairments; however, this dissertation furthered these results by demonstrating the unidirectional relationship between vision and mobility impairments on daily functioning.

In order to comprehend the relationship between vision and mobility impairments, the cumulative results of these studies were examined within the context of the WHO's ICF.<sup>3</sup> The ICF classifies impairments as problems in body function or structure.<sup>3</sup> The studies in this dissertation were based on the premise that the presence of multiple impairments would have a compounded effect on function, compared with the functional impact that would be identified through consideration of each impairment on its own.

The results of the NPHS analysis found that older adults with coexisting vision and mobility impairments reported the highest restrictions of activities of daily living compared to older adults living with one or no impairments. Because of this cumulative level of disability associated with living with both vision and mobility restrictions, the NPHS analysis revealed these older adults reported participating in fewer kinds of

physical activities. Also, older adults with coexisting vision and mobility impairments spent less total time in physical activity.

Analysis of the PALS data found that older adults living with coexisting vision and mobility impairments reported the highest use of assistive devices. The data also revealed that individuals using mobility devices required the most assistance with activities of daily living. These older adults living with both impairments reported greater unmet needs for vision devices compared to those with only a vision impairment.

Coexisting vision and mobility impairments result in an increased level of disability compared to living with one or no impairment. This cumulative level of disability increased the need for assistance for activities of daily living, decreased physical activity participation, and increased need for assistive devices.

This current study supplements the ICF by contributing to the understanding of decreased activities and participation and increased assistive device use in the presence of both conditions. Although these findings are important to understanding the health-related states of older adults with both impairments, the qualitative study best illustrates the nature of the relationship of coexisting vision and mobility impairments.

Participants suggested that vision impairment made mobility activities more difficult. A similar suggestion about mobility making vision activities more difficult was not made. For example, participants commented on not being able to rely on vision to detect objects or dangerous situations that might cause a fall or to detect an object they might reach to prevent a fall if balance were lost.

The ICF outlines health and health-related states, but from the perspective of one condition. The current studies demonstrate the complex relationship of *both* vision and mobility impairments. The cumulative effect of both conditions impacts the ability an older adult has to perform the activities and participation they desire. For example, one participant discussed her challenges with going to church. Because of her mobility limitations, she had difficulty physically getting to church, but some days she could get a ride; however, this was not the end of her tribulation. Her mobility impairment made it



difficult for her to sit for a long time, especially in the hard pews of the church, and her vision impairment made it hard to see the minister and read the prayers/hymns. She felt that the combination of both impairments made the experience so incredibly frustrating that she had stopped going to church.

The ICF can be used to comprehend the impact of coexisting vision and mobility impairments when taking into consideration the cumulative effect of both conditions on functions. The use of the ICF for both conditions can be accomplished by understanding that vision impairment makes mobility impairment more difficult, and thus creates increased difficulty performing desired activities. Rehabilitation will be successful if this relationship is considered and interventions, such as assistive technology, encompass the limitations of both conditions. This furthers the understanding of the ICF by adding knowledge of a vision impairment's amplifying effect: the presence of a vision impairment amplifies the functional limitations resulting from mobility impairments.

### 8.3 Population Estimates

Population estimates from the secondary data analysis of the NPHS revealed that approximately 3% of the Canadian population over the age of 65 is living with coexisting vision and mobility impairments. Population estimates from the secondary data analysis of PALS revealed that, of older Canadians who reported in the Census a health condition that limits their activities of daily living, 15% are living with coexisting vision and mobility impairments. The differences in population estimates between the two studies are a result of the target population sampled in each survey. The NPHS sought health information from all Canadians regardless of ability level, whereas PALS captured data only from Canadians who reported having a disability. Therefore, it was expected that the population estimates for the number of older adults living with coexisting vision and mobility impairments from PALS would be greater than the estimates of the NPHS.

### 8.4 Activities

The relationship between visual and mobility impairments has been examined; now the impact of this relationship on activities will be examined. Activities may be activities of

daily living, physical activities for exercise, leisure activities, instrumental activities of daily living, and employment and/or education. A lack of activity can lead to illness, isolation and despair, and death.<sup>4</sup> Both the NPHS and PALS confirmed that the presence of both conditions made it difficult for individuals to participate in activities; however, despite this challenge, a majority of older adults living with both conditions continued walking. Consistent with the analyses of the NPHS and PALS, in their study of walking behaviour among Canadian adults, Bryan et al.<sup>5</sup> found that a large majority of Canadian adults (70%) walked for exercise.

As indicated in the NPHS and PALS analyses, individuals with both conditions had the least participation in activities; however, the qualitative interviews expanded on how these activities changed. The qualitative interviews revealed participants modified a number of activities to accommodate both impairments. Many of the accommodations involved the use of assistive technologies. For example, a wheeled walker performed the primary function of assisting with walking, but it also provided the older adult with kinaesthetic input that helped supplement the loss of vision. If there was an object that they could not see, the walker would bump into it first, or if there was a change in the ground (e.g., carpet to tile floor), the person could feel this change rather than having to struggle to see the floor. Accommodations to activities that enhanced the function of both the vision and mobility impairment were the most successful.

When accommodation to an activity was not possible, it was discontinued. For the majority of discontinued activities, there were no assistive devices capable of restoring function. For example, every participant discussed the activity of reading. Because of these patients' significant loss of vision, many of the assistive devices were not capable of restoring vision function to the level that it was prior to the disability. The devices allowed for short-term reading, but the majority of participants explained that this was tiring and frustrating. Reading was described as a source of leisure and pleasure, and the loss of being able to sit down and read a novel was difficult. One participant thought he would spend his retirement reading books on religion and philosophy, but because of his conditions, this was a lost dream. Some participants were able to change how they read by using a DAISY reading machine, which allowed them to listen to their books, but it

was a big adjustment. Driving was another big loss for many of the participants. Driving was a source of freedom and independence. The combination of mobility and vision loss forced many of the participants to stop driving because of issues of safety, thereby limiting their freedom and independence. When participants discussed activities they had to stop because of their conditions, there was a sense of loss and grief.

These results supplement the ICF with respect to the relationship between coexisting impairments and resultant changes in activities and participation. These results indicate the importance of understanding activities and participation with both conditions taken into consideration. The ICF can be used to direct successful rehabilitation that provides accommodations to both conditions in order to enhance function and perform desired activities. For example, prescribing assistive technology that can accommodate both conditions, such as a walker that allows the individual the ability to rest when they are feeling fatigued, but also allows them to have a sense of security by decreasing a fear of falling.

This dissertation addresses the WHO's goals within its Active Ageing Policy.<sup>6</sup> The studies in this dissertation demonstrate the importance of older adults being able to maintain their ability to participate in desired activities. Also, this work provides some new information on why older adults are not able to engage in active aging. In order to maintain active living, alternative activities need to be proposed that accommodate the increased level of disability associated with both conditions. For example, if a community centre is offering a program that allows older adults to show picture slideshows, they should provide transportation to and from the event, have adequate seating and lighting, and accommodate those in wheelchairs.

The ability to participate in activities is an important part of daily living. The Active Ageing Policy and the ICF both emphasize the integration of activities in daily life. Living with both vision and mobility impairments poses greater challenges performing activities because of the increased level of disability.

## 8.5 Assistive Technologies

Assistive devices that consider both conditions will result in better function and therefore increase participation in desired activities. Many assistive technologies are prescribed during rehabilitation. Throughout this dissertation, rehabilitation is not limited to physical rehabilitation, but also includes elements of social participation and the ability to participate in meaningful activities.<sup>7</sup> The participants' comments regarding rehabilitation echo the themes found by Wallin et al.<sup>7</sup>, that is, that rehabilitation offers a sense of confidence in everyday life by helping individuals cope at home through a variety of sources, such as assistive technology. Assistive technology is used to augment or replace function in the presence of vision and/or mobility impairment, as well as improve quality of life.<sup>8</sup> In his discussion of gerontechnology, Fozard<sup>9</sup> outlined that the role of assistive technology for older adults is to: (i) prevent or delay age-related declines in functioning, (ii) compensate for existing age-related limitations and functioning, and (iii) enhance enjoyment and participation in activities.

PALS demonstrated an increased need for assistive technology for individuals living with coexisting vision and mobility impairments. Specifically, the PALS study indicated that older adults living with coexisting vision and mobility impairments used more mobility devices compared to vision devices. When asked about unmet needs, the need for vision devices was ranked highest. Overall, the increased level of disability associated with both conditions resulted in increased assistive technology use. In general, older adults had more mobility devices compared to visual devices, but more visual aids were desired.

