UNDERSTANDING THE EXPERIENCES OF RURAL COMMUNITY-DWELLING OLDER ADULTS IN USING A NEW DVD-DELIVERED OTAGO EXERCISE PROGRAM IN BRITISH COLUMBIA

by

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ABSTRACT

Introduction: The home-based Otago Exercise Program (OEP) has been shown to reduce the occurrence of falls in community-dwelling seniors. A new OEP DVD was recently developed to be delivered to people living in rural communities with minimal coaching by a physical therapist (PT). This thesis aimed to: 1) understand older adults' experiences in using the DVD-delivered OEP, and 2) explore barriers and facilitators to implementing the DVD-delivered OEP from the participants' perspectives.

Methods: Thirty-two rural community-dwelling older adults (≥75 years old) who participated in a six-month DVD-delivered OEP study were invited to participate in this qualitative study. Two small group interviews were initially conducted to explore the breadth of participants' experiences with the program. These were followed by semi-structured individual interviews to gain an in-depth understanding of these experiences. An inductive constant comparison analysis involving coding of transcripts was performed. To ensure methodological rigour, field notes, journaling and an audit trail were maintained and peer-review took place.

Results: Five participants partook in group interviews and 16 in individual interviews. Three themes emerged. Theme 1, 'The OEP DVD: Useful training tool but in need of more pep', reflected participants' experiences that the DVD provided important guidance at program onset, but was too slow and low-energy for longer-term use. Theme 2, 'Providing greater control over one's exercise regimen, but sometimes life gets in the way of staying active', described participants' appreciation of the program's flexibility, but personal health concerns and everyday lives imposed challenges for adhering to the program. Theme 3, 'Social creatures: Wanting greater human connection during exercise', described how some participants desired further social interactions for enhancing motivation and sense of guidance.

Conclusion: PTs prescribing the OEP should inform participants of the option to use the manual whenever they feel they have taken full advantage of the DVD and to perform the program with friends and family. The importance of exercise even when living with health problems should be raised at program onset, and methods of integrating the program with everyday activities should be promoted.

PREFACE

Arun Agha was responsible for the design of this research study and for the performance of the various parts of the research, including data collection, analyses, and the interpretations of the results. Arun Agha was supervised by Dr. Linda Li. Advice and guidance was also received from Drs. Teresa Liu-Ambrose and Catherine Backman.

This research has been presented in the following conferences:

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LIST OF ABBREVIATIONS

95% CI	95% Confidence Interval
BC	British Columbia
CCT	Controlled Clinical Trial
CIHR	Canadian Institutes of Health Research
IRR	Incidence Rate Ratio
KT	Knowledge Translation
MMSE	Mini-Mental State Examination
$NZ	New Zealand dollar
OEP	Otago Exercise Program
OR	Odds Ratio
OT	Occupational Therapist
PASE	Physical Activity Scale for the Elderly
PPA	Physiological Profile Assessment
PT	Physical Therapist
RCT	Randomized Controlled Trial
SD	Standard Deviation
TUG	Timed Up and Go test

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To my parents

1 INTRODUCTION

1.1 Overview

The Canadian population is aging. According to Statistics Canada, seniors (defined as persons aged 65 years and older) are the fastest growing age group, mainly due to an increasing life expectancy and the aging of the baby boomer generation.[1,2] It is well known that aging is related to certain physiological changes and chronic conditions, and may increase predisposition to falls.[3-10] Falls are serious and costly occurrences that affect many seniors every year.[11-15] There is ample evidence suggesting that physical activity and specific exercises can promote healthy aging in seniors,[16-26] prevent many chronic conditions, such as type 2 diabetes[21,22,27,28] and cardiovascular disease,[29] and reduce the rate of falls.[30] One home-based program, the Otago Exercise Program (OEP), has been shown to improve executive functioning,[31] balance and strength,[25,26] and reduce injurious falls in seniors.[32] The OEP was originally designed to be delivered by a physical therapist (PT) making four or five home visits;[25] however this is not feasible in most rural and remote communities in Canada due to a shortage of PTs.[33] To address this challenge, a new DVD-delivered OEP has been developed by a group led by Dr. Teresa Liu-Ambrose. The purpose of this study was to examine the experiences of older adults living in a rural British Columbia (BC) community in using the new DVD-delivered OEP with minimal coaching by a PT. This information will contribute to future implementation of this intervention by elucidating participant-identified barriers and facilitators to implementing this program.

This chapter is organized into eight sections. First, it reviews the physiological and cognitive changes that happen during normal aging. Next, evidence suggesting the impact of exercise in promoting healthy aging and preventing chronic conditions and falls is explored. The OEP and the evidence behind it are then introduced, and the reasons why the standard version of this program is not feasible in rural communities is discussed. The evidence supporting the use of DVDs to deliver the OEP is then reviewed. Previous studies examining older adults' views on and experiences of exercise are also considered.

1.2 Physiological and cognitive changes in normal aging

In 2011, the median age of Canadians was 39.9 years, a substantial increase from the median age of 26.2 in 1971.[2] In BC, the population of seniors is projected to increase from 700,500 in 2011 to more than one million by 2021.[34] Aging is related to certain physiological changes. For instance, in normal aging, muscle strength steadily decreases due to a loss of muscle mass, with type II muscle fibres (i.e., responsible for generating short, fast bursts of power) decreasing to a greater extent than type I muscle fibres (i.e., responsible for maintaining body posture due to their endurance capabilities).[3-7] Changes in cognitive function also occur in normal aging, with people noticing a decrease in cognitive speed and memory performance.[8] Cognitive speed has been suggested to drop by approximately 20% at age 40 and by 40–60% at age 80.[8,35] These cognitive changes are likely due to a decrease in brain size and an increase in ventricular spaces and cerebrospinal fluid.[36] In addition, damage to the brain parenchyma, which result in white matter lesions, may contribute to cognitive decline.[37] Balance control also decreases during aging, which is likely due to physiological changes including reduction in muscle strength and joint range of motion, increased reaction time, and changes in sensory systems.[26]

Myers *et al.*[9] and Carter *et al*.[10] have reported that a decrease in muscle strength, diminished cognitive function, and impaired balance in older adults are risk factors for falls. The risk of falling increases with the number of risk factors present.[38] However, muscle weakness (especially in the lower body) was found by the American Geriatrics Society, British Geriatrics Society and American Academy of Orthopedic Surgeons Panel on Falls Prevention[39] to be the most important risk factor, increasing risk by more than four times. Approximately 30% of all community-dwelling seniors experience at least one fall every year.[11-13] Falls are the leading cause of fatal injury among Canadian seniors and are estimated to cost the Canadian health care system $2.8 billion annually.[14,15] Almost half of all individuals who fall experience a minor injury and 5% to 25% acquire a more serious injury like a fracture or a sprain.[40] Falls account for 70% of injury-related days of hospital care for seniors and 40% of nursing home or long-term care admissions.[40] Most of falls in community-dwelling older adults are due to slips and trips.[41-43] Such falls have been proposed to occur due to a person's inability to regain

balance.[41]

1.3 Physical activity, exercise and associated health benefits

Physical activity and specific exercises have been shown to promote healthy aging and prevent chronic illnesses and falls.[16-29,44] According to Caspersen *et al*.[45], physical activity is any body movement involving the use of skeletal muscles that results in energy expenditure. Broadly speaking, physical activity encompasses all occupational, athletic, household and leisure activities. Exercise, on the other hand, is a form of physical activity that is planned, structured, and repetitive.[45] It is usually performed with an aim to improve health or skills. Examples include stretching exercises to improve muscle flexibility, aerobic exercises for improving cardiorespiratory fitness, and resistance exercises for improving muscle strength.

1.3.1 Evidence of exercise in promoting healthy aging

There is ample literature supporting the benefits of physical activity and exercise in promoting healthy aging.[16-26] Rowe and Kahn[46] define healthy or successful aging as encompassing the maintenance of high physical and mental functioning, and the sustained engagement in social and productive activities, in addition to the avoidance of disease and disability. For instance, resistance exercise has been shown to mitigate type II muscle fibre loss, as well as to improve balance.[24-26] Physical activity and exercise have also been shown to improve cognitive function.[16-20,47] Until recently, the majority of studies supporting the cognitive benefits of exercise solely focused on aerobic exercise.[16-20] A meta-analysis by Colcombe and Kramer[18] showed that individuals who performed both resistance and aerobic exercises received greater cognitive benefits (i.e., in terms of cognitive speed, visuospatial processes, controlled processing, and executive control) than people who performed aerobic exercise alone. Cassilhas *et al*.[48] proposed that this might be due to an increased transportation of growth factors into the central nervous system via the blood-brain barrier. In a recent randomized controlled trial (RCT), Liu-Ambrose *et al*.[47] also demonstrated that community-dwelling seniors who completed a one-year resistance exercise program showed improvements in executive cognitive

functioning in regards to selective attention and conflict resolution, as well as improvements in muscular function.

1.3.2 Evidence of exercise in preventing chronic conditions and falls

There is strong evidence that physical activity and exercise can prevent chronic conditions.[21,22,27-29,44] Physical activity and exercise have been shown to reduce the risk of type 2 diabetes (odds ratio [OR] = 0.44; 95% confidence interval [CI] = 0.22, 0.88)[28] and cardiovascular disease (risk reduction of 35% for cardiovascular mortality; 95% CI = 30%, 40%).[29] Exercise is also associated with reductions in the risks of cognitive impairment-no dementia (OR = 0.58; 95% CI = 0.41, 0.83), Alzheimer's disease (OR = 0.50; 95% CI = 0.28, 0.90), and any type of dementia (OR = 0.63; 95% CI = 0.40, 0.98).[44] Regular exercise has also been shown to reduce the number of falls, specifically multiple-component group exercise was shown to reduce rate of falls (incidence rate ratio [IRR] = 0.78, 95% CI = 0.71, 0.86), as did individually prescribed multiple-component home-based exercise (IRR = 0.66, 95% CI = 0.53, 0.82).[30] In particular, several studies have reported that resistance exercise, combined with balance exercise, prevented falls in older adults.[25,49-52] One plausible mechanism proposed in the literature is that these exercises ameliorate certain physiological changes associated with aging that act as risk factors for falls. These include poor muscle strength, impaired balance, and diminished cognitive function.[9,10]

1.4 The Otago Exercise Program

The OEP was developed in New Zealand by Campbell and Robertson[25] in 1997 to prevent falls in older adults. The OEP consists of individually tailored exercises that aim to improve strength and balance in seniors.[25,49] Exercises include strengthening for lower limb muscles (e.g., knee extensors and flexors, hip abductors, and ankle plantarflexors and dorsiflexors) and balance retraining exercises (e.g., knee bends, backwards walking, walking and turning around, sideways walking, tandem stance and walk, one leg stand, heel walking, toe walking, heel-toe walking backwards, and sit-to-stand activities). This home-based program is designed to be performed at least three times a week for 30

minutes.[25] In addition, participants are encouraged to take short walks at least twice a week. The OEP is normally delivered by a PT who makes four or five home visits with the individual over a six-month period. During the initial visit, participants receive an exercise booklet with illustrations and instructions in large print for the exercises, as well as ankle cuff weights and a calendar to record exercise frequency and record any falls that occur. The PT then conducts a physical assessment on the individual and prescribes exercises from the OEP booklet. The PT uses the additional follow-up visits to make progressive adjustments to the exercises.

1.5 Effectiveness of the OEP

To examine the existing evidence behind the benefits of the OEP, including its ability to reduce falls, a literature search for studies published between 1997 and 2013 was performed using PubMed/Medline, and Embase, with the search terms *'otago AND exercise AND (program OR programme)'*. For the PubMed/Medline search, a filter allowing only 'clinical studies' was applied. This search strategy yielded 28 studies; of those 19 were RCTs,[25,26,31,49,50,53-66] two were controlled clinical trials (CCT),[51,67] two used a pretest-posttest design,[68,69] one used a posttest-only design,[70] one was a case study,[71] two were systematic reviews,[72,73] and one was a narrative review.[74] Only studies that used a controlled experimental design that included the OEP (or exercises based on the OEP) as one of the interventions were reviewed in the current section. The final selection of studies consisted of seven RCTs and two CCTs (**Table 1**). Eight of these nine studies measured fall occurrence,[25,31,49-54,67] while one study only measured physical function.[26] Pertinent results from three studies are discussed below.

In their first RCT, Campbell *et al*.[25] assessed 233 women aged 80 years and older for one-year. Participants were randomly assigned to the exercise group or the control group. The exercise group received the OEP, and the control group received usual care and an equal number of social visits. Both groups were assessed for their balance using the 4-test balance score (range: 0 – 5)[25] at baseline and after six months. At six months, a significant improvement in balance in the exercise group compared to the control group was observed (between-group difference in change in balance score = 0.43; 95% CI = 0.21, 0.65). Moreover, after one year the OEP group experienced a lower rate of falls

compared to the control group (hazard ratio for the first four falls = 0.68; 95% CI = 0.52, 0.90). After the first year, 152 participants (65.2%) agreed to continue the study for another year. After two years, the rate of falls remained significantly lower for the OEP group compared to the control group (relative hazard ratio for all falls = 0.69; 95% CI = 0.49, 0.97).[49]

In a one-year RCT, Liu-Ambrose *et al*.[31] evaluated the effectiveness of the OEP in 74 community-dwelling seniors in BC. The intervention group received the home-based OEP delivered by a PT, while the control group received 'guideline care' based on the American Geriatrics Society/British Geriatrics Society/American Academy of Orthopedic Surgeons Falls Prevention Guidelines. At six months, no significant difference was found between the OEP group and the control group in the physiological falls risk (Physiological Profile Assessment z-score of 1.9, standard deviation [SD] = 1.2 for both the OEP and control, p = 0.98) or functional mobility (Timed Up and Go Test [seconds]: 13.6, SD = 4.3 vs. 18.1, SD = 10.5 for the OEP and control group respectively, p = 0.36). Interestingly, after one year the adjusted IRR of falls in the OEP group compared to the control group was 0.47 (95% CI = 0.24, 0.96), meaning the OEP group experienced a reduced number of falls compared to the control group. Results also trended towards a statistically significant between-group difference in the executive function of response inhibition (12.8% improvement and 10.2% deterioration in the OEP and control group, respectively, p = 0.05). The authors suggested that the fall-reducing mechanism of the OEP might involve cognition improvement; specifically, that response inhibition improvement may partially moderate the effects of muscle weakness and poor balance on falls. The positive relationship between the executive function of response inhibition and fall prevention has previously been shown.[75-78] They also suggested that the cognitive benefits provided by resistance exercise might be mediated by increased levels of insulin-like growth factor-1 and reduced serum homocysteine levels.[79,80]

A 2012 RCT by Yang *et al*.[26] investigated the effectiveness of a home-based strength and balance exercise program, based on the OEP and the Visual Health Information Balance and Vestibular Exercise Kit, in reversing older adults' mild balance dysfunction. The control group continued with their usual activities. After six months the exercise group demonstrated a significant improvement compared to the control group in

the Functional Reach Test (mean difference = 2.95 cm, 95% CI = 1.75, 4.15), the Step Test (mean difference = 2.10 steps/15 seconds, 95% CI = 1.17, 3.02), hip abductor strength (mean difference = 0.02, 95% CI = 0.01, 0.03), and gait step width (mean difference = 2.17 cm, 95% CI = 1.23, 3.11). Furthermore, 14 participants in the exercise group (23.7%) achieved balance performance within the normal range (i.e., normative performance on the stepping, reaching, and sit-to-stand maneuver clinical tests and no more than three abnormal scores on the 46 NeuroCom Balance Master measures) compared with three individuals (4.8%) in the control group (p = 0.003).