The qualitative interviews reinforced Fozard's<sup>9</sup> view of the importance of assistive technologies, highlighting the importance of these devices at an individual level. For example, devices that helped with vision loss were essential for reading and for navigating one's environment, thereby providing freedom to do things on one's own. Devices that helped with mobility loss were essential for the feeling of independence. The majority of activities discussed in the previous section had been modified but continued to be performed with an assistive device; therefore, assistive devices that are successful in accommodating both conditions allow for continuation in activities.

These results further the understanding of the relationship of coexisting vision and mobility impairments with assistive technology use. The ICF places assistive technology in the Environmental Factors domain. This dissertation outlines the dynamic relationship that coexisting vision and mobility impairments has with increased assistive technology use. As well, the increased use of assistive technology enables older adults with both conditions to modify their activities and participation.

The findings related to assistive technology use build upon the information outlined in the cross-fertilization matrix of gerontechnology. These results contribute to the understanding of the cross-fertilization matrix by expanding on the life domains (health/self-esteem, housing/daily living, mobility/transport, communication/governance, work/leisure) within the four goals (enhancement/satisfaction, prevention/engagement, compensation/assistance, care support/care organization). For example, many of the devices used by older adults with both conditions help with their tasks of daily living, such as housekeeping and reading (e.g., for cooking, finances, or personal care). These life domains of daily living achieve the goal of compensation and assistance to allow older adults to augment their residual function. Gerontechnology and its cross-fertilization matrix provide guidance to practitioners to prescribe assistive technology that complements the needs of aging people to achieve the “ultimate aim of a sustainable high quality of daily life.”<sup>10</sup>

By studying coexisting vision and mobility impairments, understanding is gained of assistive technology’s role in ameliorating the cumulative effect of both conditions on function. Participants indicated that assistive technology enabled them to participate in activities because it provides a sense of freedom, independence, and security. Assistive technology use allows for continued participation in desired activities; however, as PALS evidenced, rehabilitation service providers need to address the unmet needs of visual aids.

## 8.6 Strengths

The combination of qualitative and quantitative methods enhanced the applicability of this study and each study contributed to the understanding of coexisting vision and mobility impairments:

- (i) The NPHS provided true population-based estimates of both conditions through the sample participants based on all Canadians.
- (ii) PALS also provided true population-based estimates, but they were estimates of both conditions among those who were living with a disability. This change in the sample population provided additional quantitative data, but relative to those with a disability.
- (iii) With the addition of the qualitative study, the sample only consisted of participants living with coexisting vision and mobility impairments. The interviews obtained further insights that the quantitative studies could not provide.

For both the NPHS and PALS, the response rate was high, and adjustments in weighting for characteristics of non-respondents minimized potential non-response bias. During the NPHS and PALS interviews, once an interview was initiated, completion rates were high and individual item non-responses were minimal. In this study, the process of using semi-structured interviews allowed respondents to reply using their own interpretations of situations and to be free to answer as they chose. The responses of the interviews corresponded with the results of the NPHS and PALS.

The current study was the first Canadian investigation of the prevalence of older adults living with coexisting vision and mobility impairments and the first study illustrating the effects of both conditions on daily function. Differences were found in assistive device use, level of assistance for activities of daily living, and self-perceived health for individuals living with both conditions compared to those living with one or no vision or mobility condition. This outcome underlines the importance of rehabilitative care designed to accommodate both vision and mobility impairments to improve quality of life in older adults by improving services to address the needs of both the vision and the mobility impairment.

## 8.7 Limitations

A limitation of this study is that the NPHS and PALS were both self-report surveys, so there may be some bias resulting from differences in the way individual respondents

interpreted response categories. Also, due to Statistics Canada regulations, this dissertation could not present cell counts less than 10 because of the risk of identifying participants. This missing information may have been relevant to the analysis in the study. For example, this dissertation could not report results pertaining to gender because the counts were too small. It is quite possible that gender differences may influence some of the results presented in this dissertation, but they could not be presented. Although the number of respondents in the qualitative study was suitable for this methodology, all of the individuals who participated in the interviews were recruited from a small geographic area served by an optometry school's low vision clinic, which is somewhat unique in Canada. Therefore, the participants' experiences of vision rehabilitation may be different from that of a typical rehabilitation clinic.

## 8.8 Future Research

With the number of Canadians over the age of 65 increasing, it is recommended that future studies take into account the effect of coexisting health conditions on activities of daily living, assistive technology use, and participation in desired activities, as presented in this dissertation. There is a need for more detail on engagement in specific occupations that accommodate both conditions. More qualitative work could be done to explore things like moving about the community, completing household tasks, or engaging in leisure activities. Also, studies should focus on rehabilitative services that communicate openly with one another to provide optimal care. Rehabilitative services could provide care that improves function of both vision and mobility if there were more communication between services.

The prevalence of coexisting vision and mobility impairments will increase with the aging population. As emphasized by the concept of universality in the ICF, all individuals are susceptible to the negative outcomes of coexisting vision and mobility impairments.

To echo *The Future of Disability in America*:

disability is not destiny for either individuals or the communities in which they live. Rather, disability is shaped by personal and collective choices. Positive choices made today not only can prevent the onset of many potentially disabling conditions but also can mitigate their effects and help create more supportive

physical and social environments that promote a future of increased independence and integration for people with disabilities.<sup>11</sup>

The results from this dissertation provide a starting point from which future researchers can further improve rehabilitative care for older adults living with coexisting vision and mobility impairments in order to promote futures of increased independence.

## 8.9 Conclusion

It seems fitting that the final words of this dissertation are not my words, but the words of one of the participants from the qualitative component. We can analyze and attribute numbers to the experience of those living with coexisting vision and mobility impairments, but the reality is that the voices of the individuals living with both conditions carry the heaviest weight. Living with coexisting vision and mobility impairments increases the level of difficulty in performing the activities of daily life. Rehabilitation services need to come together and open the communication barriers between services to improve the quality of life of older adults living with coexisting vision and mobility impairments.

It's always nice to be alive. You don't know when you were born and you don't know when you will die. So enjoy that bit in-between because that's all you've got. You get through life with a happy disposition and good sex and you're alright! [*Laughs.*] I don't tell everybody that. My life hasn't been happy in lots of time and I've had difficult times but life is living and right up to the last minute you should be trying. Even if you are sitting still and waving a flag, enjoy it! Enjoy life. Wake up each morning and say I'm happy to be alive. (Betty)



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## Appendices

### Appendix A: Scoping Literature Review Summary

Title, Author, Year, Country	Intervention/Objectives/ N	Results or Findings
<p>Visual factors should be assessed in older people presenting with falls or hip fracture</p> <p><b>Abdelhafiz</b>(2003) UK</p>	<p>Literature review to examine if visual function should be investigated for the prevention of falls.</p>	<p>Falls are highly related to poor vision and that it should be assessed for risk of falls.</p>
<p>Guideline for the prevention of falls in older persons</p> <p><b>American Geriatrics Society</b> (2001) USA</p>	<p>To assist health care professionals in their assessment of fall risk and in their management of older patients who are at risk of falling and those who have fallen. They did an extensive literature search in order to compile a list of suggestions.</p>	<p>They identified 10 most common risk factors for falls – visual deficit was one. They also identified that visual intervention is needed when assessing for the risk of falls, however “There are no RCT studies of interventions for individual visual problems”</p>
<p>Promoting Independence for wheelchair users: the role of home accommodations</p> <p><b>Allen et al.</b> (2006) USA</p>	<p>To investigate whether home accommodation influence the amount of human help provided to a nationally representative sample of adults who use wheelchairs. 899 adults from the DFS survey project.</p>	<p>Wheelchair users who live alone were older, poorer, more likely to be women, less likely to be married, more likely to live in elderly housing, more likely to be covered by Medicaid, and somewhat less impaired than people who live with others. Home accommodations are inversely related to the receipt of human help in a national sample of wheelchair users and that this effect would be stronger for people who live alone than for people who live with others.</p>
<p>Health professionals’ perceptions of service delivery needs for community dwelling seniors with low vision: a pilot study</p> <p><b>Bitensky et al.</b> (2003) Canada</p>	<p>A qualitative study to investigate needs related to low vision service delivery for community dwelling seniors.</p>	<p>From a thorough literature review as well as individual interviews There are gaps in provision of service to this population resulting from funding, access, knowledge of professional competencies, and communication issues. The need for development and evaluation of a service delivery model that will meet the needs of this population.</p>