In conclusion, five out of the eight studies that measured fall occurrence showed that the OEP significantly reduced falls,[25,31,49-52] while three studies showed no benefit.[53,54,67] Three of the studies demonstrated that the OEP significantly improved physical function;[25,26,67] while one study demonstrated that the OEP improved cognitive function (with a trend towards statistical significance).[31]

In addition to the nine controlled clinical studies, Robertson *et al*.[32] conducted a meta-analysis of the OEP that used individual level data from four of the OEP controlled trials[25,49-51,54] with a total of 1016 community-dwelling seniors. The results found a 35% reduction in falls and fall-related injuries when comparing the exercise groups against the control groups (falls: IRR = 0.65, 95% CI = 0.57, 0.75; fall-related injuries: IRR = 0.65, 95% CI = 0.53, 0.81). The program was more effective for individuals aged 80 years and older compared to individuals between the ages of 65 to 79 years when considering injurious falls (ratio of IRRs for injurious falls = 0.54, 95% CI = 0.34, 0.87). The fall-reducing benefits were equal for older adults with previous falls and for those who have never fallen. In addition, both men and women benefitted equally. Approximately 70% of participants in the OEP group were engaging in some exercise or walking program at the end of the intervention period. In addition, Gillespie *et al.*[30] reported in a Cochrane systematic review that individual home exercise programs for community-dwelling older adults that incorporated two or more components of strength, balance, flexibility or endurance exercises reduced the rate of falls (IRR = 0.66, 95% CI = 0.53, 0.82), and the number of individuals falling (IRR = 0.77, 95% CI = 0.61, 0.97). The review concluded that there was strong evidence supporting the use of the OEP for fall reduction amongst older adults. Suggested plausible mechanisms may include improvements in executive

functioning, balance, and/or lower-body strength. Although the mechanism is not certain, there appears to be substantial evidence suggesting that the OEP is effective in preventing the occurrence of falls in older adults. This appears to be true for older adults who have never fallen and for those with previous falls.

Table 1. Summary of controlled trials of the OEP.

Authors (year); Country	Study Design and Sample Characteristics	Intervention and Control	Results
Campbell *et al*. (1997)[25]; New Zealand	**RCT** **Study Duration**: 1 year **Sample**: 233 women aged 80 years and older living in the community (exercise group, n = 116; control group, n = 117)	**Intervention group:** Home-based strength and balance exercise program (OEP) • Delivered by a PT • 4 home visits **Control group:** Usual care and an equal number of social visits	Compared to the control group, the OEP group experienced: • A reduced mean rate of falls and injuries after 1 year (hazard ratio for the first four falls = 0.68; 95% CI = 0.52, 0.90) • Improved physical function after 6 months mean changes in the 4-test balance score (range: 0 – 5) were 0.42, SD = 0.86, and -0.01, SD = 0.80 for OEP and control respectively; difference 0.43, 95% CI = 0.21, 0.65
Campbell *et al*. (1999a)[49]; New Zealand	**RCT** **Study Duration**: 2-year follow-up from the 1997 cohort **Sample**: 152 women aged 80 years and older living in the community (exercise group, n = 71; control group, n = 81)	**Intervention group:** Home-based strength and balance exercise program (OEP) • Delivered by a PT • 4 home visits **Control group:** Usual care and an equal number of social visits	• The rate of falls for the exercise group remained significantly lower than in the control group (relative hazard ratio for all falls = 0.69; 95% CI = 0.49, 0.97)
Campbell *et al*. (1999b)[54]; New Zealand	**RCT:** 2x2 factorial design **Study Duration**: 44 weeks **Sample**: 93 women and men aged 65 years and older and taking psychotropic medication (exercise group, n = 45; control group, n = 48)	**Interventions:** 1. Gradual withdrawal of psychotropic medication 2. Home-based strength and balance exercise program (OEP) • Delivered by a PT • 4 home visits **Four groups:** **Group A**: Gradual psychotropic medication withdrawal plus a home-based exercise program (n	• The relative hazard ratio for falls in the medication withdrawal group compared with the original medication group was 0.34; 95% CI = 0.16, 0.74 • The reduction in falls for the exercise program group was not significant compared with the no-exercise (control) group (relative hazard ratio = 0.87; 95% CI = 0.36, 2.09)

Authors (year); Country	Study Design and Sample Characteristics	Intervention and Control	Results
		= 24) **Group B**: Psychotropic medication withdrawal only, no exercise program (n = 24) **Group C**: No change in psychotropic medication plus the exercise program (n = 21) **Group D**: No change in psychotropic medication, no exercise program (n = 24)	
Robertson *et al.* (2001a)[50]; New Zealand	**RCT** **Study Duration**: 1 year **Sample**: 240 women and men aged 75 years and older (exercise group, n = 121; control group, n = 119)	**Intervention group:** Home-based strength and balance exercise program (OEP) • Delivered by a community nurse • 5 home visits **Control group:** Usual care	• Falls were reduced by 46% (IRR = 0.54; 95% CI = 0.32, 0.90) • The incremental cost per fall prevented was $NZ1,803 and $NZ155 (at 1998 prices) when hospital costs averted were considered
Robertson *et al.* (2001b)[51]; New Zealand	**CCT:** 3 exercise centres, 4 control centres **Study Duration:** 1 year **Sample:** 450 women and men aged 80 years and older (exercise group, n = 330; control group, n = 120)	**Intervention group:** Home-based strength and balance exercise program (OEP) • Delivered by a general practice nurse • 5 home visits **Control group:** Usual care	• Falls were reduced by 30% (IRR = 0.70; 95% CI = 0.59, 0.84) • The incremental cost per fall prevented was $NZ1,519 (at 1998 prices)
Campbell *et al.* (2005)[53]; New Zealand	**RCT:** 2x2 factorial design **Study Duration:** 1 year **Sample:** 391 women and men aged 75 years and older with visual acuity of 6/24 or worse who were living in the	**Interventions:** 1. Home safety assessment and modification program • Delivered by OT 2. Exercise program (modified OEP) prescribed at home by a PT plus vitamin D supplementation • OEP modified for those with severe visual	• Fewer falls occurred in the home safety program groups (group A + C) but not in the exercise groups (group B + C) (IRR = 0.59 [95% CI = 0.42, 0.83] and 1.15 [95% CI = 0.82, 1.61]), respectively) • Neither intervention was effective in reducing injuries from falls

Authors (year); Country	Study Design and Sample Characteristics	Intervention and Control	Results
	community (exercise group, n = 195; control group, n = 196)	acuity loss • PT-delivered; 5 home visits **Four groups:** **Group A**: Home safety assessment and modification program (n = 100) **Group B**: Exercise program plus vitamin D supplementation (n = 97) **Group C**: Both interventions (n = 98) **Group D**: Only social visits (n = 96)	
Skelton *et al.* (2005)[52]; United Kingdom	**RCT** **Study Duration:** 36 weeks of intervention plus follow-up time **Sample:** 81 women aged 65 years and older with a history of falls (exercise group, n = 50; control group, n = 31)	**Intervention group:** Combined group exercise classes (once a week for one hour) and home exercise program (twice a week for 30 minutes) • Delivered by qualified exercise-for-the-older-person instructors • The Otago exercises were core to both the home and group programs **Control group:** Set of home exercises (consisting of seated warm-up, mobility, flexibility and cool-down exercises) to do twice weekly (this program was considered unlikely to improve the components of fitness necessary to maintain postural stability)	• 31% reduction in the number of falls compared with the control group (IRR = 0.69; 95% CI = 0.50, 0.96) • Non-significant decrease in the number of injurious falls (IRR = 0.60; 95% CI = 0.33, 1.07)
Liu-Ambrose *et al.* (2008)[31]; Canada	**RCT** **Study Duration:** 1 year **Sample:** 74 women and men aged 70 years and older with a	**Intervention group:** Home-based strength and balance exercise program (OEP) • Delivered by a PT • 5 home visits	At 6 months: • No significant between-group difference in physiological falls risk (PPA z-score of 1.9, SD = 1.2 for both the OEP and control, p = 0.98), or functional mobility (TUG time [seconds] of 13.6, SD = 4.3 vs. 18.1, SD =

Authors (year); Country	Study Design and Sample Characteristics	Intervention and Control	Results
	history of falls (exercise group, n = 36; control group, n = 38)	**Control group:** Received 'guideline care' based on the American Geriatrics Society/British Geriatrics Society/American Academy of Orthopedic Surgeons Falls Prevention Guidelines	10.5 for the OEP and control group respectively, p = 0.36) • Results also trended towards a statistically significant between-group difference in the executive function of response inhibition (12.8% improvement in the OEP group vs. a 10.2% deterioration in the control group, p = 0.05) At 1 year: • Adjusted incidence rate ratio of falls was 0.47 (95% CI = 0.24, 0.96)
Waters *et al*. (2011)[67]; New Zealand	**CCT** **Duration:** 1 year **Sample:** 118 women and men aged 65 years and older with an increased fall risk. Exercise group #1 (peer-lead group) n = 52. Exercise group #2 (Age Concern Otago) n = 41. Control n = 25	**Intervention groups:** Both the peer-lead group and the Age Concern Otago group exercises were adapted from the OEP. <u>Intervention group #1</u> Peer-lead group: • 1 hour, weekly classes for 10 weeks • Delivered by peer <u>Intervention group #2</u> Age Concern Otago group: • 1 hour, weekly classes for 10 weeks • Delivered by professional instructor **Control group:** • 1 hour, weekly classes for 10 weeks • Seated flexibility, range of motion, and seated aerobic exercises • Delivered by instructor who followed a standardized, progressive exercise program from a manual and DVD	• Functional improvements were similar in the peer-led group and Age Concern Otago group from 10 weeks to 1 year, and all functional measures were significantly greater relative to the control group (overall p = 0.02). • After 1 year, no significant difference in the incidence of falls in the Age Concern Otago group and peer-led group compared to the control group (IRR = 0.99; 95% CI = 0.63, 1.6, IRR = 0.73; 95% CI = 0.48, 1.1, respectively)

Authors (year); Country	Study Design and Sample Characteristics	Intervention and Control	Results
Yang *et al*. (2012)[26]; Australia	**RCT** **Duration:** 6 months **Sample:** 165 community-dwelling men and women aged 65 years and over who had mild balance dysfunction (exercise group, n = 83; control group, n = 82).	**Intervention group:** Home-based strength and balance exercise program (based on OEP and the Visual Health Information Balance and Vestibular Exercise Kit) • Delivered by a PT • 3 home visits **Control group:** Participants received a fall prevention information booklet describing fall risk factors and fall-minimizing strategies. Control group participants continued with their usual activities.	After 6 months the exercise group significantly improved compared to the control group in the following: • Functional Reach Test (mean difference = 2.95 cm; 95% CI = 1.75, 4.15) • Step Test (mean difference = 2.10 steps/15 seconds; 95% CI = 1.17, 3.02) • Hip abductor strength (mean difference = 0.02; 95% CI = 0.01, 0.03) • Gait step width (mean difference = 2.17 cm; 95% CI = 1.23, 3.11) • 14 participants in the exercise group (23.7%) achieved normal balance (normative performance on the stepping, reaching, and sit-to-stand maneuver clinical tests and no more than 3 abnormal scores on the 46 NeuroCom Balance Master measures) compared with 3 participants (4.8%) in the control group (p = 0.003)

Abbreviations: OEP, Otago Exercise Program; $NZ, New Zealand dollar; IRR, Incidence Rate Ratio; RCT, Randomized Controlled Trial; CCT, Controlled Clinical Trial; CI, Confidence Interval; SD, Standard Deviation; PPA, Physiological Profile Assessment; TUG, Timed Up and Go test; PT, Physical Therapist; OT, Occupational Therapist

1.6 Delivery of the OEP using a DVD

Promoting physical activity and fall-prevention programs among seniors living in rural communities in Canada is important because of the prevalence of physical inactivity and the greater likelihood of falls in a rapidly aging rural population.[81-84] Statistics Canada defines rural communities as populations living in municipalities outside the commuting zone of larger urban centres that have populations of >10,000.[85] The prevalence of physical inactivity is greatest in rural communities; in 2011, 46.7% of individuals over the age of 65 in the Northern Health Authority (consisting of predominantly rural areas in BC's northern regions) were physically inactive, compared to the BC average of 40.4%.[82,83] Moreover, according to the World Health Organization,[81] older adults who live in rural areas are more likely to experience a fall (albeit the probability difference was not reported). Rural communities also face underdeveloped health promotion programs, a lack of diagnostic services, poor access to emergency and acute care services, a lack of non-acute health care services and insufficient service of special needs groups like seniors.[86] These data suggest that fall prevention interventions may be lacking in rural areas.

The current evidence supports the use of the OEP for reducing fall occurrences in older adults and promoting other health benefits associated with exercise; however, it is not feasible to deliver the program in its current state in rural communities because it requires multiple home visits by a PT. The shortage of health professionals, including PTs, has been a longstanding issue in rural communities in Canada.[33] The Northern Health Authority in BC estimates that there are 27 PTs per 100,000 residents,[87] which is well below the Canadian average of 55 PTs per 100,000 residents.[88] Even though 19% of the Canadian population lives in rural areas (Statistics Canada, 2011 Census of Population), approximately 8% of PTs work in rural or remote communities.[89] Moreover, in 2012, 51% of all PTs in BC worked within the private sector (Canadian Institute for Health Information, 2013). Individuals who see a PT in private practice typically pay out-of-pocket or use third-party insurance (BC's medical services plan has limited coverage for seeing a PT in private practice). This, in turn, may create an additional financial barrier for many individuals wanting access to PTs. Due to these challenges, we need to

consider alternatives to the four to five PT home visits required for the OEP in order to effectively deliver this program in rural communities.

DVDs are a viable option for delivering health and lifestyle interventions for the older population; exercise DVDs experienced an annual growth of 11.2% over the last five years, with over 20% of them purchased by older adults.[90] Past studies suggest that video-based exercise programs can increase muscle strength,[91,92] physical function,[92] and psychological well-being in older adults.[93] Average adherence rates in these studies varied from 58% to 100%.[91-93]

In 2007, Vestergaard *et al*.[94] published a RCT on the effects of a five-month home-based video exercise program on the physiological performance, functional capacity and health-related quality of life of community-dwelling older women (≥ 75 years). The control group was asked to continue with their usual activities. The results revealed a significant difference between the exercise and control groups in the change in health related quality of life as measured by EQ-5D (11.6% improvement and 13.5% reduction in the exercise and control groups, respectively; p = 0.006). However, no significant between-group difference was found in other variables, including physical performance test, leg extensor power, standing balance, mobility-tiredness score, handgrip, biceps strength, chair rise, walking-speed, and self-rated health. Adherence to the exercise protocol was 89.2% in the intervention group.

A 2013 RCT by McAuley *et al*.[95] compared two DVDs for improving physical functional performance in seniors. The intervention group received a DVD that focused on flexibility, balance, and toning exercises, while the control group received a documentary DVD on healthy aging and continued with their usual activities. At six months, participants in the intervention group demonstrated significant improvements in the Short Physical Performance Battery score (10.91, 95% CI = 10.66, 11.17 vs. 10.38, 95% CI = 10.11, 10.65 in the control group; p = 0.005), lower extremity flexibility ('sit and reach' score of -0.57, 95% CI = -1.16, 0.03, compared to the control group's score of -1.43, 95% CI = -2.04, -0.82; p = 0.045), and upper body strength ('arm curl test' score of 15.33, 95% CI = 14.62, 16.04, compared to 13.80, 95% CI = 13.07, 14.54 in the control group; p = 0.003). Self-reported adherence to the program using exercise logs was approximately 75% over six months. In summary, evidence suggests that the use of DVD

has the potential for effectively delivering home-based exercise programs for older adults. Furthermore, the adherence to video-based exercise programs appears to be comparable to that of past OEP studies (approx. 70%).[32]

A group led by Liu-Ambrose developed a new method, using a DVD, to deliver the OEP to an older adult population living in rural communities (Canadian Institutes of Health Research [CIHR] Catalyst Grant: IAD-112237). Taking into account the limited number of PTs practicing in rural areas, this new OEP involves only one visit by the PT before starting the program, followed by monthly telephone calls for six months. During the visit, the PT conducts a physical assessment and prescribes specific exercises. Participants also receive a DVD with narrated video footage of a model performing the various exercises. This footage aims to instruct, inform and motivate the individual. Prior to each exercise, introductory narrated footage describes the muscle(s) the exercise targets, and how strengthening those muscle(s) may benefit performance of certain common daily activities. This is followed by detailed instructions on how to properly perform the exercises. The DVD contains a soundtrack composed of instrumental soft music with a gradual rhythm. Similar to the traditionally-delivered program, participants using the DVD-delivered OEP also receive an exercise manual, ankle cuff weights, and a program calendar. In lieu of the participant's home, the initial visit may also occur in a community centre. Instead of the follow-up home visits, the PT makes monthly telephone calls to participants to adjust their exercises. The program frequency and duration are unchanged from the traditionally-delivered program, that is, participants are instructed to perform the program at least three times a week for 30 minutes and take short walks at least twice a week. An ongoing knowledge translation (KT) study led by Liu-Ambrose aims to evaluate the feasibility and potential physical benefits of this new DVD-delivered OEP for older adults. My thesis is a qualitative inquiry within this intervention study.

1.7 Older adults' views on and experiences of exercise

The literature has shown that older adults have a variety of views on and experiences of physical activity and exercise. Stathi *et al.*[96] explored how physical activity was valued in the context of successful aging by older adults aged 63 to 79, participating in a tailored group exercise class. From individual and group semi-

structured interviews of 13 community-dwelling older adults, it was discovered that participants were motivated to exercise in order to provide a sense of purpose to their lives. One participant expressed the following belief about exercise, *"...[e]xcercise [sic] gives you something to do... It is like going to work. You have to be a creature of habit otherwise you are lost..."* Participants also viewed social interaction as an important aspect of attending exercise sessions. For instance, one participant stated, *"I need to go and find people that I can really be happy with you know and I think that at the exercise class I find the people that I like to be with"*.

Belza *et al*.[97] examined barriers and facilitators to physical activity and exercise in 71 underserved, ethnically diverse older adults (mean age of 71.6 years) in a focus group study. Participants mentioned health (e.g., managing a chronic condition like arthritis) as motivation for them to be physically active. One participant stated, *"[e]xercising and walking gives you energy. That's how you strengthen your body. Your weakness disappears when you walk a lot."* Walking was deemed to be the most common type of exercise performed by participants. Facilitators of physical activity included fostering relationships among participants (*"[t]ry to find yourself someone to do it with. If you can find two people to get together and one motivates the other"*), bringing programs to where people live, offering classes prior to or after social events, offering low- or no-cost classes, and involving older adults in program development. Health status served as both a motivator (i.e., health promotion) and a barrier (i.e., hindering effects of chronic conditions) to physical activity. Environmental factors also served as barriers to physical activity. For instance, fear of falling due to snow, neighbourhood safety, and reliability of affordable transportation to exercise venues were examples of such environmental barriers.

Paluck *et al*.[98] sought to describe the types of health-promoting activities practiced by women living in rural communities. A total of 44 participants, 12 of whom were women 65 years or older, from a small rural community in Saskatchewan participated in eight focus groups. The most commonly reported health-promoting activities for all age groups were exercise and proper nutrition. Commonly reported forms of exercise included walking, curling, golfing, and attending exercise classes. Women of all ages agreed that achieving or maintaining physical fitness was made more

difficult due to a lack of facilities and resources, including financial resources and availability of trained personnel. They also indicated the importance of being resourceful and of having mutual support to maintain a physically active lifestyle. One participant stated, *"[y]ou have to be more motivated in a small town…we don't have gyms that we can go to, or field houses, or big parks like [the cities do]. We have to make do with what we have and encourage each other."* Harsh weather and the inconvenient and time-consuming commute to attend centre-based exercise programs also acted as barriers to exercise. One participant stated, *"[w]ho's going to drive an hour and a half to [the city] to go [to an exercise class]?"* Older women reported participating in activities that focused on improving both their physical and mental health (i.e., keeping a *"healthy mind"*). Also, older women discussed how loneliness and social isolation hindered efforts to stay healthy, and how the lack of appropriate exercise options adversely affected their living a healthy life in their community.

In a mixed-method study, Fox *et al*.[99] conducted semi-structured interviews with participants who completed a one-year group and home-based exercise program. Participants were 24 older adults, aged 70 and over, who were purposefully selected based on their diverse experiences with the intervention (i.e., 17 participants completed the intervention, 4 dropped-out, and 3 were from a control group that did not receive any exercise intervention). Participants generally saw the activities and interactions in the exercise program as enjoyable and fun. They also valued their relationships with exercise instructors and other participants, with one participant stating, *"[d]efinitely the class was better because of the other people there as well"*. Participants also expected physical benefits from the program, such as lessening physical deterioration, preventing the development of chronic conditions, and reducing fall risk. One participant stated, *"I thought, I'll take step in advance and go on the falls programme before I begin to fall. That was why I volunteered to take part"*. Some participants also valued the fact that participating in the exercise program resulted in supportive and positive reactions from family and friends.

In sum, it appears that among older adults who exercised, reasons to do it included maintaining or improving physical and mental function.[97-99] Further, many older adults viewed being physically active as a way of bringing purpose to their lives.[96] Older

adults also appreciated the positive impact of social interactions and support on their exercise experience.[97,99] Commonly reported barriers to exercise included the weather, and the commute to exercise venues.[97,98] Women in rural communities also reported that the lack of facilities and resources made it challenging to exercise.[98] However, no studies could be found that explored the experiences of older adults using video-guided exercise programs.

1.8 Conclusion

There is ample evidence suggesting that physical activity and specific exercises can promote healthy aging in seniors, prevent chronic conditions, and reduce the occurrence of falls.[16-29,44] The OEP, a home-based exercise program designed for seniors, has been shown to improve executive functioning, balance, and strength, and reduce the occurrence of falls and injuries in seniors;[25,26,31,49-52] however, there may be challenges in accessing the PT resources necessary to deliver this program in rural and remote communities.[33,89] Hence, we need to consider an alternative method of delivering this effective fall-prevention exercise program. The use of DVDs to effectively deliver the OEP appears to be a viable option.[90] Past studies have suggested that video-based exercise programs can be effective in conveying physical and psychological health benefits while maintaining good adherence.[91-95] A new DVD-delivered OEP was recently developed, but the potential barriers and facilitators to implementing this exercise program remained unknown. Knowledge of these barriers and facilitators would be critical to informing the implementation strategy for this new DVD-delivered OEP in rural communities.

1.9 Research purpose

The purpose of this study was to examine the experiences of older adults, who lived in a rural BC community, in using the new DVD-delivered OEP with minimal coaching by a PT. Specifically, this MSc thesis sought to: 1) understand older adults' experiences in using the DVD-delivered OEP, and 2) explore the barriers and facilitators to implementing the DVD-delivered OEP from the participants' perspectives.

2 METHODS

2.1 Methodology

Recognizing that community-dwelling older adults who live in rural communities and who have used the DVD-delivered OEP are best able to address the research objectives, this study aimed to discover the emic perspective. Such a perspective provides knowledge based on accounts, descriptions, and analyses expressed in terms of the conceptual schemes and categories that are regarded as meaningful and appropriate by the research participants. This qualitative study is informed by the principles of grounded theory as outlined by Glaser and Strauss.[100] Grounded theory is a methodology that "uses iterative data collection (such as interviews, observations) and analysis to build theories about social phenomena".[101] While generating a theory was not the goal of this study, an understanding of participants' experiences was the intended outcome. The knowledge generated using this approach is developed inductively from the empirical data obtained in naturalistic settings. Key aspects of the grounded theory methodology include the concurrent collection and analyses of data, and the use of purposeful sampling (i.e., the sample is selected based on participants' particular experience and knowledge and not on statistical representation) (p.428-429).[102] In addition, other important aspects include the commencement of coding and journaling after the first interview; performing constant comparative analyses of cases with each other; generating codes that 'emerge' from data and are not imposed *a priori*; and collecting data until saturation is achieved (i.e., until no new data can be collected to indicate new codes or the modification of existing codes) (p.428-429).[102] These aspects were applied to guide the methodology of the current study.

2.2 Researcher reflexivity

I am a male graduate student with strong interests in rural health stemmed from my experience as a clinical research associate for three years managing several clinical trial sites in rural Canadian communities. My responsibilities were primarily performed remotely from Vancouver, along with occasional visits to these clinical sites. In this position, I had the opportunity to interact regularly with physicians, nurses, and pharmacists in rural communities. As a result of these experiences, I hold a set of beliefs

and assumptions influencing how I conduct this research. I believe governments have a social responsibility to do their best to promote exercise in the populace as a means to prevent chronic diseases and improve the outcomes of people living with these conditions, and consequently, minimize health-related costs incurred by individuals and the society. However, I acknowledge that public health institutions with the mandate to minimize these costs (e.g., Canadian Institutes of Health Research, Public Health Agency of Canada) also possess limited resources. As such, prior to implementing exercise-promoting interventions, the effectiveness and feasibility of these interventions should be supported by empirical data. I believe that the implementation of exercise interventions will be most successful when the perspective of knowledge users are taken into consideration and incorporated into the implementation strategy. I am fully aware that these beliefs will affect my research and that not everyone may share these beliefs. For instance, data analysis has taken place against the backdrop of informing the implementation strategy that clinicians and public health institutions may implement, and identifying potential facilitators and barriers (as well as solutions to these barriers) brought forth by program participants.

One discrepancy between my beliefs regarding government responsibility and the DVD-delivered OEP is that the service required of the PT in this new program (although less than the traditionally-delivered program) may be an expense incurred by the participant. Moreover, despite this interest and my experience as a clinical research associate, I acknowledge that my viewpoints were informed by a primarily urban perspective as I have never spent an extended period of time in rural communities. This limited viewpoint prevented me from possessing the lived 'rural experience' of the study participants. As such, I placed tremendous value on the emic perspectives of study participants, as they were grounded in pertinent lived experiences.

2.3 OEP knowledge translation study

This thesis was part of a CIHR-funded KT study (Catalyst Grant IAD-112237). The KT study aimed to assess the feasibility of the DVD-delivered OEP and its potential physical benefits. A total of 32 participants volunteered to participate in the study. All participants were from Sechelt and Gibsons, two rural communities in BC. These

communities were selected due to their central location in the Sunshine Coast, and for their relatively high proportion of older adult residents. In 2011, 28.4% of Sechelt's 9,291 residents and 26.5% of Gibsons' 4,437 residents were 65 years or older (compared with 15.7% for BC overall) (Statistics Canada, 2011 Census of Population). This study was advertised in local newspapers. The advertisements were directed towards older adults who had previously experienced falls and/or who were interested in potentially preventing future falls (i.e., the OEP KT study was introduced in the setting of a mobile fall prevention clinic). Interested individuals were asked to call the study staff to book an eligibility assessment. Individuals were eligible if they: 1) were 75 years or older, 2) were community-dwelling (i.e., were not residing in a nursing home, extended care unit, or assisted care facility), 3) scored 24 or higher in the Mini-Mental State Examination (MMSE), 4) were capable of walking 100 metres independently (with or without assistive tools), 5) owned an operating DVD player and television, and 6) were able to provide informed consent. The study excluded people who had: 1) a previous diagnosis of a neurodegenerative disease, 2) a previous diagnosis of dementia, 3) a clinical stroke, or 4) a history indicating carotid sinus sensitivity (i.e., syncopal falls).