<p>Accessibility and Mobility of persons who are visually impaired: a historical analysis</p> <p><b>Blasch et al (1995) USA</b></p>	<p>To give a brief history of accessibility and mobility</p>	<p>Explained the development of the white cane, guide dog, and people involved with these changes, and social changes.</p>
<p>Older people's use of powered wheelchairs for activity and participation</p> <p><b>Brandt et al. (2004) Denmark</b></p>	<p>To investigate outcomes of older people's use of powered wheelchairs and risk factors for negative outcomes. Used the ICF as well as the HAAT model as its conceptual framework.</p> <p>N =111 users of powered wheelchairs.</p>	<p>Their results showed that The most frequent activities of powered wheelchairs (in the summer) were going for a ride, shopping visiting friends and family. The wheelchair provided opportunities for this senior sample the ability to carry out prioritized activities. Risk factors involved with wheelchair use of age, gender, physical ability, and <b>visual function.</b></p>
<p>The effects of blurring vision on medio-lateral balance during stepping up or down to a new level in the elderly</p> <p><b>Buckley et al. (2005) UK</b></p>	<p>To determine how medio-lateral dynamics of stepping and single limb support stability when stepping up or down to a new level were affected by blurring the vision of health elderly subjects.</p>	<p>Balance during stepping up and down was significantly affected by blurred vision. Highlighting the importance of accurate visual feedback in the precise control of stepping dynamics when stepping up or down to a new level. (How did they control for accommodation).</p>
<p>Interventions for preventing falls in older people in residential care facilities and hospitals</p> <p><b>Cameron (2007) USA</b></p>	<p>Literature review of the increased prevalence of falls for those in residential care facilities and hospitals.</p>	<p>This copy doesn't include the report, but it is specific for nursing homes. Might be related to vision, not sure.</p>
<p>Randomized controlled trial of prevention of falls in people aged 75 and over with severe visual impairments: the VIP trial</p> <p><b>Campbell et al. (2005) UK</b></p>	<p>To assess the efficacy and cost effectiveness of a home safety program and a home exercise program to reduce falls and injuries in older people with low vision. N = 391</p>	<p>The home safety program reduced falls and was more cost effective than an exercise program in this group of elderly people with poor vision. However, they felt that different elderly population require specifically selected program, so this is not the be all and end all.</p>
<p>Quality indicators for falls and mobility problems in vulnerable elders</p> <p><b>Chang (2007) USA</b></p>	<p>182 articles considered to assess the risk of falls.</p>	<p>They identified significant fall risk – including vision and the type of studies which included a visual assessment as their protocol.</p>

<p>Content comparison of health-related quality of life (HRQOL) instruments based on the international classification of functioning, disability, and health</p> <p><b>Ciezaet</b> al (2005) Germany</p>	<p>To examine the relationship between the most frequently used short HRQOL instruments and the ICF.</p>	<p>In the 148 items of the 6 instruments a total of 226 concepts were identifies and linked to the ICF. Therefore the ICF proves to be highly useful for the comparison of HRQOL instruments. With few exceptions, the content of the HRWOL instruments was represented but the ICF categories and therefore the ICF can service as the common framework when comparing HRQOL instruments.</p>
<p>Wheelchair use among community-dwelling older adults: prevalence and risk factors in a national sample</p> <p><b>Clarke</b> et al. (2005) Canada</p>	<p>To identify the factors associated with wheelchair use in older adults (over 65) in a national sample of Canadians. N = 5395, from the CSHA study.</p>	<p>The characteristics they found which were associated with an increased probability of use (which helps to identify those in need as well as potential barriers to use) include <b>multiple chronic health conditions</b>, difficulty performing daily activities, and being unmarried increased the risk of wheelchair use later in life.</p>
<p>Binocular visual-field loss increases the risk of future falls in older white women</p> <p><b>Coleman</b> et al. (2007) UK</p>	<p>To examine the relationship between binocular visual field loss and the risk of incident frequent falls in older white women.</p>	<p>Of 4071 women, 409 had severe VF loss and 643 had frequent falls. Therefore VF might be an indicator for prevention of falls.</p>
<p>Higher risk of multiple falls among elderly women who lose visual acuity</p> <p><b>Coleman</b> et al. (2004) USA</p>	<p>2002 participants were recruited for a 5 year follow up all were women. To determine the association between changes in VA and frequent falls in older women.</p>	<p>A change in VA over 5 years is an important risk factor for frequent falls. Therefore older individuals should be referred to eye care providers not only when there is loss of VA but also when the VA can be improved.</p>
<p>Causes and prevalence of visual impairment among adults in the US</p> <p><b>Condon, The eye diseases prevalence research group</b> (2004) USA</p>	<p>The estimate the cause-specific prevalence and distribution of blindness and low vision in the US and to estimate the prevalence figures over the next 20 years.</p>	<p>ARMD is leading cause...increase by approx 70% by 2020</p>

<p>Important causes of visual impairment in the world today</p> <p><b>Congdon et al. (2003)</b> USA</p>	<p>To give an overview of the causes of blindness in the world.</p>	<p>Covers refractive error, age-related causes of blindness, infectious causes of blindness, nutritional and metabolic causes of blindness, and trauma.</p>
<p>A bird can't fly on one wing: patient views on waiting for hip and knee replacement surgery</p> <p><b>Conner-Spady et al (2007)</b> Canada</p>	<p>To obtain patient's perspectives on acceptable waiting times for hip or knee replacement surgery</p>	<p>303 participants responded to open ended and closed ended questions pertaining to their thoughts on acceptable wait time for surgery. As well they were able to express additional thoughts regards their surgery. Patient views on waiting times are not only related to quality of life issues, but also to prior expectations and notions of fairness and priority.</p>
<p>Optometric and ophthalmic contact in elderly hip fracture patients with visual impairment</p> <p><b>Cox et al. (2005)</b> USA</p>	<p>To describe previous contact with optometry and ophthalmic services in a group of elderly patients with and without visual impairment who had fallen and sustained a fractured hip. N = 537</p>	<p>This study shows poor optometric contact in a group of elderly patients with VI who had fallen and fractured their hip. They seem to be aware of their visual defects but are not able to access the optometric services requires.</p>
<p>Improving vision to prevent falls in frail older people: a randomized trial</p> <p><b>Cumming et al. (2007)</b> Australia</p>	<p>To determine the efficacy of vision and eye examinations, with subsequent treatment of vision problems, for preventing falls and fractures in frail older people.</p>	<p>Vision and eye testing did not lead to reduced risk of falls. There are several possibilities – chance or bias, change in prescription, change in behavior with improved vision, frailty etc. Therefore no conclusive conclusions can be made from this study at this time.</p>
<p>Changes in the quality of life in severely disabled people following provision of powered indoor/outdoor chairs</p> <p><b>Davies et al. (2003)</b> UK</p>	<p>To determine the benefits for patients who received an EPIOC and to quantify their perceived change to their quality of life n =72</p>	<p>They used the EQ-5D and found it may have limited value in detecting change in the perceived quality of life of such severely disabled persons. However they report EPIOC significantly improves perception of reduced pain, discomfort, improved levels of mobility and perceived quality of life, even though the chair did not significantly alter their perceived health state.</p>

<p>Different aspects of visual impairment as risk factors for falls and fractures in older men and women</p> <p><b>De Boer et al (2004) UK</b></p>	<p>To examine whether impairments in near contrast sensitivity and other aspects of vision are associate with falls and fractures within the same cohort of people.</p>	<p>Showed that people with poor visual contrast sensitivity had a 1.5fold-increase in the relative risk of recurrent falling.</p>
<p>Unmet need for personal assistance with activities of daily living among older adults</p> <p><b>Desai et al. (2001) USA</b></p>	<p>This study examined the prevalence, correlates and negative consequences of unmet need for persona assistance with ADL among older adults.</p>	<p>20.7% who needed help with at least 1 adl reported receiving inadequate care. I don't know I agree with their categories, but good to know.</p>
<p>The effect of wheelchair use on the quality of life of person with multiple sclerosis</p> <p><b>Devitt et al (2003) Canada</b></p>	<p>To explore the impact of wheelchair use on the quality of life of persons with MS using the PIADS. To examine the clinical utility of the PIADS. 13 adults with MS from a continuing care hospital.</p>	<p>Competence 1.54, adaptability 1.64, and self-esteem 1.06. Therefore the PIADS demonstrates that wheelchairs appear to have a positive impact on the perceived quality of life of persons with MS. Incorporation the PIADS into the assessment process would enhance client-centered practice by increasing the focus on the important quality of life outcomes in addition to traditional performance component outcomes.</p>
<p>Correlates of life satisfaction among person with spinal cord injury</p> <p><b>Dijkers (1999) USA</b></p>	<p>To analyze the correlates of life satisfaction for individuals with spinal cord injury. 2183 persons with SCI were selected for annual research follow up. They used the FIM measure which is a measure of disability.</p>	<p>Life satisfaction after SCI can be reliably measured y means of the SWLS.</p>
<p>Standards for wheelchair prescription</p> <p><b>Di Marco (2003) Australia</b></p>	<p>Investigate the prescription of wheelchairs</p>	<p>This paper had an excellent literature review and introduction including: wheelchair dependence, the challenge of wheelchair prescription, outcomes of wheelchair prescription (abandonment, satisfaction, posture and comfort), and factors influencing wheelchair prescription outcomes. Their results of interviews resulted in listing of goals and objects of wheelchair prescription, clinical guidelines, and wheel chair user participation.</p>