All eligible participants underwent a falls risk assessment by the study staff at a community centre at baseline and at the end of the six-month program period. The assessment included obtaining the participant's general health, falls history, socioeconomic status, standing balance, and measuring the physiological falls risk using the Physiological Profile Assessment.[103] Next, a PT assessed the participant (i.e., assessed factors potentially influencing safety and program adherence), prescribed specific exercises from the OEP, and instructed the participant in how to use the OEP DVD, and how to perform the exercises and walks. The visit took place at the community centre or at the participant's home within days after the baseline assessment. Participants also received an OEP DVD, an exercise manual (containing written instructions and images outlining how to perform the OEP exercises), one pair of ankle cuff weights (weight amount was up to the discretion of the PT), and a program calendar. Participants were asked to participate in the DVD-delivered OEP for six months. They were instructed to record the following information in a calendar every month: 1) the days they completed the exercise program, 2) if they used the video or the manual, 3) if they had any falls, 4)

medical care received, and 5) any changes in medication. Participants were also instructed to complete a monthly Physical Activity Scale for the Elderly (PASE) and mail the documents to the study centre in a pre-addressed, postage-paid envelope at the end of each month. A PT made monthly telephone calls to participants to make progressive adjustments to the exercises. A research assistant also telephoned participants on a monthly basis to inquire if they had any questions about the study or their falls calendars/PASE. These telephone calls occurred two weeks apart from the monthly PT telephone calls so that the research assistants could forward any urgent questions by participants to the PT. During the baseline visit, participants provided the PTs and the research team with preferred dates and times for the telephone calls to take place. I was a member of the research team performing the baseline and endpoint falls risk assessments. This provided me with the opportunity to establish rapport with participants prior to inviting their participation in the qualitative study.

2.4 Design, participants and data collection of the qualitative study

This qualitative study had two methodological components: the first component comprised of initial pilot group interviews, while the second component involved in-depth individual interviews. All participants were recruited from individuals enrolled in the OEP KT study, regardless of their level of adherence to the exercise program. No additional eligibility criteria were applied for this study. Consent to participate in the interviews was not a prerequisite for the OEP KT study. Participants were asked to provide additional informed consent prior to the interviews six months following enrollment in the OEP KT study. The first wave of participants who completed the KT study were asked to participate in one of two face-to-face pilot group interviews, which took place either at a seniors' centre or a community centre. The purpose of these pilot group interviews was to outline a range of topics that were later explored in depth in the individual interviews. A facilitator (myself) led each group interview session and a field note taker recorded in-depth descriptions of participants, as well as the context, impressions, and any other notable circumstances pertinent to the interviews in order to increase rigour. The facilitator led the interviews using a semi-structured guide (see **Appendix A**). All sessions were audio recorded.

After the pilot group interviews, I explored the breadth of topics brought forth by the participants and identified topics that required further in-depth exploration. I then invited all remaining OEP participants who did not participate in the group interviews to take part in individual interviews. The individual interview guide was developed to reflect the topics that were brought forth in the pilot interviews and that I wanted to explore further (see **Appendix B**). Participants had the option of face-to-face or telephone interviews. Face-to-face interviews took place in the participant's home or in a coffee shop near the participant's home. Holt[104] recently showed that telephone interviews could be used interchangeably with face-to-face interviews without compromising data quality. Other advantages of telephone interviewing included greater ease of scheduling and the creation of a more comfortable environment to discuss sensitive topics for certain individuals.[105] In turn, this may have increased access to participants who would not have typically participated in face-to-face interviews (i.e., due to reasons such as distance, unavailability, and privacy), thus increasing study credibility. However, given the importance of physical movement and exercise in this study, the lack of visual observation during telephone interviews may have limited my insight into the specific exercises participants were referring to. I also recorded field notes during and after each individual interview.

During data collection, I maintained a journal to record my reflections, and regularly reviewed the reflections to understand the impact they may have had on the research process. This increased the credibility of the study because by critically self-reflecting on one's research, research relationships, personal assumptions, and research role, there is a greater chance that the study findings more accurately describe the phenomenon.[106] This study received ethics approval from the University of British Columbia (H11-01604) and the Vancouver Coastal Health Authority.

2.5 Data analysis

Following each interview, audio recordings were transcribed verbatim by a professional transcription service. I then verified transcripts against the original audio recordings and de-identified the transcripts. QSR International's N-Vivo software (version 10) was used for data organization and analysis. An inductive constant

comparison analysis was performed, whereby broad themes and patterns (or categories) that emerged from the research were identified.[107] Specifically, each transcript was read and codes were assigned to sentences, paragraphs, and sections.[107] The codes represented an idea with which the part of the transcript was associated.[107] Due to the inductive nature of this analysis, codes were generated from the data and were not pre-determined. Data analysis quality relies on repeated, systematic searching of the data.[108] Consequently, after initial coding, the data were constantly revisited until I was certain that no new information of relevance to the study could be found in the data (i.e., until saturation was achieved).[107] Similarly coded sections were compared against each other to ensure consistency in the definition of the codes.[109] Following coding of the transcripts, codes with similar elements were combined to form categories.[109] These categories were then clustered around the research questions they contributed to answering.[107] Once completed, the data associated with each question were examined and reviewed to create a report of the findings. This analytical process was recorded and an audit trail was maintained. The audit trail enhances rigour by tracking the key decisions made by the researcher during the study. I outlined the processes used to identify codes, categories, and relationships from the data. Journal entries were used to note impressions, associations, questions and ideas that complemented and explained the codes that were found.[102]

As part of this process, peer reviewing was conducted involving four individual interview transcripts. The peer review aimed to enhance credibility by detecting issues in the analysis such as overemphasized or underemphasized points, vague descriptions, and assumptions made by the researcher. One transcript was reviewed by one colleague with impartial views of the study; the remaining three transcripts were reviewed by LL. The reviews took place over face-to-face meetings lasting between 1.5 to 2 hours. During each meeting, we compared our coding and came to a consensus in our interpretations.

3 RESULTS

3.1 Overview

This chapter provides the findings from interviewing individuals who participated in the OEP KT study. It begins by describing the characteristics of interview participants. Topics that emerged from the initial pilot group interviews are interpreted and their impact on the construction of the individual interview guide is discussed; results from the individual interviews are then presented. The themes that emerged from these data are outlined by using representative excerpts from participants, as well as my own interpretations. These themes are framed with the aim of providing insight into participants' experiences in using the DVD-delivered OEP and insight into the barriers and facilitators to implementing this program from the participants' perspectives.

3.2 Participant sample

The first wave of participants was composed of 14 individuals who completed the main KT study, of those, five agreed to partake in one of the pilot group interviews (three in the first group and two in the second group). All were female and their ages ranged from 74 years to 85 years. Three of these participants had received at least some university education. The duration of the first and second group interviews were 53 minutes and 50 minutes respectively. The adherence to the DVD-delivered OEP program by participants was not available at the time of writing.

Following these initial group interviews, the remaining nine participants from the first wave who were not available for the group interviews and 18 participants from the second waves were invited to individual interviews. Of these 27 individuals, 16 participated in in-depth individual interviews (three face-to-face interviews and 13 telephone interviews). Ten of the participants were female. Participants' ages ranged from 75 years to 97 years, and five had received at least some university education. The duration of the individual interviews ranged from 28 minutes to 54 minutes (median = 37 minutes). **Table 2** presents demographic and interview characteristics of participants who completed group and individual interviews. See **Appendix C** for the characteristics of the 11 OEP KT study participants who did not partake in interviews.

Table 2. Characteristics of participants who completed group and individual interviews.

Pseudonyms	Sex	Age	Highest Level of Education	Interview Method: Face-to-Face/Telephone	Interview Location (if Face-to-Face)
Pilot Group Interviews					
Anne	Female	74	High school certificate or diploma	Face-to-face (pilot group interview #1)	Seniors' centre
Betty	Female	75	Some university without certificate or diploma	Face-to-face (pilot group interview #1)	Seniors' centre
Claire	Female	82	University degree	Face-to-face (pilot group interview #1)	Seniors' centre
Dana	Female	85	Grades 9-13, without certificate or diploma	Face-to-face (pilot group interview #2)	Community centre
Edna	Female	77	University degree	Face-to-face (pilot group interview #2)	Community centre
In-Depth Individual Interviews					
Frank	Male	78	High school certificate or diploma	Face-to-Face	Coffee shop
Gabby	Female	81	University certificate or diploma	Face-to-Face	Participant's home
Holly	Female	81	Some university without certificate or diploma	Face-to-Face	Participant's home
Ida	Female	82	High school certificate or diploma	Telephone	N/A
Jenny	Female	88	Trades or professional certificate or diploma	Telephone	N/A
Katy	Female	81	High school certificate or diploma	Telephone	N/A
Lacy	Female	75	High school certificate or diploma	Telephone	N/A
Mary	Female	97	Trades or professional certificate or diploma	Telephone	N/A
Ned	Male	90	Grades 9-13, without certificate or diploma	Telephone	N/A
Oliver	Male	77	University degree	Telephone	N/A
Patty	Female	82	Grades 9-13, without certificate or diploma	Telephone	N/A
Quinn	Male	84	High school certificate or diploma	Telephone	N/A
Roberta	Female	77	University degree	Telephone	N/A
Sandra	Female	82	University certificate or diploma	Telephone	N/A
Thomas	Male	84	Trades or professional certificate or diploma	Telephone	N/A
Walter	Male	79	High school certificate or diploma	Telephone	N/A

3.3 Results from the pilot group interviews

One topic brought forth by the pilot group interview participants pertained to how they used the OEP DVD and the written manual (statements made by participants are in *italics*). In particular, participants discussed the extent to which they used the DVD and manual, and their reasons for doing so. They used the DVD mostly during the start of the OEP and found it quite useful. However, as they progressed, participants transitioned to using the DVD less and the manual increasingly more. Some participants commented that the pace of the DVD was too slow.

> *Actually, if I wanted to improve the video, I thought it was wonderful the way it started and the descriptions that it gave and the purpose and so on and when the [model] demonstrated how to do it correctly, which I think is very important, like to do it correctly. But in the video you had to watch it every time. Well any intelligent person, after doing it five, six, ten times, you want to just do the exercise so it would be, to me, better to be able to slip through and what the exercise is and then allow to pause and let you do it. There was too much description so after a while I would just fast forward, fast forward, and then after that I would, just went to the [manual] if I had any problem* (Anne, group interview #1).

> *Well specifically I found the video rather slow and I got a bit impatient doing it. So as soon as I learned the correct posture and positioning and the format of the exercise, I referred more to the [manual] that we were given. And then I, after I don't know how many weeks, probably three or four, I didn't use the video except maybe once every month to see that I wasn't falling down on doing it correctly. But I found the [manual] more beneficial…*(Edna, group interview #2).

However, not all participants shared this belief. For instance, one participant seemed to really appreciate the amount of visual guidance provided by the DVD (something the manual was not able to provide to them) and continued using the DVD throughout the program duration.

> *Yes…I used the video. I tried it with the manual once at the beginning and I thought no, I want the video because you can see what they're doing… I thought it worked very well for me* (Claire, group interview #1).

Participants also discussed how they had incorporated the program into their daily lives. For instance, participants discussed the diverse settings and moments in which they were able to

perform components of the program. They also seemed to appreciate the level of control they had over choosing the time and place to exercise.

> *[Y]ou could do it anywhere, you could do it down the street or if you're waiting in the bank. We were waiting in the bank one day and we were doing our ups on the toes and down on the heel one* (Betty, group interview #1).

> *[S]ometimes when I was in the kitchen and waiting for things to happen I did the things, you know walked along the kitchen counter and that type of thing. And when I'd sit down, I'd do some you know lifts and that… you can fit it in to your day [so] that [it] suits you, even sometimes when you're getting pretty tired, you can start in and get part way through or even finish the program, you get energized a little bit* (Dana, group interview #2).

A third topic that emerged from these interviews pertained to the human interactions associated with the OEP (including the face-to-face and telephone contact with the PT), and with exercise in general. Particularly, two key subjects were the participants' dissatisfaction with the limited face-to-face interactions with the PT, and their comparisons of the OEP with group exercise classes like tai chi, qigong and yoga.

> *I thought [the meeting with the physical therapist] was a little rushed. At the end, I thought that was, I could have, I would have liked to have spent more time with the physiotherapist on certain things. Just to get certain things, questions you had, answered* (Betty, group interview #1).

> *And this is like our 80-year-old neighbour who talked about eight people to go to [a] qigong [class] with him, not all in the same car, but he takes a carload every week. But I think the [Otago] program is very explicit in the video and in the illustrations. The instruction doesn't need to be done in a social setting but maybe just to have some contact partway through just to rev up the motivation again, do some comparisons* (Edna, group interview #2).

Motivation and guidance were important components of this discussion. Participants indicated that a greater level of human interaction in the OEP might have increased their motivation to perform the program and provided them with further guidance. In regards to motivation, participants like Anne expressed that a group exercise setting would have created a more entertaining and fun exercise experience.

> *[T]he energy in the group would be very helpful [in performing the OEP] and they have here, they have tai chi, they have yoga, they have all these different ones and women, well men too, they're aware of being a little bit dizzy or perhaps have fallen, would come out and exercise in a group, it would be great because everybody would come out and do that that wants to…Just like Aquafit or anything else, [participants] have fun when they're together* (Anne, group interview #1).

In terms of guidance, participants like Betty and Claire felt that further face-to-face interaction with the PT or a live instructor would have provided more opportunities for them to receive constructive feedback that they felt was sometimes missing in the program.

> *I would have liked to have spent more [face-to-face] time with the physiotherapist…I would run it in the centers like this and have people come and do them… the physio could be in the room while you're doing the exercises… And go around and say no, you should be standing or you should look like this or whatever… Like they do in yoga right, you go into a, yoga starts and then the instructor comes by and tells you no, you've got to do this or that or…*(Betty, group interview #1).

> *…I think I'm doing what [the model in the DVD is] doing and I'm hoping that I'm but there's no one but me though… I may think I'm just doing exactly what she's doing and it might be way off or you know things about your body that you think that is what they're doing up there but in fact if somebody who was, knew what it was supposed to be, they could come up and just say well look, just do a little bit this way or that way* (Claire, group interview #1, discussing the benefits of having a live instructor).

The topics brought forth during the pilot interviews prompted me to add specific questions to the interview guide with the aim of exploring these phenomena at a more in-depth level (**Appendix B**). For example, the first topic (i.e., how they used the OEP DVD and the written manual) prompted me to add specific questions to the guide exploring the pattern and extent of use of the DVD and/or the manual and the rationale behind it. The second topic (i.e., how they incorporated the program into their daily lives**)** resulted in the addition of questions exploring how individuals were able to integrate the OEP exercises in their daily routines and activities, such as performing household chores. The third topic (i.e., human interactions associated with the OEP and exercise in general) inspired the addition of questions exploring how participants compared the OEP with popular community-based group exercise classes like

yoga, and how participants felt about their interactions with the PT during the initial home visit and the subsequent telephone contact.