<p>Low vision: assessment and training for mobility</p> <p><b>Dodds (1987)</b> Great Britain</p>	<p>To develop visual tasks this might be predictors of mobility performance.</p>	<p>Textural shearing, degraded images, embedded figures, parfoveal attention were all elements they described.</p>
<p>The effect of electrically powered indoor outdoor wheelchairs on occupation: a study of users' views.</p> <p><b>Evans (2000)</b> England</p>	<p>To evidence that EPIOC (electrically powered indoor/outdoor wheelchairs) are effective and therefore funding from the government should continue in England.</p>	<p>From the 8 participants who were interviewed, EPIOCs did have a positive impact on patients' occupation. There may also be a positive impact on users' health.</p>
<p>The Future of Disability in America</p> <p><b>Field, Jette, IOM (2007)</b> USA</p>		<p>The importance of the incorporation of the ICF into their model. The use of assistive devices. Follow up from disability in America.</p>
<p>Trends in the use of assistive technology and personal care for late-life disability, 1992 -2001</p> <p><b>Freedman (2005)</b> USA</p>	<p>Description of national trends during the 1990s in difficulty and forms of assistance with self-care activities in late life. Sample from the Medicare Current Beneficiary Survey, N = 128 568</p>	<p>Their findings indicate there has been a decline in the number of people over 65 who were reliant on help from others. This is significant considering the growth of the population. The decline is attributable to assistive devices (which accounted for about half of the observed decline).</p>
<p>Association of comorbidity with disability in older women: the women's health and ageing study</p> <p><b>Fried et al (1999)</b> USA</p>	<p>Explores the associations between multiple disease pairs and different types of physical disability, with the objective of hypothesis development regarding the importance of disease interactions.</p>	<p>They found that there was an association between several conditions (i.e. Vision and arthritis).</p>
<p>Falls and health status in elderly women following second eye cataract surgery: a randomized controlled trial</p> <p><b>Foss et al. (2006)</b> UK</p>	<p>To see if second eye cataract surgery reduces the risk of falling and to measure associated health gains for 239 participants</p>	<p>They found that second cataract surgery is associated with gains in visual function and confidence about falling and with reduced visual disability and handicap because it had improvement in VA and contrast sensitivity</p>
<p>Will my patient fall</p> <p><b>Ganz (2007)</b> USA</p>	<p>To id the prognostic value of risk factors for future falls among older patients</p>	<p>Screening for risk of falling during the clinical exam starts with asking if the patients has fallen in the past year.</p>

<p>Interventions for preventing falls in elderly people</p> <p><b>Gillespie</b> (2007) USA</p>	<p>A large review of potential interventions for preventing falls.</p>	<p>They found several suggestions (exercise, nutrition etc). Related to vision they used the study by Day 2002 to demonstrate that a combo of visual correction, exercise and, home safety intervention created significant decrease in fall risk</p>
<p>Emerging concerns of older stroke patients about assistive device use</p> <p><b>Gitlin</b> et al (1998) USA</p>	<p>To examine the early interpretations of devices by one group of elderly y patients, those in rehabilitation following stroke.</p>	<p>Not much that I need</p>
<p>Assessing visual detection ability for mobility in individuals with low vision</p> <p><b>Goodrich</b> et al. (2003) USA</p>	<p>To investigate the mobility performance of legally blind patients with ARM as assessed by their ability to visually detect hazards in their travel path. 60 subjects recruited and tested with three types of hazards and three day light.</p>	<p>ARM patients have a greater risk of fall related injury, substantial difference between the types of hazards in the degree of risk they pose to ARM travelers, their ability to improve can be predicted from the assessment and that most subjects can improve their ability to visually detect obstacles if provided appropriate training and filters.</p>
<p>The International classification of functioning as an explanatory model of health after distal radius fracture: a cohort study</p> <p><b>Harris</b> et al. (2005) Canada</p>	<p>To identify health impacts in body structure/function, activity, and participation at baseline and follow-up, to determine whether they support the ICF model of health. N = 790 participants who were followed up 1 week, 3 months, 1 year post radial fractures.</p>	<p>They completed instruments pertaining to wrist fracture as well as the sf 36. Their results demonstrated that the ICF framework is supported when evaluating the impact of distal radius fracture on health as measured by the SF-36.</p>
<p>Older adults and assistive devices: use, multiple device use, and need</p> <p><b>Hartke</b> et al (1998) USA</p>	<p>Description of older device users in the community as well as to differentiate multiple-device users and those with unmet need for devices</p>	<p>About 23% of older adults in the community are using some type of ad. Mobility devices represent the greatest single type of device users and about 8% are using multiple devices.</p>
<p>Falls and health status in elderly women following first eye cataract surgery: a randomized controlled trail</p> <p><b>Harwood</b> et al. (2007) UK</p>	<p>Similar to the study written by Foss... this looks at the risk of falls following first cataract surgery.</p>	<p>First eye cataract surgery reduces the rate of falls and risk of fractures and improves visual function and general health status.</p>



<p>Falls in older people: effects of age and blurring vision on the dynamics of stepping</p> <p><b>Heasley et al (2005) UK</b></p>	<p>Similar to the Buckley article previous... this study investigates the effects of blurred vision on stepping by investigating the role of age.</p>	<p>Older subject used a more cautious and controlled stepping strategy</p>
<p>Screening for visual impairment in older people: validation of the Cardiff Acuity Test</p> <p><b>Johansen et al. (2003) UK</b></p>	<p>To examine the use of a simple alternative approach that is quicker, and more practical to assess visual impairment in dysphasic, deaf, or confuse patients</p>	<p>The CAT is reliable and valid for frail, elderly or confused patients and can be used for significant visual loss and therefore to help prevent falls.</p>
<p>Unmet and undermet need for activities of daily living and instrumental activities of daily living assistance among adults with disabilities: estimates from the 1994 and 1995 disability follow-back surveys</p> <p><b>Kennedy (2001) USA</b></p>	<p>To more fully delineate the type and magnitude of disability assistance needs access the US population</p>	<p>A relatively high rate of unmet and under met need for disability assistance in the generation population.</p>
<p>Performance-based and self-assessed measures of visual function as related to history of falls, hip fractures, and measured gait time</p> <p><b>Klein et al. (1997) USA – Beaver Dam</b></p>	<p>To report the relationships between visual function parameters and falls, hip fractures, and gain time in adults.</p>	<p>229 of the 2722 patients reported falling, 72 had hip fractures. Therefore visual function is related to falls, gait, and hip fracture.</p>
<p>Environmental variables and mobility performance in adults with low vision</p> <p><b>Kuyk et al. (1996) USA</b></p>	<p>The effects of changing light level on mobility performance were examined in a heterogeneous population of visually impaired adult. N= 88</p>	<p>Light level, object contrast, and object type influence mobility performance. Performance varies depending on the type of vision loss. People with peripheral field restriction have greater difficulty with mobility than individuals with just an acuity loss.</p>
<p>Visual correlates of mobility in real world settings in older adults with low vision</p> <p><b>Kuyk et al. (1998) USA</b></p>	<p>Similar to article above...effects of reduce light interferes with visual mobility</p>	

<p>Reducing hazard related falls in people 75 years and older with significant visual impairment: how did a successful program work?</p> <p><b>La Grow et al. (2007)</b> Australia</p>	<p>This RCT investigated two programs in order to decrease the risk of falls. The first being an in home visit from an OT and the second being an exercise program.</p>	<p>Their results concluded that the home safety assessment and modification program tested was effective in preventing falls because removal of objects, training with the OT, and discussion with the OT helps.</p>
<p>Visual functioning questionnaire: reevaluation of psychometric properties for a group of working-age adults</p> <p><b>Langelaan et al. (2007)</b> Netherlands</p>	<p>The objectives of this study were first to obtain the factor structure of the VFQ 25 and second to obtain internal scales by Rasch analysis. 129 visually impaired adults mean age of 42 were to take the test.</p>	<p>They first subject the items of the VFQ to exploratory factor analysis with proximate rotation and then performed a separate rasch analysis on each factor. The factor analysis indicated four factors and this structure of the VFQ largely confirms the structure of the questionnaire. The results of this study suggest that modifications of the original VFQ structure are necessary.</p>
<p>Comparison of balance in older people with and without visual impairment</p> <p><b>Lee et al. (2003)</b> Hong Kong</p>	<p>A cross-sectional study was used to compare the balance ability of older people with and with visual impairment.</p>	<p>Balance was shown to be more impaired with greater visual impairment, which could result in falls and resultant injury.</p>
<p>Older persons and community travel: the effect of visual impairment</p> <p><b>Long et al (1996)</b> USA</p>	<p>The results of a study that compared the community travel habits and perceptions of older person with visual impairments to those of older person without visual impairment. N=32 visually impaired, 28 sighted</p>	<p>From their lit review they found visual impairment is associated with reduced ability to shop for groceries, climb stairs, and walk outside of the house. Increasing age is associated with greater dissatisfaction with travel ability. Their study reported visually impaired participants reported that they traveled infrequently by themselves in their communities, there were relatively dissatisfied with their ability to travel.</p>
<p>The effect of an individualized fall prevention program on fall risk and falls in older people: a randomized control trial</p> <p><b>Lord et al. (2005)</b> Australia</p>	<p>To determine whether an individualized fall prevention program comprising exercise, visual and counseling interventions can reduce physiological falls risk and falls in older people.</p>	<p>It was found that the interventions were effective in improving some measures of vision and strength and reducing small changes in PPA falls risk scores.</p>

<p>Visual risk factors for falls in older people</p> <p><b>Lord et al (2001)</b> Australia</p>	<p>To determine the tests most predictive of falls in community living adults from a range of visual screen tests.</p>	<p>The studying finds that impaired vision is important and independent risk factors for falls. Adequate depth perception and distant-edge-contrast sensitivity in particular appear to be important for maintaining balance and detecting environment risk factors.</p>
<p>The prevalence of low vision and blindness in Canada</p> <p><b>Maberley et al. (2006)</b> Canada</p>	<p>To ascertain the prevalence and primary causes of visual impairment in a representative Canadian population. 85 000 persons located in Prince George (BC) were sampled from all ophthalmic charts in the community in 2003. The proportion of Prince George's prevalence of visual impairment was determined by standardized to the Canadian population using the 2001 Census data. 962 subset were eligible for inclusion.</p>	<p>This is the first paper to estimate the prevalence of visual disability in Canada using accurate diagnostic and visual acuity data. Approx. 1% of the population was noted to have a visual impairment. Low vision was estimated to be three times as common as blindness.</p>
<p>Visual factors and orientation-mobility performance</p> <p><b>Marron et al (1981)</b> USA</p>	<p>To examine the quantitative relation between three visual function – visual field, spatial contrast sensitivity and visual acuity and O&amp;M</p>	<p>The most important aspect of the test visual skills influencing O&amp;M performance is the combined effect the log% visual field and the log peak contrast sensitivity.</p>
<p>The activity inventory: an adaptive visual function questionnaire</p> <p><b>Massof et al. (2007)</b> USA</p>	<p>To test the hypothesis that all combinations of items in the AI, and by extension all visual function questionnaires, measure the same visual ability variable. 1880 low vision patients before their first visit to the low vision services, 407 were selected to have a second test with the NEI VFQ, ADVS, VF 14, VAQ.</p>	<p>Visual abilities are a composite variable with two factors; one most heavily influences reading function and the other most heavily influences mobility function. Subsets of items within the AI and different questionnaires all measure the same visual ability variable. In clinical practice the AI can be helpful to the clinician in addressing goal-oriented components of the rehab plan. The AI can serve as a tool to plan rehab, evaluate patient progress, and measure outcomes.</p>
<p>An examination of the orientation and mobility and quality of life issues for older person with low vision</p> <p><b>McLean (1999)</b> Canada</p>	<p>Thesis</p>	<p>Provides definition of OM, role of vision and low vision in OM, theory in rehab, and OM rehab model for vision</p>

<p>Barriers, facilitators, and access for wheelchair users: substantive and methodologic lessons from a pilot study of environmental effects</p> <p><b>Meyes et al (2002) USA</b></p>	<p>A pilot study to measure chronic wheelchair users experiences of reaching and failing to reach specific destinations and to examine the experience of these</p>	<p>Results indicated that social participation by wheelchair users should focus not only on the built environ but also that interventions in personal assistance and at, and other program. Referenced that ICIDH</p>
<p>Lifestyle implications of power mobility</p> <p><b>Miles-tapping et al. (1994) Canada</b></p>	<p>Interviewed electric wheelchair and scooter users residing in Winnipeg to understand the impact of power mobility on quality of life for seniors and younger people with disabilities. N = 11</p>	<p>They did interviews with the theory of symbolic interactionism as their theoretical background. They also based their framework on the ICIDH. There were several themes which emerged from the interview: deciding on power mobility and obtaining it, initial experiences, others' reactions, and longer effect, and paid work. Overall perspective is that power mobility is a help or even a necessity to put people with disabilities to work.</p>
<p>Outdoor mobility and social relationship of elderly people</p> <p><b>Mollenkopf et al (1997) Germany</b></p>	<p>Initial findings of a project which investigates the mobility needs of the elderly and the aiming factors hindering their desired mobility in three European countries.</p>	<p>There is a clear connection between the social situation of older persons and specific mobility patterns. Most of them felt that they wanted to participate in more activities but could not because of mobility issues. And by mobility they were talking about any means of getting out of the house, this includes by foot, car, or assistive device</p>
<p>Measuring wheelchair intervention outcomes: development of the wheelchair outcome measure</p> <p><b>Mortenson et al (2007) Canada</b></p>	<p>The creation of the Wheelchair Outcome Measure (WhOM)</p>	<p>Based on the ICF. It will elicit goal-oriented interventions, give clients a mechanism to present feedback, and provide clinics with a method to quantify outcomes of their intervention that are individually meaningful to each client. It will help justify prescription of wheelchair systems.</p>

<p>Perceptions of power mobility use and safety within residential facilities</p> <p><b>Mortenson et al ( 2005)</b> Canada</p>	<p>To explore perceptions of power mobility and power mobility safety. Recruited from Vancouver Coastal health (VCH) n = 19</p>	<p>Qualitative analysis revealed four main themes: the meaning of power mobility, learning the rules of the road, red flags, and solutions. There was indication that power mobility could enhance QOL but be a source of discrimination and frustration. Those who should be considered for power mobility should have certain intellectual faculties, such as the ability to learn and respond appropriately and second they need physical capacities such as <b>adequate vision</b> and reliable motor function. There were concerns about danger to others, dangers to self, and concern about property. Solution was to include additional mobility training, re program their chairs, and as a last resort to remove chair.</p>
<p>Clinical practice guideline for the assessment and prevention of falls in older people</p> <p><b>National Institute for Clinical Excellence (NICE) (2004)</b> UK</p>	<p>Overview of fall rehabilitation</p>	<p>Found the risk of falls to be caused by several features, the top three being past history, mobility impairment, and visual impairment (pg 19). There are a lot of studies summarized here which go over many types of interventions and other use material. One was rehabilitation.</p>
<p>Factors which influence the use of low vision aids</p> <p><b>Palmer (2005)</b> UK</p>	<p>To explain the reasons as to why people need low vision aids</p>	<p>Reading was a major use of needing devices, how long people use devices for, what sort of information is relevant to this etc.</p>
<p>The Development, Assessment, and Selection of Questionnaires</p> <p><b>Pesudovs et al. (2007)</b> USA</p>	<p>Summary of how previously developed instruments are best assessed using a systematic process and we propose a system of quality assessment so that clinician and researchers can determine whether there exists an appropriately developed and validated instrument that matches their particular needs.</p>	<p>They evaluated four QOL instruments: The PIADS, the refractive status vision profile (RSVP), National eye institute refractive quality of life, and quality of life impact of refractive correction. In terms of the PIADS, it turns out pretty good</p>