3.4 Results from individual interviews

A total of 16 participants took part in the in-depth individual interviews. The vast majority of participants found the OEP to be useful and beneficial and reported that the program positively impacted the physical and psychological aspects of their lives. Participants felt that the OEP improved their balance and lower body strength, which some individuals attributed to alleviating their fear of falling.

> *I think it's very useful, I think it's a good program. I found it was very helpful to me particularly because I do have a problem with a bit of vertigo and my balance is not good, and these are very important things for preventing falls, to help improve that. And it got me going on exercise again because I'd kind of got off the way of doing exercise. I walk the dogs every day so that was, it got me out and I was active and doing housework and gardening and stuff is all good but you need a bit more than that. And this [program] particularly I found with the weights and several of those balancing exercises were really a challenge so it was good* (Holly).

> *Well, I guess [the program] gets you up and also it gets you away -- you don't -- when you're participating in it, you're not quite so scared of falling or you know, feeling slightly fragile* (Thomas).

A minority of participants felt that the program had little or no impact on their health. These participants attributed this lack of noticeable improvement to reasons such as *the condition of old age*, and to the belief that their high levels of physical activity as younger adults already provided them with the needed abilities to prevent falls. As such, some of these individuals felt that the OEP was largely futile.

> *…I was hoping that I might see an improvement in myself. But there hasn't been much…[I think] [i]t's because of -- how can I say? It's the condition of old age…* (Ned).

> *No [the OEP did not help me]. 'Cause I don't want to brag, but I have been trained [as a]…gymnast, and I am used to correcting myself [to prevent falls] when I need to* (Walter).

Particularly disconcerting was that one participant (i.e., Lacy) attributed components of the OEP as the reasons for the increasing pain and discomfort that she felt.

> *Well, I had to quit doing them because I went and got -- it bothered my sciatic nerve. And I've never had sciatica in my life. But I felt that one day, I was doing them, and I was on the sideways motion where you kick your foot out to the side, and I did it a few times, and I thought, "This is just…" it just was intensely uncomfortable. And then the next day, I woke up and…[my] back hurt and then my…sciatic nerve started acting up, so I had to drop them. I had to drop that exercise* (Lacy).

After the appearance of this pain, Lacy initially had difficulty in contacting and notifying the PT by telephone but was eventually able to speak with her. In their conversation, Lacy described her issues to the PT and notified her that she would be dropping that specific exercise (she continued with the remainder of the program until completion). It was unclear how the PT responded.

> *Well, I phoned [the physical therapist] in the second day after it happened, but they were out of the office, so I didn't hear back until the -- so I guess that was a Tuesday, and I didn't hear back from them unit the Saturday night, so that was a long time for something like that. It wasn't just a simple question, but I wanted to report that…And they were away from the phone for quite some time… Well, I had to give [that exercise] up. I had to give that part of the exercise…up. I told them I was giving it up. [chuckle] I couldn't do it, not with the pain like that…I can't remember now what [the physical therapist] said. [chuckle]* (Lacy).

Living with chronic health conditions acted as a significant barrier to engaging in certain activities, including domestic chores and exercise. These sentiments were expressed by Oliver:

> *Well, yeah. I had quadruple bypass surgery on my heart on [date]. So the -- I stopped exercising two days before that. And because of the intrusiveness of the operation [chuckle], I wasn't able to do much in the way of exercising as far as this program was concerned for the rest of November and December* (Oliver).

Participants spoke about living very busy lives and managing their limited time to fulfill all their commitments.

And my wife reminds me we relocated our residence and as you may know, from our change of address. And so we had a lot of things on our plate. And it wasn't easy to follow this program on a daily basis (Quinn).

I am in my eighties…and [my husband and I] have made a decision to go on living here in this place…rather than find us an apartment or something. As long as we live here I'm not sure that I'd have that extra energy [to continue with the OEP] (Gabby).

Nevertheless, most participants planned to continue following the OEP in some capacity. One key reason was that they wanted to continue reaping the benefits of the program. However, some participants stated that they would use the OEP at a reduced frequency.

…I plan to, I've got the paper copies I plan to pick it up again to use it because I felt it did that much good (Frank).

… I'll continue, you know once a week on my own, you know, it's just for my own benefit (Jenny).

[I see myself only doing it] [i]n the winter… Because there's a whole lot to do outside [otherwise] (Gabby).

Several participants shared that they would recommend, or have already recommended, this program to their family and peers. On the other hand, one participant (Lacy) stated that she could not see herself using the program again. This was attributed to a general dislike of exercise and a lack of motivation.

So I think it's a good program, and get it out to the rest of the seniors in the province as soon as you can (Oliver).

No, [I don't think I'll continue using the program]. [chuckle] Like I say, [I] don't like exercise, so -- -- I'm not motivated to do it anymore. [chuckle] I need to be motivated (Lacy).

Three main themes were identified from the interviews that reflected participants' experiences in participating in the DVD-delivered OEP, namely **1) The OEP DVD: Useful training tool but in need of more pep, 2) Providing greater control over one's exercise**

regimen, but sometimes life gets in the way of staying active, and **3) Social creatures: Wanting greater human connection during exercise.**

Theme 1: The OEP DVD: Useful training tool but in need of more *pep*

Many participants reported using the DVD during the beginning of their program and some used it periodically thereafter when wanting to review the exercises. Participants seemed to appreciate the guidance provided by the DVD, in that it presented an overview of the OEP, demonstrated the appropriate posture, positioning and pace for performing certain exercises, and offered easy-to-follow instructions.

> *Well I did [use the DVD] at first because I wanted to find out all about it so I used the video which was fine* (Holly).

> *…I learned the correct posture and positioning and the format of the exercise[s] [from the OEP DVD]…*(Edna, group interview #2).

> *Well, I think it was quite a good DVD … I think it's more [for] initial impressions and then…review[ing] periodically…*(Thomas).

However, one key critique of the OEP DVD was that it was somewhat *slow* and *long*, and in need of more *pep*. This acted as an important barrier to using the DVD on a more frequent basis and incorporating it as a regular part of their OEP routine. This lack of *pep* seemed to be due in part to an absence of motivational music as well as the *not very energetic* model in the DVD performing the Otago exercises.

> *It's got no kind of pep to it though, it's really kind of dull…[the DVD had] no music to speak of, I mean it just had sort of a rhythm in there, just a baseline…they should work on the video, get it a bit more entertaining if possible. It's, this one that you have now, it tells you what to do and everything but like I said it's a bit boring and I think that's a big thing that people would think oh, this gets boring …a bit of more music would help* (Holly).

> *I thought that the TV stuff -- what do you call that -- the video -- it was a bit dated…And I think it should have been a little more attractive…and the person, you know, demonstrating seemed to be not very energetic…But I think -- and I really think that music helps, seems to help too* (Roberta).

Moreover, participants commented on the slow pace of the exercise instructions that were provided in the DVD. Individuals also found it frustrating that there was no convenient method to skip the introductory video footage of each exercise. These issues became especially inconvenient as participants became more experienced performing the program.

> *… I tried very hard to do the exercises the way they were demonstrated in the video. But that, as I got to know the sequence of the exercises, it extended the time it was taking for me to do the exercises to the appropriate repetitions…And it just extended the exercise time too much, I thought. So I dispensed with the video…*(Oliver).

> *…[the model] goes through what you have to do and then she does it. Well by the time you get to used to what the exercise program is you're way ahead of her* (Holly).

On the other hand, Ned and his wife, Patty, found they could not keep up with the pace of the DVD. This was due to Patty's pre-existing health condition, which substantially slowed down the pace of these individuals performing the exercises.

> *Well, [my wife Patty, and I] probably didn't do it in the same time as the lady in the video did it. We were able to -- to -- we started off quite well. And then we decided that we just couldn't keep up with the video* (Ned).

Many participants stopped using the DVD after the first several sessions and used the written manual or made personal notes on the exercise instructions to guide their performance of the program.

> *…I got the [manual] out to do the exercises, based on -- you know, I wanted the pictures of the exercises and so I could see the -- what I was supposed to be doing. And then I would just flip from page to page to page to get through them. And to me, that worked quite well* (Walter).

> *And so [the DVD] extended the exercise time unnecessarily, so I just wrote down the sequence of the exercises and had it on a piece of paper beside me and I just went through the sequence without the use of the video after, I guess -- well, I did it for -- I used the video for about a month* (Oliver).

The participants found the manual to be easy to use, versatile, convenient, and useful. This was attributed to the clear layout and design of the written instructions and images. This was in contrast to the DVD, which some individuals found *cumbersome* to use due to an inability to navigate efficiently within the DVD.

> *…I would just flip from page to page to page to get through them. And to me, that worked quite well… Much better than trying to follow a video program over which I had no control…[with the manual] I could stop, get a cup of water. Otherwise, the video would be just carrying on. And yes, I could go and stop it, stop the machine and stuff like that, but that was a -- to me…not a valid means of communicating something. It just didn't seem to want to work in my head. But give me a piece of paper that I can read and then I could carry out the instructions and then refer back to the paper again* (Walter).

> *Our DVD player isn't great and it was hard sometimes to make [the OEP DVD] skip back if you wanted to go back and look at something again…*(Holly).

> *…it wasn't practical to do the DVDs… [The manual] was quite good because it was quite clear and well-illustrated and you could see what had to be done and so on. So it was quite easy to follow it, yeah* (Thomas).

Few participants also discussed not having a *mindset* conducive to using a DVD to guide their exercise program. Main reasons for this mindset included associating the TV for *entertainment not for something [they] need to do for work*, being *old-fashioned*, or to the fact that they *couldn't be bothered* to use the DVD. This may indicate that these participants may have had issues not specifically to the OEP DVD but perhaps to exercise DVDs more broadly. In fact, some participants had never used the OEP DVD (e.g., Frank). It is important to note that these participants continued to perform the program, but by using alternatives to the DVD, most often the manual, to guide their exercises.

> *To me, I guess maybe being older or old-fashioned or something, I preferred to read the instructions rather than to watch them* (Sandra).

> *…I'm not that sort of a person. I don't immediately think, oh yeah, I've got to turn the TV on. You know, I turn the TV on for entertainment, not for something I need to do for work or for -- it's a different mindset* (Walter).

Moreover, insufficient technical competency (i.e., not capable to run the DVD player) and technical problems with the DVD player prevented few participants from using the DVD (i.e., Jenny and Katy). Several participants suggested that in addition to the current OEP DVD participants should also receive another version of the DVD in which the exercise instructions were provided at a faster pace, the presentation was peppier, and better music was incorporated.

> *I think it would be good if you had two videos, one video to start with to show people how to do the exercises and then another video when they're familiar with it that is a bit peppier and you know a little bit of better music and to do them a little bit faster than the lady in the exercise video in the Otago thing because you see she does it first of all, as I recall, she goes through what you have to do and then she does it. Well by the time you get to used to what the exercise program is you're way ahead of her… like I said I think you should have a training video and then one for when people know what they're doing that makes it more interesting and exciting* (Holly).

> *Well, you could have shown it slowly at…first, but then if you want us to use that exercise DVD to work with, it -- you should have had one that went a little bit faster. You know, it's like, okay, so I -- you've shown me now how to do it in slow motion. But I'm not going to stand there and do it the same…*(Lacy).

In summary, the OEP DVD provided participants with important guidance by offering an overview of the OEP, demonstrating the appropriate posture, positioning and pace for performing exercises, and offering easy-to-follow instructions. They found the DVD particularly useful during the onset of the program, but they also found it too slow, long, and low-energy to be used several times a week to guide a six-month exercise program. Some participants subsequently replaced the DVD with the written manual or self-written notes after the first several sessions. Several participants also suggested providing an additional version of the DVD where the exercise instructions were provided at a faster pace and where the presentation was *peppier* and incorporated *better music*.

Theme 2: Providing greater control over one's exercise regimen, but sometimes life gets in the way of staying active

Participants generally expressed a feeling of control and flexibility over the exercise program. For instance, the control afforded by the home-based design of the program allowed participants to choose convenient and preferred times and locations to exercise.

> *…you weren't tied down to -- and you didn't have to be, say, Monday, Wednesday, Friday. You could be Monday, Tuesday, and Friday you know, whatever. That was a good aspect of [the program] because you didn't -- it wasn't tied down to any particular day…*(Thomas).

> *Well, what makes it easy is we -- we live in a very small B.C. town and we're not isolated, but semi-secluded, surrounded by shrubbery and stuff, and well, we've got our own little world here. And so it's -- it's -- it's easy to decide on when you want to do [the OEP]* (Quinn).

> *I liked the fact that I could do them when I felt comfortable doing them…I know sometimes, when it was hot in the summer, I'd be out on my deck and doing them outside on the deck [chuckle] 'cause it was too hot in the house* (Lacy).

Participants also talked about integrating components of the OEP into their daily routines, such as exercising in between household chores, while reading or watching TV, while out on walks, or outdoors if the weather was nice. This further enhanced the feeling of flexibility and control over the program.

> *…after dinner clean up, I do sit and I'm up and down a bit but I might be, you know I might be sitting for two, three hours in the evening with a book or TV but during that time I've been using the leg weights* (Katy).

> *And I would do parts of the [program] while we were doing our walk. You know, the ones where you put your one foot in front of the other and you did the backward walk. There was about four of them that you could do when you were actually out on the road walking. And we'd still do some of them when we're walking just for the heck of it. But that was kind of fun because we would walk down the centreline of the middle of the road, 'cause we go first thing in the morning and there was [chuckle] no traffic, and we followed the -- the yellow line for a while doing these -- putting your feet in front of one another…and you could sneak a -- one thing, I was at the chiropractor's office and I was sitting in the*

waiting room, so I -- well, I can do these exercises here. So I did them while I was waiting for her (Lacy).

Because we have a small dog and he keeps us -- because of his necessities, he has to have his walks, and it's been good to do that. So we would incorporate [the program] at the same time (Ned).

Participants contrasted this feeling of control and flexibility over the OEP with the travel barriers and time demands they associated with centre-based exercise programs. These barriers were often the result of pre-existing medical conditions that prevented some participants from commuting (e.g., Holly), inconvenient public transportation, scheduling demands, and long travel times.