<p>The effect of an outdoor powered wheelchair on activity and participation in users with stroke</p> <p><b>Pettersson et al. (2006)</b> Sweden</p>	<p>The purpose here is to describe and compare activity limitations and participation restrictions in person with stroke from their own perspective, before and after using an outdoor powered wheelchair. N = 32. Used the IPPA and the WHODAS II</p>	<p>They used the ICF as their conceptual framework. Pre assessment data was collected followed by an assessment 3-5 months post wheelchair adoption. The main finding was that the participants regarded their activity and participation problems as having been to a great extent decreased or solved at follow-up as compared with baseline.</p>
<p>Use of the Canadian occupational performance measure in vision technology</p> <p><b>Petty et al. (2005)</b> Canada</p>	<p>To see if the COPM can be used for low vision assistive technology.</p>	<p>There conclusion what that the COPM is an effective tool for low vision aid selection.</p>
<p>Occupational therapy and vision loss: assistive technology for older adults</p> <p><b>Petty et al ( 2007)</b> Canada</p>	<p>Mainly to investigate if OT's are able to effectively prescribe CCTVs</p>	<p>They concluded that they are able to prescribe them</p>
<p>The importance of individualized wheelchair seating for frail older adults</p> <p><b>Rader et al (2000)</b> USA</p>	<p>Examines overlooked area of assessment of older adults specifically indicators of need for a seating assessment, the benefits of proper seating, guidance related to reimbursement for needed equipment, working together.</p>	<p>Better seating is related to improved quality of life.</p>
<p>Impact of wheeled seated mobility devices on adult users' and their caregivers' occupational performance: a critical literature review</p> <p><b>Reid et al (2002)</b> Canada</p>	<p>A critical review to examine the body of knowledge concerning the impact and effectiveness of the provision of wheeled seated mobility on the occupational performance of wheelchair users and their caregivers.</p>	<p>Specific to seated and manual mobility devices. Need for improvement in three areas: research quality (there is a lack of clear theoretical basis, lack of reporting reliable and valid outcomes measures, and an inability to demonstrate impact from an effectiveness perspective), research context (should consider caregivers, integration of qualitative and quantitative) , and research focus (need to address how various factors interact and lead to successful outcomes).</p>

<p>The relationship of visual and hearing impairments to disability: an analysis using the longitudinal study of aging</p> <p><b>Rudberg et al (1993)</b> USA</p>	<p>To investigate if people with hearing and vision impairment are at risk for increased disability in basic ADLs compared to people without</p>	<p>Persons with vision impairment were more likely to have increased disability. People with hearing impairments were not related to increase adl disability.</p>
<p>Visual impairment in an aged care ward</p> <p><b>Rush (2007)</b> Australia</p>	<p>To assess the prevalence and causes of visual impairment in an age care ward.</p>	<p>The top three were cataract, refractory error and ARMD.</p>
<p>Measuring subjective quality of life following SCI: a validation study of the assistive technology device predisposition assessment</p> <p><b>Scherer et al. (2001)</b> USA</p>	<p>To assess whether or not a subset of items in the ATD PA would be a good measure of subjective QOL for person with new SCI. N = 22</p>	<p>With the MPT model as their conceptual framework, they found that high positive correlations were found between the QOL subset and the SWLS and both correlated negatively with the depression subscale of the BSI.</p>
<p>Response Shift Theory: important implications for measuring quality of life in people with disability</p> <p><b>Schwartz et al (2007)</b> USA</p>	<p>This article was to inform us how to attend to appraisal processes and response shift theory can inform development of HRQOL measures for people with disability that do not confound function and health and that consider important causal indicators such as environment. This article presents theoretical and conceptual distinctions building on response shift theory and other current developments in HRQOL research.</p>	<p>Their theory is based around the ICF model. It is important to understand response shift, how response shift can affect standard psychometric indices and what possible solutions couple integrate response shift theory into health and HRQOL measurement in research with person with disabilities. Suggestions for research:</p> <ol style="list-style-type: none"> <li>1) measure of HRQOL needs to include stapes that eliminate the inclusion of functional items indeed to measure health</li> <li>2) incorporate assessing response shift during the test construction process using the Rapkin Appraisal Profile</li> <li>3) Longitudinal research be implemented that compares groups of people with various function impairment as well as people with no functional impairment</li> </ol>

<p>Longitudinal analysis of the relationship between regular eye examinations and changes in visual and functional status</p> <p><b>Sloan</b> (2005) UK</p>	<p>To determine whether regular eye examinations are associated with a greater or lesser rate of loss of ability to read newsprint onset of blindness or low vision.</p>	<p>Additional years with eye examinations are related to better visual health and vision-related functioning, both in reducing decline in vision and in improving functional status, especially in IADLS.</p>
<p>A wheelchair society: the nursing home scene</p> <p><b>Smithers</b> (1990) USA</p>	<p>The range of interpretive structures used by staff and residents in assigning meanings to patterns of wheelchair use in a 180 bed nursing home.</p>	<p>Wheelchairs increased the abilities of staff to manage and control a large, diverse resident population. Wheelchairs extended the mobility status of residents with significant consequence for environmental control and wellbeing. Give the perspective of staff and the perspective of residents of their wheelchair. Wheelchair becomes an extension of the physical self, thereby enabling a greater degree of control over social and physical space.</p>
<p>Does mobility performance of visually impaired adults improve immediately after orientation and mobility training?</p> <p><b>Soong</b> et al (2001) Australia</p>	<p>With the inclusion of a control group of subjects, this study investigated the effect of orientation and mobility training on mobility performance of a group of visually impaired adults. N =19 with OM, 18 w/o OM</p>	<p>There was no improvement in mobility performance for a group of visually impaired subjects immediately after OM training compared with a control group. They used several other studies to confirm these results. However, they suggest further research is needed to assess self reported mobility performance and mental effort needs to be considered. Also, to look at the longitudinal impact of mobility performance.</p>
<p>Use of biopticamorphic lenses to expand the visual field in patients with peripheral loss</p> <p><b>Szlyket</b> et al. (1998) USA</p>	<p>To test the effectiveness of a bioptic form of a peripheral vision enhancement lens in patients with RP, choroideremia, and Usher's syndrome. N = 15</p>	<p>Patients with peripheral vision loss may benefit from a rehab program which combines low vision training with amorphic lenses in a bioptic configuration.</p>
<p>Orientation and mobility training for adults with low vision (review)</p> <p><b>Virgili</b> et al (2007)</p>	<p>To assess the effects of (O&amp;M) training with or with associated devices for adults with low vision.</p>	<p>The review found two small trials with similar methods, comparison O &amp; M training to physical exercise. They concluded there is little evidence on which type of O &amp; M training is better for people with low vision who have specific characteristics and needs.</p>



<p>How does visual impairment affect performance on tasks of everyday life</p> <p><b>West</b> et al (2002) USA</p>	<p>To determine the association between performance on selected tasks of everyday life and impairment in visual acuity and contrast sensitivity N = 2520 from 65 – 84 years (SEE project)</p>	<p>Both contrast sensitivity and visual acuity loss contribute independently to deficits in performance on everyday tasks. Specifically for mobility, significant changes were found for a 4 m walk and chair stand for both visual and contrast sensitivity.</p>
<p>The combined effect of visual impairment and cognitive impairment on disability in older people</p> <p><b>Whitson</b> et al. (2007) USA</p>	<p>To determine the risk of disability in individuals with coexisting visual and cognitive impairment. 162 community dwelling person aged 65 and older living in five counties in north Carolina. Cognitive impairment was measured with the SPMSQ and visual impairment was assessed according to self-report.</p>	<p>Participants with coexisting visual and cognitive impairment were at greater risk of IADL disability. Statistics used were logistic regression model.</p>
<p>Measuring of quality of life</p> <p><b>WHOQOL</b> (1997) USA</p>	<p>Development of WHOQOL</p>	<p>The necessity of QOL in the assessments of older adults</p>
<p>Association of back pain frequency with mortality, coronary heart events, mobility, and quality of life in elderly women</p> <p><b>Zhu</b> et al (2007) Australia</p>	<p>Cohort design data from a RCT of calcium intervention. To describe the epidemiology of back pain and determine the association of back pain frequency. 1484 elderly women 70-85 years of age who participated in the calcium intake fracture study.</p>	<p>Frequent back pain is serious health problem in elderly women, which leads to reduced quality of life and mobility but is associated with increased risk of mortality and coronary heart events.</p>

## Appendix B: CISS-Access to the RDC Program Approval Letter



SSHRC  CRSH

350 Albert Street, P.O. Box 1610  
Ottawa ON K1P 6G4  
www.sshrc.ca

350, rue Albert, C.P. 1610  
Ottawa ON K1P 6G4  
www.crsh.ca

September 14, 2009

Ms. Jessica G. Huber

**FILE: CISS-RDC-HUBER/ 401841**

Dear Ms. Huber:

Thank you for submitting an application to the *CISS-Access to the RDC Program*, a joint initiative between Statistics Canada, the Social Sciences and Humanities Research Council and the Canadian Institutes of Health Research. The RDC-Access Granting Committee has now completed the review of your proposal and has approved it. We will now notify Statistics Canada so that it can do the required security check.

We also ask that you contact the RDC analyst and make an appointment to begin the administrative processes to gain access to the centre. Your centre can be found at the following website:  
<http://www.statcan.ca/english/rdc/network.htm>.

You have 1 year from the date of approval of your proposal in order to initiate access to the RDC. If you are unable to commence your research projects within the first 12 months after your project has been approved for RDC access, please contact the RDC analyst to make special arrangements.

If you have not contacted your RDC analyst within the first 12 months after your proposal has been approved, you will need to re-apply to SSHRC in order to re-gain access to the RDC. The reviews of the applications were based on SSHRC peer review procedures. Each proposal was evaluated on the basis of four main criteria: scientific merit and viability of the proposed research; the viability of the methods to be applied given the data on which the analysis will be performed; a demonstrated need for access to detailed micro data; and, the expertise and ability of the researchers to carry out the work.

You will find enclosed an evaluation submitted to SSHRC. Should you have further questions, please feel free to contact the officer responsible for the administration of the *CISS-Access to the RDC Program*,

Sincerely,

Murielle Gagnon  
Director  
Strategic Programs and Joint Initiatives

cc: Beverley Hunt, Research Data Centres Headquarters Operations  
Encl.



Social Sciences and Humanities  
Research Council of Canada

Conseil de recherches en  
sciences humaines du Canada

Canada

## Appendix C: Western Ethics Board for Health Sciences Research Involving Human Subjects Approval Letter



### Office of Research Ethics

The University of Western Ontario  
Room 5150 Support Services Building, London, ON, Canada N6A 3K7  
Telephone: (519) 661-3036 Fax: (519) 850-2466 Email: ethics@uwo.ca  
Website: www.uwo.ca/research/ethics

### Use of Human Subjects - Ethics Approval Notice

**Principal Investigator:** Dr. B. Chesworth

**Review Number:** 17622E

**Review Date:** November 24, 2010

**Protocol Title:** A profile of Canadians 65 years and older living with coexisting vision and mobility impairments

**Department and Institution:** Faculty of Health Sciences, University of Western Ontario

**Sponsor:** None

**Ethics Approval Date:** January 11, 2011

**Review Level:** Expedited

**Approved Local # of Participants:** 10

**Expiry Date:** April 30, 2011

**Documents Reviewed and Approved:** UWO Protocol. Letter of Information and Consent.

#### Documents Received for Information:

This is to notify you that The University of Western Ontario Research Ethics Board for Health Sciences Research Involving Human Subjects (HSREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the Health Canada/CH Good Clinical Practice Practices: Consolidated Guidelines; and the applicable laws and regulations of Ontario has reviewed and granted approval to the above referenced study on the approval date noted above. The membership of this REB also complies with the membership requirements for REB's as defined in Division 5 of the Food and Drug Regulations.

The ethics approval for this study shall remain valid until the expiry date noted above assuming timely and acceptable responses to the HSREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the UWO Updated Approval Request Form.

During the course of the research, no deviations from, or changes to, the protocol or consent form may be initiated without prior written approval from the HSREB except when necessary to eliminate immediate hazards to the subject or when the change(s) involve only logistical or administrative aspects of the study (e.g. change of monitor, telephone number). Expedited review of minor change(s) in ongoing studies will be considered. Subjects must receive a copy of the signed information/consent documentation.

Investigators must promptly also report to the HSREB:

- a) changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
- b) all adverse and unexpected experiences or events that are both serious and unexpected;
- c) new information that may adversely affect the safety of the subjects or the conduct of the study.

If these changes/adverse events require a change to the information/consent documentation, and/or recruitment advertisement, the newly revised information/consent documentation, and/or advertisement, must be submitted to this office for approval.

Members of the HSREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the HSREB.

Chair of HSREB: Dr. Joseph Gilbert  
FDA Ref. #: IRB 0000940

Ethics Officer to Contact for Further Information		
<input type="checkbox"/> Janice Sutherland	<input type="checkbox"/> Elizabeth Wambolt	<input checked="" type="checkbox"/> Grace Kelly

*This is an official document. Please retain the original in your files.*

cc: ORE File

## Appendix D: Waterloo Ethics Board for Health Sciences Research Involving Human Subjects Approval Letter

Ethics Clearance (ORE # 17041)

Date: 03/05/11 09:08 AM  
From: ORE Ethics Application System  
Reply-To:  
Sender:

Dear Researcher:

The recommended revisions/additional information requested in the ethics review of your ORE application:

Title: A profile of Canadians 65 years and older living with co-existing vision and mobility impairments

ORE #: 17041

Principal/Co-Investigator: Dr. Graham Strong

Faculty Supervisor: Dr. Jan Polgar

Faculty Supervisor: Dr. Bert Chesworth

Student Investigator: Jessica Huber

have been reviewed and are considered acceptable. As a result, your application now has received full ethics clearance.

A signed copy of the Notification of Full Ethics Clearance will be sent to the Principal Investigator or Faculty Supervisor in the case of student research.

\*\*\*\*\*

Note 1: This clearance is valid for five years from the date shown on the certificate and a new application must be submitted for on-going projects continuing beyond five years.

Note 2: This project must be conducted according to the application description and revised materials for which ethics clearance have been granted. All subsequent modifications to the protocol must receive prior ethics clearance through our office and must not begin until notification has been received.

Note 3: Researchers must submit a Progress Report on Continuing Human Research Projects (ORE Form 105) annually for all ongoing research projects. In addition, researchers must submit a Form 105 at the conclusion of the project if it continues for less than a year.

Note 4: Any events related to the procedures used that adversely affect participants must be reported immediately to the ORE using ORE Form 106.

Best wishes for success with this study.

Susan E. Sykes, Ph.D., C. Psych.  
Director, Office of Research Ethics

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## **Appendix E: Letter of Information**

A profile of Canadians 65 years and older living with coexisting vision and mobility impairments

### **Introduction and Background:**

We (Jessica Huber, Janice Polgar, and Bert Chesworth) are researchers at the Faculty of Health Sciences at the University of Western Ontario (UWO) and we, along with Graham Strong from the University of Waterloo's School of Optometry, invite you to participate in our study. This study is part of Jessica Huber's doctoral dissertation research study and is supervised by Drs. Janice Miller Polgar, Bert Chesworth, and Graham Strong. This research project is a collaboration between the University of Waterloo's School of Optometry and the University of Western Ontario's Health and Rehabilitation Sciences program.

We are conducting in-home interviews to explore how living with a vision and mobility impairment affects activities, assistive technology use, health care perception, and the individual's ability to participate in the community.

### **What does participation in this study involve? Where will this study take place?**

Participation will involve answering some questions about your background and to talk about your experiences living with both vision and mobility impairments.

The background information and the questions regarding your experiences living with both vision and mobility impairments will be completed by each participant through a 1-2 hour interview with a facilitator in your home. A sample interview question is: "What challenges do you have participating in activities in the community?"

With your agreement, each interview will be audio-recorded and later transcribed into a written format for further data analysis. The transcribed data will not contain any personal information that might identify you. If you do not wish to be audio-recorded, you should not participate in this study. Also, with your agreement, anonymous excerpts

from the interview will be used in Jessica Huber's thesis dissertation and future publications.

Once the study is completed, we may contact you by phone or email to ensure that our interpretations of the information collected from you are accurate. For example we may ask you to elaborate on a topic we talked about during the interview for further clarification. You do not have to agree to be re-contacted after you have participated in this study.

### **Who may participate in this study?**

We are interested in having up to 6-10 participants in this study. There are several eligibility criteria:

- 1) Participants with low vision and mobility impairment, as their primary disabling condition, will be included in this study. Participants with low vision will have less than normal vision, are not completely blind, and are best helped by primarily the use of vision enhancement devices such as magnifiers, illumination, closed-circuit televisions, and electronic on-screen magnifiers. Participants with mobility impairment include those who have difficulties with locomotion (e.g., walking) inside and/or outside of their homes and benefit from the use of wheelchairs, scooters, canes, walkers crutches, etc. for daily activities.
- 2) Participants must be 65 years of age or older, and have used one or more assistive technology for 6-18 months OR more than 3 years.
- 3) Each study participant must be able to participate in an in-home interview (1-2 hours). All interviews will be conducted in English.