A lot older people my age can't drive. Their vision, I can't drive at night you see and a lot of exercise programs are in the evenings for people after work but that doesn't apply to seniors. But anyone that was in the evenings in the wintertime forget it, I couldn't drive because I can't, headlights coming at me, I have glaucoma and I just can't drive at night (Holly).

Well you have to realize I'm 20 to 25 minutes from Sechelt and 20 to 25 minutes from Pender Harbour pool so by the time I do all that driving, hell, all the exercise is done. I don't know if it's nearly an hour driving…(Katy discussing the inconveniences of centre-based exercise programs).

Participants also discussed their displeasure of having to be dependent on others when attending exercise programs out in the community and feeling uncomfortable in such programs. For instance, Ned's experiences involving the level of assistance he receives when commuting by car dissuaded him from attending centre-based exercise programs. Also, Holly described herself feeling out of place in some centre-based exercise programs where other participants were younger and looked different from her.

The thing that I've been saying is that with all the help that I've been getting, it's taken away a lot of my independence, and I don't like that… I can't -- right now, I can't even get in my car without somebody opening the door for me, which is very nice of them, and I'm always obliged for them to do that for me. But sometimes, when I -- my inner thoughts say, "I wish you'd let me do it myself"(Ned).

> *…I tried yoga but I didn't like it much. They were all about forties and 50-year-olds and I couldn't keep up…they've got an exercise room down there, they've got weights and they've got a trainer and everything. But it's all full of young guys…wearing spandex and I think oops, I don't want to be in with them. I mean there's nothing wrong with it but you feel, you feel like a, stick out like a sore thumb 'cause you're not the same physical appearance or ability and you just don't want to be there* (Holly).

One participant discussed how the OEP allowed her to work around her health problem and still engage in exercise (Jenny). However, for the majority of participants, personal health concerns, including pre-existing chronic conditions (e.g., arthritis) as well as symptoms from exercising (e.g., pain and fatigue), acted as barriers to performing the OEP despite the flexibility of the program.

> *…I haven't been walking* [in the OEP]*…because of these hips and I've also developed a problem with a couple of spots on the bottom of my feet…*(Katy).

> *And particularly, the [OEP exercise of] going up and down stairs. I -- I'm -- I find that difficult and I don't know that I could really improve. I would like -- as a matter of fact, we're having acupuncture at the moment to try to help with the lower back problems I have* (Ned, describing how is lower back problems made it difficult to complete an exercise from the OEP).

Some participants also found it challenging to maintain the OEP routine due to other events and activities in their lives. For example, Katy's renovation of her home and her subsequent illness acted as barriers in following the program. Other participants prioritized other activities over performing the OEP, which they felt left them with insufficient time to perform the program. The health concerns of loved ones and the associated caretaking responsibilities were also described to have taken priority over performing the OEP (e.g., Frank).

> *I started out with great hopes and then my life sort of turned upside down with a renovation here that was going terribly wrong. Then my husband in the summer got sick and I picked it up and I got sick and so I, I wrote notes to the physiotherapist every month to tell them the difficulties I was having so I haven't done a proper program* (Katy).

Setting aside the time [made it difficult to use the program]…'Cause I may be retired, but I've still got a lot of stuff to do (Walter).

Once, once my wife, I can't, I can't use the word passes on but once I'm on my, if I'm ever on my own I plan to, I've got the [OEP manual] I plan to pick it up again to use it because I felt [the program] did that much good…[but] lately for the last few months I haven't been doing [the Otago strength and balance exercises] because of my [wife's health] problems (Frank, describing how the time invested in taking care of his ill wife prevented him from performing the program).

Several OEP exercises required ample safe walking space and balancing support. For some participants, it was difficult to find this in their homes or their neighbourhoods. For instance, Mary was not able to use the OEP DVD because the DVD player was situated in a room that had insufficient space to perform certain exercises. Another participant, Gabby, described not being able to perform the walking component of the program during the wintertime due to the harsh weather and a fear of falling.

…where the DVD [player is]…there's not really enough room in that room to do exercises (Mary).

[I might not walk during the wintertime] because I'm not very reliable on my feet…I might slip (Gabby).

In conclusion, participants felt the program was flexible and that they had control over when and where to exercise. This was in contrast to the transportation barriers they associated with centre-based programs. Another sub-theme concerned the impact of their own health, their loved ones' health, and other activities in their lives on their exercise routines. Moreover, they expressed certain challenges in finding a suitable space to perform the program.

Theme 3: Social creatures: Wanting greater human connection during exercise

In the context of this study, 'social creatures' can be defined as individuals who had a high level of appreciation for human connections with regards to guidance and motivation during exercise. Such connections included casual social interactions between peers in an exercise

setting (e.g., development of *camaraderie*), as well as formal interactions with a health professional (e.g., the personal relationship between a client and a PT, which involves counseling and encouragement of the client by the PT).

During the individual interviews, participants were asked to compare the OEP with popular centre-based exercise programs that they may have previously participated in or have knowledge of, such as Aquafit and yoga. These prompts also led some participants to consider a hypothetical OEP set in a group setting, often involving a live instructor. Some participants felt that interacting with other participants in a group setting had many benefits. For example, Thomas and Jenny spoke about the advantages of a hypothetical group exercise setting in enabling them to compare and contrast exercise performance with peers or instructors to ensure proper technique. Moreover, Katy felt that a hypothetical group setting would make it easier for participants to ask questions.

> *…you can see how other people are doing it, see -- compare yourself to them, and if you make mistakes, you can see that you are making mistakes, whereas if you do it on your own and you get off on the wrong foot, there's no one to correct you* (Thomas).

> *I like group work, sharing it with somebody and you can compare what you're doing to what they are doing, you know what I mean? It's the same way if you're taking art lessons or whatnot, you can see how you compare to the next fellow* (Jenny).

> *…it may have been a good thing for everybody to go through the exercises once with an instructor there…so [participants] could have asked on the spot because some seniors don't like, well of course, they don't like to make phone calls and they don't like to admit that they don't know how to do things and they don't like to ask so maybe on the spot with a whole bunch of people there they might…*(Katy).

Some participants also believed that they would be more motivated or feel more energetic in a hypothetical group OEP involving a live instructor. They felt that this could be achieved by feeding off the *energy* from a live instructor or from peers. This energy was thought to be derived from the *enthusiasm* and vigor demonstrated by the instructor or peers. Participants reported that positive peer pressure might be another important factor that would motivate individuals to exercise in such a group setting. One form of such peer pressure might be a feeling of social commitment participants feel towards peers in these exercise events.

Yeah, something like that. [chuckle] I think that when I talk about the energy of the instructor or two instructors, you -- you know, you need that -- you need that sort of one-on-one or -- how can I say -- and even the group thing (Roberta).

Well, I think [doing the program in a group setting would be] encouraging. I think it's encouraging, and mentally, I think it's a little more invigorating…Also, I think you get to this age, and when it's conducted by people like yourself [referring to the interviewer who is in his mid-20s] you're full of enthusiasm, you've got all the mobility in -- from top to bottom [chuckle] in respect to your -- your health, your -- your age. And it's encouraging. It should be encouraging to people of my age because you're -- you've got the energy to put the enthusiasm into it that we as older people are less likely to -- we've lost it over the years (Patty).

…I think there is a strong need for older people to keep social contacts so I don't know whether it may be [beneficial to have] an optional joining together of people to do it initially. It would be a little more people-oriented in other words. You're not looking at a video, you're not having to motivate yourself to get up off the chair and do it. But you have a commitment to meet with some people and I mean that's what gets me out to walk. It's that you feel well I don't feel like walking today but they're going to wonder why I'm not there and you get up and you go… The social aspect might be a way to look at it… The instruction doesn't need to be done in a social setting but maybe just to have some contact partway through just to rev up the motivation again, do some comparisons (Edna, group interview #2).

Similar to their impressions of the OEP DVD as discussed in Theme 1, some participants also described the program as a whole as becoming *boring* and somewhat *tedious*, especially during the latter part of the program. One important cause of these feelings was the belief that the program became repetitive and monotonous. For example, Jenny thought the program became tiresome during the latter stages because of its repetitiveness. Similarly, Holly experienced a feeling of boredom in the end because of its tediousness.

You're sitting you know by yourself in your house and doing it just gets, gets much after six months. I mean I found it a real drag at the end…I don't know, repeating the same thing night after night, well it wasn't, it was every second night but it seemed like every night at the end. I guess it's cause you're repeating the same thing but that's what you do anyway when you're doing things. I don't know, I can't explain why it makes me say that, what other word I can use (Jenny).

> *…I found that the program itself was…that I got bored with the exercise program in the end. I got to the point where I was thinking oh darn, I've gotta do this darn thing 'cause you know I said I would so I will. But it was getting to be a little tedious* (Holly).

Some participants believed that a group exercise setting might have helped alleviate these feelings of boredom. Being immersed in a social setting and having upbeat music were key reasons for this belief. For instance, Betty felt that placing the OEP in a social setting would have created greater interest and made the program more entertaining because of the social interactions with peers. Additionally, Holly explained that her past experience in the Jazzercise exercise program, where she was interacting with others in a social setting with music, created a fun environment and felt that the OEP in a similar setting would have been more fun.

> *…[Y]ou need community to do [the OEP] if you live alone especially. You… probably would be more attentive to the program [in a community setting] because…we [could] stop for lattes [with other participants]…and [have] big discussions on the world and stuff. So you [would] have to commit yourself to it…[I]f you did [the OEP] in a community setting where people would come and you'd do it together…it would be more entertaining* (Betty, group interview #1).

> *I think, and the other thing is you're doing [the OEP] on your own… [if you would be] with a group at the activity center…[it would be] much more fun because you're with other people and you know the instructors, it's more like Jazzercise used to be, I used to do that years ago and it was fun and the music is good and it's got a good beat to it and it gets you going. And this one with you being on your own and no music to speak of, I mean it just had sort of a rhythm in there, just a baseline…*(Holly).

Some participants also associated a group exercise setting as facilitating *camaraderie* and the establishments of new relationships, something that participants seemed to value. Participants also gave personal examples of how these new relationships could sometimes extend from the exercise setting to other social activities.

> *And then periodically, like, partway through, you stop and have a tea break, and there's a bit of a camaraderie. So that's -- you know, that's -- it is very pleasant to be part of a group and you know, and talk back and forth to various members of the group, eh* (Thomas).

We've only been twice [to this particular group exercise class], but [chuckle] -- and then we go and play some mind games and -- get to know each other…There's a lot of -- you know, we stand around telling each other how -- you know, what's the latest thing. [chuckle] Latest illness and stuff. And the group I'm in said you've got five seconds to say your latest thing (Roberta, referring to another exercise group she is involved in).

Several participants felt that the OEP would benefit from incorporating an organized group exercise component along with the home-based exercises (e.g., Patty). Roberta suggested involving an upbeat and enthusiastic group instructor for the group classes because of the significant impact she feels instructors have on adherence to exercise programs among older adults.

…I think that if there was a facility once a week, say, at the [community] centre…I think if it was offered once a week, it would be a growing thing for seniors. Yes, [like] a group program. You know, when I said that I'm not a very social person, but I think something like that, I would certainly go to, because it's so beneficial (Patty).

And it would be like -- what I see with Aquacize [group exercise program], your instructor's, like, 80% of it. You know, if you have a really, really upbeat, excellent instructor, the people stay, and if they don't like the instructor, especially older people. They just take off (Roberta).

However, not all participants agreed with the idea of adding a group component to the OEP. Several participants cited transportation as a major barrier. On the other hand, some participants preferred to exercise alone and with minimal instructions. For these participants, it appeared that the home-based program was a preferred choice over an exercise group.

I don't think [performing the OEP strength and balance exercises and walks with other people would] make much difference to me because I've done most of my exercises alone for many, many years. So I don't think it would change my energy or enthusiasm for exercising. You know, I know that exercises is good for me, so I try to do it. [chuckle] (Oliver).

Yeah, and that I don't, I don't want to sound overconfident but I just maybe because of the stage of my life, I just don't need the instructions, I don't need like weekly instructions to tell me how to do it over and over again 'cause I know how to do that so I'm really happy

just doing it on my own (Katy, when referring to group exercise classes).

Participants also felt that the PT interactions were beneficial because of the important guidance and motivation they received during these interactions. Specifically, they appreciated the clarification, advice, support and encouragement they obtained from the PT during the initial home visit and subsequent telephone calls. Participants also valued the PT customizing the OEP exercises to fit their own abilities and needs.

> *…I found it very beneficial for [the physical therapist] to walk me through the exercises and pointed out…certain ways of doing the exercises that gave me the maximum benefit. And I think that was really very helpful. And as a result, I think I personally got more benefit from the exercises because [the physical therapist] having pointed out these little improvements as it were… And the physios, at least…to me, [chuckle] was certainly, like, very motivating* (Oliver).

> *[The interaction with the physical therapist] was good because it made you realize that this wasn't all you could do that you could do more and then it would be better for you when you could do more. So yeah, it was good* (Holly).

> *[The physical therapist] came to my house which was absolutely wonderful and she went over them with me and you know circled a few things and gave me tips on things so I had that really laid out well…And you know many times [the physical therapist] reassured me you know if you need me phone me, don't worry about it just phone, we're here to help you so that, they reassured me on that* (Katy).

However, after the initial visit, participants generally wanted more opportunities for face-to-face interactions with the PT. Participants felt that more home visits by the PT would have been beneficial in terms of receiving further guidance and motivation. Specifically, participants largely found the telephone contact useful (i.e., in terms of receiving advice and creating a feeling of continued support), but would have appreciated a greater level of performance evaluation and feedback, and a motivational *boost* that they believed could only be achieved with additional home visits.

> *If [the PT would] come, say, halfway through and said, you're either doing very well, or you're -- yeah, we should change -- do more -- like, maybe do more of one thing and less of another. You know, in her expertise, she could see how well I was progressing, and there*

be -- so there'd be the feedback. You know, if you do exercises on your own like that, you don't know how well you're doing, if you're following them exactly as laid out, you know, maybe you're sloughing off a little bit, or maybe you're doing too much of one thing. So yeah, I think a personal call partway through, say halfway through, would've been quite helpful, yeah (Thomas).

Well, I think that six months is a long time to have people doing things on their own. I mean, the phone calls are fine, but I think perhaps a visit here and there might have been a helpful thing…I would suggest that, keep people motivated, yeah (Sandra).

Particularly, an additional home visit halfway through the program or a *midterm boost* was an idea that was brought forth by a few participants.

…I wouldn't have minded seeing [the physical therapist] partway through the program again…you do need a little bit of a midterm boost, I think, eh (Thomas).

…maybe if there had been a mid-time visit, might have been useful…(Lacy).

Despite this desire to have further interactions with the PT, participants seemed to be aware of the resource challenges present in many rural communities in Canada, including their own, and felt that such additional interactions were not feasible. For example, Holly felt that she would have valued the opportunity to interact with the PT more closely during the program but was sensitive to the fact that it may not be feasible in rural communities.

…The [telephone] calls [by the physical therapist] are valuable…just to check up how you're doing and do you have any questions. But a lot of people, even I myself might think yeah well you know it would be nice to just pop in and talk to [the physical therapist] but [they're] not there. It's fine though…for the people who are in remote areas, they know they're in remote areas, they can't just pop down the road and go to…the hospital or whatever, so I think that they've got to be, you've got to be practical about it and say well yes, it would be better if [the physical therapist] could meet more often and all that but it's not practical for a lot of people [in rural communities]. So I think the way it's done has been fine (Holly).

Participants generally expressed that the walking component of the OEP was fairly easy to complete, with several participants stating that they were walking more than was necessary as per the program and that they were already walking prior to starting the program. Some

participants made the walking component of the OEP more social by walking with friends or loved ones.

> *[My partner and I] were already [walking] every day anyway…I think [that] the easiest part of the whole program is going on a walk* (Betty, group interview #1).

> *But the walk thing, I'm not too concerned about because we have a big dog and we take her out for a walk twice a day every day. Every day. And it's not climbing hills or anything, but it's a good -- you know, good exercise function. So I do that regardless of weather or program or anything else* (Quinn).

In conclusion, in Theme 3 some participants felt that interacting with other participants in a group setting had many benefits in terms of guidance (e.g., opportunity to compare and contrast exercise performance with peers) and motivation (e.g., feeding off the *energy* from a live instructor or from peers) and felt that the OEP would benefit from incorporating a group exercise component. However, not all participants agreed to the idea of adding such a group component because of the potential unwanted introduction of transportation barriers, and also due to personal preference. For these participants, it appeared that the DVD-delivered OEP was the preferred choice. Participants also felt that the PT interactions were beneficial because of the important clarification, advice, support and encouragement they obtained from them. However, some felt that they would have wanted more face-to-face interactions with the PT. Despite this, participants seemed aware of the resource challenges present in many rural communities in Canada, including their own, and felt that such further interactions may not be feasible.

3.5 Summary

Results from this study showed that participants found the DVD-delivered OEP to be useful and beneficial, and believed that it positively impacted physical and psychological aspects of their lives. Participants also believed that the DVD provided them with important guidance when first starting the program. One key critique was that the DVD was somewhat slow and low-energy. Once acquainted with the exercise routine, many participants progressed to using the written manual, as it was easier and more convenient to use than the DVD. Participants in general appreciated the flexibility and the control they had over deciding when and where to exercise. This enabled them to integrate the OEP into many daily routines and household chores.

Two common reasons for stopping the OEP emerged from the interviews; namely, poor health and a busy schedule. Some, although not all, participants felt that the OEP would benefit from incorporating a group exercise component to the program. Increased social contact was thought to provide greater guidance and motivation to participants. Individuals appreciated the counseling and encouragement they received from the PT, but some participants would have preferred more face-to-face interactions with them. Despite this, participants were cognizant of the health resource limitations in rural communities.

4 DISCUSSION

4.1 Summary of findings

The objectives of this study were to understand older adults' experiences in using the DVD-delivered OEP, and explore the barriers and facilitators to implementing the DVD-delivered OEP from the participants' perspectives. These objectives guided an inductive constant comparison analysis. Findings from the initial group interviews informed the development of the interview guide that was used for the individual interviews. Particularly, the individual interviews further explored how participants used the OEP DVD and the written manual, how they had incorporated the program into their daily lives, and what they thought about the role of human interactions in the OEP and exercise in general.

Three themes emerged from the analysis of the interviews. The first theme, **the OEP DVD: useful training tool but in need of more pep**, reflects participants' experiences that the OEP DVD provided them with important guidance during the beginning of the program, but that it was too slow, long, and low-energy to be used several times a week to guide a six-month exercise program. Some participants subsequently replaced the DVD with the written manual.

The second theme, **providing greater control over one's exercise regimen, but sometimes life gets in the way of staying active**, outlines participants' appreciation of the flexibility of the program and the provided sense of control over when and where to exercise. This control allowed them to integrate components of the OEP into their daily routines. Participants often contrasted this feeling of control and flexibility to the burden and time of travelling to exercise classes out in the community. Another sub-theme concerned the impact of their own health, their loved ones' health, and other activities in their lives on their exercise routine.

The third theme, **social creatures: wanting greater human connection during exercise**, describes how some participants felt that interacting with other participants in a group setting had many benefits in terms of guidance and motivation, and felt that the OEP would benefit from incorporating a group exercise component. However, not all participants agreed to the idea of adding such a group component because of the introduction of transportation barriers, and also due to personal preference. Participants also valued interactions with the PT because they received important clarification, advice, support and encouragement. Some felt that they

would have wanted more face-to-face interactions with the PT; however, they were cognizant of the resource challenges in their community.

4.2 The role of the DVD in the DVD-delivered OEP

Kingston *et al.*[110] published one of the few studies that investigated the experiences and beliefs of participants who completed a home-based DVD-delivered exercise program. Participants were adults (median age of 35 years) who sustained traumatic hand injuries and who were asked to perform exercise therapy delivered using both a DVD and brochures, or only brochures. The DVD showed a model performing the exercises with an assortment of video footage, audio, and written captions. Based on a follow-up telephone survey, participants found that the DVD helped them to correctly perform the exercises. Specifically, participants reported that the DVD was a useful resource that complemented the written instructions. For instance one participant stated the following, *"So much information was given in the session you forget it when you go home and wind up doing it wrong. The DVD gave the correct exercise"*. In addition, Khalil *et al.*[111] performed a mixed-method study exploring how individuals (aged 25 to 78 years) living with Huntington's disease experienced a home-based exercise DVD. The program included flexibility, strength, balance and endurance exercises tailored for individuals living with Huntington's disease. Participants felt that the DVD acted as a supportive mechanism to help complete the exercises, especially in the presence of cognitive impairments, and appreciated the real-life demonstration of the exercises on the DVD. For instance, one participant stated, *"the visual thing of using the DVD makes it much easier to do it, because to do things that have to be committed to memory, particularly in my case [where] memory is a problem, is impossible. So the visual cues of the DVD make it easy to do"*. The findings from the present study support Kingston *et al.*'s[110] and Khalil *et al.*'s[111] results.

Participants from the current study found the DVD to be a helpful resource when initiating the exercise program. Participants attributed the DVD with providing them with an important overview of the program and with key information about the OEP strength and balance exercises, including the appropriate posture, positioning, and pace for performing the exercises. After the first several sessions, many participants stopped using the DVD on a regular basis, and proceeded to using the written manual. Participants found the manual to be easier and more convenient to use, and felt that it was a handy resource to refer to on a periodic basis. It is

important to note that since adherence data were not available at the time of writing, there are no data indicating whether the frequency and duration of use of different OEP guiding tools (i.e., DVD, manual, self-written notes) were associated with different adherence rates or physiological changes.

4.3 Integrating the OEP into the lives of older adults

Participants appreciated the home-based design of the OEP as it facilitated integration of components of the program into their daily routines. Participants contrasted this feeling of control and flexibility over the OEP with the travel barriers and time demands they associated with centre-based exercise programs. This latter finding resonated with those of Paluck *et al.*[98], who reported that older women living in a rural area experienced difficulties travelling to exercise classes (i.e., long commute times). Despite this flexibility, health concerns, including pre-existing chronic conditions as well as symptoms from performing the OEP, remained important barriers to completing the program. Health concerns identified by participants that acted as barriers to exercise included symptoms like pain and fatigue, as well as pre-existing chronic health conditions like arthritis and depression. These findings support results from Belza *et al.*[97], Cohen-Mansfield *et al.*[112], Mathews *et al.*[113], Lees *et al.*[114], Booth *et al.*[115], and O'Neill and Reid[116], who also identified older adults' health concerns as key barriers to physical activity. In Belza *et al.*'s[97] study, common barriers included physical conditions, such as hearing or visual impairments and feeling tired or dizzy, as well as psychological conditions (specific examples of psychological conditions were not given). Moreover, Cohen-Mansfield *et al.*'s[112] quantitative survey of 324 community-dwelling participants aged 74 to 85 demonstrated that the most common self-reported barriers to exercise were 'health problems' and 'pain'. Participants who reported 'health problems' as a barrier measured more depressed than individuals who did not report them as a barrier. From these findings, Cohen-Mansfield *et al.*[112] suggested that in order to increase exercise participation among older adults, it might be useful for exercise interventions to address physical pain and depressed affect, and make clear to participants the importance of exercise even when living with health problems.

Findings from the present study also indicated that participants were quite busy with other activities in their daily lives. Occupations are defined by the Canadian Association of Occupational Therapists as activities and tasks that individuals do during the sequence of daily

life that have value and meaning to the person.[117] Particularly, household, leisure, volunteer and social activities were important occupations to many participants (e.g., going to the beach, volunteering at hospitals, acting as caregivers for ill loved ones), and were often perceived to be of higher priority than performing the OEP, particularly the strength and balance exercise component. Certain occupational activities have been found to be associated with better health and well-being across age groups.[118] Meaningful occupations or valued life activities have also been found to reduce cardiovascular disease,[119,120] prostate cancer,[121] depression,[122] dementia,[123] and all-cause mortality.[119] Moreover, they have also been shown to improve quality of life in older adults[124,125] and promote healthy aging.[126] Although these activities are important for older adults to maintain a healthy life, there is currently no evidence that occupational activities alone can prevent falls. Interestingly, despite their busy schedules many participants managed to adhere to the walking component of the OEP. Many individuals walked even more than the required amount. This may have been because participants were able to integrate walking into their daily routines and responsibilities better than the strength and balance exercise component (e.g., walking the dog or walking to collect the mail). The current study findings, together with the literature on the benefits of occupational activities, outline the importance of enabling older adults to maintain common occupational activities that give meaning and value to the person while engaging in therapeutic exercise programs.

4.4 Social support and exercise in older adults

Despite the transportation-related barriers participants associated with centre-based exercise classes, participants felt that interacting with other participants in a group setting had many benefits, especially in terms of motivation. Participants reported that being able to feed off the *energy* of the instructor and classmates often brought about enhanced motivation to exercise. This supports other studies demonstrating that social interactions and support are significant facilitators of exercise, especially in older adults.[96,99,112,116] Reasons for this include increasing participants' levels of enjoyment, comfort, and motivation.[99] In Stathi *et al.*'s[96] study, older participants identified social interaction as an important facilitator to attending group exercise sessions. This was due to finding pleasure from connecting with others and expanding their social network. The current study's findings also support those of Fox *et al.*[99], which showed that older adults' relationships with exercise instructors and other participants were key facilitators to

participating in an exercise program. Specifically, participants in Fox *et al.*'s[99] study felt that the group exercise setting provided a friendly and supportive environment that offered socializing opportunities. This was expressed to be a primary source of enjoyment for participants.

Social isolation can have adverse health consequences, including increasing the risk of death.[127,128] The magnitude of risk associated with social isolation is comparable with that of smoking cigarettes.[129] Social isolation has also been shown to diminish the health effects of exercise. For instance, Stranahan *et al.*[130] demonstrated that social isolation in rats delayed and reduced the positive effects of exercise on neurogenesis, when compared with rats that exercised in a group-housed setting. Social isolation can also make it more challenging for older adults to engage in exercise. In Paluck *et al.*'s[98] study, older women living in a rural community spoke about the adverse impact that social isolation and loneliness had on their efforts to remain healthy, including engaging in exercise. Further discussion on this topic was not available; however, mutual support was found to be a key means to maintaining a physically active lifestyle in a rural community.[98] For instance, one participant stated, "*[y]ou have to be more motivated in a small town…we don't have gyms that we can go to, or field houses, or big parks like [the cities do]. We have to make do with what we have and encourage each other.*" As is reflected in the findings from this current study as well as in the literature, human connection plays an important role in facilitating the maintenance of exercise among older adults.

Participants in this study often compared the OEP with group exercise programs such as Jazzercise. It is important to note that the OEP is designed primarily to be a fall prevention clinical intervention, unlike programs such as Jazzercise, which aim to create a fun and energetic environment where individuals can engage in recreational group exercise. It is key for clinicians to make the primary goal of the OEP clear to potential participants at program onset so that they are able to have more accurate expectations of what the program entails and its potential outcomes. Realistic outcome expectations from exercise programs have been shown to positively impact adherence.[131] Nonetheless, the suggestions made by participants about enhancing the level of human connection during this program should be carefully considered by the PTs who implement it and by the researchers who developed this program, especially if these suggestions can act as further motivators to complete the program and maximize potential benefits (please refer to the implications on practice and research, Section 4.6, for further discussion on social support and the OEP).

4.5 Limitations and strengths

This study has several limitations. First, all participants were recruited from individuals who completed the six-month OEP KT study. This means that participants had to meet the enrollment criteria of the OEP KT study (see Section 2.3 for criteria) and thus this limits the transferability of the findings to other community-dwelling older adults living in rural communities (transferability refers to the extent to which study findings can be transferred to other situations).[132] Particularly, individuals who did not meet a certain level of cognitive functioning (i.e., score 24 or higher in the MMSE), or who had a clinical stroke or a diagnosis of a neurodegenerative disease were excluded from the KT study. As such, the study findings have limited transferability to older adults living with cognitive impairments, which make up a large number of older adults (in 2011, 14.9% of Canadians aged 65 and older were living with cognitive impairment, including dementia).[133] Second, the socioeconomic status of study participants may have been greater than those of other seniors living in BC. Statistics Canada reports that 13.9% of adults 65 years and older living in BC are considered as having a low-income status.[134] This is in contrast with the 7.8% and 9.9% of adults 65 years and older living in Sechelt and Gibsons, respectively.[135,136] These statistics are further supplemented by the current study's field notes that described several of the participants living in affluent neighborhoods. As a result of these group characteristics, the study findings are limited to a relatively specific sample and setting. Although the transferability is limited, the thorough description of the context of this research minimizes the potential for readers to inappropriately apply these results to incompatible situations.[132]

The majority of the individual interviews took place over the telephone. The telephone medium may have limited the depth of the contextual information that was collected. The lack of visual observation during the telephone interviews may have also limited my insight into the specific OEP exercises that participants were referring to. Furthermore, despite my strong interest in rural health that comes from my years as a clinical research associate remotely managing rural clinical sites, I do not have a 'lived experience' in rural communities. I placed substantial value on the emic perspective of participants; however, this lack of lived experience may have still limited my analytical approach, as a great deal of interpretation was required on my part. The process of member checking (i.e., where participants are involved in verifying data

and interpretations) may have been a potential means to address this shortfall; however, given the time and financial resource limitations this was not possible for this study. This process would be recommended for future qualitative studies researching similar phenomena. Another limiting factor was that the program adherence data for interviewed participants were not available at the time of writing. Such information would have been useful in order to provide further context to the findings. Moreover, compared to the data on participants' experiences of the OEP strength and balance exercises, there were limited data on participants' experiences of the walking component (including on the social aspects of the walks). This may have been due to an insufficient number of question probes in the interview guide inquiring about the walking experiences, but may also be due to the fact that participants may have viewed the walks as a routine they were already engaging in prior to the start of the OEP. As such, participants may have felt that walking was irrelevant to their OEP experience.