### **Confidentiality and informed consent**

All the information collected will remain confidential. Your real name will not be used in any of the written or published works. Only individuals directly involved with this study (that is, the researchers identified above) will have access to any information that would reveal your identity. The information will be destroyed by confidential shredding 5 years

after publication. Data storage and security measures are in place. The recorded study, transcribed information and any identifying information will be kept in a locked filing cabinet in the research laboratory of Dr. Polgar, in the School of Occupational Therapy at the University of Western Ontario. The transcribed interview data and any identifying information will be maintained in separate, secure locations.

If you agree to participate, we will request that you sign the attached consent form once you have asked any questions you have about participating in this study. You will be given a copy of this letter once you have signed the consent form. If you would like a copy of the summary of results upon completion of the study, please indicate this to one of the study investigators. We will record your name and contact information on a page separate from other information we collect.

**Are there associated benefits or risks with participating in this study?**

Your participation in this study is completely voluntary. You may refuse to participate, refuse to answer any questions or withdraw from the study at any time without any negative impact on your relationship with the School of Optometry or the Low Vision Clinic or the University of Waterloo.

There are no known risks, harms or discomforts associated with participating in this study. Participants may experience emotional reactions during the study in the discussion of their impairments, disabilities, use of assistive technology, etc. If this were to occur we anticipate that these effects would be temporary.

**Remuneration**

Since the interview will be in home, there will be no cost to you aside from your time. It is expected that interviews will take 1.5 – 2 hours in length. You will be reimbursed with a \$10.00 gift certificate as a thank you for your time.

If you have any questions about the study, please do not hesitate to contact us at any of the numbers below. If you have any questions about subject rights please contact the

Office of Research Ethics at the University of Waterloo at (519) 888-4567 extension 36005.

I would like to assure you that this study has been reviewed and received ethics clearance through the Office of Research Ethics at the University of Waterloo (ORE #17041) and through the Office of Research Ethics at the University of Western Ontario (REB #17622E). However, the final decision about participation is yours. If you have any comments or concerns resulting from your participation in this study, please contact Dr. Susan Sykes.

Sincerely,

Jessica Huber,

*PhD Candidate*

*Co-chairs of thesis committee and principle ethics applicant*

Jan Miller Polgar, PhD, OT Reg (Ont.)  
School of Occupational Therapy,  
The University of Western Ontario

Dr. Bert Chesworth  
Associate Professor  
School of Physical Therapy,  
The University of Western Ontario

Dr. Graham Strong  
Associate Professor  
School of Optometry,  
The University of Waterloo



## **Appendix F: Participant Consent Form**

### **Study title: A profile of Canadians 65 years and older living with coexisting vision and mobility impairments**

#### **Consent Statement:**

I have read the information presented in the information letter about a study being conducted by Jessica Huber, Janice Miller Polgar, Bert Chesworth and Graham Strong of the School of Optometry at the University of Waterloo and the Health and Rehabilitation Sciences department at the University of Western Ontario. I have had the opportunity to ask any questions related to this study, to receive satisfactory answers to my questions, and any additional details I wanted.

I am aware that I have the option of allowing my interview to be audio recorded to ensure an accurate recording of my responses.

I am also aware that excerpts from the interview may be included in the thesis and/or publications to come from this research, with the understanding that the quotations will be anonymous.

I was informed that I may withdraw my consent at any time without penalty by advising the researcher.

This project has been reviewed by, and received ethics clearance through, the Office of Research Ethics at the University of Waterloo. I was informed that if I have any comments or concerns resulting from my participation in this study, I may contact the Director, Office of Research Ethics. This project has also been reviewed by, and received ethics clearance through, the Office of Research Ethics at the University of Western Ontario.

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

YES  NO

I agree to have my interview audio recorded.

YES  NO

I agree to the use of anonymous quotations in any thesis or publication that comes of this research.

YES  NO

Participant Name: \_\_\_\_\_ (Please print)

Participant Signature: \_\_\_\_\_

Witness Name: \_\_\_\_\_ (Please print)

Witness Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## **Appendix G: The Semi-Structured Interview Guide**

I wanted to thank you again for your willingness to participate in my research project. Your thoughts are important for me to understand how living with both a vision and mobility impairment affects your ability to participate, use assistive technology, and how you find the health care services.

I will be audio recording our entire interview and making notes, is that okay with you?

I want to start first with some general questions regarding you and then we'll move into some more specific questions. Are you okay to start?

### **Demographic information:**

1. What is your name? How would you like to be addressed?
2. What is your age?
3. What is your current living situation? (*i.e.* home, apartment, nursing home, etc.)
4. Who do you live with? (*i.e.* alone, family, spouse, etc.)

### **Interview guide:**

1. Can you describe for me your vision impairment? (what is it called, what do you see)
  - a. How long having you been living with your vision impairment? (when did it start?
  - b. When did it get to its worse? Is it worsening?
2. Can you describe for me your mobility impairment?(what is it called, what do you see)
  - a. How long having you been living with your mobility impairment? (When did it start?
  - b. When did it get to its worse? Is it worsening?
3. Thinking of a traffic light, there are red lights meaning stop, yellow lights meaning slow down, and green lights meaning go.

- a. Are their activities that you have had to stop (just like our red light) because of your health conditions?
  - b. Are their activities that you have had to change (just like our yellow light) because of your health conditions?
  - c. And are their activities that you have continued the same despite your health conditions?
4. What challenges do you have participating in activities in the community? E.g. going to church, social events, family events, etc.
5. What challenges do you have participating in activities that are every day for you? E.g. personal care, cooking, cleaning, etc.
6. Do you use any devices prescribed by a health care professional to help with your vision loss? Describe
7. Do you use any devices prescribed by a health care professional to help with your mobility loss? Describe
8. Are there any devices that you wished you had, but you don't? Why don't you have these devices (financial, never prescribed, doesn't work with both health conditions)
9. Do you find any of these devices work for both your health conditions? (i.e. does a walker help with vision and mobility?)
10. Since you are living with two health conditions, how do you find the health care system? (e.g. do you feel like both conditions are treated equally, does the treatment for one work with the treatment for another? Or are you feeling they are separate?)
11. If you could change something about the health care system so that it worked better for someone living with two health conditions, what would you change?
12. I've asked you a lot of questions about living with a vision and mobility impairment related to the activities you do, the devices you use, and the health care system. Is there anything else that you would want me to learn from you?  
Final thoughts?

Again, Mr/Mrs \_\_\_\_\_ I really want to thank you for the time you have given me. Your insight will help me with my research and hopefully make a difference for those living with vision and mobility impairments. As a small token of my appreciation I do have a gift card for you for Tim Hortons. Thank you again for your help.

**Probes:** In what way? Can you give an example? How so? How did you experience that?

## Curriculum Vitae

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**Post-secondary Education and Degrees:** The University of Western Ontario  
London, Ontario, Canada  
2007 – 2011 Ph.D.

University of Waterloo – School of Optometry  
Waterloo, Ontario, Canada  
2005 – 2007 MSc.

University of Waterloo  
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**Honours and Awards:** Province of Ontario Graduate Scholarship  
2009-2010, 2010-2011

Graduate Thesis Research Award  
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Joint Fund for Graduate Student Research  
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Joseph A. Scott Studentship in Aging & Mobility  
Lawson Health Research Institute  
2008-2009, 2009-2010

Dean of Science Award  
Faculty of Science, University of Waterloo  
2008

Ph.D. Scholarship in Rehabilitation Science  
Ontario Neurotrauma Foundation  
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International Conference on Aging, Disability and Independence  
(ICADI) Graduate Student Scholarship  
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Constance W. Atwell Award  
The Low Vision Research Group  
2007

**Related Work  
Experience**

Teaching Assistant  
The University of Western Ontario  
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Research Assistant  
Injury Prevention for Senior Drivers in Canada  
Canadian Association of Occupational Therapists.  
The National Blueprint for Injury Prevention in Older Drivers.  
2009

**Publications:**

Huber, J., Sillick, J., & Skarakis-Doyle, E. (2010). Personal Perception and Personal Factors: Incorporating Health Related Quality of Life (HRQOL) into the International Classification of Functioning, Disability and Health. *Disability and Rehabilitation*. *Accepted*, 32 (23), 1955-1965.

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