Despite these limitations, there were several strengths present in this study. First, the inductive nature of this study facilitated the emergence of findings that were grounded on the lived experience of participants who live in rural communities. Second, several techniques that have been shown to improve rigour and trustworthiness were implemented throughout this study. This included the maintenance of field notes, journaling, and an audit trail, as well as engaging in peer-review involving two individuals during the analysis. Additionally, the pilot group interviews assisted in the generation of an individual interview guide that guided the in-depth exploration of relevant key topics. Moreover, embedding this qualitative inquiry into an intervention study supplements the quantitative results with explanations of 'why' and 'how' these results came to be and provides additional insight for interpreting the KT study findings. Lastly, given that many study participants were volunteers who had previously experienced falls or who felt that they were at risk of falling, this enhances the transferability of the study findings to individuals who are most likely to use and benefit the greatest from the OEP.

4.6 Implications on practice and research

These findings have several important implications for the researchers who developed this program and for how this new DVD-delivered OEP should be implemented. Participants identified transitioning from primarily using the DVD, to primarily using the manual after becoming more accustomed with the program. The manual was found to be easier and more

convenient to use. PTs prescribing the OEP may want to inform participants that they are not expected or required to use the DVD for the entire six-month duration and that they have the option of progressing to the written manual alone whenever they feel they have taken full advantage of the DVD. The availability of this option could support more experienced participants by having them avoid the frustration other participants felt towards the DVD as they became more accustomed to performing the program. Prescribing PTs should also be mindful that there is not one approach to guiding the program, and that participants should be encouraged to develop their own methods of guidance as they see fit (e.g., some participants created their own convenient exercise notes). Additionally, it may be useful to look into creating an additional version of the OEP DVD that may better complement a more advanced participant. As suggested by participants, this additional version of the DVD could present a leaner and faster version of the program, perhaps excluding much of the introductory footage preceding each exercise.

Despite the apparent increased scheduling flexibility provided by the DVD-delivered OEP, further considerations of personal health concerns and occupational activities by the PT may be needed during the initial home visit and throughout the telephone contact, especially when it comes to the strength and balance exercise component of the program. As evidenced by the data in this study, addressing health concerns should include discussing any symptoms experienced from performing the OEP, as well as pre-existing conditions. This should also include clarifying to participants the importance of exercising even when living with health problems. The adverse consequences of insufficiently addressing symptoms is resonated by the experience of Lacy (i.e., involving pain) and the difficulty she experienced in trying to contact the PT and the lack of support she felt she received from the PT. Also, adding a component to the OEP that teaches participants to self-monitor and to properly address their pain and discomfort may be another way of mitigating the adverse impact that health issues can have on program participation. In regards to the time demands participants associated with their various occupational activities, methods of integrating the OEP (particularly the strength and balance exercise component) with these occupational activities should be promoted. An example includes promoting the use of the manual. The manual may provide greater flexibility in terms of the location and time of strength and balance exercise. Unlike the DVD, which some participants felt was occasionally limiting due to the need to find a suitable space in which to watch the DVD and concurrently perform the exercises, the manual could be used in a variety of settings and also

while performing other routines (e.g., while waiting at a bank).

Addressing the 'social creatures' findings, PTs may want to promote further connections with peers during the performance of the OEP by informing participants that they have the option of performing the program with friends and family. Suggestions may include performing the walking component with others, or performing the strength and balance exercises with peers at a convenient setting (e.g., participants' home). Based on the data, it seems that integration of a social component into the OEP may provide participants with a sense of guidance without the direct support of a PT, and may make them feel more motivated to complete their exercises. Advising participants to plan their exercises so that their social desires are met may make performing the OEP more enjoyable and facilitate adherence to the program, as well as help in preventing social isolation and its adverse health effects.

The study findings also have key implications for future research. It would be useful for further implementation studies to explore the best times and settings to initially prescribe the OEP for older adults (e.g., after a fall in an acute care setting, or during a family physician visit, etc.). Such data may further improve the likelihood of program uptake by participants. Also, it would be useful to explore more closely what participants found to be their ideal length of time for using the various OEP guiding tools (i.e., the length of time they used the DVD, and if and when they progressed to using the manual). This information, in addition to the results from the KT study, could aid prescribing PTs in providing more specific guidelines that could help create a program experience that is more enjoyable and effective for participants. Moreover, it may be important to address what types of social settings OEP participants feel would enhance their exercise experiences and facilitate adherence. For instance, it may be beneficial to learn how participants feel about partnering with peers or neighbours, performing the OEP DVD with specific cultural groups, or taking turns hosting small exercise groups in their homes.

4.7 Conclusion

This study's results construct an understanding of the experiences of older adults living in a rural community in using the new DVD-delivered OEP. Insight was also gained on the facilitators and barriers to implementing this program from the participants' perspectives. Three key facilitators were identified. First, the versatility and convenience of the written manual made it easier for participants to complete the OEP. As participants became more familiar with the

exercises, they felt that the manual could replace the DVD. Next, another key facilitator pertained to how the home-based design of the OEP provided the needed flexibility and sense of control over when and where to exercise, allowing participants to better integrate exercise into daily routines and avoid common transportation barriers in attending centre-based exercise programs in rural settings. Moreover, social support from family and friends was identified by participants to be another central facilitator to completing the OEP. Specifically, strong social support during exercise was felt by participants to have the ability to enhance enjoyment and motivation.

Several barriers were also identified. For instance, personal health concerns were a key hurdle to performing exercise. This finding suggests that participants should be informed of the importance of exercise even when living with health problems and such problems should be addressed in a prompt and thorough manner in order to effectively support participants in working through these issues. A second barrier was that certain everyday activities were identified by older adults to take priority over completing the OEP; thus, in addition to personal health concerns, everyday responsibilities or activities should be discussed prior to the start of the program, and methods of integrating the program with these activities should be promoted (e.g., promoting the versatility of the written manual). Finally, the boredom participants experienced in the OEP during its latter stages was also identified as an important barrier. Participants felt that a greater level of social interaction during exercise may have alleviated these feelings of boredom. It may be useful to recommend to participants to perform parts of the OEP with family members or peers.

By elucidating the participant-identified facilitators and barriers to implementing this program, and by recognizing the importance of personalizing the program to participants' communities, health statuses, occupations, needs, and desires, this study has the potential to inform an implementation strategy for this new DVD-delivered OEP in rural communities that can effectively promote exercise and fall prevention in older adults.

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APPENDIX A: PILOT GROUP INTERVIEW GUIDE

PART A: Preamble

1) Introduction

Welcome and thank you, my name is Arun Agha. I am a Master's student with the Rehabilitation Science program at UBC. I am involved in studying ways to support an active lifestyle in older adults.

This is Jenny Leese. She is a Research Assistant from the Arthritis Research Centre of Canada. She will be taking notes during the interview to make an accurate record of what is said, including your comments.

You have been asked to be part of this group interview because you have participated in the Otago Exercise Program over the last 6 months. In this interview we will be asking you about your views of the Otago Exercise Program and your experiences in participating in the program during the last 6 months.

The group meeting will last about 90 minutes. You will be tape-recorded during the session. The resulting audio recording will be transcribed into text. At this time, I would like to get each of your permissions to be voice-recorded during this discussion. [Note: Arun will ask each participant for permission: *Do you agree to be voice-recorded during this group session?*]

2) Ground rules

Before we get started, I would like to review a few ground rules…

• During the session, I am going to ask you several questions; we would like for everyone to take part in the discussion, as your ideas are all important to our research. We ask that only one person speak at a time.

• Feel free to treat this as a discussion and respond to what others are saying, whether you agree or disagree. We're interested in your opinions based on your own personal experiences, so there is no right or wrong answer. We are here to learn from you.

• Please treat one another with respect. This means not doing anything or saying anything that could cause another member of the group to feel uncomfortable.

• As this is a group discussion we cannot guarantee complete anonymity, but we ask that you respect the privacy of others by not reporting personal details of the discussion outside the group or the identity of any individual present once they leave the group interview site.

• We are only going to use first names during this discussion. Any names or places you say will be taken out of the transcript to respect confidentiality.

• Before we begin the session, does anyone have any questions?

• I will now start the audio recording.

PART B: Questions and Prompts

[Note: Before starting the session, Arun will audio record his name, date, location and a brief description of the study.]

[Note: Arun will ask participants to introduce themselves by stating their first name, in order to assist the individual transcribing to differentiate between voices.]

1) As you remember, in this study we ask you to follow the Otago Exercise Program. This program involves exercising with the DVD for 30 minutes at least 3 times a week and going on short walks at least twice a week; all the while receiving minimal coaching by a physical therapist. **How do you feel about this exercise program?**

Probes….

a. Can you tell me about what you enjoyed about the Otago Exercise Program?
b. Was there anything you did not like about the program?
c. What did you think of the instructions provided by the program?
d. Can you talk me though a typical day when you participated in the program?

2) Please tell me your experience in following the Otago program in the last 6 months. **Specifically, what made it easy or difficult for you to participate in this program?**

Probes….

a. Can you give examples of what helped you to follow the Otago program?
b. Can you describe a situation that made it difficult for you to follow the Otago program?
c. What do you think might prevent people like you from following the Otago Exercise Program?

3) Our plan is to make the Otago Exercise Program available to and used by people like you. **Based on your experience with the program, what do you think should be done or should be paid attention to when we 'open it up' for everyone?**

Probes….

a. Would you recommend this program to others like you? Can you explain?
b. Who do you think should know about this program?

4) **Is there anything else you would like to add or any questions you have?**

PART C: Conclusion

This is the end of our group interview.

What we learned from today's discussion will help us understand what you think about the Otago program and will allow us to help make it easier for people like you to have an active lifestyle.

Thank you for taking the time today to help us with this project and telling us what you think.

[Note: Turn off recorder.]

-END OF GROUP INTERVIEW-

APPENDIX B: INDIVIDUAL INTERVIEW GUIDE

PART A: Preamble

Welcome and thank you, my name is Arun Agha. I am a Master's student with the Rehabilitation Science program at UBC.

In this interview I will be asking you about your views of the Otago Exercise Program and your experiences in participating in the program during the last 6 months.

This session will last about 90 minutes. You will be tape-recorded during the session.

I'm interested in your opinions based on your own personal experiences, so there is no right or wrong answer. Feel free to let me know if you want to take a break at any time.

Before we begin the session, do you have any questions?

I will now start the audio recording.

PART B: Questions and Prompts

[Note: Before starting the session, Arun will audio record his name, date, location, and first name of interviewee.]

1) As you remember, in this study we ask you to follow the Otago Exercise Program. This program involves exercising with the DVD for 30 minutes at least 3 times a week and going on short walks at least twice a week; all the while receiving minimal coaching by a physical therapist. **How do you feel about this exercise program?**

Probes….

e. Can you tell me about what you enjoyed about the Otago Exercise Program?
f. Was there anything you did not like about the program?
g. What did you think of the instructions provided by the program?
h. Can you talk me though a typical day when you participated in the program?
i. What did you think of the actual exercises you had to do? Fun? Boring? Useful?
j. How did you use the DVD video? Only at the start? Continuously over the last 6 months? Never?
k. How about the written manual?
l. How do you think the Otago program has affected your ability to carry on your daily activities and tasks, such as getting from places to places, and household chores?
m. What about hobbies or social activities, like gardening, golfing, visiting families and friends?

2) Please tell me your experience in following the Otago program in the last 6 months. **Specifically, what made it easy or difficult for you to participate in this program?**

Probes….

d. Can you give examples of what helped you to follow the Otago program?
e. Can you describe a situation that made it difficult for you to follow the Otago program?
f. What do you think might prevent people like you from following the Otago Exercise Program?
g. Some programs like Aquafit, yoga or exercise classes in community centres take place in a group and people can interact with each other. How do you think the Otago program compared to these group programs?
h. What did you think of the 'tailored' component of the Otago program?
i. How did you feel about your interaction with the physical therapist?
   - During the initial exercise prescription?
   - The telephone contacts during the program?

3) Our plan is to make the Otago Exercise Program available to and used by people like you. **Based on your experience with the program, what do you think should be done or should be paid attention to when we 'open it up' for everyone?**

Probes….

c. Would you recommend this program to others like you? Can you explain?
d. Who do you think should know about this program?
e. How would you suggest we ('the researchers') get this 'program' out to people like you? What would be the role of health care professionals (e.g. physicians, physical therapists, nurse practitioners)?
f. Compared to other physical activity programs (e.g. yoga, qigong, Aquafit) you may be participating in, how does the Otago program compare?

4) **Is there anything else you would like to add or any questions you have?**

PART C: Conclusion

This is the end of the interview.

Thank you for taking the time today to help us with this project and telling me what you think.

[Note: Turn off recorder.]

-END OF INTERVIEW-

APPENDIX C: CHARACTERISTICS OF OEP KT STUDY PARTICIPANTS WHO DID NOT PARTAKE IN INTERVIEWS

Participant ID	Sex	Age	Highest Level of Education
OVS31	Female	81	University certificate or diploma
OVS35	Female	78	High school certificate or diploma
OVS37	Female	81	High school certificate or diploma
OVS40	Female	80	High school certificate or diploma
OVS41	Female	89	High school certificate or diploma
OVS47	Male	82	High school certificate or diploma
OVS50	Male	84	University degree
OVS56	Male	78	Trades or professional certificate or diploma
OVS61	Male	80	Some university without certificate or diploma
OVS62	Male	80	University certificate or diploma
OVS64	Male	85	High school certificate or diploma